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Acquisition of the Syntax and Interpretation of Chinese Null Arguments: An Investigation of Child and Adult Second Language and Native Language Development

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Acknowledgements

Abstract

This study aims to test the fundamental difference hypothesis (FDH) and Interface Hypothesis using a three-way comparison of developmental paths in adult L2, child L2, and child L1 acquisition. The acquisition of Chinese null arguments is the test case. English requires arguments in subject and object positions to be phonetically realized except in a number of restricted contexts. The interpretation of subjects in coordinate and embedded clauses is constrained by syntactic binding theory. Chinese is known as a topic-prominent language. The discourse topic in Chinese is believed to contribute to the distribution of null/overt arguments. Null arguments are allowed if they can be identified through discourse; while overt arguments signal the difference or contrastive focus. The interpretation of null/overt subjects is bound by the topic antecedent in the discourse. The distribution and interpretation of arguments in English do not interface with discourse pragmatic rules like they do in Chinese. Even English allows null subjects without a discourse context; they adopt different pragmatic strategies, and their interpretation differs from Chinese ones. The FDH predicts that L2-learning adults are not constrained by the Universal Grammar (UG) like L1 speakers. Child L2 acquisition is the bridge between the two. The developmental paths of adult L2 acquisition will differ from those of child L2 acquisition. The Interface Hypothesis predicts that L2 Chinese L1 English speakers will have problems integrating discourse information and syntax structure. Their performances will differ from those of adult L1 Chinese speakers.

A three-way comparison is carried out based on the data from an experiment including an acceptability task and an interpretation task. A judgement task examines the acceptability of sentences with a null subject, a null object, and both a null subject and a null object. The interpretations of a null/overt subject in adjoined and embedded clauses are also investigated. The results are as follows:

1. L2 children and L2 adults pass through the same developmental sequence. Like child L2 acquisition, adult L2 acquisition is also constrained by UG.

2. The performances of L1 adults do not differ from those of high proficiency L2 learners, and L2 learners eventually overcome difficulties at the syntax-discourse interface.

3. Child L2 acquisition follows a different developmental sequence from child L1

acquisition as a result of L1 transfer. Furthermore, L2 Chinese L1 Englishspeakers' first person null subject acceptability is much higher than the third person null subject acceptability. This asymmetry might be the result of L1 transfer. The FDH and Interface Hypothesis are not confirmed by the current study.

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List of Abbreviations

A: argument

ACC/Acc: accusative case

ACP: aspect marker

AJT: acceptability judgement task

AGR/Agr: agreement

BEN: benefactive

2L1:   bilingual

C: complementizer

cl.:   clitic

CL: classifier

CLD: Contrastive Left Dislocation

CLLD: Clitic-Left Dislocation

CLT: clitic

CP: complementizer phrase

DE: a modifying marker in Chinese

DECL: declarative particle

DEF: definiteness

EXP: experietial aspect marker

1s: first person singular

FDH: Fundamental Difference Hypothesis

HSK: Hanyu Shuiping Kaoshi

INFL/I: inflection

IP: inflectional phrase

L: linker

LF: Logical Form

L1:   first language

L2:   second language

MASC: masculine (= male)

N:	noun
NOM/Nom:	nominative case
NP:	nominal phrase
Num:	number
O:	object
OPC:	Overt Pronoun Constraint
PAS:	Position of Antecedent Strategy
PAST:	past tense
PF:	Phonological Form
PFV:	perfective aspect marker
PRG:	progressive aspect marker
PL:	plural
PVT:	picture verification test
Q:	question/question marker
2 :	second
S:	subject
SG:	singular
SLA:	second language acquisition
Spec:	specifier
t:	trace
T:	tense
3s:	third person singular
TOP:	topic
TopP:	topic phrase
TP:	tense phrase
UG:	Universal Grammar
V:	verb
VP:	verb phrase
YCT:	Youth Chinese Test

Chapter 1 Introduction

This thesis compares four different groups of learners of Chinese—L2 adults, L2 children, L1 children and L1 adults—in their acquisition of Chinese null arguments in which syntax interfaces with discourse pragmatics. The developmental sequences of four groups of participants are compared with the aim of answering the question of whether adult L2, child L2 and child L1 involve the same processes (Schwartz, 1992) and whether adult L2 (and child L2) learners overcome interface difficulties (Sorace, 2005).

1.1 Syntactic properties

In this thesis, possible effects of the the syntax-discourse interface are explored using the properties of null arguments in Chinese as testing ground. In Chinese, arguments may appear to be null or overt in both subject and object positions. Null arguments are licensed and identified by the presence of the topic (Huang, 1984). This is illustrated in (1):

Speaker A: Zhangsan$_i$ renshi Lisi$_j$ ma?
     Zhangsan know Lisi-Q
     'Does Zhangsan$_i$ know Lisi$_j$?'

(1) Speaker B: a. [$_{topic}$ Ø$_i$ Ø$_j$ [Ø$_i$ renshi Ø$_j$]]^1
          Ø know Ø
       *'(He$_i$) knows (him$_j$).'

     b. ??[$_{topic}$ Ø$_i$ Ø$_j$ [**Ta**$_i$ renshi **ta**$_j$]
          he know he
       'He knows him**.**

     c. ??[$_{topic}$ Ø$_i$ Ø$_j$ [**Zhangsan**$_i$ renshi **Lisi**$_j$]
          Zhangsan know Lisi
       'Zhangsan knows Lisi.

In (1a-b), the null pronoun and the overt pronoun *ta* ('he/him') are both allowed in the subject and object positions in Chinese. Null arguments are licensed by the presence of the topic at the beginning of the sentence (1a). The overt subject (1b) and null subject (1a) are

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[1] The symbol "Ø" in this study stands for a null pronoun. According to Huang (1984), null pronouns are traces. Detailed discussion is in Chapter 2.

referring to the same subject NP in the previous sentence—Zhangsan, and the overt object (1b) and null object (1a) are interpreted as the same object NP—Lisi. However, the overt subject and overt object in the second Chinese sentence are pragmatically redundant. Native speakers of Chinese would prefer to use a null subject and a null object in the second sentence (Xu, 1986). Only when speakers want to highlight difference or use contrastive focus do they use overt pronouns instead of null pronouns.

     Tai (1978) claims that the use of null or overt pronouns in Chinese is determined at the discourse level rather than by grammatical structure. The use of a null pronoun avoids repetition while the use of an overt pronoun is connected with highlighting differences. Null and overt pronouns can appear in embedded and adjoined clauses, as shown in (2). In (2a), both the null and overt subjects in the embedded clause are referring to the topic antecedent in the matrix clause. In (2b), both null and overt subjects in the adjoined clause are referring to the topic antecedent in the first part of the sentence. It is natural for native speakers to use null subjects, which are bound by the element in topic position in TopP, in (2a) and (2b). Overt subjects in these examples highlight or re-introduce the topic (e.g. Zhangsan in (2)). The use of null and overt arguments and their interpretation is therefore analysed as the result of interaction between syntax and discourse pragmatics.

(2) a. [$_{topic}$ Zhangsan$_i$ [duo   Lisi$_j$ shou [ta$_i$/Ø$_i$ xihuan Mary]]].
          Zhangsan face to   Lisi say he/Ø like   Mary
     'Zhangsan$_i$ says to Lisi$_j$ that he$_i$ likes Mary.'

  b. [$_{topic}$ Zhangsani [gei   Lisi$_j$ liwu hou], [ta$_i$/Ø$_i$ jiu   likai.]]
          Zhangsan give Lisi gift after   he/Ø EXP   leave
     'Zhangsan$_i$ gives Lisi$_j$ a gift and then he$_i$/Ø$_i$ left.'

1.2 Fundamental Difference Hypothesis

     Within the field of L2 acquisition many research studies have examined whether L2 acquisition is constrained by the same innate language learning mechanism as L1 acquisition (i.e. Universal Grammar as proposed by Chomsky, 1986) or by something different (i.e. a problem-solving or general learning mechanism). The fundamental difference hypothesis (FDH; Bley-Vroman, 1989) contends that the natural system of L1 learners of a language is fundamentally different from that of L2 non-native learners.

Bley-Vroman (1989) proposes ten types of supporting evidence for his FDH. He argues that an adult L2 system virtually never matches the target language system. At any stage, a superficial match between the L2 system and the target language does not necessarily mean that the L2 and target language grammars have converged. Many of the studies addressing this question directly compare the ultimate attainment of L2 adults with L1 adults or the linguistic development of L2 adults with L1 children. In this thesis, following Schwartz (1992), it will be shown that child L2 acquisition is the missing link in the cross-learner comparison. L2 children and L2 adults are similar in that both groups have experience of linguistic development in their native languages which allows for potential L1 transfer. However, L2 children and L2 adults differ with respect to age; the L2 children are more like the L1 children in this respect. These similarities and differences are explored in the comparison of the learners' developmental sequences. The thesis tests whether L2 adults, L2 children and L1 children pass though the same developmental sequences in their acquisition of null arguments in Chinese in order to address the question of whether adult L2 acquisition is driven by the same innate language acquisition device as L1 acquisition, namely Universal Grammar (Chomsky, 1986), or whether it is based on general learning mechanisms (Bley-Vroman, 1989).

1.3 Interface Hypothesis

Interfaces between grammar and external systems related to language, such as the syntax-discourse interface, or between different internal modules, such as the syntax-semantics or syntax-morphology interfaces, are credited with causing difficulties in integrating two or more linguistic systems. The original version of the Interface Hypothesis (Sorace, 2003; 2005) argues that properties with narrow syntax, which are internal to the computational system, are not problematic for L2 learners while interface properties are subject to L2 non-convergence (e.g., Belletti et al., 2007; Rothman, 2009; Sorace, 2005; Valenzuela, 2006; Zhao, 2008). The recent version of the Interface Hypothesis divides interfaces into external and internal categories. An external interface is where the syntax interfaces with other cognitive domains such as discourse pragmatics and an internal interface is juncture in which other formal properties of grammar such as morphology are

involved. Lozano (2006), Sorace (2011), Sorace and Filiaci (2006), Sorace and Serratrice (2009), and Tsimpli and Sorace (2006) propose that external interfaces pose greater difficulties for very advanced L2 speakers than internal ones. In fact, both versions of the Interface Hypothesis test phenomena at the syntax-discourse interface in near-native L2 speakers to argue the case for residual difficulty in the realization of discourse constraints.

1.3.1 Interface effects in L2 acquisition

The question of whether interface properties are problematic for L2 acquisition has been extensively investigated (Belletti et al., 2007; Gurel, 2006; Ivanov, 2009; Rothman, 2009; Slabakova et al., 2011; Sorace & Filiaci, 2006; Tsimpli & Sorace, 2006; Valenzuela, 2006; among many others). There has been a parallel emphasis on interfaces in L1 acquisition (Platzack, 2001; Tsimpli et al., 2004), L2 acquisition and bilingual acquisition (Hulk & Cornips, 2006; Serratrice et al., 2004). Evidence of non-nativeness in L2 grammar includes indeterminacy, optionality and residual L1 effects. According to Sorace, optionality "can be defined as the coexistence within an individual grammar of two or more variants of a given construction which: (i) make use of the same lexical resources; (ii) have the same meaning." (2000, p. 93). For example, incongruity occurs when a learner is acquiring Chinese, which is a language with null subjects, but the learner's native language is English, a language with overt subjects. For a period of time in this learner's mental grammar, there will be optionality if the learner accepts Chinese sentences with overt subjects, but also Chinese sentences with null subjects. In this case, there are two opposing values (or options) in this L2 learner's interlanguage grammar.

Tsimpli and Sorace's (2006) study shows that optionality exists among advanced L2 learners. Their results suggest that advanced learners of L2 Greek do not have difficulty acquiring a focus structure (internal interface), but they still show optionality in the topicalisation structure (external interface). L2 data of Tsimpli and Sorace's (2006) study provides evidence for a recent version of the Interface Hypothesis in which the acquisition of an external interface (i.e. syntax-discourse) properties present problems even in very advanced L2 speakers. If syntax-discourse interface properties are problematic for advanced L2 speakers, they are also challenging for younger speakers or for lower levels of L2 speakers. Significant differences are expected to be found between L2 adults/children

and native speakers. This comparison between L2 adults/children and natives is an important part of this study. Sorace (2011) argues that some properties of an external interface may be problematic for certain L2 learners, but some may not. The present study provides an empirical case with which to determine whether or not residual optionality exists for advanced speakers in L2 Chinese. This study tests two versions of the Interface Hypothesis in two ways: (i) the original hypothesis (Sorace, 2005) that L2 learners cannot acquire properties at an interface; and (ii) a recent version of the hypothesis (Tsimpli & Sorace, 2006) suggesting that syntax-discourse properties are problematic even for very advanced L2 speakers. Advanced L2 children and advanced L2 adults are tested on whether they can acquire properties at a syntax-discourse interface.

1.4 Organization of the Dissertation

This thesis contributes to the increasing volume of research on L2 acquisition at the syntax-discourse interface by investigating whether or not L2 Chinese children and adult learners of English, which does not allow null arguments, can come to know the distribution and interpretive constraints associated with pragmatic knowledge. Chapter 2 discusses the properties that are related to null arguments: distribution and interpretation in embedded and adjoined clauses. Chapter 3 discusses the hypotheses that this study is designed to test. From the cross-group experimental data, it is determined whether L2 Chinese children and L2 Chinese adults come to know that (i) when a topic is introduced in the previous context, it does not necessarily need to be in the preceding sentence, and null arguments are preferred and that (ii) the interpretation of null and overt subjects are bound by a discourse topic.

Two sets of experiments were carried out among three learner groups—L2 Chinese adults, L2 Chinese children, and L1 Chinese children, as well as Chinese native controls. In order to determine the developmental sequence for L2 learners, participants were divided into three proficiency groups according to the results of a standard proficiency test. The developmental sequences for L2 adults, L2 children, and L1 children are compared in order to test the FDH; and the results for advanced L2 adults and advanced L2 children are compared with native controls to test the Interface Hypothesis. These categories are outlined in Chapter 4.

The results are presented in Chapter 5. In terms of acceptance of null arguments, L2 children and L2 adults pass through the same developmental sequence. The sequence differs from that of the L1 children in the initial stage, which is analysed as the result of L1 transfer. Both L2 adults and L2 children accept null arguments in Chinese from a very early stage. The results of an interpretation task show that L2 children and L2 adults pass through the same developmental sequence. The developmental sequence suggested for L2 children (and L2 adults) slightly differs from that for L1 children. Therefore L1 influence might play a role when acquiring the interpretive constraints on null and overt subjects in Chinese.

Findings further suggest that for L1 and L2 learners, there is a discrepancy between acceptability and interpretation (target-like acceptability is in place before target-like interpretation). Furthermore, there is also a discrepancy between first person singular null argument acceptability and a third person singular null argument acceptability. In Chapter 6, a discussion of the results in relation to the research questions is presented. It presents possible explanations for the discrepancy between acceptability and interpretation, such as limited discourse integration, input matter, and universal topic features. L1 transfer may play a role in the first person and third person discrepancies.

Chapter 7 summarizes the findings of the present study and discusses its contributions for second language acquisition research. It also outlines a number of suggestions for future research in this area. The observation that L2 adults pass through the same developmental sequence as that of L2 children suggests that adult L2 acquisition is constrained by UG. Furthermore, L2 adults and L2 children are able to acquire the null argument property in which syntax interfaces with discourse. This outcome suggests that interface-conditioned properties are not as problematic for L2 learners as the Interface Hypothesis predicts.

Chapter 2 Null and overt arguments in Chinese

Introduction

A characteristic property of languages such as Chinese, Japanese and Korean is that null subjects and objects are licensed and that they are identified by discourse topics. For example, in Chinese, the object *zheban shu* 'this book' in (1) and subject and object *Zhangsan* and *Lisi* in (2) can be null and identified by topics in the discourse. In Japanese (3), null elements can appear in both embedded subject (3a) and object position (3b). As exemplified in (3c), on the condition that the null arguments are identifiable through discourse, a single argument may be null, or both arguments may be null simultaneously (Guerriero et al., 2001; Hirakawa, 1993). In Korean, null arguments can be identified by a single topic in the discourse context, though the topic does not necessarily have to be in the preceding sentence, as in (4):

(1) Speaker A: Ni   du guo   zheben shu ma?
             You   read-ASP   this   book-Q
             'Have you read this book?'

     Speaker B: Wo du guo   Ø.
              I   read-ASP Ø
              'I have read (this book).'

(2) Speaker A: Zhangsan renshi Lisi ma?
             Zhangsan know Lisi-Q
             'Does Zhangsan know Lisi?'

     Speaker B: Ø Renshi Ø
             Ø know   Ø
             '(Zhangsan) knows (Lisi).'

(3) a. John-ga   Ø Mary-o   sukida to   itta.
     John-NOM   Ø Mary-ACC   like   COMP said
     'John said that (he) likes Mary.'

    b. John-ga   Mary-ga   Ø sukida to   itta.
     John-NOM Mary-NOM Ø like   COMP said
     'John said that Mary likes (him).'

c. Ø Ø yonda.
    read-past
    '(John) read (book).'   (Japanese: Hirakawa, 1993, p. 31-32)

(4) a. Ku   cip-un   ichung-ita.   Ø   cipung-I   hinsayk-ita. Kuliko Ø kangka-ey
      iss-ta.
      that house-top two story-is   Ø   roof-nom white-is   and   Ø riverside-at
      is-dec
      'That house is two stories high. (Its) roof is white. (It) is located close to the river.'

   b. Nay-ka Mary-ka   Ø po-ass-ta-ko   sayngkha-ko-iss-te-n
      I-nom   Mary-nom Ø see-past-decl-comp think-comp-prog-retro-adnom
      ku   salam-i   cuk-see-ta
      that   person-nom   die-past-decl
      'That man whom I believe Mary has seen (him) died.'
                                                             (Korean: Cole, 1987, p. 606-607)

This thesis deals with the acquisition of Chinese, one of the null argument languages. This chapter details the properties of null arguments which will be tested in the experimental work presented in the subsequent chapters. Section 2.1 briefly discusses the early linguistic theory related to null arguments. Section 2.2 outlines the properties related to the licensing and identification of Chinese null arguments. Cross-linguistic differences in the use of null and overt arguments are given in Section 2.3.

2.1 Early null arguments theory

The null subject phenomenon has been studied in L1 acquisition (Guerriero et al., 2001; Hyams, 1986; Valian, 1991; Wang et al., 1992) and L2 acquisition (Lakshmanan, 1995; White, 1985; 1986; Yuan, 1993). These studies mainly analysed null subjects as a *pro*, and investigate the null subject phenomenon from the perspective of the pro-drop parameter. The pro-drop parameter allows the subject to be dropped in certain circumstances. While subject-drop has received extensive attention, object-drop has been less well studied. In language acquisition, exponents of the pro-drop parameter believe that null objects are simply the result of performance errors and do not represent an actual syntactic phenomenon. Hyams and Wexler's (1993) study found that object-drop is much less common than subject-drop in child acquisition of English; and Jakubowicz et al. (1997) also found that objects are dropped much less frequently than subjects in child French data.

However, null objects are frequently observed in cross-linguistic child acquisition (Hyams & Wexler, 1993; Jakubowicz et al., 1997; Guerriero et al., 2001; Wang et al., 1992). In null subject languages like Japanese (Guerriero et al., 2001) and Chinese (Wang et al., 1992), objects are dropped systematically. Moreover, in early child German data, objects are dropped even more frequently than subjects (Jakubowicz et al., 1997). Null objects in child language cannot be analysed merely as performance errors. In recent years, linguists have concluded that the distribution of null (and overt) arguments in null-subject languages is related to information availability (Serratrice et al., 2004; Yuan, 1993). The oler the information carried by an argument, the more likely it will be null.

First I briefly review the L1 acquisition literature concerning the null subject phenomenon based on the pro-drop parameter (Hyams, 1986) followed by early L2 null-subject acquisition studies (Lakshmanan, 1995) focusing on the syntactic and morphological aspects of the pro-drop parameter.

2.1.1 The null subject phenomenon

2.1.1.1 The Pro-drop Parameter

Hyams (1986) has argued that the null subject phenomenon is a universal property of child language. She claims that there is an initial period in child L1 acquisition during which referential subjects are optional and expletive subjects are entirely absent regardless of whether the target language is a null subject language. For example, the evidence from studies of the early grammars of children acquiring pro-drop languages such as Italian (Hyams, 1986) and Chinese (Wang et al., 1992) indicates that children acquiring these languages appear to assume from the very beginning that overt subjects are optional. Hyams (1986) analysed null elements in subject position as *pro* elements licensed by an AGR(eement) feature. As for the early grammars of English, which is not a pro-drop language, Hyams (1986) observed that children learning English drop subjects during the early stages of their acquisition. She further argues that English-speaking children mis-set their pro-drop parameter to a Chinese-like setting for a fairly long period. In fact, children acquiring a large number of non pro-drop languages all seem to allow subject-drop for a certain period, even if the adult language never does (Hyams, 1986).

Hyams (1986) suggested that languages like Italian and Spanish allow subjects to be dropped based on the premise that UG provides the language learner with a certain setting of the pro-drop parameter. The default setting of this parameter allows subjects to be dropped in certain circumstances, but not objects. The child learner of a non pro-drop language can only reset this parameter once s/he has received sufficient positive evidence from the input in his or her linguistic environment (Hyams, 1986; Rizzi, 1986). In the case of non pro-drop languages like English, it is the expletive subject in the input which indicates that subjects are obligatory in this language (Hyams, 1986). Therefore, the learner of non pro-drop languages will encounter positive evidence in the input in his/her linguistic environment and will reset the parameter accordingly. This is why Hyams (1986) argued that the child works from the assumption that all languages are null subject languages. Otherwise, if a child assumes that subjects are obligatory in his/her language, s/he will not encounter evidence contradicting this assumption. Many pro-drop languages allow lexical NPs in subject position and nothing explicitly indicates that null subjects are licit. Thus the child cannot re-analyse his/her language as pro-drop. The pro-drop parameter predicts that the absence of subjects in a young child's language use in the initial developmental stage is related to parameter setting. Exponents of the pro-drop parameter, however, do not view object-drop as an actual syntactic phenomenon (Hyams & Wexler, 1993).

Although English adults do not permit null subjects in tensed clauses and only permit null objects in a restricted number of contexts, English children produce both null subjects and null objects during early L1 acquisition (Guerriero et al., 2001; Hyams, 1986; Valian, 1991). As object-drop in child English is infrequent (Hyams & Wexler, 1993), the pro-drop theory claims that null objects are the result of performance errors. However, in early child German, objects are dropped more frequently than subjects (Jakubowicz et al., 1997). Furthermore, the presence of null objects in Chinese, Japanese, and Korean is a common syntactic phenomenon. Null objects in child language cannot therefore be analysed as performance errors.

Another explanation for argument-drop in language acquisition is that children's cognitive development is not yet advanced enough to process long sentences. Based on data collected from English and Italian children, Valian (1991) argued that argument-drop was the result of processing constraints. The longer the sentence is, the more likely the

argument is to be dropped. The difficulty in processing long sentences results in argument-drop. Because subjects often refer to old information, they are the most likely arguments to be dropped. As for object-drop, Valian (1991) found that when a subject is present the object is more likely to be dropped. Furthermore, objects are more likely to be dropped from sentences with longer subject NPs. If this processing account is correct, objects are more likely to be dropped than subjects, because more processing power is available at the beginning of the sentence than at the end. The presence of subjects should therefore be higher than objects in general. However, objects are more likely to be present than subjects in child English (Hyams & Wexler, 1993). Although data from child acquisition of English renders Valian's (1991) processing difficulty account less convincing, her study provides useful data from both English and Italian.

Wang et al. (1992) examined Valian's (1991) data and concluded that subject drop was not necessarily reflecting grammatical differences, but pragmatic ones. They investigated whether English-speaking children used the same licensing and identification of null arguments as used by Chinese-speaking children. They conducted an elicited production task with both L1-Chinese and L1-English children. Their prediction was that early English, like Chinese, is a pro-drop language and that young English- and Chinese-speaking children would use null arguments similarly. The Chinese group consisted of four girls and five boys whose aged from two years to four years and six months. The English-speaking children consisted of five girls and four boys, ranging in age from two years and five months to four years and five months. Nine female Chinese native speakers served as controls. During the experiment, participants were presented with a number of pictures and asked to explain the scenes in the pictures in the form of a story.

The prediction was not supported by the results: Chinese-speaking children systematically produced null arguments, whereas English-speaking children did not. The mean percentage of sentences with null subjects produced by Chinese children differed significantly from that of English children ($p < .01$). As for sentences with null objects, the differences between the Chinese-speaking child group and the English-speaking child group is significant ($p < .01$). However, both Chinese- and English-speaking children used null subjects (but not null objects) according to similar pragmatic rules: null subjects were sometimes co-referential with the antecedents from the discourse, as in example (5); though

sometimes the referents of the null subjects were not previously introduced, as in example (6). Examples are taken from Wang et al. (1992), p. 233-234:

(5) a. Da ye lang$_i$ zai zheli tou kan. Ø$_i$ zai kan xiao zhu.
     big wild wolf$_i$ ASP here secretly look. (It$_i$) ASP look little pig
     'The big wild wolf is here peeping secretly.' 'It is looking at the little pig.'

  b. Look at this bad wolf$_i$. He$_i$ got in there. Ø$_i$ fell down.
     'Look at this bad wolf. He got in there. (He) fell sown.'

(6) a. Ø kan jingjing. Ø mei chuan xiexie.
     (He) look mirror (He) not wear shoe
     'He is looking in a mirror. He didn't wear shoes.'

  b. Ø jump up. Ø jump in bed. Ø fall down.
     '(He) jumped up. (He) jumped in bed. (He) fell down.'

<div align="right">(Wang et al., 1992, p. 233-234)</div>

The null subject in (5a)–(5b) refers to 'the bad wolf' previously mentioned in the discourse. Null subjects in (6a) and (6b) exemplify cases in which there is no antecedent. In addition, the null subjects in (6a) and (6b) refer to the same phonologically empty antecedent. Wang et al. (1992) explained this kind of null subjects were "understandable from the context". Null subjects are licensed and identified by a null element (i.e. the "topic" of Huang, 1986) which is identified contextually. A null topic is co-referential with something in the discourse. In other words, not only Chinese-speaking children but also English-speaking children produce null subjects which follow pragmatic principles in the early stages of L1 language development.

     Both Valian (1991) and Wang et al. (1992) therefore suggest that the frequency of null arguments may be related to something beyond syntactic structure. This suggestion is further supported by Guerriero et al.'s (2001) study. When testing two groups of three-year old English and Japanese-speaking children, Guerriero et al. (2001) found that children, in both languages, tended to drop arguments previously mentioned in the discourse. The presence of null arguments is therefore related to pragmatic conditions.

     Serratrice et al. (2004) investigate the distribution of arguments in an English-Italian bilingual child and the role of discourse pragmatics in argument realization

in the bilingual child and in her monolingual English- and Italian-speaking peers. Their findings suggest that in both English and Italian, the distribution of null subjects and null objects is constrained by discourse pragmatics; null arguments are associated with information availability. Linguistically co-present information is more likely to be phonologically null than new information. When an argument appears in a sentence, new information is expected. Both bilingual and monolingual children tended to use null arguments which had an antecedent in the previous discourse. Discourse licensing of arguments is therefore also available to monolingual English children in the early stages of language acquisition. At some point in their development, English-speaking children become aware of the specific requirements of English, including the fact that all arguments must be overt. Regardless of the availability of discourse licensing, null arguments become syntactically blocked in adult English speakers' mental grammars; a change triggered by naturalistic input. Serratrice et al.'s (2004) finding suggests that in child acquisition of both English and Italian, the use of null arguments is associated with discourse pragmatics. The presence of null arguments in children's mental grammars is related to a specific pragmatic rule. Chinese is a discourse-oriented language (Huang. 1984; Li & Thompson. 1976). Objects in Chinese, like subjects, can be null more freely than objects in English and in Italian. Null objects as well as null subjects are constrained by pragmatic rules.

In the following sections, I will turn to look at L2 acquisition of null arguments, early studies of which also focused primarily on the morphosyntactic aspects of the pro-drop parameter.

2.1.1.2 Morphological Uniformity Principle

Recall that the current study is concerned with the L2 acquisition of null arguments in Chinese by English children and adults. Although there are many studies of null arguments in L2 acquisition, none of the L2 studies are focus on L1-English-L2-Chinese children. I will therefore limit my discussion to providing a brief introduction of Lakshmanan's (1994) study with English L2 children then discuss the two key adult L1-English-L2-Chinese studies.

In conducting a longitudinal study in which speech data was collected from four L2 children learning English, Lakshmanan (1994) tested the predictions of a theory of

null-subjects, namely, the Morphological Uniformity Principle (MUP). Proposed by Jaeggli and Safir (1989), null subjects are allowed only in languages with morphologically uniform inflectional paradigms, as stated in (7):

(7) Morphological Uniformity

An inflectional paradigm P in a language L is morphologically uniform iff P has either only underived inflectional forms or only derived inflectional forms.

(Jaeggli & Safir, 1989, p. 29)

Null subjects are permitted in languages in which all verbs are morphologically inflected or in which none of them are. Pro-drop languages like Italian and Spanish have a uniform paradigm as all the verbs are fully inflected for person, number, tense and mood. They are therefore subject to the MUP just like languages with no inflectional paradigms like Chinese and Japanese. According to Jaeggli and Safir (1989), *pro* is identified by INFL in Chinese and Japanese despite the absence of phonologically-realized morphological agreement. This theory was adopted by Yuan (1993), which I will discuss later.

Lakshmanan (1994) looked at the development of the relationship between null subjects and verb inflection. The native languages of the L2 English children were French, Spanish and Japanese. French, like English, is a non-null-subject language, whereas Spanish and Japanese permit null subjects. The analysis of the Spanish-speaking child, Marta, showed that she used null subjects from the beginning and that nearly all null subjects appeared with the verb form "is". Marta's English production data shows no relation between the omission of inflections and null subjects. In addition, the French-speaking child Muriel's transcripts showed that the presence of pronominal subjects and verbal inflection were not related in her speech. Muriel's use of null subjects in English correlated with her use of "(it) is". No null subjects but low frequency of inflections were found in the Japanese-speaking child Uguisu's English data. The results suggest that there is no relationship between the lack of inflection and the presence of null subjects. In particular, Lakshmanan (1994) found hat Uguisu used overt subject pronouns in English from the earliest developmental stage. Japanese, like Chinese, is one of the null-subject languages without rich subject-verb agreement morphology. Lakshmanan (1994) suggested

that L2 children learning English know from early on that overt subjects are obligatory in English and that L2 children fail to use overt subjects because of context rather thanissues surrounding setting grammatical parameters.

As for adult L2 acquisition, studies with English speakers learning null subject languages such as Spanish (Isabelli, 2003; Phinney, 1987) show that the syntactic properties associated with null subject are easy to acquire. They focused on the use of null subjects versus overt subjects, verb-subject word order, and the *that*-trace effect (i.e. extracting subjects across overt complementizers). Isabelli (2003) investigated the acquisition of null subject in a naturalistic learning context. The data were collected from sixty-four native English speakers learning Spanish through an exchange programme in Barcelona. All L2 participants had been exposed to nine months of naturalistic input at time of testing. A grammaticality judgement task and an oral interview were carried out before and after their time in Barcelona. Following comparisons with native speakers, the results show that the L2 learners improved significantly on all syntactic properties related to null subject, that null subject properties were acquired by intermediate and advanced students, and that after nine months exposure in a naturalistic learning context, the language learners performed at ceiling with regards to null subjects. The data indicate that naturalistic input benefits L2 learners n terms of the acquisition of null subjects.

One hundred and ten beginners and one hundred and twenty low-intermediate learners of Spanish participated in Phinney's (1987) study. L2 learners' compositions were examined. The results show that L1-English-L2-Spanish learners seem to succeed in acquiring null subjects in the early stages of their linguistic development. Phinney pointed out that most examples of null subjects occurred in subordinate or conjoined clauses. In other words, null subjects occurred where the discourse referent has already been mentioned in the context. L2 learners in Phinney's (1987) study were aware of the discourse restrictions on the use of null subjects in Spanish.

From these studies, L2 learners learning both null and non-null subject languages seem to acquire the syntactic aspects of null subjects easily. Evidence for the syntactic properties of null subjects seems to be largely available from naturalistic input. The use of null and overt subjects is related to the discourse context. The properties of Chinese null and overt arguments are related to discourse factors. I will discuss properties of Chinese

null arguments in terms of discourse context from this point.

2.2 Properties of null arguments

Li and Thompson (1976) note that Chinese is a topic-prominent language rather than a subject-prominent language like English. In a topic-prominent language, the topic is the most important part of the sentence, though it is not necessarily the subject of the sentence. In topic-prominent languages, sentences tend to have topic-comment structures, in which the topic is sentence-initial and the rest of sentence comments on it. A subject-comment structure is the standard sentence structure in English in which the subject is sentence-initial and the rest of sentence describes it. In other words, basic Chinese sentence structure is of the topic-comment type rather than the subject-comment type. Although many sentences do have an identifiable subject, topic plays a major role in relation to other elements in the sentences. An example of a topic-prominent sentence is taken from Li and Thompson (1976, p. 227):

(8) Neikuai tian   women zhong daozi.
    that   field   we   grow rice
    'That field (topic), we grow rice (on it).'

Here the noun phrase *neikuai tian* 'that field' is the topic and *women zhong daozi* 'we grow rice' is the comment. In Chinese any element could be a topic. Topics are in the initial position of the sentence. This topic position is in fact related to pragmatic and semantic factors. Pragmatically, this pre-verbal position signals that the topic is definite (as shown in (9)). The topic subject *zei* 'thief' in the pre-verbal position of (9a) is interpreted as definite, while topic *zei* in the post-verbal position of (9b) is interpreted as indefinite. Semantically, meaning differences results from differing positions of adverbials (I will not discuss this in detail here, but refer the reader to Tai, 1973).

(9) a. **Zei**   pao le.
     thief   run ASP
     '**The thief** has run away.'

b. Pao le   **zei**.
   run ASP thief
   '**A thief** has run away.'

(Li & Thompson, 1976, p. 228)

Since the pre-verbal position signals definiteness and topics are always definite by definition, topics are always pre-verbal. A pre-verbal topic is an obligatory element of every Chinese sentence. This topic could be the subject, the object, or another element in the sentence.

Huang (1984) proposes the 'hot-cool continuum' to classify languages according to their information structure. Languages like English and French are 'hot' languages because the information that is required to understand each element in a sentence must be overtly expressed. In 'hot' languages subject and object pronouns cannot in general be null in grammatical tensed clauses (see examples (10-11)). Italian and Spanish are 'medium-hot' languages because subject pronouns can be null optionally, though object pronouns cannot be null(see examples (12-13)). In 'cool' languages such as Chinese, Japanese and Korean, subject and object pronouns are usually[2] null in grammatical sentences. To understand a sentence, the addressee uses the mutual knowledge between himself and the speaker. Such knowledge might include 'inference, context, and knowledge of the world, among other things' (Huang, 1984, p. 531). The acceptability of null subject and null object pronouns is just one aspect that reflects the hot-cool distinction between 'hot' (i.e. English), 'medium-hot' (i.e. Italian and Spanish), and 'cool' (i.e. Chinese) languages.

(10) a. John promised Bill that he would see Mary.

   b. *John promised Bill that Ø would see Mary.

(11) a. John promised Bill that Mary would see him.

   b. *John promised Bill that Mary would see Ø.

(Huang, 1984, p. 532)

Compare these examples with the Spanish sentences below. Both overt subject pronouns (in

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[2] The use of null/overt arguments is associated with pragmatics.

(12)) and null subject pronouns (in (13a)) are permitted. However, null object pronouns are not permitted (in (13b)):

(12) a. Jose sabe   que el   ha sido visto por Maria.
     Jose know   that he has been seen by Maria
    'Jose knows that he has been seen by Maria.'

  b. Jose sabe   que Maria lo ha visto.
    Jose know   that Maria CL has seen
    'Jose knows that Maria has seen him.'

(13) a. Jose sabe   que Ø ha   sido visto por Maria.
     Jose know   that Ø has been seen by Maria
     'Jose knows that (he) has been seen by Maria.'

  b. *Jose sabe   que Maria Ø ha visto.
    Jose know   that Maria Ø has   seen
    'Jose knows that Maria has seen (him).'

<div align="right">(Huang, 1984, p. 533)</div>

Spanish pronouns in object positions, unlike those in subject positions, must be phonetically realized, as the contrast in (12b) and (13b) shows. In contrast, 'cool' languages like Chinese allow null pronouns in both subject and object positions in both matrix and embedded clauses:

(14) Speaker A: Zhangsan kanjian Lisi le ma?
             Zhangsan see   Lisi ASP Q
             'Did Zhangsan see Lisi?'

  Speaker B: a. ta kanjian ta le.
           he see   he ASP
           'He saw him.'

           b. Ø kanjian ta le.
            Ø see   he ASP
           '(He) saw him.'

           c. ta kanjian Ø le.
            he see   Ø ASP
           'He saw (him).'

d. Ø kanjian Ø le.
   Ø see   Ø ASP
   '(He) saw (him).'

e. wo zai   Ø kanjian Ø le.
   I   guess Ø see   Ø ASP
   'I guess (he) saw (him).'

f. Zhangsan shou Ø kanjian Ø le.
   Zhangsan say   Ø see   Ø ASP
   'Zhangsan said that (he) saw (him).'

(Huang, 1984, p. 533)

As exemplified in (14), both null subjects and null objects are allowed in Chinese. The sharp contrast in acceptability between the Chinese discourse (14) and the English sentences in (10)–(11) is one of the foci of the present study. Next, the properties of Chinese null arguments are presented, before turning to what contributes to these properties. I will discuss English and Italian-type languages descriptively and theoretically in Section 2.3.

2.2.1 Chinese null arguments

Compared with other languages, null arguments in Chinese are freely permitted. Italian and Spanish are both null subject languages with a rich inflectional agreement paradigm. These inflections are found under INFL and are phonologically present on the verb. Rizzi (1982, 1986) believes that INFL in these languages licenses a null subject (*pro*), and the rich verbal inflection identifies who or what *pro* refers to. Consider the Spanish paradigm below:

(15)   habl-o   I speak   1SG

        habl-as   you(SG) speak   2SG

        habl-a   he/she speaks   3SG

        habl-amos   we speak   1PL

        habl-ais   you(PL) speak   2PL

        habl-an   they speak   3PL

(Jaeggli & Safir, 1989, p. 27)

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Because the inflectional morphology in (15) uniquely defines the person and number for the subject, null subjects are available in languages like Italian and Spanish. Null objects, however, are only available in restricted contexts. I will discuss null objects in Italian and Spanish in a greater detail later in the cross-linguistic comparison section.

Chinese is also a language which permits null subjects. However, verbs do not carry differentiated person and number morphology as INFL in Chinese is weak. There is no verb and agreement matching relation at any level of a sentence. Subject position in Chinese is not overtly associated with agreement and/or case-marking. Compared with (15), the Chinese example below shows that an empty subject position candenote any number or person without any morphological alteration on the verb:

(16) Ø   xihuan   mao.
     'I/you/she/etc. like(s)   cats.'

Moreover, not only does Chinese allow null subjects, but it also freely allows null objects (Xu, 1986):

(17) Speaker A: Ni du   guo   zheben shu   ma?
               you read-ASP   this   book-Q
               'Did you read this book?'

     Speaker B: Ø du   guo Ø.
                 Ø read-ASP Ø

<div align="right">(Xu, 1986, p. 75)</div>

(18) Speaker A: Halibote   shi ben   hao   shu.
               Harry Potter is   CL   good book
               'Harry Potter is a good book.'

     Speaker B: Zhangsan shuo Ø du guo   Ø le.
               Zhangsan say Ø   read-ASP Ø ASP
               'Zhangsan said that he has read it.'

Here both subject and object in the answering sentence are null (17)–(18). . It is considered more natural not to repeat NPs already mentioned in the previous discourse (Xu, 1986).

Why are arguments more freely null in Chinese? Yuan (1997) assumed that the empty category in subject position is *pro* (like in Italian and Spanish), which is licensed by the absence of inflection in Chinese INFL. In his analysis of Chinese syntax, Yuan (1997) adopts the split inflection hypothesis (Pollock, 1989), which suggested that Infl(ection) splits into the two functional heads T(ense) and AGR(eement). The contrast between sentences containing *persuade*-type verbs and those containing *tell*-type verbs indicates that the finite and non-finite distinction exists in Chinese. This can be seen in (19a) and (19b) below (Yuan, 1997, p. 470):

(19) a. *Wo meiyou gaosu guo ta ni zuo renhe shiqing.
          I not-have tell EXP him you do any thing
       '*I have not told him you did anything.'

   b. Wo meiyou quan guo ta qu zuo renhe shiqing.
       I not-have persuade EXP him go do any thing
       'I have not persuaded him to do anything.'

As seen in (19a), the *tell*-type verb *gaosu* 'tell' takes a finite clause as its complement, whereas in (19b) the *persuade*-type verb *quan* 'persuade' takes a non-finite clause as complement. Sentences (19a) and (19b) demonstrate that only a finite clause, but not a non-finite clause, would block the licensing relation between the negative polarity item *renhe* 'any' and the negation *meiyou* 'not-have' (Yuan, 1997). The finite and non-finite distinction tells that T(ense) exists in Chinese even if it is underspecified (Yuan, 1997). Yuan further assumes that since underspecified T is present in Chinese, so underspecified AGR(eement) is also available. It is the underspecification of T and AGR that licenses null subjects in Chinese: "in spite of the availability of T and AGR in Chinese, they are to be treated as functional heads without distinctive features (Yuan, 1997, p. 470)."

Not only null subjects but also null objects are permissible in Chinese. Yuan (1997) followed Huang (1984) in assuming that a null object is the result of topicalisation. The element in object position is moved out to the front of the sentence (topicalised) to form a topic and is dropped. Null objects are the traces of topics. As illustrated in (20a), an empty category in subject position is *pro* (like in Italian), while an empty category in object position is a trace (20b):

(20) a. Yuan (1997): (like 'Greek-type' languages) null subjects/*pro*s are licensed by agreement inflections in INFL (a) which is absent in Chinese; null objects = traces (b).

```
                    IP
              ┌─────┴─────┐
             NP           IP
              │      ┌─────┴─────┐
         Zhangsanᵢ  NP          I'
                     │     ┌─────┴─────┐
                   proᵢ    I          VP
                           │      ┌────┴────┐
                       i-seeᵥ              V'
                                      ┌─────┴─────┐
                                      V          NP
                                      │           │
                                     tᵥ          Lisi
```

b.

```
                 CP or TopP
              ┌──────┴──────┐
             NP             C'
              │        ┌─────┴─────┐
        (That manᵢ)    C          IP
                       │      ┌────┴────┐
                    [topic]  NP        I'
                             │    ┌─────┴─────┐
                          Zhangsan I          VP
                                   │      ┌───┴───┐
                               i-knowᵥ   Ø       V'
                                            ┌────┴────┐
                                            V        NP
                                            │         │
                                           tᵥ        tᵢ
```
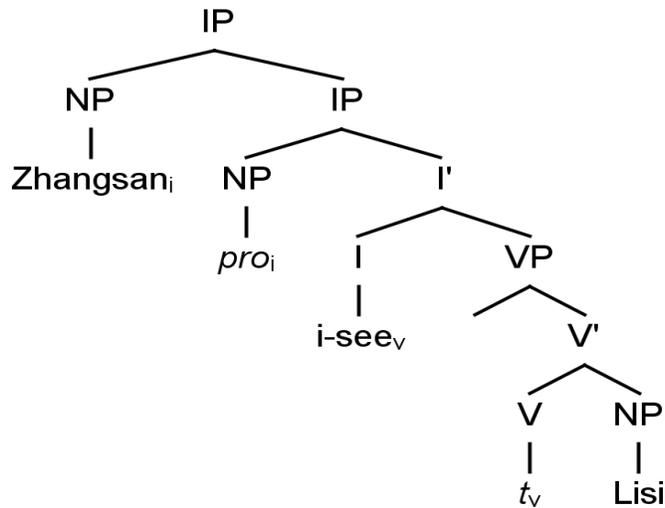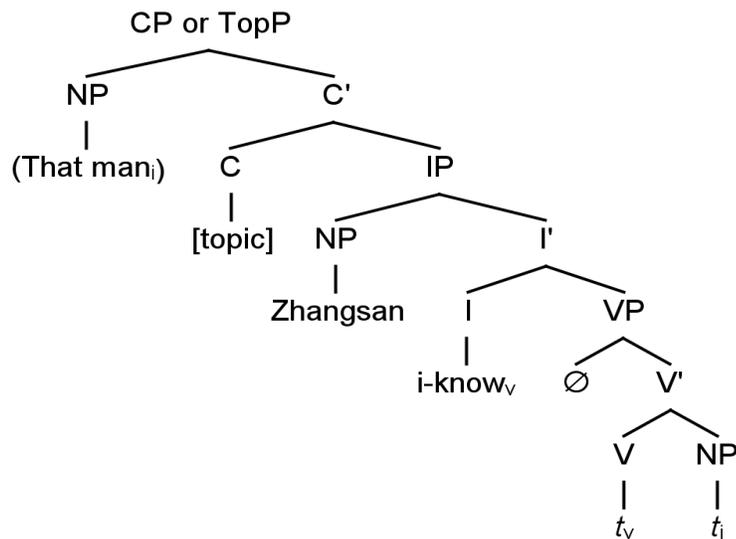
In Yuan (1997), *pro*s are licensed and identified by INFL. *Pro*s can also be identified, when a referential NP (*Zhangsan*, in this example) appears in [Spec, IP]. 'That man' in (20

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b) is moved to [Spec, TopP] and is a trace. Empty categories appearing in object position are identified though topics. A topic can be someone or something mentioned previously in the discourse. INFL in 'Greek-type' languages is strong enough to license null subjects. In languages like English, however, INFL is not strong enough to license null subjects; therefore, overt subjects are obligatory in English. As for Chinese, INFL is even weaker than in English. How then does INFL license Chinese null subjects? Huang (1984) suggests that null arguments are licensed and identified by the presence of a topic in the specifier position of CP or of a TopicP, as shown in (21) for null subjects and (20b) for null objects.

(21) Huang (1984): empty categories in subject and object positions are licensed by topic; null subjects = traces. (*cf. (20a), this is different from Yuan's analysis)
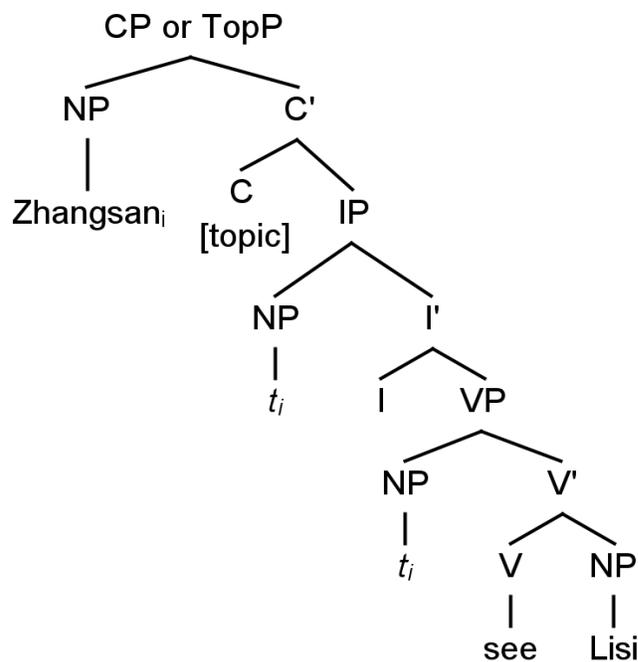
Both Yuan (1997) and Huang (1984) analyse null objects as traces which are bound by topic. It is the analysis of null subjects which differentiates Yuan's analysis from Huang's. Yuan assumes that Chinese null subjects are licensed and identified by INFL (null subject = *pro*), whereas Huang (1984) suggests that Chinese null subjects are traces licensed and

identified by the presence of a topic (null subject = trace). In the present study, Huang's (1984) analysis is adopted to explain how null subjects and null objects are licensed and identified. Both null subject and null object are traces and are represented by the symbol "Ø". Huang (1984) argues that the topic is moved to [Spec, CP] and that topicalisation is obligatory in all Chinese sentences. This means that the sentence-initial topic position is filled in all simple SVO sentences:

(22)   a. [$_{topic}$ Zhangsan$_i$ [Ø$_i$ kanjian Lisi le].
             Zhangsan   see   Lisi ASP
        'Zhangsan saw Lisi.'

Multiple topic constructions are also allowed, as in (23). Null subjects and null objects are traces bound by the topic. The arguments have moved to the front of the sentences and the topics themselves can be dropped if they are already present in the discourse context, as shown in (24).

(23) Zhei ge   yiwai$_j$,   Lisi$_i$, Zhangsan gaosu   guo Ø$_i$ Ø$_j$.
       this CL   accident   Lisi   Zhangsan tell-about ASP Ø Ø
       'This accident, Lisi, Zhangsan have told him about it.'

(24) Speaker A: Zhangsan$_i$ renshi Lisi$_j$ ma?
                   Zhangsan   know   Lisi Q
                   'Does Zhangsan know Lisi?'

      Speaker B: [$_{topic}$ Ø$_i$ Ø$_j$ [Ø$_i$ renshi Ø$_j$]
                            Ø knows Ø
                   '(He) knows (him).'

The two topics in Speaker's B's speech in (24) are identifiable from the previous discourse, so it is more natural for them to be null. *Zhangsan$_i$* and *Lisi$_j$* in the first sentence and [$_{topic}$ Ø$_i$ Ø$_j$] form a topic chain. Null topic NPs are those "which operate across discourse to delete the topic of a sentence under identity with a topic in a preceding sentence. The result of such a deleting process is formally a *topic chain*" (Huang, 1984, p. 549). The topic chain is therefore the largest syntactic unit in Chinese and the topic NP can be null. (25) exemplifies the topic chain process:

(25) [topic Zhongguo_i, [defang hen da]]. [topic Ø_i, [renkuo   hen   duo]].
       China   place   very big   population very many
    [topic Ø_i, [tudi hen   feiwo]]. [topic Ø_i, [qihou   ye   hen   hao]].
              land very   fertile   climate also very good
    [topic Ø_i, [women duo hen xihan Ø_i]].
              we   all very like   Ø

    '(As for) China, (Its) land area is very large. (Its) population is very big. (Its) land is
     very fertile. (Its) climate is also very good. We all like (it).'

                                                              (Tsao, 1979, p. 63)

The null object in (25) is a trace bound by its immediate null topic. Every null topic is identified by the first topic *Zhongguo* 'China'. As long as there is an antecedent somewhere in the discourse context which can identify the topic(s), topics themselves as well as subjects and objects can be null. In this study, I adopt and put forward Huang's (1984) analysis that (i) the topic chain is the largest syntactic unit in Chinese; and (ii) every Chinese sentence obligatorily has a topic, including those with overt arguments. Null arguments in Chinese are acceptable at the syntactic level because of the presence of a topic at the discourse level. Discourse constrains the distribution and identification of null arguments.

This study looks at the acquisition of licensing and identification of null arguments and its different interpretation from overt arguments. Specifically, it examines whether non-native Chinese speakers (L2 learners) are able to integrate different sources of knowledge from the discourse context and from syntactic structure. Next, I turn to the mechanism by which null arguments are identified.

2.2.2 Identification of Chinese arguments

Chinese allows null and overt pronouns to appear in both subject and object positions. Broadly speaking, null pronouns are associated with topics; and overt option pronouns are used to highlighting difference or signal contrastive focus (Li & Thompson, 1940). Null pronouns are used to avoid repeating topics in the discourse, while overt pronouns are used to highlight specific old topics or to avoid ambiguity. With respect to the identification of null and overt pronouns, there are discourse constraints which must be obeyed (Tai, 1978).

Firstly, Chinese does not have backward anaphoric binding. Backward anaphora occur when the pronoun precedes the antecedent. In other words, in Chinese antecedents

must precede co-referential null and overt pronouns. First consider the following examples for overt pronouns (Tai, 1978, p. 284-285):

(26) a. **Lao Zhang** lai   kan-le wo, **Ø/ta** dai-le   yi ge xiao haizi yiqi   lai.
         John   came see-ASP I   he bring-ASP one CL small child together come
         '**John** came to visit me, and **he** brought a child with him.'

    b. ***Ø/Ta**   lai   kan-le wo, **Lao Zhang** dai-le   yi ge xiao haizi yiqi   lai.
         he   came see-ASP I   John   bring-ASP one CL small child together come
         '**He** came to visit me, and **John** brought a child with him.'

(27) a. **Lao Zhang** likai-le   zher   yihou, **ta** jiu meiyou zai   huilai guo.
         John   leave-ASP here   after he FVP no   again return FVP
         'After **John** left here, **he** never came back again.'

    b. ***Ta** likai-le   zher yihou, **Lao Zhang** jiu   meiyou zai   huilai guo.
         he leave-ASP here after   John   FVP   no   again return FVP
         'After **he** left here, **John** never came back again.'

(28) a. **Lao Zhang** zoujin   wuzi-li   de shihou, wo ma-le   **ta**.
         John   walk in house-PROP DE time   I   scold-ASP he
         'When **John** walked into the room, I scolded **him**.'

    b. ***Ta** zoujin   wuzi-li   de shihou, wo ma-le   **Lao Zhang**.
         he walk in   house-PROP   DE time   I   scold-ASP John
         'When **he** walked into the room, I scolded **John**.'

Examples (26)–(28) illustrate that it is possible for Chinese (and English) to find antecedents in the previous discourse; however, Chinese cannot look for antecedents in the following discourse like English can. Similarly, the referent of a null pronoun must be in the previous discourse, as shown in examples (29)–(30) below:

(29) *$Ø_i$ yi   jin-le   menr, wo jiu   ma-le   **Lao Zhang$_i$**.
       Ø moment enter-ASP door   I   FVP scold-ASP   John
       *The moment (**he**) entered the door, I scolded **John**.

(30) *$Ø_i$ qi-le   Meiguo yihou, wo jiu   mei jian-guo **Lao Zhang$_i$**.
       Ø go-ASP America after   I   FVP   no   see-FVP John
       *After (**he**) went to the United State, I never saw **John** again.

(31) **Ø_i** yi   jin-le   menr, **Lao Zhang_i** jiu ba   yifu   tuo-le.
     Ø monent enter-ASP door   John   FVP take   cloth off-ASP
     (he) Entering the door, **John** immediately took off his clothes.

<div align="right">(Tai, 1978, p. 286)</div>

Examples (29)–(30) are not grammatical because the null pronoun is co-referential with an object in the following clause. There is an exception, as shown in (31), the null pronoun is identified as the noun phrase *Lao Zhang* by backward identification. However, this kind of exception is very rare. The assumption made for (31) is that *Lao Zhang* is originally generated in topic position and is moved by the adverbial preposing rule in Chinese (see Tai, 1978 for detailed discussion). So a sentence like (31) is in fact derived from a sentence like (32):

(32) **Lao Zhang_i** [**Ø_i** yi   jin-le   menr], jiu ba   yifu   tuo-le.
     John   Ø monent enter-ASP door   FVP take   cloth off-ASP
     '**John**, **(he)** entering the door, immediately took off his clothes.'

<div align="right">(Tai, 1978, p. 286)</div>

The second discourse is that repetition of the topic is dispreferred in subordinate (33) and coordinate (34) clauses (Tai, 1978):

(33) a. **Lao Zhang_i** dao-le   Meiguo yihou, **Ø_i**   jiu jiao-le   hen duo   pengyou.
       John   arrive-ASP America after Ø   FVP make-ASP very many friend
       '*Since **John** came to the U.S.A., **(he)** has made many friends.'

   b. ?? **Lao Zhang_i** dao-le   Meiguo yihou, **ta_i** jiu jiao-le   hen duo   pengyou.
        John   arrive-ASP America after   he FVP make-ASP very many friend
        'Since **John** came to the U.S.A., **he** has made many friends.'

(34) a. **Xiao Mei_i** jie-le   hun,   **Ø_i** sheng-le   liang ge haizi.
       Mary   make-ASP marrage Ø birth-ASP two   CL child
       '**Mary** got married and **(she)** born 2 children.'

   b.?? **Xiao Mei_i** jie-le   hun,   **ta_i** sheng-le   liang ge haizi.
        Mary   make-ASP marrage she birth-ASP two   CL child
        'Mary got married and **she** born 2 children.'

As seen in (33)–(34), null pronouns are preferred for pragmatic purposes, namely to avoid repetition. Overt opronouns in these contexts do not cause ungrammaticality but are

dispreferred. In addition, both null and overt subjects refer to the referents in the initial position of the preceding clauses, i.e. topics. In the following sections, I will discuss null and overt arguments in greater detail based on thse observations.

2.2.2.1 Identification of Chinese null arguments

Huang (1984) suggests that null subjects and null objects are traces bound by topics. In Chinese, null arguments are identified by the discourse or the context of the utterance. The subject position in matrix clauses cannot be identified by agreement (in contrast with Italian and Spanish, cf. (15) and (16)). Without any antecedent in the previous discourse, the object position in matrix clauses can be interpreted as anyone or anything, as in (35).

(35) Zhangsan kanjian Ø le.
    Zhangsan see   Ø LE
    'Zhangsan saw me/you/her/it/...'

In embedded clauses, null subjects are identified by being bound by the topic (T(opic)-bound null subjects) as in (36a). As for embedded objects, null arguments here can only refer to a discourse topic, as seen in (36b).

(36) Speaker A: Zhangsan$_i$ kanjian Lisi$_j$ le   ma?
            Zhangsan   see   Lisi ASP Q
            'Did Zhangsan see Lisi?'

    Speaker B: a.Wo xiang Ø$_i$ kanjian Lisi le.
            I   think Ø see   Lisi ASP
            'I think that he saw Lisi.'

            b.Wo xiang Zhangsan kanjian Ø$_j$ le.
             I   think Zhangsan   see   Ø ASP
            'I think that Zhangsan saw him.'

          c. Zhangsan$_i$ shou Ø$_i$ kanjian Lisi le.
           Zhangsan say Ø see   Lisi ASP
           'Zhangsan said that he (Zhangsan) saw Lisi.'

As shown in (36b), embedded null objects can only be co-referential with and be bound by the discourse topic (T-bound null objects) which in this case is *Lisi*. T-bound null objects in

Chinese are subject to Principle C of Binding theory (Chomsky, 1981). So Chinese freely allows null subjects and null objects. On the basis of (36c) one might argue that embedded null subjects can be identified by the c-commanding nominal (A-bound null subjects). Recall that topicalisation is obligatory in Chinese, which means that at least one argument has been fronted to a sentence-initial position (Huang, 1984). Furthermore, Chinese null arguments are licensed and identified by the obligatory topic. Therefore, null subject in sentences like (36c) is in fact bound by the topic, *Zhangsan*, as illustrated in (37).

(37)   [$_{topic}$ Zhangsan$_i$ [Ø$_i$ shou [Ø$_i$ kanjian Lisi le]]].
            Zhangsan   Ø say   Ø   see   Lisi ASP
        'Zhangsan said that he saw Lisi.'

Example (38) illustrates how a null subject chooses its antecedent. A null subject is identified by the topic. The null subject in (38a) is as co-referential with the topic antecedent - *Zhangsan* - or as another alient person in the discourse. In (38b), an embedded null subject is interpreted as *Zhangsan* or as another alient person in the discourse, but not as co-referential with the matrix object, *Lisi*.

(38) a. [$_{topic}$ Zhangsan$_i$ [Ø$_i$ dui Lisi$_j$ shuo [Ø$_{i/*j/k}$ kanjian Xiaowang le]]].
            Zhangsan Ø   to   Lisi say   Ø   see   Xiaowang ASP
            'Zhangsan$_i$ says to Lisi$_j$ that he$_{i/*j/k}$ saw Xiaowang.'

      b. [$_{topic}$ Zhangsan$_i$ [Ø$_i$ yiwei [Lisi$_j$ zhidao [Ø$_{i/*j/k}$ kaoshi bu   jige]]]].
            Zhangsan Ø   think Lisi   know   Ø   exam   not pass
            'Zhangsan thinks Lisi knows that he$_{i/*j/k}$ didn't pass the exam.'

In coordinated clauses as in (39)–(40), null arguments are identified by an antecedent in the preceding clause, as illustrated in (39). In (40), the null subject in the second conjoined clause can only be co-referential with the topic antecedent *Zhangsan*, but not *Lisi*.

(39) a. John$_i$ du   le   Halibote   xiaoshuo, Ø$_i$ you kan le   dianyir.
        John read ASP Harry Potter novel   Ø also see ASP movie
        'John read the Harry Potter novel and he also saw the film.'

b. John kan le   dianyir$_i$, wo you kan le   Ø$_i$.
   John see ASP movie   I   also see ASP Ø
   'John saw the film and I also saw it.'

(40) [$_{topic}$ Zhangsan$_i$ [Ø$_i$ gei   Lisi$_j$ ben shu], [ranhou   Ø$_i$ likai le]].
         Zhangsan Ø   give Lisi CL   book after   Ø leave ASP
         'Zhangsan gave Lisi a book and then he (Zhangsan) left.'

Recall that multiple topics are allowed in Chinese and that there is no overt syntactic element in the syntax to indicate gender or number. Consider (41a): in the preceding sentence, the conjunction *gen* ('with') connects two NPs. Therefore two NPs - *John* and *Mary* - are topicalised and moved to the topic position. The null subject in the following clause is then co-referential with *John and Mary*:

(41) [$_{topic}$ John$_i$ gen Mary$_j$ [Ø$_{i+j}$ qu hua chuan], [Ø$_{i+j}$ diao le   yi   ge zhongtou yu]].
         John with Mary   go row boat,   Ø   fish ASP one CL hour   fish
       'John went rowing with Mary and they fished for an hour.'

The identification of null argument is not therefore locally determined but determined using the discourse context.

2.2.2.2 Identification of Chinese overt arguments

Chinese also has an overt third person singular pronoun *ta*. In addition to the null pronoun, Chinese allows the overt pronoun *ta* in subject position (42a) and in the object position (42b).

(42) a. Ta/Ø xihuan Xiao Zhang.
        he/Ø like   Xiao Zhang
        'He likes   Xiao Zhang.'

     b. Xiao Zhang xihuan ta/Ø.
        Xiao Zhang   like   him/Ø
        'Xiao Zhang likes him.'

The distribution of null and overt pronoun in argument positions is constrained by pragmatic rules in discourse. Compare the sentences below:

(43) a. [_{topic} Zhangsan_i [Ø_i xihuan Lao Wang], [Ø_i bu xihuan Lisi]]
          Zhangsan Ø like   Lao Wang, Ø not like   Lisi
          'Zhangsan likes Lao Wang but he doesn't like Lisi.'

      b. ??[_{topic} Zhangsan_i [Ø_i xihuan Lao Wang], [ta_i bu xihuan Lisi]
          Zhangsan Ø   like   Lao Wang   he not like   Lisi
          'Zhangsan likes Lao Wang, but he doesn't like Lisi.'

      c. [_{topic} Zhangsan_i [Ø_i xihuan Lao Wang_j], [_{topic} Ø_j [Lisi bu xihuan Ø_j]
          Zhangsan Ø   like   Lao Wang   Ø Lisi not like Ø
          'Zhangsan likes Lao Wang, but Lisi doesn't like him.'

      d. ?? [_{topic} Zhangsan_i [Ø_i xihuan Lao Wang_j], [_{topic} Ø_j [Lisi bu   xihuan ta_j]
          Zhangsan Ø like   Lao Wang   Ø Lisi not like   he
          'Zhangsan likes Lao Wang, but Lisi doesn't like him.'

In (43a), the null subject is co-referentia with the topic antecedent *Zhangsan*. The overt pronoun *ta* in (43b) is also grammatical but is considered redundant (Tai, 1978, also see (33)-(34)). Chinese overt pronouns are also associated with the topic of the sentence. In other words, overt pronouns are repetition of the topic. Overt pronouns are not considered redundant if they are used to highlight the old topic in written Chinese. Such 'highlighting' is generally marked by phonological stress in spoken Chinese. In (43b), *Zhangsan* is the topic and is such is not. A null object in a sentence like (43c) is bound by the null topic which is identified through the topic chain, here *Lao Wang*. Again, the overt pronoun *ta* in (43d) is redundant as it is co-referential with the already overtly expressed topic. However, overt pronouns are useful for signalling contrastive focus, as in (44):

(44) Speaker A: [_{topic} Wo_i[Ø_i jian guo Lao Wang_j], [_{topic} Ø_j[Lisi ye   jian guo   Ø_j]

              I   Ø   see EXP Lao Wang   Ø Lisi also see   EXP   Ø
              'I saw Lao Wang. Lisi also saw him (Lao Wang).'

    Speaker B: a. [_{topic} Ø_j[Wo ye   jian guo Ø_j].
                  I   also see EXP Ø
                  'I also saw him (Lao Wang).'

             b. ?? [_{topic} Ø_j[Wo ye   jian guo ta_j].
                  I   also see EXP he
                  'I also saw him (Lao Wang).'

c. [_{topic} **TA**_j, [wo jian guo Ø_j].
          he, I see EXP Ø
          '**Him** (Lao Wang), I saw.'

(44a) shows that the overt subject pronoun 'I' signals the start of a turn by a different speaker. The null object pronoun is then used to avoid repeating the topic Lao Wang. This is the kind of answer a native Chinese speaker would give. (44b) is acceptable but the overt object pronoun *ta* is considered redundant. However, in (44c) *ta* is fronted and therefore receives a contrastive focus interpretation.

Nonetheless, the overt pronoun *ta* is not always interpreted in the same way as null pronouns. *Ta* in the embedded subject position in (45a) and the embedded object position in (45c) are co-referential with the topic and therefore refer to either the topic antecedent *Xiao Zhang* or another salient person in the discourse (if there is one). Compare this with sentences (45b) and (45d). A null pronoun in the subject position refers to the topic antecedent in (45b), whereas a null pronoun in the object position can only refer to the discourse topic (45d).

(45)   a. [_{topic} Ø_j] [_{topic} Xiao Zhang_i [Ø_i shuo [ta_{i/j} xihuan Lao Wang]]].
              Xiao Zhang Ø say he like   Lao Wang
              'Xiao Zhang says that he (Xiao Zhang or a salient person) likes Lao Wang.'

      b. [_{topic} Ø_j] [_{topic} Xiao Zhang_i [Ø_i shuo [Ø_{i/j} xihuan Lao Wang]]].
              Xiao Zhang Ø   say Ø like Lao Wang
              'Xiao Zhang says that he (Xiao Zhang or a salient person) likes Lao Wang.'

      c. [_{topic} Ø_j] [_{topic} Xiao Zhang_i [Ø_i shuo [Lao Wang xihuan ta_{i/j}]]].
              Xiao Zhang Ø   say Lao Wang like   he
              'Xiao Zhang_i says that Lao Wang likes him (Xiao Zhang or a salient person).'

      d. [_{topic} Ø_j] [_{topic} Zhangsan_i [Ø_i shuo [Lao Wang xihuan Ø_{*i/j}]]].
              Zhangsan Ø say Lao Wang like   Ø
              'Zhangsan says that Lao Wang likes him (a salient person).'

To summarize, Chinese, like other null-subject languages, permits both null and overt pronouns in argument positions. Huang (1982) finds that Chinese embedded null subjects

can refer to either a topic antecedent or a salient discourse entity (a topic in discourse). This is also true of embedded overt subjects as seen in (46):

(46) a. Zhangsan$_i$ shuo Ø$_{i/j}$ xihuan qu hua chuan.
     Zhangsan say   Ø   like   go row boat
     'Zhangsan said he (Zhangsan or a salient person) likes to go rowing.'

    b. Zhangsan$_i$ shuo ta$_{i/j}$ xihuan qu hua chuan.
     Zhangsan say   he   like   go row boat
     'Zhangsan said he (Zhangsan or a salient person) likes to go rowing.'

As mentioned earlier, a null element in the embedded object position can only refer to a topic in discourse, not the topic antecedent, *Zhangsan* (see 47a). In contrast, *ta* 'he' in the embedded object position can refer to either the topic antecedent or a discourse topic, as shown in (47b):

(47)   a. Zhangsan$_i$ shuo Lisi jian guo   Ø$_{*i/j}$
      Zhangsan say   Lisi see EXP   Ø
       'Zhangsan says that Lisi saw him/her (salient person).'

    b. Zhangsan$_i$ shuo Lao Wang jian guo ta$_{i/j}$.
     Zhangsan say   Lao Wang see EXP he
     'Zhangsan says Lao Wang saw him (Zhangsan or salient person).'

However, the experiment I will conduct focuses on how to interpret null and overt subjects which are co-referential with topics. In other words, I will concentrate on the locus of the interface between syntax and discourse pragmatics.

This section outlines the properties of Chinese null arguments and its linguistic analyses for these properties. Different interpretations of null and overt subject were also discussed. In the next section, I will focus on differences in null and overt argumrnts in Chinese and English. The interpretation of null and overt subjects in the adjoined clauses and embedded clauses will be discussed in great detail. I will also discuss Italian-type pro-drop languages to present the full paradigm.

2.3 Differences between Chinese, Italian, and English

This thesis investigates the acquisition of Chinese null arguments by native

English-speaking children and adults. In addition to the properties of Chinese null arguments, it is necessary to consider the relevant properties in the participants' L1, English. Recall that English is a 'hot' language that does not allow null subject or object pronouns in tensed sentences. Italian, Spanish and Greek are languages that allow null subject pronouns in tensed sentences. Null object pronouns, like in English, are not allowed. In this section, differences between Italian-type language and English will be presented before discussing the difference between Chinese and English.

2.3.1 Null subjects in Italian-type languages

Greek, Italian and Spanish allow null subjects where English would have unstressed overt pronouns (448a). Overt subject pronouns in Italian-type languages are used like stressed pronouns in English (48b). Consider the examples (from Serratrice et al., 2004, p. 186):

(48) a. L'ho   visto.
       (I) cl. have-1s   seen-MASC-SG
       'I saw him.'

     b. Ho visto   LUI non LEI.
        (I) have seen   him not her
        'I saw HIM not HER.'

As discussed earlier, null subjects in Italian, Spanish, and Greek are more freely available than in English. This is believed to be due to their rich inflectional paradigms. In these languages the verb inflects for person, number and gender to agree with the grammatical subject.

Overt subject pronouns are also available in Italian, as in example (49d). The distribution of null and overt subject pronouns is once more subject to discourse constraints. The distribution of null or overt subject pronouns in referential contexts depends on discourse pragmatic factors including topicality (Serratrice, 2004; Montrul & Louro, 2006) as shown in (49a-b), the introduction of a new or different referent (49c) or contrastive focus (49d). Spanish examples from Montrul & Louro, 2006, p. 404:

(49) a. Pepe no vino hoy   a trabajar.   *Pepe/?el/ Ø estara   enfermo.
         Pepe no came today to work   Pepe/?he/ Ø   will be   sick
         'Pepe did not come to work today. He must be sick.'

same referent/ topic

    b. Quien vino? El/Mario/*Ø   vino.
       who   came? He/Mario/*Ø came
       'Who came? He/Mario came.'

topic

    c. Hoy   no fui   a trabajar. Pepe/el/*Ø penso   que estaba enferma.
       today no went to work.   Pepe/he/*Ø thought that was   sick
       'Today I did not go to work. Pepe/He thought that I was sick.'

different referent/ topic shift

    d. El periodista$_i$ dijo que **el$_i$**/ Ø$_i$ no   habia escrito   ese   reporte.
        the journalist said that he   not   had   written   that   report
        'The journalist said that **he (himself)** had not written that report.'

contrastive focus

In (49a), *Pepe* is the topic. Therefore, the presence of a full NP co-referential with *Pepe* in the second sentence violates pragmatic constraints on topicality and is ungrammatical. By the same token the overt pronoun *el* 'he' is not natural here either. Only when a null option appears in the subject position is the sentence is both grammatical and fully acceptable. Contrast this with the pragmatic situation in (49b): new information is expressed in the answering sentence so the referential NP and the overt subject pronoun are grammatical, but the null subject is not. As for (49c), according to Sorace (2000), the use of overt subjects in a pro-drop language grammars is related to topic-shift, that is when a referent different from the antecedent in the preceding sentence or clause is introduced. Therefore, as the NPs are not co-referential in (49c), both the referential NP and overt pronoun are grammatical in the embedded clause, whereas a null subject is ungrammatical. In (49d), the overt pronoun *el* is allowed because it is used to contrast the journalist with another person.

Furthermore, the null pronoun is obligatory in non-referential contexts such as in existential verbalizations in (50a), weather predicate in (50b), and impersonal expressions in (50c); examples from Montrul & Louro, 2006, p. 405:

(50) a. Ø Hay   poco trabajo.
      Ø there is   little work
      'There is little work.'   *existential*

    b. Ø Llueve mucho en primavera.
      Ø rains   a lot   in spring
      'It rains a lot in spring.'   *weather verb*

    c. ØEs obvio   que Ø   va   a   nevar.
      Øis   obvious   that Ø   is going   to   snow
      'It is obvious that it is going to snow.'   *impersonal expression*

In pro-drop languages such as Spanish and Italian, an overt subject pronoun has the [+topic] or [+focus] feature.

How then do null pronouns in Italian and Spanish choose their antecedent? The null subject can be null if it is co-referential with the topic antecedent (51a). However, overt pronouns are a marked option signalling a shift of topic or focus. The distribution of null and overt pronouns in subject position is therefore constrained by pragmatic rules; while interpretation of null and overt pronouns differs depending on where the antecedent is. Carminati (2005) explains that "the null pronoun prefers an antecedent which is in the Spec IP position (or in the AgrS position under Pollocks split INFL hypothesis), while the overt pronoun prefers an antecedent which is not in the Spec IP position" (p. 33). This is shown in (51a–b). In intra-sentential anaphora like in (51a–d), null pronouns have a subject preference, while overt pronouns have a non-subject preference. An overt subject pronoun cannot be co-referential freely with the antecedent in the adjoined clause, as in (51b–c). The overt subject pronoun in (51b) can only refer to the object *Maria*, showing its non-subject preference, while the overt subject pronoun with prosodic contrast in (51c) has a contrastive focus interpretation and refers to the subject *Laur*). As for English, there are no such restrictions on co-referentiality with subject pronouns (51d). As shown in (51d), overt pronoun *she* can refer to either *Laura* (the subject) or *Maria* (the non-subject).

(51) a.Ieri   Laura$_i$ e   uscita   con Paolo. Ø$_i$ Si   e   divertita molto.
      yesterday Laura is-3SG gone-F out with Paolo *pro* herself is-3SG enjoyed-F very much
      'Yesterday Laura went out with Paolo. She (Laura) had a very good time.'

b.Laura$_i$ ha abbracciato Maria$_j$ e poi lei$_{j/*i}$ e uscita.
 Laura have-3SG hugged Maria and then she is-3SG gone out
 'Laura hugged Maria and then she (Maria) went out.'

c.Laura$_i$ ha abbracciato Maria$_j$ e poi LEI$_{i/*j}$ e uscita.
 Laura have-3SG hugged Maria and then she is-3SG gone out
 'Laura hugged Maria and then SHE (Laura) went out.'

d. Laura$_i$ hugged Maria$_j$ and then she$_{i/j}$ left.

<div align="right">(Serratrice et al., 2004, p. 186)</div>

Objects, however, are obligatory in both languages regardless of pragmatic conditions. In Italian, objects are expressed as post-verbal noun phrases, for example *la sua amica* in (52a) or as weak clitic pronouns in pre-verbal position such as *l'* in (52c). As for English objects, noun phrases or pronouns are always overt and found post-verbally, as shown in (52b) and (52d):

(52) a. Laura ha incontrato la sua amica.
 Laura have-3SG met the her friend
 'Laura met her friend.'

 b. Laura watched a film.

 c. Laura l'ha vista.
 Laura her have-3SG seen
 'Laura saw her.'

 d. Laura saw her.

<div align="right">(Serratrice et al., 2004, p. 186)</div>

Pre-verbal object pronouns in Italian are analysed as weak clitic pronouns (*l'*), as in (53a), while post-verbal pronominal object pronouns *lui* and *lei* are strong pronouns with a [+focus] feature, as in (53b). English also has strong pronouns in post-verbal position can be found in English, but this position is not associated with focus, unlike in Italian and Spanish. English objects are only interpreted as focused if they are prosodically contrasted, as in (54; Serratrice et al., 2004, p. 186):

(53) a. L'ho   visto.
     (I) him have-1s   seen-MASC-SG
     'I saw him.'

   b. Ho   visto LUI non LEI.
      (I) have-1s   saw him not her
      'I saw HIM not HER.'

(54) I saw him. vs   I saw HIM not HER.

Overt subjects in English are not subject to discourse pragmatic rules in simple typical contexts, though topic-drop can occur in a restricted number of contexts for example diary-drop contexts, which I will discuss in detail in the next section. The realization of overt objects is not constrained by pragmatic conditions either in English or Italian-type pro-drop languages.

Italian and Spanish do not allow null objects, except for contexts in which a null object is interpreted as an indefinite pronoun, as in (55) and (56):

(55) Speaker A: Compraste café?
               bought   coffee
               'Did you buy coffee?'

    Speaker B: Si, compre Ø.
               yes bought *pro*
               'Yes, I bought some.'   (Campos, 1986, p. 354)

(56) a. Questa decisione rende   la   gente/Ø   felici.
        this   decision   make   the   people   happy
        'This decision makes people happy.'

    b. Questa decisione non rende   tutti/Ø   felici.
       this   decision   not make   everyone   happy
       'This decision doesn't make everyone happy.'

                                                        (Rizzi, 1986, p. 516)

The null object is permitted in Speaker B's speech in (55) because it has an indefinite reading. In (56), when an indefinite NP such as 'people' or 'everyone' appears in object position, it can also be expressed using a null pronoun. According to Rizzi (1986), the null objects in (56) have no antecedent but it has the same characteristics as a generic

pronominal element. This type of null object is [-anaphoric, +pronominal], hence it is a *pro*. Due to its characteristics *pro* is subject to binding principle B. The null object may be bound by the NP outside its governing category, but not any NPs within it, as illustrated in (57):

(57) a. $NP_i \ldots [_{GC} \ldots pro_i \ldots]$

  b. $*[_{GC} \ldots NP_i \ldots pro_i \ldots]$

<div align="right">(Rizzi, 1986, p. 510)</div>

According to Rizzi (1986), this type of null object has no antecedent at all. This means that Italian and Spanish null objects are not traces. Recall that Chinese null objects are analysed as traces bound by a topic which is salient in the discourse. Null objects (as well as null subjects) in Chinese are therefore structurally different from those in Italian and Spanish.

2.3.2 Differences between Chinese and English

2.3.2.1 Syntactic structure

Following Huang's (1984) analysis of Chinese null subject and null object, I will assume that the topic position in Chinese [Spec, CP] is an obligatory position that must be filled by at least one element. In English, however, topicalisation is optional. Although English does not allow null subjects and null objects except in restricted contexts such as diary-drop and co-ordination, topicalisation is possible in sentences such as the ones below:

(58) Speaker A: Do people like Harry Potter$_i$?

   Speaker B: a. Harry Potter$_i$, many people like t_i.

      b. * $\emptyset_i$, Many people like $\emptyset_i$.

      c. $[_{topic} \emptyset_i [$hen dou ren xihuan $\emptyset_i]$

        $\emptyset$ very many man like $\emptyset$
      'Many prople like Harry Potter.'

In sentence like (58a) the object is moved leftward in order to be topicalised. The object 'Harry Potter' is consequently interpreted as being emphasized. However, the topic 'Harry Potter' cannot be null, as (58b) shows. Recall that null topics are allowed in Chinese; hence (58c) is grammatical (see Section 2.2.1).

2.3.2.1.1 Null subject analyses in English

The specifier of IP in tensed clauses--the position occupied by the subject—is either filled directly by a lexical NP or overt/expletive pronoun, as shown in (59a-d), or through the movement of an argument from a post-verbal position into the specifier, as in (59e).

(59) a. Mary came.
    b. She came.
    c. Here comes the bus.
    d. It is raining.
    e. The bus$_i$ comes Ø$_i$.

In English, the specifier of a tensed IP in sentences as in (60) is not permitted to be null:

(60) a. *Came
    b. *Comes the bus
    c. *is raining

Only in restricted contexts does adult English allow null subjects: diary drop contexts (61), coordinated clauses (62)[3], progressive participle constructions (63), and questions with an implied second person (64) (Haegeman, 1990; 1997; Zwanziger et al., 2003)

(61) Got up, had a shower and went to work.

(62) He left the office and Ø went to the cinema.

---

[3] One might argue that this does not count as an example of a null subject, as it could be just the VPs which are co-ordinated. Detailed discuss see Haegeman (1990; 1997).

(63) Speaker A: What are they doing?

      Speaker B: Singing.

(64) Want to go for a drink?

However, null elements are not allowed in embedded clauses or CPs with an overt C-head, nor when the subject is third person (Haegeman, 1990):

(65)   a. *Guess what (I) won?

        b. *How do (you) go to school?

        c. * (He) woke up, (he) had a shower and (he) went to school.

Haegeman (2007) analyses adult null subjects in spoken English and written diary-style contexts. She adopts Rizzi's (2006) version of a phase-based approach to Spell-out[4]. In the original proposal, the complement of the phase head is sent to spell-out as soon as a phase category is formed, according to a successive-cyclic derivation of clauses. In order not to be pronounced, the moved elements always transit via an intermediate position on the phase edge, as in (66):

(66) [$_{CP}$ which book$_i$ do [$_{IP}$ you think [$_{CP}$ Ø$_i$ [$_{IP}$ we should read Ø$_i$]]]

                                             (Adapted from Haegeman 2007, p. 105)

In (66), the DP *which book* originates in the complement clause and moves to the specifier of the main clause. In (66) the root phase is the CP. This then means that the moved wh-element *which book* in [Spec, CP] and the auxiliary *do* in C will not be sent to Spell-out. However, Rizzi (2006) does not assume that CP is the root phase. Instead, he proposes that CP can be decomposed into a hierarchical sequence of specialized projections as in (67a). Example (66) can therefore be recast as (67b):

---

[4] See Chomsky (2001) for detailed discussion.

(67) a ForceP > TopP > FocP > FinP > TP

    b. [$_{ForceP}$ [$_{Force}$ Ø] [$_{FocP}$ which book$_i$ do [$_{IP}$ you think [$_{CP}$ Ø$_i$ [$_{IP}$ we should read Ø$_i$]]]]]

<div align="right">(Adapted from Haegeman 2007, p. 106)</div>

Haegeman (2007) suggests that English null subjects are restricted to the edge of the root phase and implements Rizzi's (2006) phase-based spell-out analysis of null subject in language acquisition. Haegeman (2007) proposes that TP is a possible root phase in English, but that Topic Phrase (TopP) is not. In this case, the complement of T will be pronounced but the specifier of this root phase, the subject, and the T head will not be pronounced. The examples in (68) below show that subjects are not always pronounced:

(68) a. [$_{TP}$ (I) [$_{vP}$ Came to England a couple of days ago.]]

    b. [$_{TP}$ (It) [$_{vP}$ Looks like rain.]]   (Haegeman, 2007, p. 108)

However, the subject must be pronounced in the context of fronted arguments. The examples in (69) are ungrammatical because the fronted arguments move to TopP. The subject *I* is in the [Spec, TP] position, which is not the specifier of the root phase and must be pronounced:

(69) a. *[$_{TopP}$ More problems [$_{TP}$ don't need.]]

    b. [$_{ForceP}$ [$_{TopP}$ More problems [$_{TP}$ I don't need.]]]   (Haegeman, 2007, p. 108)

Haegeman (1997; 2007) also analyses null subjects in diary contexts ((70a) & (70b)) and in co-ordinated clauses ((70a') & (70b')). She finds that in English, an overt antecedent in the preceding conjunct is required to license a null subject in co-ordinated clauses (Haegeman, 1997; 2007), as seen in (70a') and (70b'). The null subject in (70a) and (70b)is equivalent to that in the second conjunct of (70a') and (70b'):

(70) a. [$_{TP}$ Ø [$_{vP}$ Went to the cinema.]]

    a'. [$_{ForceP}$ [$_{TopP}$ He$_i$ [$_{TP}$ Ø$_i$ [$_{vP}$ left the office]] and [$_{TP}$ Ø$_i$ [$_{vP}$ went to the cinema.]

<div align="right">(Adapted from Haegeman, 1997, p. 241)</div>

b. [TP Ø [vP Felt like midnight.]]

b' [ForceP [TopP It$_i$ [TP Ø$_i$ [vP was half past seven]] and [TP Ø$_i$ [vP felt like midnight.]

(Adapted from Haegeman, 2007, p. 117)

In the co-ordinated clause, (70b), the subject in the second clause is null provided there is a specific referent in the preceding clause. In the context of embedded clauses, subjects will always remain in the complement of a higher phase and hence will be pronounced:

(71) [ForceP1 I think [ForceP2 that [TP I will not see her again.]]]   (Haegeman, 2007, p. 113)

In English arguments in TopP must be pronounced. However, null topics (i.e. 'topic-drop' in Haegeman, 1997) can be found in diary contexts (Haegeman, 1990):

(72) (topic)$_i$ Ø$_i$ Went out last night, Ø$_t$ saw Mary, Ø$_i$ talked with her a while.

As (72) shows, the null topic was not previously introduced in the discourse. These kinds of null subjects tend to be interpreted as first person singular *I*.

2.3.2.2 Interpretive effects

As mentioned in Section 2.2.1, the obligatory topic in Chinese constrains the distribution of null and overt subject pronouns and their interpretation. Before turning to the interpretive effects on null and overt subjects, I will briefly discuss the different pragmatic strategies that Chinese and English apply to interpret null subjects.

2.3.2.2.1 Different pragmatic strategies

Topics in [Spec CP] licence and identify null arguments in Chinese. However, without any previous discourse context, there is no element which can act as an antecedent for null arguments. This means that null arguments can be interpreted as any person, number or gender in this context:

(73) Ø xihuan yinyue. Ø Xiang   ge   chang.
     Ø like   music. Ø   want to song sing
     'I/you/he/it/we/they… like(s) music. I/you/he/it/we/they… want(s) to sing a song.'

Recall that this kind of null subject sentence is grammatical in Englishdiary-drop too. The null subject in English diary-drop, however, would be predominately be interpreted as first-person (cf. (73)):

(74) a. (I) Like music. (I) Want to sing and dance.

These examples show that although null subject sentences are possible in both Chinese and English (in diary-drop contexts) and that null subjects are both topic-bound, their interpretation is different.

2.3.2.2.2 Null subject interpretation

In the case of co-ordinated clauses, Chinese null subject pronouns are bound by topic and are co-referential with the topic:

(75) [$_{topic}$ Xiao Mei$_i$ [Ø$_i$ poacha   gei Lao Wang$_j$], [renhou Ø$_{i/*j}$ chuqu   le].
     Xiao Mei Ø   make tea   give Lao Wang   after   Ø   go out ASP
     'Xiao Mei made tea for Lao Wang and then she (Xiao Mei) went out.'

(76) [$_{topic}$ Xiao Mei$_i$ gen Lao Wang$_j$ [Ø$_{i+j}$ he   cha], [renhou Ø$_{i+j}$ chuqu   le].
     Xiao Mei with Lao Wang Ø   drink tea   after   Ø   go out   ASP
     'Xiao Mei had tea with Lao Wang and then they went out.'

As exemplified in (75) and (76), there are two possible interpretations of null subjects in the adjoined clauses. In (75), the subject in the first clause, *Xiao Mei,* is topicalised and the null subject in the adjoined clause is interpreted as co-referential with this topic, *Xiao Mei*. The first clause in (76) can be interpreted as 'Xiao Mei and Lao Wang had tea together' as Chinese allows more than one element to be topicalised. Consequently, null subject in the adjoined clause is co-referential with both topics *Xiao Mei* and *Lao Wang*. Note that not every sentence with *gen* 'with' can be interpreted in this way. Consider the following examples:

(77) John$_i$ gen Mary$_j$ qiuhun,　　　　danshi Ø$_{i/*j}$ shibai le.
　　John with Mary propose marriage but　Ø　fail　ASP
　'John proposed to Mary, but he failed'

(78) John$_i$ gen Mary$_j$ qiuhun,　　　　renhou Ø$_{i+j}$ jiu　jiehun le.
　　John with Mary propose marriage after　Ø　FVP marry　ASP
　'John proposed to Mary, and then they get married.'

(79) John$_i$ gen Mary$_j$ jiehun hou, hen　kuai Ø$_{*i/j}$　jiu huaiyun le.
　　John with Mary marry after very quick Ø　　FVP pregnant ASP
　'After John married Mary, she was pregnant very soon.'

As examples (77)–(79) show, none of these examples can mean 'John and Mary…together'. In addition, the interpretation of null subjects is determined by the semantic meaning of the verbs involved. In (77), the subject of the verb *shibai* 'fail' in the second clause must be co-referential with the agent of the first clause, in this case, John. In (79), the verb *huaiyun* 'be pregnant' requires a female subject. Only *jiehun* 'marry' in (78) must take two arguments. The details of the semantic differences between the verbs in (77)-(79) are beyond the scope of this study so I will not discuss this further and such verbs will be avoided in the experimental design.

　　Chinese allows multiple topics. However, in English the null subject can only be co-referential with the subject antecedent as illustrated in (80)–(81). In (80), even though the adjunct word *with* connects two NPs, the null subject in the second clause can only be co-referential with the subject antecedent:

(80) John$_i$ gave Kevin$_j$ a gift and Ø$_i$ left.

(81) John$_i$ went out with Kevin$_j$ and Ø$_i$ had a great time.

　　In embedded clauses, null subjects can be co-referential with topic antecedent or a salient person in the discourse, as shown in (82) but co-referentiality with the object *Lisi* is dispreferred. In English, embedded null subjects are not allowed, as shown in (83):

(82) (topic)k [topic Zhangsani [Øi dui Lisij shuo [Øi/*j/k zhengzai jie dianhua]]].
    Zhangsan Ø to Lisi say Ø ASP answer telephone
  'Zhangsani says to Lisij that Øi/*j/k is answering the phone call.'

(83) *John says to Kevin that Ø is in danger.

To sum up, in Chinese, a null subject in the adjoined clause is bound by the sentential topic and is co-referential with the topic antecedent, as exemplified in (75)–(76). When a null element appears in the embedded subject position, it is co-referential with the topic antecedent or someone salient in the discourse, as in (82). In English, null subjects are pragmatically restricted in that one (and only one) antecedent is allowed, as shown in (80)–(81). However, embedded clauses null subjects are not permitted regardless of the availability of discourse referents as in (83).

2.3.2.2.3 Overt subject interpretation

Recall that overt pronouns in Chinese are highlighting differences or signal contrastive focus. As illustrated in (84), overt subject *ta* 'he' and overt object *wo* 'I' pronouns in answer (84b) are interpreted as focused elements with focus interpretation to emphasize that HE saw ME.

(84) Speaker A: Ta you kanjian ni ma?
     he have see you Q
     'Did he see you?'

  Speaker B: a. Ø Kanjian Ø le.
       Ø see   Ø ASP
       'He saw me.'

      b. Ta kanjian wo le, danshi Ø mei gen wo shuohua.
       he see I ASP but Ø no with I speak
       'HE saw ME, but did not say a word to me.'

Consider also the dialogue in (85). Every overt subject *wo* 'I' is used as to highligh different 'I's:

(85) Speaker A: Yanchanghui zai   nail?
      concert PROP where
      'Where is the concert taking place?'

 Speaker B: Zai litang.   Wo mei qu guo.
     PROP assembly hall I no go ASP
     'It's in the assembly hall. **I** haven't been there before.'

 Speaker C: Meiguanxi, wo qu guo.
     no matter I go ASP
     'It doesn't matter, **I**'ve been there.'

Wo as used by speaker B expresses the difference between speaker B and other people who have been there before. The w*o* used by speaker C distinguishes speaker B who hasn't been there from speaker C who has been there before. The same pragmatic strategies apply to the sentences like (86).

(86) a. Ø Bie peng Ø!
   Ø no touch Ø
   '(All salient people) Don't touch it!'

 b. **Ni** bie peng Ø!
  you no touch Ø
  'YOU don't touch it.'

The difference between (86a) and (86b) is that the null subject in (86a) could be anyone, while the overt subject in (86b) refers to a specific person. By using the overt subject pronoun *ni* 'you' in (86b) means that 'you' has a specific referent in contrast with any other salient person in the discourse - everyone but 'you' can touch it.

  Pragmatic constraints license and identify null subjects (and null objects) in Chinese. If an overt subject pronoun appears where a null subject pronoun is acceptable, the overt subject pronoun is associated with the discourse purpose of highlighting something or signalling contrastive focus.

  In Chinese sentences in which there are two antecedents, an overt subject pronoun highlights the topic. Recall that *ta* 's/he' is a third person singular pronoun. So the overt pronoun *ta* in adjoined clauses can only take one antecedent, which is the topic in the case of (87)–(88):

(87) [topic Xiao Mei_i [Ø_i poacha gei   Lao Wang_j], [renhou ta_{i/*j}   chuqu   le]].
       Xiao Mei Ø make tea give Lao Wang   after   s/he   go out   ASP
       'Xiao Mei made tea for Lao Wang and then s/he (Xiao Mei) went out.'

(88) [topic Xiao Mei_i [Ø_i gen   Lao Wang_j he   cha], [renhou ta_{i/*j} chuqu   le]].
       Xiao Mei Ø   with Lao Wang   drink tea   after   s/he go out   ASP
       'Xiao Mei had tea with Lao Wang and then s/he (Xiao Mei) went out.'

In English, overt pronominal subjects do not automatically highlight new information or signal contrastive focus. The overt pronominal subject *he* in (89)–(90) can refer to either *John* or *Kevin*[5].

(89) John_i gave Kevin_j a gift and then he_{i/j} left.

(90)   John_i says to Kevin_j that he_{i/j} is in danger.

The differences between Chinese and English are as follows. Chinese has an obligatory topic position at the leftmost edge of every sentence. Chinese topics are also associated with interpretive effects, including freely available multiple topics and free person/number/gender interpretation in the cases in which there is no discourse antecedent. In English, in contrast, topics only occur in restricted contexts and are preferentially read as first person. They are also not automatically interpreted as highlighting difference or signalling contrastive focus, as is the case in Chinese

2.4 Summary

In this chapter, cross-linguistic differences between Chinese and English regarding null arguments were presented and studies concerning null subjects in language acquisition discussed. Early studies focused on properties related to the Null Subject Parameter. However, there was also an awareness at that time that discourse-pragmatic properties were involved, particularly in data taken from production of connected discourse (such as

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[5] Native English informants note that they prefer (93) when the pronoun is co-referential with the subject, but that the object reading is also available.

compositions). White (1989) argued that if native speakers of non-null-subject languages use overt pronouns in their production, this is not a guarantee that they have failed to acquire the syntax of null arguments. It may simply be the case that they have not yet worked out the precise discourse considerations that govern the use of null versus overt pronouns. In other words, White suggests that there are two different factors that an English-speaking L2 learner of Chinese must acquire: (i) the fact that null arguments are syntactically permitted, and (ii) the pragmatically appropriate context in which null arguments are felicitous. Since overt pronouns in English are not regulated in the same way as Chinese subject pronouns, L2 Chinese learners of low proficiency are expected to predominantly use overt pronouns, or to use null and overt pronouns indiscriminately. Moreover, Sorace and Filiaci's (2006) findings suggest that syntax-discourse interface properties cause difficulties for L2 adult learners. Zhao's (2008) findings, however, indicate that syntax-discourse properties are eventually acquired by L2 Chinese adults.

The current study sets out to test the Interface Hypothesis. If interface properties can be acquired, L2 Chinese learners will have no problem in accepting null subjects and objects. English-speaking learners of Chinese, therefore, require both the correct syntactic knowledge of null arguments (i.e. that both null subjects and null objects are allowed) and the discourse conditions that govern the felicitous use of null arguments (i.e. that there is a topic antecedent in the discourse domain). Hence this phenomenon is to be found at the syntax discourse interface. In addition to the Interface Hypothesis, the current study also sets out to test the FDH by including L2 children (and L1 children) in the test. The FDH suggests that adult L2 acquisition stems from something other than UG. If L2 adults pass through the same developmental stages as those of L2 children, adult L2 acquisition, like child L2 acquisition is constrained by UG. Thus, the FDH would not be supported.

Chapter 3 Background

Introduction

The present study will investigate the acquisition of Chinese null arguments by comparing the developmental paths of between English adult and child L2 learners of Chinese and child L1 native speakers of Chinese. Developmental sequence data has been used largely in the debate on whether adult L2 acquisition is constrained by the same innate language mechanism as L1 acquisition (i.e. UG) or by a general learning mechanism (i.e. problem-solving approach). Studies on the Interface Hypothesis which address processing capability in L1 and L2 are discussed in this chapter. This chapter also presents studies of null arguments. These studies make specific predictions regarding the distribution of null subjects and the interpretation of both null and overt subjects in Chinese. The research questions derived from these studies form the basis of the study reported in Chapter 4.

3.1 Developmental Data

A conceptual problem in both native (L1) and non-native (L2) acquisition deals with how acquisition proceeds and language learning develops. It asks how learners move from one language development stage to another and how and why grammars develop in a certain way. The main focus of generative language development research for decades has been the logical problem of language acquisition. Researchers explore the developmental path that learners follow to attain their eventual knowledge of the language in order to explain the nature of learners' systems and how they ultimately attain complex linguistic knowledge on the basis of the input of the L2 to which they are exposed, if indeed they attain this knowledge. By analyzing stages of development, we can gain evidence to determine the similarities and differences which exist between types of acquisition—L1 and L2, child and adult, and monolingual and bilingual acquisition. It will also show to what extent these different types of acquisition are consistent and predictable. That the developmental paths are predictable is not a new idea (Brown, 1970) and it is also the key difference between non-generative and generative approaches to language acquisition. Consistency and predictability are well-recognised characteristics of L1 acquisition, and together with evidence of the Poverty of the Stimulus, they have been taken as an indication

of the role of UG in L1 acquisition (Chomsky, 1986). If UG is involved in L2 acquisition as well, consistency and predictability are expected. The present study compares the developmental sequence of both L1 and L2 Chinese to test the FDH (Bley-Vroman, 1989), which I will also discuss in detail in this chapter.

Input also plays a role in both L1 and L2 acquisition. As language-specific differences are expected, divergence in the learners' developmental paths is not unexpected. In the case of bilingual children, Sorace (2005) assumes that the developmental stages bilingual children go through should be parallel with those of monolingual children. Any differences between the paths of individual bilingual child participants could be the nature and the quantity of input to which these bilingual children are exposed. Even within L1 acquisition, some divergence occurs. This supports Schwartz's (1992) argument that there are differences in developmental stages between L1 and L2 learners and between L2 learners with different native language backgrounds (Schwartz, 1992). Schwartz's (1992) study suggests that the comparison of the development paths of L2 children and L2 adults is one way to test for UG involvement in adult L2 acquisition. That individual differences (input and L1 backgrounds) during the developmental process do not prevent learners from reaching similar levels of ultimate attainment in L2 acquisition provides evidence that UG is available to L2 learners (White, 1989; 2003).

The first step in addressing the language learning developmental is the observation and description of the developmental paths which learners follow. The identification of such paths requires establishing criteria which can be used to distinguish consecutive stages. Furthermore, overlap between stages and the variation within each stages itself once they have been determined must be accounted for. The existence of overlap and variation might be seen as a manifestation of optionality. The existence of optionality has been observed in both L1 and L2 acquisition (Hyams, 1996; Sorace, 2000; 2003; 2005; Serratrice et al., 2004; Sorace & Filiaci, 2006; White, 1992; Prevost & White, 2000). Optionality is characterized as the phenomenon in which more than one form of a given grammatical structure exists in L2 learners' interlanguage. Sorace (2000; 2004) observes that optional forms exist in L2 grammatical structures that are subject to the interface between syntax and the peripheral systems (e.g. discourse pragmatics). Interface condition properties are more unstable, and consequently, more vulnerable than pure syntax properties (Sorace, 2000; 2004; 2005;

Tsimpli et al., 2004). Lozano's (2006) study on the acquisition of Spanish word order which is constrained by pragmatic rules has shown that advanced learners still show indeterminacy. The nature of optionality and its source are still up for debate, in particular whether learners' systems exhibit consistency in their choices (Sorace, 2000). Underspecification has been considered a source of optionality for L1 acquisition (Hyams, 1996).

Recent research has shown that interfaces between syntactic knowledge and other linguistic domains are important in terms of developmental sequences and final outcomes (Sorace, 2003). The most vulnerable interfaces (i.e. interfaces between syntax and discourse pragmatics) cause difficulties in child 2L1 (bilingual) and adult L2 acquisition (2000; 2003; 2005). Sorace (2005) further claims that interfaces are the loci of L2 non-convergence.

In sum, by analyzing developmental data, we can explore the stages of language development and the possible explanations for differences between native and non-native acquisition. In the next section, I will turn to discuss the logical problem of second language acquisition in greater detail.

3.1.1 The logical problem of second language learning (Bley-Vroman, 1989)

In the field of second language acquisition (SLA), the debate between the UG-led acquisition approach and the fundamental difference hypothesis has been the focus of many studies. This section presents the fundamental difference hypothesis (FDH) proposed by Bley-Vroman (1989).

The majority of second language learners do not achieve the same level of competence as native speakers of the language. One of the arguments about adult second-language learning is that adult learners cannot learn the second language the way they have learned their first language (Bley-Vroman, 1989).

The logical problem of L1 acquisition is that the linguistic input available to children is underdetermined in terms of the complexities of adult grammar. Children acquire their native language system in its full complexity even when they are exposed to limited linguistic data. Chomsky (1986) has proposed that children are equipped with an

innate structure, UG, which consists of principles and parameters that provide certain options which will be set according to the language-specific data. Some researchers (Hawkins, 2001; Schwartz, 1992; Song & Schwartz, 2009; White, 1985; 1989; 2003) have argued that UG, whether directly or indirectly, is also available for L2 acquisition as in the case of L1 acquisition; while other researchers (Bley-Vroman, 1989) do not believe that UG is available in adult L2 learners. According to Bley-Vroman, adult learners can never learn a second language in the same way that they acquired their first language. Bley-Vroman believed that there is "the lack of general guaranteed success" for adult L2 learners. He pointed out:

One obvious possibility is that the innate system that guides child acquisition no longer operates in adult foreign language learning (or, more weakly, that its operation is partial and imperfect.). This would easily explain why foreign language learning is often a difficult and ultimately unsuccessful task. (Bley-Vroman, 1989, p. 41-42)

Bley-Vroman summarizes nine fundamental characteristics of adult foreign language learning which contrast with child language development and which are used to motivate the FDH. They are: (a) lack of success, (b) general failure, (c) variation in success, course, and strategy, (d) variation in goals, (e) fossilization, (f) indeterminate intuitions, (g) importance of instruction, (h) negative evidence, and (i) the role of affective factors (p. 43-49). He believed that the logical problem of adult L2 learning is that a uniquely language-oriented acquisition system operates in children when they acquire their native language but does not operate in adults. Without any domain-specific learning system, adult L2 acquisition resembles general adult learning which is fundamentally different from child L1 acquisition.

In his FDH, Bley-Vroman argued there are three kinds of basic differences between child and adult language acquisition: internal, linguistic, and qualitative. The internal difference is the difference in the internal cognitive state of adults and children. This difference stems from the unavailability of the language faculty rather than from a change in general learning ability. Finally, the difference between child language acquisition and adult second language learning is a qualitative, not merely a quantitative difference. The

domain-specific acquisition system is not available for adult L2 learners.

Bley-Vroman (1989) maintained that adult L2 acquisition stems from something other than UG, namely a problem-solving mechanism, while child L2 acquisition can still access UG. The adult L2 system never completely matches the adult L1 system. Working from Bley-Vroman's assertion that adult L2 learners cannot acquire the properties of the L2 which are underdetermined by the data, Schachter (1988) reported empirical evidence for this in support of the FDH. However, while Schachter (1988) and many other researchers have focused on differences between native and non-natives, Bley-Vroman et al. (1988) and other researchers have provided empirical evidence against the FDH by arguing that L2 adults are able to acquire properties of the target language which are underdetermined by the input data.

3.1.2 On the issue of completeness in second language acquisition (Schachter, 1988)

Schachter (1988) provides evidence that UG is not operational in second language acquisition using subjacency as a test case. Subjacency is a principle of UG which constrains the movement of *wh*-expressions. Taking English as an example, subjacency dictates that wh-movement may not take place over more than one bounding node at a time. The bounding nodes for English are clause (S) and noun phrase (NP), as illustrated in (1) below:

(1)   a. *What$_i$ [$_s$ did Mary wonder [$_s$ whether [John had brought t$_i$]]]
       b. *What$_i$ [$_s$ did Mary make [$_{NP}$ the claim [$_s$that [John had seen t$_i$]]]

In example (1a), the sentence is ungrammatical because the *wh*-word crosses two clauses after being extracted from its original clause where the trace *t* is located. In (1b), the sentence violates subjacency because the *wh*-word crosses two clauses and an NP. However, in example (2), the *wh*-word can pass through the intermediate *wh*-position without violating subjacency by moving over one clause or NP at a time.

(2) What$_i$ [$_s$ did Mary believe [$_s$ t$_i$ that [John had brought t$_i$]]]

L1 children are not explicitly taught the grammaticality of (3) and ungrammaticality of (4). The positive evidence from a naturalist input of English only exemplifies *wh-* in grammatical sentences, not ungrammatical ones. It is not clear how the restrictions in complex structures like in examples (1)–(2) are learned. L1 children possess knowledge of subjacency that goes far beyond the input to which they are actually exposed. There must therefore be an innate device (i.e. UG) which works with the input to provide children with complex knowledge of restrictions of subjacency, amongst other things.
claim that John had seen?

However, languages such as Japanese, Korean, and Chinese do not have *wh-*movement and are termed wh-in-situ languages. The *wh-*words stay in the positions in which they are base-generated rather than moving to the leftward position in the CP to form questions, in contrast with English *wh-*words which do move. In the Chinese example in (3), the *wh-*word stays in the embedded clause in the question:

(3) John yiwei Mary yao   zia   ga shou?
    John think Mary want marry to who
     'Who does John think that Mary wants to marry?'

(3) shows that the *wh-*word *shou* 'who' stays in the direct object position in the embedded clause. For L2 learners whose L1s do not have subjacency, their knowledge of *wh-*movement must be attributable to UG or L2 input. Schachter (1988) investigated the subjacency principle in L1 Korean and L1 Dutch learners of English. With respect to *wh-*movement and subjacency, Dutch is very similar to English, whereas Korean differs from English by forming *wh-*question in situ (as in the Chinese example in (3)). English *wh-*movement and subjacency were not taught explicitly to the participants. If Dutch speakers showed evidence of acquiring subjacency in English, this would be the result of either the availability of UG or L1 influence from Dutch. If Korean speakers, on the other hand, showed evidence of acquiring subjacency successfully, this could not be attributed to L1 influence.

Schachter (1988) conducted a grammaticality judgement task on 21 adult native speakers of Korean and 18 adult native speakers of Dutch. Both groups of speakers were recruited from advanced ESL classes. The tasks included both grammatical and

ungrammatical complex sentences. The results showed that native English L1 controls correctly accept grammatical sentences and reject sentences that violated subjacency. Schachter (1988) found that the L1 Korean speakers were native-like in judging the grammatical sentences, but failed to reject the ungrammatical ones. By contrast, L1 Dutch speakers were accurate in accepting the grammatical sentences and in rejecting ungrammatical subjacency violations.

She interpreted the results to mean that where L2 properties are similar to those in the learner's L1, learners can acquire target language properties by accessing their L1. Where the L1 had no similar properties, the target language property was not accessible for the L2 learners. This explains why L1 Korean speakers make non-target-like judgements with respect to subjacency in English. Schachter's (1988) study claims that UG is not available (or is only partly available) to L2 learners, and thus supports the FDH.

However, the results of Bley-Vroman, Felix, and Ioup (1988) suggest that L2 learners do acquire subjacency constraints which are not part of their L1. Bley-Vroman et al. (1988) again investigated the acquisition of subjacency by 92 adult L1 Korean advanced learners of English. They completed a grammatical judgement task concerned sentences with *wh*-movement and although the results showed that the L2 participants did not achieve the accuracy of native controls, they rejected ungrammatical sentences at a higher-than-chance rate. The study suggested that L2 input (both naturalistic and classroom input) underdetermines restrictions on English *wh*-movement. In contrast with Schachter (1988), the research by Bley-Vroman et al. suggested that UG is accessible in L2 acquisition.

3.1.3 Summary

From Bley-Vroman et al.'s (1988) and Schachter's (1988) studies, the question of UG availability remains unresolved. The present study seeks to provide evidence about this question. While many of the SLA studies compared L2 attainment with natives, Schwartz (1992) argued that the traditional ways which are used in L2 acquisition research were unable to determine whether or not UG was involved. She suggested that a comparison of the developmental paths of adult L2 with child L2 can inform the nature of adult L2 acquisition. Schwartz's (1992) suggestion provides a framework for methodology of the present study.

3.2 Testing between UG-based and problem-solving models of L2A (Schwartz, 1992)

Schwartz (1992) claims that by comparing the developmental sequence data from adult L2 and child L2 acquisition, researchers could answer the question of whether adult L2 acquisition is UG-led or is a case of general problem-solving. She points out the inadequacies in traditional methods of developmental sequence data collection and analysis. The first traditional approach compares the developmental paths of adult L2 learners with L1 native speakers of the target language. The data collected would show whether the developmental sequences of these two groups are the same, in which case L2 acquisition must be constrained by UG, or whether the paths are different, in which case there must be another learning mechanism involved. The problem with this method is that the differences may due to L1 influence. The second traditional method compares developmental sequences of adult L2 learners with different L1 language learners. The idea is to compare the stages of L2 development across a set of learners with different L1s, for example the acquisition of English by Arabic, Chinese, and Spanish L1 adults. Again, different developmental sequences may also be due to L1 influence, especially when the L2 learners all have different L1 backgrounds. Any similarity would be the result of UG involvement.

Schwartz (1992) claims that making a comparison between child L2 and adult L2 acquisition avoids these problems. She assumes that child L2, like child L1, is also driven by UG because they are generally more successful than adult learners. Furthermore, because L1/L2 children have full access to UG, general learning mechanisms are predominantly used by L2 adults, and that by comparing the developmental sequences of L2 children with those of L2 adults one could determine whether UG is involved in L2 acquisition generally or just in the case of L2 adults. In addition, L2 children share the same L1 constant with L2 adults. Schwartz argues that iff there is L1 transfer, similar developmental sequences should be found between L2 children and L2 adults. In her (1992) paper, she takes transfer in both groups as given. Therefore, similar developmental sequences in child L2 and in adult L2 would provide evidence for UG involvement in L2 acquisition generally, whereas different developmental paths would indicate that adult L2 acquisition is based on general cognitive learning principles while and child L2 acquisition stems from domain-specific principles. Her argument is schematised in (4):

(4) a. Child L2 development＝Adult L2 development (holding the L1 constant):

　　→Adult L2 acquisition is constrained by UG

　b.Child L2 development≠Adult L2 development (holding the L1 constant):

　　→Adult L2 acquisition is not constrained by UG

<div align="right">(Schwartz, 2004, p. 39)</div>

However, Schwartz (1992) does not say anything about whether her findings also hold for discourse-related language properties and how they interact with other linguistic domains. It was shown in the previous chapter that interaction between different language domains plays a crucial role in the acquisition of null arguments in Chinese. Note that the hypothesis, namely that the child L2 and adult L2 developmental sequence should be the same, is predicted by Schwartz's theory. The following sections discuss the studies applying the hypothesis and provide the empirical evidence that adult SLA is constrained by UG.

3.2.1 Testing the fundamental difference hypothesis (Song & Schwartz, 2009)

Song and Schwartz (2009) argued against the FDH using a particular method of analysing developmental data. They tested the FDH by examining the poverty-of-the-stimulus (POS) problem, comparing the performance of L1 English adult and child learners of Korean as an L2 whose L1 knowledge is by definition the same.

The phenomenon under investigation is *wh*-constructions with negative polarity items. Korean is a *wh*-in-situ language and the canonical word order is SOV, as shown in the *wh*-object questions in (5a) and (6a):

(5) a. Nonscrambled SOV word order
　　Swuna-ka **mwues-ul** sa-ass-ni?
　　Swuna-NOM **what-ACC** buy-PAST-Q
　b. Scrambled OSV word order
　　Mwues-ul Swuna-ka sa-ass-ni?
　　what-ACC Swuna-NOM buy-PAST-Q
　　'What did Swuna buy?'

(6)   a. Nonscrambled SOV word order

　　　Swuna-ka   **mwues-ul**   sa-ci anh-ass-ni?
　　　Swuna-NOM **what-ACC** buy-*ci* NEG-PAST-Q
　　b. Scrambled OSV word order
　　　Mwues-ul Swuna-ka   sa-ci   anh-ass-ni?
　　　what-ACC Swuna-NOM buy-*ci* NEG-PAST-Q
　　　'What didn't Swuna buy?'

<div align="right">(Song & Schwartz, 2009, p. 326)</div>

As shown in (5a) and (6a), the subject precedes the direct object in *wh*-object questions. The *wh*-object questions in (5b) and (6b) show OSV word order as the *wh*-word *mwues* 'what' has been scrambled. SOV and OSV orders are equally acceptable in positive (5) and negative (6) *wh*-questions given the appropriate discourse context. However, scrambling of the object is obligatory in a negative *wh*-question with a negative polarity item:

(7) a. Nonscrambled SOV word order
　　　*Amwuto **mwues-ul**   sa-ci   anh-ass-ni?
　　　Anyone   **what-ACC** buy-*ci* NEG-PAST-Q

　　b. Scrambled OSV word order
　　　Mwues-ul amwuto   sa-ci   anh-ass-ni?
　　　what-ACC anyone   buy-*ci*   NEG-PAST-Q
　　　'What didn't anyone buy?'

<div align="right">(Song & Schwartz, 2009, p. 326)</div>

As illustrated in (7b), OSV word order is obligatory in the *wh*-object question because of the presence of the negative polarity item *amwuto* 'anyone'. Korean does not have obligatory *wh*-movement but has scrambling, whereas English has obligatory *wh*-movement and does not have scrambling. Thus, for native English speakers learning Korean, they have to learn that scrambling is optional in a *wh*-object question in Korean, except in a negative *wh*-object question with a negative polarity item as the subject. According to Song and Schwartz (2009), these constraints in the target language input are rare and are neither in the L2 learners' first language nor taught in the L2 classroom. Therefore, L2 learners face a POS problem in their acquisition of Korean *wh*-constructions with negative polarity items.

　　　Four groups of participants took part in this study, namely L1 English adult learners

of L2 Korean and L1 English child learners of L2 Korean as well as L1 Korean children and L1 Korean adults. The participants completed three tasks: an elicited-production task, an acceptability-judgement task and an interpretation-verification task, together with an independent picture-narration task for the L2 learners to determine their proficiency in Korean.

The results from all the tasks show that the high proficiency L2 learners were native-like across all test conditions. This indicated that adult L2 learners are able to overcome the POS problem of Korean *wh*-constructions containing negative polarity items. Song and Schwartz (2009) found that the more proficient L2 learners are, the more target-like responses are found. They also inferred the L2 developmental sequence by L2 learners' proficiency results, finding that adult L2 learners and child L2 learners of similar proficiency perform at the same level of accuracy. The fact that adult and child L2 developmental paths are parallel indicates that both child and adult L2 acquisition is constrained by UG. Furthermore, the match between the developmental paths of the L2 adults and the L2 children or between L1 adult controls and high proficiency L2 children and adults strongly suggests that these learners' underlying representations were "equivalent to each other as well as, by extension, to the underlying representations of (developing and final-state) natives" (Song & Schwartz, 2009, p. 354). By examining whether child and adult L2 Chinese learners' underlying representations are equivalent to those of final-state Chinese natives I aim in the present study to bring new evidence to bear on whether adult L2 acquisition is different from child L2 and child L1 acquisition (thus providing evidence for the FDH) or whether they are the same (thus providing evidence for UG in all types of L2 acquisition.

The parallels in development between L2 adult and L2 children learners constitute compelling evidence for the hypothesis that UG constrains adult L2 acquisition. However, Song and Schwartz (2009) examined a phenomenon which is contained within the syntactic domain. They were not concerned with the interaction between different language domains. To find out how interface conditions might affect the developmental paths of L2 children and L2 adults, Unsworth (2005) carried out a study on L2 acquisition at the syntax-semantics interface by investigating whether L2 Dutch children and L2 adults acquire the properties of direct object scrambling.

3.2.2 Child L1, Child L2, and Adult L2 Acquisition: Differences and similarities (Unsworth, 2005)

Adopting the comparative method proposed by Schwartz (1992), that is, comparing how four different groups of language learners—L2 children, L2 adults, L1 children and L1 adults—acquire the constraints on direct object scrambling in Dutch, Unsworth (2005) examined whether child L2, adult L2, and child L1 acquisition involve the same process. The results show that L2 children and L2 adults can acquire the interpretive constraints on scrambling and that the L2 children and L2 adults pass through the same developmental sequence. Based on these observations, Unsworth (2005) concluded that adult L2 acquisition, like child L2, is constrained by UG.

In Dutch, direct object NPs may appear to the left (scrambled) or to the right (non-scrambled) of adverbs and negation. Whether the object is in a scrambled or non-scrambled position has an effect on how it is interpreted. Examples (8) and (9) illustrate this using indefinite objects (Unsworth, 2005, p. 2):

(8) Indefinite object NPs in sentences with adverbs
    a. *Non-scrambled*
      Het meisje heft twee keer een aap   gekieteld.
      the girl   has two times a   monkey tickled
      'The girl tickled a(ny) monkey twice.'

    b. *Scrambled*
      Het meisje heft een aap   twee keer gekieteld.
      the girl   has   a   monkey two times tickled
      'The girl tickled a (certain) monkey twice.'

(9) Indefinite object NPs in sentences with negation
    a. *Non-scrambled*
      De jongen heeft geen (niet + een) vis   gevangen.
      the boy   has   no   not + a   fish   caught
      'The boy didn't catch a(ny) fish.

    b. *Scrambled*
      De jongen heeft een vis   niet gevangen.
      the boy   has   a   fish   not caught
      'The boy didn't catch a (certain) fish.'

(8a) and (9a) show the non-scrambled object to the right of the adverb and negation. The object in (8b) and (9b) has been scrambled to the left of the adverb or negation. The position of the indefinite object affects its interpretation. When the indefinite object appears in the non-scrambled position, it has a non-specific interpretation, whereas it receives a specific interpretation in the scrambled position. The non-scrambled indefinite object in (8a) can refer to any monkey, whereas the scrambled indefinite object (8b) refers to a specific monkey that the girl tickled on two different occasions. The sentence with the non-scrambled indefinite object in (9a) means that the boy did not catch any fish, whereas scrambled indefinite object in (9b) refers to a specific fish that the boy failed to catch. Whether indefinite object NPs are scrambled or not affects their semantic interpretation.

Definite object NPs which are (not) scrambled across negation are also interpreted differently; non-scrambled definite objects are contrastively interpreted (10a), whereas negation in sentences with scrambled definite objects is interpreted at the sentential level (10b).

(10) Definite object NPs in sentences with negation
    a. *Non-scrambled*
      Het meisje heft niet het **plaatje** nagetekend.
      the girl   has not the picture copied
      'The girl hasn't copied the **picture**.'

    b. *Scrambled*
      Het meisje heft het plaatje niet **nagetekend**.
      the girl   has the picture not copied
      'The girl hasn't **copied** the picture.'

<div align="right">(Unsworth, 2005, p. 2-3)</div>

In (10a), the sentence is interpreted as expressing a contrastive negation of the object. (10a) has the implication that the girl did copy something (but not the picture). The scrambled sentence in (10b) is interpreted as expressing a sentential negation of the object. The difference between non-scrambled and scrambled definite objects in negative sentences is the interaction between negation and focus.

Unsworth (2005) argued that the acquisition of the interpretive effects of definite objects in Dutch constitutes a POS problem for English-speaking L2 children and L2 adults.

This is because scrambled indefinite objects cannot have a non-specific interpretation and cannot possibly be induced from the L2 input, nor the learner's L1 (English), nor the L2 classroom. Unsworth (2005) suggested that if L2 children and L2 adults in the study show target-like knowledge of these constraints, their language development process must be constrained in the same way as L1 acquisition.

Thirty-three L1 English-speaking L2 Dutch learners were tested, including eleven L2 children and twenty L2 adults. All L2 participants were resident in the Netherlands and had had some language instruction alongside various amounts of naturalistic L2 input. Eleven native adult speakers of Dutch were also tested. The L2 participants were divided into three proficiency groups (low, mid, and high) using proficiency scores based on semi-spontaneous data. In addition to the experimental tasks, a picture description task was carried out in order to help determine the L2 learners' proficiency in Dutch. A truth value judgement task and an elicited production task were carried out to obtain utterances in which scrambling was potentially necessary.

The results of the definite condition show a relatively high correlation between proficiency level and target-like production. Unsworth proposes the following developmental stages for the acquisition of scrambling of definite objects over negation, based on the learners' proficiency levels:

(11) Definite object scrambling:
    Stage 1: Negation-Verb-Object
    Stage 2: Negation-Object-Verb
    Stage 3: Object- Negation-Verb

(Unsworth, 2004, p. 6)

In stage 1, virtually none of the L2 learners who produced Negation-Verb-Object scrambled the object. In the next stage, the L2 learners produced both Negation-Object-Verb and Negation-Verb-Object utterances. In stage 3, the L2 learners produced only scrambled Object-Negation-Verb utterances or produced both scrambled and Negation-Object-Verb utterances. L2 children and L2 adults were present in all three stages.

As for the results of the indefinite condition, there is again a significant correlation between proficiency scores and target-like production. Unsworth (2004) suggested a similar developmental sequence for the acquisition of the scrambling of indefinites:

(12) Indefinite:

    Stage 1: Negation-Verb-Object

    Stage 2: Negation-Object-Verb

    Stage 3: Object- Negation-Verb

(Unsworth, 2004, p. 7)

Once more, in stage 1 the L2 learners never scrambled. In stage 2, the L2 learners produced Negation-Object-Verb order utterances in combination with Negation-Verb-Object utterances. In the final stage, the L2 learners never produced Negation-Verb-Object (i.e. non-scrambled) utterances. There were both L2 children and L2 adults in all three stages.

From these results it seems that L2 children and L2 adults pass through the same developmental sequence. In addition, both English-speaking L2 children and L2 adults were able to overcome the POS problem to acquire the interpretive constraints on scrambled indefinite objects. The L2 children and L2 adults in Unsworth's study acquired the necessary syntax-semantics interface properties. Furthermore, Unsworth observes that the L2 children's response pattern in the comprehension task was more like L1 children than L2 adults, therefore suggesting that both L2 and L1 child learners are affected by their ability to integrate different sources of information.

Unsworth's (2005) findings support that adult L2 acquisition, like child L2 acquisition, is constrained by UG. The L2 adults and L2 children in the study were able to acquire the interface-conditioned properties of object scrambling. Unsworth (2005) also pointed out that the ability to integrate information appears to affect the language development of L1 and L2 children. In other words, the age of the participants is an issue when it comes to properties associated with processing ability.

3.2.3 Summary

Schwartz (1992) offers a way to employ developmental sequence data in order to

decide between UG-based (White, 1985) and problem-solving (Bley-Vroman, 1989) models of adult L2 grammatical development. This consists of comparing the developmental sequence of child L2 acquisition to that of adult L2 acquisition while holding their L1 constant. Following this method, Song and Schwartz (2009) and Unsworth (2005) investigated whether adult L2 acquisition, like child L2, is constrained by UG. Their results support the UG-based model of SLA.

Regarding the acquisition of Chinese null arguments, which is a phenomenon at the interface of syntax and discourse pragmatics, the cognitive domain interacts with aspects of the grammar which is constrained by UG. Sorace (2005) suggests that linguistic properties involving the syntax-pragmatics interface cause greater processing difficulty for L2 learners; stating that "syntactic processes are less automatic in L2 speakers than in L1 speakers, which in turn may increase integration difficulties." (Sorace, 2005, p. 74). Sorace (2005) does not consider children's developing ability to integrate information and does not address aspects of the syntax-discourse interface because of the effect of age. Unsworth's (2005) findings suggested that age appears to affect interlanguage development, L2 adults might go through a different developmental path from that of L2 children. The current study asks whether the path of development that adult L2 learners follow is distinct from that of child L2 learners in the context of the syntax-pragmatics interface. In the following sections, theory and studies which deal with interface properties are discussed. The Interface Hypothesis, proposed by Sorace and Filiaci (2006), suggests that interface-conditioned language phenomena are harder for adult L2 learners to acquire.

3.3 The Interface Hypothesis

In the past decade, there has been considerable investigation into the ways in which different components of the grammar interact with each other. The prevalent concept of interfaces in recent acquisition research refers to interaction or mapping between different linguistic modules. Chomsky (1995) saw interfaces, namely logical form (LF) and phonological form (PF), as levels of representation. LF is the interface between cognitive processes and the grammar system (creating real-world interpretations); and PF is the interface between the grammar and articulatory systems (converting structure and meaning into sound). Sorace (2000; 2003; 2005) stated that interfaces cause difficulties in child

bilingual acquisition (e.g., Hulk & Cornips, 2006; Serratrice et al., 2004) and adult L2 acquisition (e.g., Tsimpli & Sorace, 2006; Belletti et al., 2007). Research has covered both grammar-internal interfaces, such as the interfaces between syntax and semantics (Tsimpli & Sorace, 2006; Yuan, 2010) or syntax and morphology (Lardiere, 1998; Prevost & White, 2000; Hulk & Cornips, 2006) and grammar-external interfaces, such as the interface between syntax and discourse (Belletti et al., 2007; Sorace & Filiaci, 2006; Gurel, 2006; Rothman, 2009; Valenzuela, 2006; Ivanov, 2009). Figure 3.1 shows the interfaces between different components.
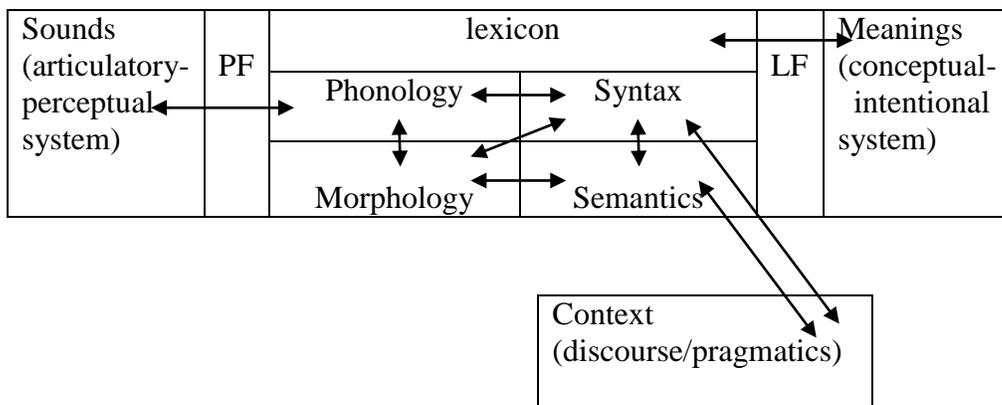
Figure 3.1 Internal and external interfaces (adapted from White, 2009)

Sorace and Filiaci (2006) found a mismatch between target-like acquisition of syntax and non-target-like acquisition of interface properties in highly proficient L2 learners' ultimate attainment. They therefore proposed the Interface Hypothesis. Sorace's (2005) original proposal stated that interface properties were harder to acquire or involved more persistent difficulties than properties relating to 'pure', non-interface domains, such as narrow syntax (Valenzuela, 2006; Belletti at al., 2007). In recent language acquisition research, concern has turned to whether grammar-external interfaces are subject to a greater delay than grammar-internal ones (Lozano, 2006; Montrul & Louro, 2006; Sorace & Filiaci, 2006; Tsimpli & Sorace, 2006).

Tsimpli and Sorace (2006) carried out an experiment that tested external and internal interface properties in advanced learners of L2 Greek. They tested the use of overt subject pronouns, which involves the external interface of pragmatic conditions and syntax, and

focus and topicalisation structures, which involve the internal interface of semantic conditions and syntax. Tsimpli and Sorace distinguished the two interfaces using the following definition:

> "The distinction between the two interfaces is based on the assumption that the syntax-discourse interface is a 'higher' level of language use, integrating properties of language and pragmatic processing, where syntax-semantics involves formal properties of the language system alone. (Tsimpli & Sorace, 2006, p. 653)."

In null subject languages such as Italian and Greek, overt subject pronouns are regulated by a number of discourse factors. The sentences (13a) and (13b) below exemplify the use of overt subject pronouns:

(13) a. Topic shift (Italian)

La signora$_i$ saluta la ragazza$_j$, mentre lei$_j$ attraversa la strada.

the lady   greets   the girl,   while   she crosses   the street

'The lady is greeting the girl while she (the girl) is crossing the street.'

b. Contrastive topic (Greek)

Xthe   **esi** sinandises ti Maria   (oxi ego).

yesterday you met-2s   the Maria (not   I)

'Yesterday YOU met Maria (NOT I).'

(Tsimpli & Sorace, 2006, p. 654)

As shown in (13a), the overt subject pronoun *lei* 'she' involves shifting the discourse topic from the matrix subject, *la signora* 'the lady', to the matrix object, *la ragazza* 'the girl'. The subject pronoun *esi* 'you' in the example (13b) is used as a contrastive topic. Properties in which syntax interfaces with discourse factors are considered to be external interface properties, whereas properties in which syntax interfaces with semantic factors are considered to be internal interface properties. Greek focusing and topicalisation (CLLD), for example, involves the same syntactic operations (movement and agreement matching)

but induces different verb-raising and clitic effects. In Greek, both focus (14a) and topicalisation (14b) structures require leftward moving of objects, as shown below (examples are from Tsimpli & Sorace, 2006, p. 655):

(14) a. Focus
    [$_{CP}$ (**Op**) Ton   Petro$_i$ [$_{IP}$ sinandise t_i i   adhelfi mu
          the-ACC Petro   met-3s the-NOM sister   my
    'It was Petro that my sister met.'

  b. Topicalisation (CLLD)
    [$_{CP}$ Ton   Petro$_i$ [$_{IP}$ **ton**$_i$ – sinandise t_i i   adhelfi   mu
      the-ACC Petro **cl.** - met-3s the-NOM sister   my
    'Petro, my sister met him.'

In focus structures like (13a) the direct object *ton Petro* is moved to CP and leaves a trace in its base-generated position. In topicalisation structures like (13b) the direct object is moved leftward and a clitic co-referential with the left dislocated phrase adjoins to IP. Although both focus and topicalisation involve leftward movement and agreement matching, the status of the operator differentiates focus from topicalisation. The focus operator is on the left-periphery adjoined to CP, it is constrained by the island principle and it requires the verb to raise. The focus construction is at the internal interface. Topicalisation, however, involves clitic-left dislocation (CLLD), not a null operator. The clitic position is the licensing position in CLLD and is always IP-internal. CLLD is not subject to island constraints and requires no verb-raising. CLLD construction is at the external interface. Distinguishing CLLD from focus constructions requires knowledge at the internal syntax-semantics interface. Tsimpli and Sorace (2006) found target-like verb-raising in the focus condition as expected; whereas non-target-like clitic use was found in most topicalisation conditions. Tsimpli and Sorace's (2006) study argued that in L2 acquisition properties at the external-interface (topicalisation) posed a greater difficulty than those at the internal-interface (focus). Although the current study focuses on the properties in grammar-external interface domains only, whether residual difficulties exists at this external interface would be informed by this work.

      Staying on the subject of this external interface, Sorace (2005) claims that

properties at the syntax-discourse interface were precisely the sources of problems for L2 acquisition. Discourse conditions such as topicalisation and focus [6] designate the information status of aspects of the discourse content. These conditions restrict how particular structural options receive particular pragmatic interpretations. At the syntax-discourse interface, these structural conditions impose constraints on syntax. Some empirical studies conducted on L2 Spanish (Lozano, 2006; Valenzuela, 2006) and L2 Italian (Belletti et al., 2007; Sorace & Filiaci, 2006) claim that the syntax-pragmatics interface is an inevitable locus of optionality (Sorace, 2005), while others favour the claim that syntax-pragmatics interface can be acquired (Ivanov, 2009; Rothman, 2008; Zhao, 2008). The current study investigates a property at the syntax-pragmatics interface and so looks to provide evidence for the debate on whether external syntax-pragmatics interface properties can be acquired or not.

I now turn to discuss L2 empirical studies which deal with syntax-discourse interface-conditioned properties. Belletti et al. (2007) carried out various experiments on L2 near-native Italian speakers to investigate the distribution of null and overt subjects in the development of their interlanguage grammars.

3.3.1 Internal vs. external interfaces

In *pro-drop* languages such as Spanish and Italian, the use of both null subjects and overt subjects is allowed. A null subject appears when it is co-referential with a previously mentioned NP, as shown in (15). An overt subject is interpreted as being focused, as shown in (16).

(15) Maria$_i$ telefonera quando *pro*$_{i/?j}$ ne   avra voglia.
     Maria   will-call when   *pro* will   feel like
     'Maria will call when she feels like it.'
                                        (Adapted from Belletti et al., 2007, p. 659-660)

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[6] Note that whether [topic] or [focus] features are discourse-conditioned or not varies from language to language. For example, [focus] in Italian is at the syntax-discourse interface (Sorace & Filiaci 2006), whereas in Spanish it is at the syntax-semantic interface (Tsimpli & Sorace 2006).

(16) Speaker A: Chi   e caduto per   le scale?
　　　　　　　who is fallen   from the stairs
　　　　　　　'Who fell down the stairs?'

　　　Speaker B: a. E caduto il   ragazzo.
　　　　　　　　　is fallen   the boy
　　　　　　　　　'The boy fell down.'

　　　　　　　　b. *Il   ragazzo e   caduto.
　　　　　　　　　　the boy   is   fallen
　　　　　　　　　　'The boy fell down.'

(Adapted from Belletti et al., 2007, p. 666)

In (16), speaker A is asking a question and a new information is required in speaker B's answer. In (16a), the post-verbal subject is interpreted as the new information focus of the sentence, whereas the pre-verbal subject does not express new information (16b). The word order between subjects and verbs and focus exemplifies the interplay between syntax and discourse pragmatics. In these languages, subjects can optionally occur in preverbal and postverbal positions in finite declaratives. Broadly speaking, SV and VS orders have been claimed to be free. In (17), the subject *Juana* can either precede or follow the verb, *compro* 'bought':

(17) a. Compro un libro Juana.
　　　　bought a   book Juana.

　　　b. Juana compro un libro
　　　　Juana bought   a book.
　　　　'Juana bought a book.'

(Isabelli, 2004, p. 152)

the categories unaccusative and unergative according to their semantic meanings. In syntax, unaccusative verbs like 'arrive' have one object argument whereas unergative verbs like 'cry' have one subject argument, as seen in the English examples (18)–(19):

70

(18) The bus$_i$ arrived t_i.

```
              VP
           /      \
        NP          V'
         |        /    \
     The bus_i   V      NP
                 |       |
              arrived    t_i
```
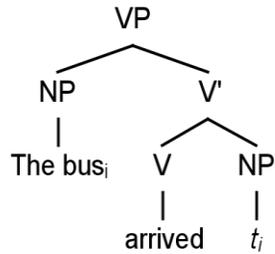
(19) Mary cries.

```
            VP
          /    \
        NP      V
         |      |
       Mary   cries
```
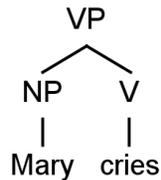
As shown in English sentence (18), the single argument of an unaccusative is a direct object. The argument is generated in object position in the deep structure. It then moves and leaves a trace in object position in the surface structure. In contrast, in unergatives the argument is generated in subject position and no NP movement is involved, as shown in (19). In English, unaccusative and unergative verbs are both pronounced in SV order. However, in languages like Spanish and Italian, unaccusatives and unergatives are associated with different word orders. Unaccusative verbs project VS order (as in (20)) while unergative ones project SV order (as in (21)).

(20) a. Chi   e   arrivato?
       who   is arrived
      'Who has arrived?'

    b. E arrivato Gianni.
       is arrived Gianni
       'Gianni has arrived.'

(21) Maria telefonera quando *pro* ne   avra voglia.
      Maria will-call   when   *pro* will feel like
      'Maria will call when (she) feels like it.'

<div align="right">(Adapted from Belletti et al., 2007, p. 659-660)</div>

Recall that overt subjects in preverbal position are interpreted as given information and therefore as topics, whereas postverbal subjects are associated with focus and express new information. These word orders are associated with pragmatic rules. As seen in (16a), the VS order is a pragmatic, appropriate answer to the question, whereas the SV order in (16b) violates the discourse constraints.

In the study by Belletti et al. (2007) seventeen English near-native speakers of Italian completed a series of experiments testing SV/VS word order in Italian and therefore knowledge of discourse factors. To test the L2 learners' sensitivity to the interaction between word order and focus, two elicitation tasks (VS (word order) videos and headlines), a spontaneous production task (story telling) and an interpretation task (picture verification) were employed.

The story telling task tests the production of subjects in *pro-drop* languages. "VS videos" is an elicitation task designed to testing the interpretation of focused postverbal subjects across various verb types: transitive, unaccusative, and unergative plus - existential-'there'. Participants were shown short videos and instructed to answer some questions about the video by using the given verb in their answers. Another elicitation task used headlines to elicit only focused sentences. Subjects were asked to complete the sentences using given eventive unaccusative verbs and noun phrases. The given subject NPs were manipulated by indefiniteness/definiteness. The picture verification task was to tests the interpretation of null and overt pronominal subjects in bi-clausal contexts, as in (22) below. (22a) illustrates an example of forward anaphora in which the subordinate clause follows the matrix clause. (22b) is an example of backward anaphora in which the subordinate clause precedes the matrix clause.

(22) a. The mother$_i$ kisses her daughter$_j$, while she$_j$/*pro$_i$* is wearing her coat.

   b. While he$_j$/*pro$_i$* yawns, the inspector$_i$ takes the ticket from the passenger$_j$.

<div align="right">(Belletti et al., 2007, p. 664)</div>

The results from the spontaneous production task show no differences between near-natives and native controls in the production of null subjects (52% and 59% respectively) or in the production of post-verbal subjects (16% and 15% respectively). This suggests that near-natives have come to acquire native-like syntactic expressions of subjects in Italian. In the VS video task, the near-native group produced significantly fewer post-verbal subjects than the native control group regardless of verb types, as shown in the table below. In the second elicitation task, the result was consistent with the findings in the VS video task. The overall production of VS order remained significantly lower in sentences with both indefinite NPs and definite NPs (respectively 41% vs. 26% for the near-natives; 69% vs. 46% for the controls).

Table 3.1 Results of production of null subjects and VS order from all tasks

		Near-natives	Native controls
Null subject		52%	59%
Post-verbal subject		16%	15%
Subject-Focus	transitive	14%	80%
	unaccusative	32%	90%
	unergative	34%	86%
	existential-'there'	98&	100%
All-Focus	indefinite	41%	69%
	definite	26%	46%

(Adapted from Belletti et al., 2007)

The results of the interpretation task show that the pattern of null subject interpretation in both forward and backward anaphora contexts are identical in the near-native group and native control group. This further confirmed that the near-natives have acquired the properties required for null subjects. However, in the case of an overt subject, the near-natives have a higher tendency to interpret the overt subject pronoun as a matrix subject in both forward and backward anaphora contexts than the natives. The analysis of forward and backward anaphora will be discussed in greater detail later.

Belletti et al. (2007) reported that the target-like syntactic knowledge of subjects (i.e. the use of null and post-verbal subjects) in the spontaneous production task but the failure to identify their use under discourse conditions (i.e. the overuse of overt pronouns in the elicitation tasks and misinterpretation of overt subject pronouns in anaphora resolution)

were inconsistent with each other. They claimed the non-target-like behaviour is the residual effect of L1 transfer of discourse strategies. English SV word order persistently influenced L2 grammar in all sentence constructions except in existential-'there' constructions which also displays VS order in English. Other L2 studies also found inconsistencies between the target-like acquisition of syntax and learners' failure to acquire discourse constraints on the syntax of the target language (Lozano, 2006; Sorace & Filiaci 2006; Valenzuela, 2006). This suggests that interface difficulties may play a role in the acquisition of properties at the syntax-discourse interface.

As mentioned previously, unaccusatives project VS word order and unergatives project SV word order. On this basis, Belletti et al. (2007) pointed out that both word orders are syntactically derived in both languages. However, though this property is found in the native speakers' performance, it is not consistent in the near-natives' performance. This is evidenced by the fact that the behaviour of native speakers and near-natives is virtually identical in the production of postverbal subjects (see Table 3.1), yet the data in Belletti et al. (2007) study, however, did not show differences in production of VS orders according to verb types (Table 3.1), even though unaccusatives should be easier to produce in VS word orders. The participants in Belletti et al. might not therefore have acquired the semantic condition on the syntax of unaccusatives and unergatives by the time of testing, even if they are near-natives. A conclusion on performance at the syntax-semantic performance could not be drawn from the data.

s that advanced L1 Greek and English learners of L2 Spanish acquired SV (unergative) versus VS (unaccusative) word order successfully but failed to recognize that VS order was always preferred when the subject was focused. Lozano's (2006) findings support the later version of the Interface Hypothesis that properties at the internal interface (syntax-semantics) are acquired before those at the external interface (syntax-discourse). Comparing end-state grammars of L2 learners, Valenzuela (2006) reports that optionality from L1 continues to occur at the syntax-discourse interface but not at the syntax-semantic interface in terms of clitic left dislocation in Spanish. I will discuss this in the following section.

3.3.2 L2 end state grammars and incomplete acquisition of Spanish CLLD constructions (Valenzuela, 2006)

Valenzuela (2006) tested the interpretation of topicalised elements in the end state L2 Spanish of L1 English speakers. In English, topicalisation is formed by moving an element leftward, as illustrated in (23). Leftward movement is called topicalisation left dislocation (CLD). Topicalisation is also found in languages with clitics such as Spanish, Italian and, which are different due to the presence of a clitic. Topicalisation with a clitic is called clitic left dislocation (CLLD), as illustrated in (24a):

(23) Water$_i$, I drink t_i every day.   *CLD*

(24) a. Libros, lei
      books   read-1sg
      'Books, I read.'

  b. El   libro, **lo**   lei.   *CLLD*

     the book   cl.   read-1sg
     'The book, I read.'

  c. Un libro, lei.
     a   book read-1sg
     'A book, I read.'

  d. *Un libro, **lo** lei.
     a   book cl. read-1sg
     'A book, I read.'

(Valenzuela, 2006, p. 285)

As seen in (24b), the clitic *lo* is present in CLLD contexts. In Spanish, topic constructions are grammatical either without or with clitics, as (24a-b) show. The CLLD structure is used to when the topic is definite as in (24b). When the topicalised element is indefinite, the clitic is not used as in (24c). Example (24d) is ungrammatical because it contains both a clitic and an indefinite topic. In other words, whether the topic has a specific or a general interpretation can be recovered from the presence of a clitic. In the sentence with a clitic the topic is referring to a specific book, while in the sentence without a clitic the topic is referring to any generalized book. This discourse constraint does not exist in English as

English does not have clitics.

When L1 English speakers learn Spanish as an L2 they must observe the discourse restriction on clitics. That is, L2 learners of Spanish must be sensitive to specificity. Following Sorace (2003), residual optionality is expected to be found at this interpretive level. L1 English learners of L2 Spanish will have difficulty acquiring the specificity distinction associated with the different type of topics.

Valenzuela's (2006) experiment was conducted in Spain on fifteen post-puberty L1-English-L2-Spanish speakers and twenty-five monolingual Spanish speakers. The L2 participants were near-native speakers of Spanish resident in Spain at the time of testing. The monolingual native controls consisted of university students and staff. The experiment consisted of two oral and one written task. An oral grammatical judgement task tested L2 speakers' comprehension of the syntactic and interpretive differences between CLD and CLLD in Spanish. Grammatical and ungrammatical sentences were presented in minimal pairs; sentence (25) illustrated a non-specific topic construction example. All examples are taken from Valenzuela (2006), p. 29:

(25) a. Agua, tomo todos los dias.

     water drink every the days

     'Water, I drink every day.'

  b. *Agua, **la**   tomo todos los dias.

     water cl.   drink every the days

     'Water, I drink every day.'

The second task, an oral sentence selection task, aimed to test the interpretation of specificity. Participants were asked to select the most appropriate response following a short story:

(26) Ayer por la manana, Eva se fue a la Universidad y vio a su amigo Pedro y a su amiga Ines, pero como tenia muchas cosas que hacer…

   'Yesterday morning, Eva went to the university and saw her friend Pedro and her

friend Ines, but since she had many things to do…'

a. <u>A Pedro, no   lo saludo.</u>   Correct answer
   To Pedro, not cl. greeted
   'She did not greet Pedro'

b.   A Pedro, no saludo.
     To Pedro, not greeted
     'She did not greet Pedro'

c.   Ni a ni b
       'Neither a nor b'

d.   Ambas a y b
       'Both a and b'

The third task was a sentence completion task designed to test interpretation. Participants were asked to complete the sentences according to the given context, thereby deciding whether a clitic was used or not:

(27) Context: Eric sale con sus amigos los fines de semana. Van a ver peliculas y
                van a restaurants. Su amigo le pregunta que actividad prefiere. Eric
                contesta:
                'Eric goes out with his friends on weekends. They go to movies and
                they also go to restaurants. His friend asks him which activity he
                prefers. Eric answers:'

     Sentence: Peliculas, _____ porque me canso de restaurantes.
               'Movies, _____ because I get tired of going to restaurants.'

     Correct answer: Peliculas, <u>prefiero</u> porque me canso de restaurantes.

The results of both the grammaticality judgement and sentence selection tasks show that the native controls correctly selected the grammatical CLLD construction with specific topics rather than non-specific topics, while the near-native group selected the CLLD

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construction regardless of the specificity of the topic. The results from the sentence completion task also indicate that the native control group recognise the specificity distinction, while the near-native group does not.

Overall, the study shows that the syntax of clitic left dislocation constructions is acquired by near-native L2 speakers of Spanish, but they fail to constrain CLLD contexts according to whether the topic is $[+/-$ specific]. However, while these L2 learners did not fully acquire all aspects of CLLD at the syntax-discourse interface, the L2 learners in Ivanov's (2009) study did fully acquire all aspects of CLLD, as I will show in the next section.

3.3.3 Topicality and clitic doubling in L2 Bulgarian: a test case for the Interface Hypothesis (Ivanov, 2009)

Ivanov's (2009) study provides contradictory empirical evidence of the same interface phenomenon by investigating L1 English learners of L2 Bulgarian who successfully acquire the pragmatic function of Bulgarian clitics.

In Bulgarian, all direct or indirect objects which are topicalised are obligatorily doubled by a co-referential clitic. As seen in (28), this looks similar to the Spanish CLLD construction. Bulgarian clitics are overt markers of topicality and are strictly limited to pre-verbal positions, but are ungrammatical in sentence-initial position as in (29a). In this case, the clitic will appear post-verbally, as seen in (29b).

(28) Ivan **go**   vidja   Maria.
     Ivan him-cl. see-PAST 3[rd]P.SG   Maria
     'Maria saw Ivan.'

(29) a. ***Go** vidjax.

     b. Ø Vidjax   **go**.
        Ø see-1st P.SG.PAST   cl.-him
        'I saw him.'

                                                                (Ivanov, 2009, p. 18-19)

The clitic is obligatory in such utterances. Consider the dialogue below:

(30) A: Njakoj   vizdal li   e   Ivan   dnes?
        somebody seen   Q   is   Ivan   today
        'Has anybody seen Ivan today?'

   B: a. Ivan **go**   vidjah   sutrinta.
        Ivan him-cl. saw-1st P.SG in the morning
        'I saw Ivan in the morning.'

      b. Sutrinta #(**go**) vidjah Ivan.

<div align="right">(Adopted from Ivanov, 2009, p. 19)</div>

Dialogue (30) shows that pragmatic felicity depends on the topic being doubled by an agreeing clitic or not is related to pragmatic felicity. In (30a), the object NP is fronted to topic position and an overt agreeing clitic is required. In contrast, the topic in (30b) does not move and is not clitic doubled. However, without a pre-verbal clitic, (30b) sounds pragmatically odd.

Ivanov (2009) recruited twenty-four L1 English learners of L2 Bulgarian and sixteen monolingual Bulgarian native speakers for his experiment. All the L2 learners had started studying Bulgarian after the critical period of acquisition (Lenneberg, 1967). According to the results of a proficiency test, the L2 Bulgarian speakers were divided into two groups—advanced (n = 10) and intermediate (n = 14). Following proficiency testing, the L2 Bulgarian speakers were divided into two groups of advanced native-like (n = 10) and intermediate (n = 14) learners. The advanced participants had a mean number of years of exposure to Bulgarian of twelve years and seven months; and the intermediate participants had been exposed to Bulgarian for a mean average of two years and six months. All but two out of ten advanced participants had been living in Bulgaria at the time of the experiment.

A context-sentence evaluation task was carried out. In this task, a situation is described in English followed by a short dialogue in Bulgarian. The dialogue, which was presented bi-modally, consists of a question and four grammatical possible answers. Participants were instructed to evaluate the appropriateness of each answer on a scale from one (totally unacceptable) to five (perfectly acceptable). The appropriateness of the answers depended on the given context. An example of the 'topic' test condition is given below (Ivanov, 2009, p. 21):

(31) Q: Poluci   li koleta ot Peter?
    Receive-2P.SG.PAST Q package from Peter
    'Did you receive the package from Peter?'

  A: O1. Koleta   **go** polucix   minalata sedmica.
      package-DEF. hin-cl. receive-1P.SG.PAST last week
       'I received that package last week.' *[+Obj. fronting] [+Cl. doubling]*
    O2.Minalata sedmica **go** polucix koleta. *[-Obj. fronting] [+Cl. doubling]*
    O3.#Koleta polucix minalata sedmica. *[+Obj. fronting] [-Cl. doubling]*
    O4.#Minalata sedmica polucix koleta. *[-Obj. fronting] [-Cl. doubling]*

Of the possible answers in (31), options 1 and 2 both contain clitic doubling and are considered to be pragmatically appropriate to the question. They are therefore expected to receive higher appropriateness evaluations, whereas options 3 and 4 are not felicitous in the context and are expected to receive lower evaluations. In the 'focus' test condition, however, options 3 and 4 are felicitous because they involve object fronting.

   The results in the 'topic' condition with accusative objects show that L2 advanced group rated appropriate options 1 and 2 significantly more highly than options 3 and 4 (see table 3.2). In this respect, advanced L2 speakers behaved like native speakers. As for the intermediate group, L2 learners did not discriminate in their ratings of the four options. Comparing the results across the 'topic' and 'focus' conditions (Table 3.3), the advanced L2 learners and L1 natives did not differ to a statistically significant degree. The intermediate group, on the other hand, evaluated option 4 more highly regardless of the condition. Ivanov (2009) suggested this may be the result of L1 transfer as option 4 is available in the learners' L1 in a similar context.

Table 3.2 Mean rates of acceptablility in the topic accusative condition

	Option 1	Option 2	#Option 3	#Option 4
Control	4.67	4.26	2.13	1.89
Advanced	4.75	4.34	2.73	3.29
Intermediate	3.66	3.29	3.8	4.33

Table 3.3 Mean rates of acceptablility in the focus accusative condition

	# Option 1	# Option 2	Option 3	Option 4
Control	1.86	1.43	4.4	4.88
Advanced	2.82	2.09	4.31	4.69
Intermediate	3.5	3.16	4.15	4.4

(Ivanov, 2009, p. 22-23)

The results from Ivanov's study show that the advanced L2 learners' judgements do not differ to a statistically significant degree from those of the native controls in either the topic and focus conditions. This shows that they successfully observed the pragmatic conditions on the syntax of clitic-doubled constructions in Bulgarian. The intermediate L2 learners' strong preference for the English-like SVO word order without a clitic shows that they are influenced by their L1 and so experience difficulties in integrating the pragmatic constraints on clitic doubling in Bulgarian. The claim of the Interface Hypothesis that end-stage L2 learners experience residual difficulties with properties at the syntax-pragmatic-interface is not borne out by Ivanov's (2009) study as his advanced participants successfully acquired the given interface property.

The results of Ivanov's (2009) study contrast with those of Valenzuela (2006). Ivanov's advanced L2 participants mastered the use of clitics whereas Valenzuela's near-native L2 participants did not all fully acquire the necessary properties. It should be noted, however, that some of the near-native L2 in Valenzuela's (2006) study showed no difficulty integrating $[+/-$ specific] with clitics.

3.3.4 Summary

The original 'Interface Hypothesis' as proposed by Sorace and Filiaci (2006) predicts that interface-conditioned properties are difficult, if not impossible, to acquire. Tsimpli & Sorace (2006) proposed that grammar-external interface properties were harder to acquire than grammar-internal ones. The studies discussed above suggest that not all phenomena at the grammar-external syntax-discourse interface are problematic for L2 acquirers.

Given that the current study investigates L2 acquirer's acceptability and interpretation of null/overt arguments, we now turn to review L2 studies related to null and overt subject acquisition. Studies look at distribution of null and overt subject are first reviewed in the next section.

3.4 Beyond the syntax of the null subject parameter

Montrul and Louro (2006) investigated the acquisition of Spanish subjects by L1 English learners of L2 Spanish of various levels of proficiency. More specifically, Montrul and Louro (2006) asked whether properties at the syntax-discourse interface are acquired later than those at the syntax-morphology interface.

English and Spanish differ with respect to the distribution of null and overt subjects. According to the definition given by Tsimpli and Sorace (2006), there are two domains of knowledge associated with this phenomenon: morphology (an internal domain) and discourse pragmatics (an external one). Table 3.4 lists the morphological differences between Spanish and English:

Table 3.4 Null subject properties: Spanish vs. English

Language	Spanish	English
Verbal agreement	rich verbal agreement	poor verbal agreement
Subjects	null/overt	overt
Expletives	null expletives	overt expletives
Subject position	pre-verbal and post-verbal	pre-verbal
***That-trace* effect**[7]	YES	NO

(Montrul & Louro, 2006, p. 403)

As seen from Table 3.4, in the morphology domain, Spanish has rich person and number agreement attached to verbs that licenses and identify null subjects. Spanish allows both null and overt subjects, whereas English only allows overt subjects. Spanish has null expletives but English does not. Subjects in Spanish can appear either in thr pre-verbal or

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[7] As Montrul and Louru (2006) noted, the *that-trace* effect was not investigated because it was rarely found in the participants' production.

post-verbal position, while subjects in English only appear preverbally. It is possible to have a that-trace after the complementiser in Spanish but not in English.

In the discourse-pragmatics domain, the distribution of null and overt subjects is constrained by specific discourse rules:

(32) Same referent/topic

Pepe no vino hoy   a trabajar.   *Pepe/?el/ *pro* estara   enfermo.
Pepe no came today to work   Pepe he   *pro* will be   sick
'Pepe did not come to work today. (He) must be sick.'

(33) Focus[8]

Quien vino?   El/Mario/**pro* vino.
who   came?   He/Mario/**pro* came
'Who came?   He/Mario came.'

(34) Different referent/ topic shift

Hoy   no fui   a trabajar. Pepe/el/**pro* penso   que estaba enferma.
today no went to work.   Pepe/he/**pro* thought that was   sick
'Today I did not go to work. Pepe/He thought that I was sick.'

(35) Contrastive focus

El periodista$_i$ dijo que el$_i$/ *pro*$_i$ no   habia escrito   ese   reporte.
the journalist said that he(himself) not   had   written   that   report
'The journalist said that he had not written that report.'

(Montrul & Louro, 2006, p. 404)

As illustrated the above examples, if a referential NP or an overt subject pronoun does not introduce a new topic or referent or is not used for contrastive focus, it is considered pragmatically redundant. In addition, Spanish overt pronouns cannot have variable readings: that is, overt pronouns cannot have *nadie* ('nobody') or *quien* ('who') as antecedents, as illustrated below:

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[8] In Montrul and Louru (2006), "topic" was used for this category. I use "focus" here to signal that the new information is given.

(36) Nadie$_i$ cree que *el$_i$/ *pro*$_i$ es inteligent.
    'Nobody believes that he is intelligent.'

(37) Quien$_i$ cree que *el$_i$/ *pro*$_i$ es inteligent?
    'Who believes that he is intelligent?'

<div align="right">(Montrul & Louro, 2006, p. 404)</div>

overt pronouns are not allowed in non-referential contexts, for example in existential contexts (38), weather verb (39), and impersonal expressions (40; examples from Montrul & Louro, 2006, p. 405):

(38) Existential contexts

    pro Hay   poco trabajo.
    pro there is   little work
    'There is little work.'

(39) Weather verbs

    pro Llueve mucho en primavera.
    pro rains a lot   in spring
    'It rains a lot in spring.'

(40) Impersonal expressions

    pro Es obvio   que *pro* va   a   nevar.
    pro is   obvious that *pro* is going to snow
    'It is obvious that it is going to snow.'

    Montrul and Louro (2006) recruited forty-eight L1 English learners of L2 Spanish and twenty native speakers of Spanish. They divided the L2 participants into three groups: intermediate (n = 16), advanced (n = 16) and near-native (n = 16). Learners' proficiency was determined by the scores from a proficiency test and an oral interview. All participants were given an oral production task. They were instructed to re-tell a story of Little Red Riding Hood from an illustrated booklet in order to control their vocabulary use.

    The results are summarized in Table 3.5 for morphosyntax and Table 3.6 for discourse-pragmatics:

Table 3.5 Percentage accuracy for agreement

	Agreement errors	
Native controls	0.49 %	(5/1019)
Near-native	0.13 %	(1/794)
Advanced	2.28 %	(15/659)
Intermediate	12.55 %	(61/468)

(Montrul & Louro, 2006, p. 409)

As seen in Table 3.6, only the intermediate group differed from other groups by producing errors on more than twelve per cent of occasions (p < .001). All groups except the intermediate learners group show

Table 3.6 Percentage of overt subjects and null subjects

	Overt Subjects		**Null Subjects**	
	correct	redundant	correct	illicit
Native controls	100	0	99	1
Near-native	99.7	0.3	94.5	5.5
Advanced	92.4	7.6	91.6	8.4
Intermediate	77	22.9	99	1

(Montrul & Louro, 2006, p. 412)

As shown in Table 3.6, advanced and near-native L2 learners performed like native controls. Intermediate L2 learners produced redundant overt subjects much more frequently than other groups - on 22.9% of occasions compared with 7.6% of subject produced by advanced speakers. With respect to null subjects, the advanced and near-native groups showed significantly higher use of null subjects compared with the native control and intermediate groups. The advanced and near-native groups also showed used null subjects illicitly 8.4% and 5.5% of the time respectively. The intermediate group, like the native controls, used pragmatically correct null subjects on 99% of occasions. However, Montrul and Louro (2006) suggest that the intermediate group's success with null subjects does not come from their L2 grammar but from their L1. This is because that English allows null

subjects in the test situations used.

overall findings show: that learners of intermediate proficiency are less accurate in terms of properties at the syntax-morphology interface than those at the syntax-discourse interface; that advanced learners are accurate in terms of morphosyntactic agreement but are less accurate than native speakers in their use of null subjects; and that near-native learners acquire both the syntax-morphology-interface property of agreement the syntax-discourse-interface property of subject expression to almost native levels, except for a residual overuse of null subjects. The results of Montrul and Louro's (2006) study support the claim that properties in which syntax interfaces with morphology (at an internal interface) are in place before those in which syntax interfaces with discourse (at an external interface; Tsimpli & Sorace, 2006). Montrul and Louro (2006) conclude that vulnerability at the interfaces comes from L1 interference.

Gurel's (2006) results, however, contrast with those of Montrul and Louro (2006). Gurel (2006) investigated subject expressions in L1 English learners of L2 Turkish. Once again, the distribution of null and overt subjects in Turkish is constrained by features at two interface domains: the internal syntax-semantic interface and the external syntax-discourse interface. The participants were twenty-eight native speakers of English with a near-native end-state level of proficiency in Turkish. The participants were first exposed to Turkish as adults between the ages of 25 and 34 and had all been living in Turkey for more than ten years by the time of the experiment. The tests consisted of a picture selection task, a written interpretation task, a truth-value judgement task, and a picture identification-listening task. The results show that near-native L2 learners have knowledge of the pragmatic constraints on the distribution of overt and null subjects in Turkish. However, they still experience difficulties in working out the binding properties of the overt pronoun. Gurel (2006) argued that the near-native L2 learners' failure to acquire overt subject binding is due to persistent L1 interference. These findings contrast with Montrul and Louro's (2006) results of near-native learners in that they suggest that syntax-discourse interface properties are acquired earlier than syntax-semantic interface properties.

Neither Montrul and Louro's (2006) nor Gurel's (2006) consider whether person has an effect on the distribution of null and overt pronouns. However, Sanchez, Camacho, and Ulloa (2010) investigated the distribution of different person subjects in L2 Spanish

3.4.1 Shipibo-Spanish : Differences in residual transfer at the syntax-morphology and the syntax-pragmatics interfaces (Sanchez, Camacho, & Ulloa, 2010)

Sanchez et al. (2010) conducted a study of the distribution of first and third person subject-agreement morphology and that of null/overt first person subjects by thirty-nine L1 Shipibo-L2 Spanish adults and forty-one monolingual Spanish adults. Shipibo is a mixed null argument language that only allows third person subjects to be null and has no person agreement on the verb, as illustrated in example (41), whereas Spanish is a null subject language that allows first-, second-, and third person subjects to be null and has rich verbal inflection on the verb, as in example (42):

(41) Shipibo:
    En   ra   atas   bana-ke.
    I   EVID manioc   plant-PERF
    'I planted manioc.'

(42) Spanish:
    Yo   plany-e   yucca.
    I   plant-1SG-PAST-PERF   manioc
    'I planted a manioc.'

<div align="right">(Sanchez et al., 2010, p. 331)</div>

As seen above, Spanish depends on rich subject-agreement morphology to indicate first-, second-, and third person for different structures. whereas person and number are not morphologically encoded in Shipibo. Sanchez et al. (2010) predicted that the ability to match person features on both subjects and verbs, a syntax-morphology interface activity, may still cause difficulties even after prolonged exposure to Spanish. The following examples illustrate mismatch errors from the participants' data:

(43) Bueno, primer días en Lima, **yo** est**uv-o**   buscando   lugar (d)onde para estar.
    well   first days in Lima **I** be-PAST-**3PL** looking-for place where for stay
    'Well, in my first days in Lima, I was looking for a place to stay.'

(44) Mi mama hag-**o**   artesania.
    my mom make-**PRES-1SG** crafts
    'My mom makes crafts.'

<div align="right">(Sanchez et al., 2010, p. 343-344)</div>

Example (43) illustrates a mismatch involving a first person subject and a third person verb form while example (44) illustrates a mismatch between a third person subject and a first person verb form. These mismatches indicate that there is some dissociation between the licensing of null subjects and their verbal morphology in L1 Shipibo speakers' L2 Spanish interlanguage grammars.

In addition, there are differences between Shipibo and Spanish at the syntax-discourse interface in terms of how topics are distributed. Although first and second-person arguments cannot be null in Shipibo, only one overt first or second person argument is required in a situation where there is a main clause and an adjunct clause. In Shipibo, if the topic of the sentence is the first person subject of one clause, whether it has previously been introduced in the discourse or not, it may be optionally be expressed in the other clause as a null argument. Consider the following examples:

(45) a. **En** westiora ipo chichi-xon-ra,   **en** Quique kena-ke.
    I   a carachama catch-PRIOR.SS.TR-EVID, **I**   Quique call-PERF
    'After I caught a carachama [type of fish], I called Quique.'

   b. **En** westiora ipo chichi-xon-ra,   **Ø** Quique kena-ke.
    I   a carachama catch-PRIOR.SS.TR-EVID, **(I)** Quique call-PERF
    'After I caught a carachama [type of fish], I called Quique.'

   c. Westiora ipo   chichi-xon-ra,   **en** Quique kena-ke.
    A carachama   catch-PRIOR.SS.TR-EVID, **I** Quique call-PERF
    'After (I) caught a carachama [type of fish] and called Quique.'

(Adapted from Sanchez et al., 2010, p. 335)

Examples (45b) and (45c) show that, in Shipibo, the first person subject need only be expressed overtly once. When it is the topic, the first person subject can be overt, (45a), or null (45b). This is in contrast to Spanish, where a topic is not required to licence a null first person subject. However, first person null subjects in Spanish (and other Romance languages) tend to be interpreted as topics in the discourse even if they constitute new information. Example (46) contains a first person null subject not previously introduced in the discourse:

(46) Ayer   Ø v-**i**   a   Lucia.
      Yesterday Ø see-**1SG-PAST**   to   Lucia
      'I saw Lucia yesterday.'

<div align="right">(Sanchez et al., 2010, p. 336)</div>

Sanchez et al. (2010) predicted that even learners with many years of exposure to L2 input, either classroom instruction or naturalistic input, may continue to experience difficulties with the licensing of first person null subjects at the syntax-discourse interface-pragmatics. They therefore predicted that L2 Shipibo speakers would use overt first person pronouns in the given discourse context, where native Spanish speakers would use a null first person pronoun. Compare the following examples of discourse data from L1 Spanish monolinguals (47) and from L1 Shipibo-L2 Spanish speakers (48):

(47) L1 monolingual Spanish:

Eh bueno yo ehegrese <del> [/] del colegio en el dos mil cuatro. Eh luego ***pro*** me prepare para primera opción pero no ***pro*** ingrese. Eh luego ***pro*** me cambie de academia. ***Pro*** estuve primero en la academia Pamer para primera opción y luego ***pro*** estuve en la academia Trilce.

'Eh well **I** graduated from school in 2004. Eh, then **(I)** studied for the first option but **(I)** was not admitted. Eh, then **(I)** changed academies. **(I)** was first in the Pamer academy in first option and then **(I)** was in the Trilce academy.'

(48) L1-Shipibo-L2-Spanish:

Entonces **yo** trabajando en todos: artesania, agricultura, Madera, mas que todo Madera. En la agricultura no me salía tanto, entonces **yo** me llegue a pensar: (d)onde quizás ***pro*** voy a trabajar bien.

'Then, **I** worked in everything: crafts, agriculture, in wood, mostly in wood. In agriculture, there was not much work for me. Then **(I)** got to think about where **(I)** will work well.'

<div align="right">(Sanchez et al., 2010, p. 347)</div>

In example (47), after the first overt subject pronoun introduces the topic in the discourse, the rest of the first person subjects are null. This discourse pattern contrasts

with the one found in Shipibo speakers, as shown in example (48). Even after the first overt subject pronoun establishes the topic in the discourse, speaker uses another overt first person pronoun, followed by another null first person pronoun. The discourse pattern shown in example (48) is more like the pattern observed in Shipibo. Sanchez et al. (2010) took the overuse of overt subject pronouns in the Spanish data from L1 Shipibo speakers to indicate that L1 Shipibo speakers are not sensitive to the interaction between topicality and the distribution of null subjects in Spanish, as they transfer this information over from their L1.

The data were collected at a university community in Lima, Spain. Thirty-nine L1-Shipibo-L2 Spanish speakers had been exposed to naturalistic input for more than three years by the time of testing. L2 participants were divided into two groups according to the number of years of formal Spanish instruction they had received. They took the length of formal Spanish instruction as an indicator of input. Group 1 was formed of sixteen L2 participants with an average of four years and eight months of formal instruction, and group 2 comprised twenty-two L2 participants with an average of fourteen years of formal instruction. They used a structured questionnaire to collect spontaneous oral production.

Their results indicate that difficulties with the interpretive constraints on morphemes at the syntax-morphological interface may be overcome with prolonged exposure to formal instruction. Evidence of the acquisition of null subject licensing (extended from third- to first person subjects) consisted of a significant decrease in the frequency of mismatches between the subject and verbal agreement. In terms of syntax-discourse interface difficulties, however, Sanchez et al found a non-native-like distribution of first person null subjects in both L2 groups regardless of participants' length of exposure. Native Spanish speakers used first person singular null subjects with null antecedents in their responses significantly more often than the responses given by the L2 Spanish speakers. Sanchez et al. (2010) claimed that L2 participants' non-native-like distribution of first person null subjects comes from the residual transfer of discourse strategies from their L1, Shipibo, as seen in example (48). Their study also highlighted the fact that residual transfer is more pervasive at the syntax-discourse interface. This is evidenced by the significant improvement in the matching between subjects and verbal agreement (a syntax-morphology interface property) from Group 1 to Group 2, but that

both groups demonstrated non-native distribution of first person null subjects (a syntax-discourse interface property). After prolonged naturalistic exposure and formal instruction, phenomena at the syntax-morphology interface seem to be acquirable, whereas syntax-discourse interface phenomena seem to be problematic for L2 learners. Sanchez et al also suggested that L1 transfer and pragmatic input deficit are possible contributing factors for this delay in acquisition.

With respect to the distribution of null and overt subjects, Montrul and Louro (2006) and Sanchez et al. (2010) suggested that residual difficulty exists at the syntax-discourse interface; whereas Gurel (2006) argued that properties at the syntax-discourse interface are not more difficult to acquire than other interface properties. With respect to the internal interface vs. external interface debate, Montrul and Louro's (2006) and Sanchez et al.'s (2010) studies support Tsimpli and Sorace's (2006) claim that properties at the internal interface were acquired earlier than those at the external interface, while Gurel's (2006) study does not support this claim. The issues related to internal interface vs. external interface go beyond the scope of the current study.

It is worth noticing that both Montrul and Louro (2006) and Gurel (2006) did not support the original formulation of the interface hypothesis, as the properties of null and overt subject distribution are eventually acquired by L2 learners despite being at the interfaces. Sanchez et al. (2010) did not test near-native speakers but their study showed that residual transfer is more pervasive at the syntax-discourse interface level.

To discuss interface-conditioned properties of null subjects in more detail, next, I turn to review a study on subject interpretation. Sorace and Filiaci (2006) carried out a truth-value judgement task to examine the interpretation of overt subject pronouns. The non-native-like performance shown by L1 English speakers of near-native-like L2 Italian suggest that syntax-pragmatics interface properties are problematic for these learners. Now I turn to look at the case of anaphora resolution in Italian.

3.4.2 Anaphora resolution in near-native speakers of Italian (Sorace & Filiaci, 2006)

According to Sorace (2003), the term 'near-native', used to refer to speakers at the most advanced stage of second language acquisition, may denote either incompleteness of their competence (lack of given L2 properties) or divergence (interlanguage representations

of L2 properties that are consistently different from native representations).

Filiaci (2006) studied the interpretation of forward and backward anaphora by fourteen near-native L1 English-L2 Italian speakers. Their results indicate that even after near-native speakers have acquired the constraints on pronominal subjects in Italian, they still employ different processing strategies from native Italian speakers to interpret subject pronouns in subordinate clauses. In this case, they show transfer from their L1, English.

Referring to Carminati's (2005) proposal on pronoun-antecedent relation, Sorace and Filiace (2006) adopt the "position of antecedent strategy" (PAS) to account for different preferences in interpreting null and overt subjects in subordinate clauses. According to the PAS, speakers are strongly biased towards selecting a topic subject in the Spec IP position in the matrix clause as the antecedent for a null subject in the subordinate clause. In contrast, overt pronoun are more likely to be interpreted as co-referential with an antecedent in a lower position in the phrase structure (e.g., the matrix object). The PAS is considered to be a syntax-discourse interface strategy (Carminati, 2005). Violation of the PAS does not result in ungrammaticality as long as the sentences in question are unambiguous; per contra, in ambiguous sentences, a stricter observation of the PAS is necessary, as illustrated in (49) and (50):

(49) Gregorio$_i$ ha ditto che lui$_i$ sara present   al matrimonio   di   Maria.
     Gregorio$_i$ has said that he$_i$ will be present at the wedding of   Maria.

(50) Maria$_i$ scriveva   spesso a Piera$_k$ quando lei$_{??i/k}$ era   negli Stati Uniti.
     Maria$_i$ used to write often to Piera$_k$ when   she$_{??i/k}$ was in   the USA.
                                                              (Sorace & Filiaci, 2006, p. 348)

In (49), although the pronoun-antecedent relation as illustrated violates the PAS, it does not result in a grammatically illicit sentence. As there is no other possible antecedent in the matrix clause, *lui* 'he' can refer to the matrix subject *Gregorio* without inducing ungrammaticality. This is because, according to Carminati (2005), the potential of miscommunication is low in an unambiguous sentence (49). To avoid misinterpretation, as seen in (50), speakers seem to apply an "avoid miscommunication" principle for overt pronouns by applying a stronger version of the PAS. As both the topic subject (i.e. *Maria*) and matrix object (i.e. *Piera*) in (50) are possible antecedents of *lei* 'she', the sentence is

ambiguous. To avoid misinterpretation, the PAS is stricter and *lei* is interpreted as referring to the matrix object *Piera*. The flexibility of antecedent assignment with overt pronouns shows that the PAS belongs to the syntax-discourse interface rather than the narrow syntactx.

Sorace and Filiaci (2006) suggest that forward and backward anaphora pose different processing demands for the speaker and listener:

(51) (Discourse topic)$_l$ La mamma$_i$ da un bacio   alla figlia$_k$ mentre lei$_{k/l}$/*pro*$_i$ si mette il cappotto.
                              the mother   give a kiss   to the daughter   while   she   wears the coat
'The mother kisses her daughter, while she/*pro* is wearing her coat.'

(52) (Discourse topic)$_l$ Mentre lei$_{k/l}$/*pro*$_i$ si mette il cappotto, la mamma$_i$ da   un   bacio alla figlia$_k$.
                              while   she   wears   the coat   the mother gives a   kiss to the daughter
'While she/*pro* is wearing her coat, the mother kisses her daughter.'

(Adopted from Sorace & Filiaci, 2006, p. 352)

Forward anaphora occur when the antecedent(s) in the matrix clause precede the anaphora in the subordinate clause, as illustrated in (51), whereas backward anaphora occur when the anaphor precedes the antecedent, as in (52). In (52), both the subject and the object in the matrix clause appear before the subject pronoun in the subordinate clause. In (52), the subordinate clause precedes the matrix clause. In this case, the null or overt subject of the subordinate clause appears before its possible antecedents, thus causing greater demand for the listener/reader's processor. The listener/reader needs to bear in mind that there is information which is yet to be provided while obeying the discourse constraints on antecedent assignment.

Sorace and Filiaci claimed that cases of backward anaphora with overt pronouns should be particularly costly because of the amount of processing they involve. On the one hand, the parser was structurally biased to fill the information gap as soon as possible by choosing the matrix subject as the antecedent of the overt or null pronoun ('Active Gap-filler Strategy' (2006, p. 359)). More specifically, when encountering backward anaphora, they believe the parser immediately starts to search for a syntactically legitimate

antecedent, that is, an antecedent that does not violate Principle C (Chomsky, 1981). The parser then evaluates each subsequent NP as a possible antecedent. The parser expects to solve the anaphoric dependency with the first NP (i.e., the subject position of the matrix clause) it encounters in its search. On the other hand, the PAS states that the overt pronoun does not normally refer to the matrix subject which is in the position of Spec IP. Thus, the contradiction between the "active gap-filler strategy" and the PAS results in costly processing. In Sorace and Filiaci's study (2006), native Italian speakers and near-native English-speaking learners adopt different strategies in resolving backward anaphora.

A picture verification test (PVT) was conducted on twenty monolingual Italian speakers and fourteen native speakers of English who had reached near-native proficiency in Italian. Both groups of speakers were required to interpret null and overt pronouns in ambiguous sentences. These ambiguous sentences were sentences in which both the subject and object in the matrix clause were potential antecedents for the overt pronoun *lui/lei* in the subordinate subject position.

Sorace and Filiaci (2006) found that the near-native L2 speakers behaved like native speakers in interpreting the subordinate null subject, both in forward and backward anaphora contexts. In the forward anaphora-null pronoun condition, near-native L2 speakers behaved like natives in choosing the matrix subject (46% and 51%, respectively) or matrix object (near-natives: 43% and natives: 44%) as the antecedent. A similar bias was found when choosing the antecedent in the backward anaphora-null pronoun condition: near-native L2 learners and native controls selected the antecedent in the subject position (85% and 85%) and in the object position (9% and 11%) of the matrix clause. In addition, near-natives also identified the null subject as someone other than the matrix arguments in a native-like fashion (near-natives vs. natives: 11% and 15% in forward anaphora; 6% and 4% in backward anaphora). These native-like judgements suggested that the near-native L2 speakers had acquired the PAS as far as null subjects were concerned.

In terms of the overt pronoun conditions, the near-native L2 speakers displayed different patterns from the native speakers. When the antecedents preceded the anaphora, both groups favoured the matrix object as the antecedent (60% for near-natives; 82% for native control s). Near-native L2 learners therefore displayed a native-like preference for the matrix object but not as frequently as the native controls. Consequently they selected

the matrix subject as the antecedent significantly more often than the native control group (27% vs. 8%). Although both L2 learners and native controls chose the already expressed discourse topic as antecedent at very similar rates (13% vs. 11%), L2 learners show clearly different behaviour from native controls in identifying antecedents in contexts of forward anaphora with an overt pronoun in the subordinate clause.

Near-native L2 learners' behaviour in contexts of backward anaphora shows even greater differences. The L2 learners had problems in interpreting the overt pronoun *lei/lui* 'she/he' of the subordinate clause as either co-referential with the matrix subject or matrix object. There was no significant difference between the L2 learners and the native control group in identifying the overt pronoun as co-referential with the matrix object (25% vs. 24%). However, L2 learners identified the matrix subject as the referent of the overt pronoun significantly more often than the native Italian speakers (47% vs. 12%). Unlike L2 learners, the native controls strongly preferred to identify a discourse referent as co-referential with the overt pronoun (28% vs. 64%). The English-speaking L2 learners seem to prefer to find an antecedent as soon as possible at the cost of violating the PAS. In backward anaphora-overt pronoun condition, L2 Italian learners make different judgements from those made by L1 Italian speakers. Together with the results of the forward anaphora, near-native L2 speakers of Italian do not show evidence of obeying the PAS as far as overt subjects are concerned.

Sorace and Filiaci (2006) suggest that the divergence of the L2 learners from the L1 native speakers might be a result of their inability to integrate different processing resources. According to them, L2 learners might have insufficient processing resources to integrate the active gap-filler strategy with the PAS. The active gap-filler strategy therefore predominates in the processing of the overt pronoun by English-speaking learners of Italian, and so they prefer to choose the matrix subject as an antecedent. Recall that native Italian speakers prefer to take a referent mentioned previously in the discourse as the antecedent in forward anaphora cases. It seems that the L2 learners do not have sufficient processing resources to choose a topic from the discourse as the referent of the overt pronoun in the way that the native speakers do. Hence, Sorace and Filiaci (2006) suggested that the near-native speakers had a null-subject grammar and respected the PAS, as they behaved similarly to the native speakers in their interpretation of null subjects. However, the

near-native speakers may not have the necessary processing resources to integrate multiple sources of information when in interpreting overt subject pronouns in contexts of backward anaphora.

Sorace and Filiaci (2006) also suggest that the problem of interpreting overt pronouns in backward anaphora contexts might be in part related to the L2 learners' L1. Sorace and Filiaci note that "[t]here is no one-to-one correspondence between English and Italian pronoun inventories"; therefore unstressed English pronouns may correspond to both null and unstressed overt Italian pronouns. In other words, a pronoun that co-refers with a subject antecedent is null in Italian and unstressed but overt in English, while a pronoun that co-refers with an object or a topic antecedent is an unstressed overt pronoun in both Italian and English. Whether the optionality comes from a processing problem or a problem related to L1 remains unclear. Sorace and Filiaci's findings confirm Sorace's (2005) assertion that features (i.e. the PAS) relevant to the syntax-discourse interface are particularly problematic for adult L2 speakers.

It is worth noting that the PAS predicts that the object of the main clause is the preferred antecedent for the overt subject in the subordinate clause. In Sorace and Filiaci's study (2006), the PAS failed to account for the fact that the discourse referent was the preferred choice in backward anaphora sentences.

In contrast to Sorace and Filiaci's (2006) speakers who have difficulty integrating syntax and discourse information, Kizu's (to appear) L2 speakers master the properties at syntax-discourse interface.

3.4.3 L2 Acquisition of Null Subjects in Japanese: A new generative perspective and its pedagogical implications (Kizu, to appear)

Kizu (to appear) examins the phenomenon of null subjects in L2 Japanese by conducting an experiment focusing on how L2 learners of Japanese identify the referents of null subjects and use overt subjects. Thirty-five L2 adult learners of Japanese and ten native Japanese adults took part. In Japanese, first and second person null subjects are realised differently from third person null subjects. First and second person subjects are not expressed overtly in invitation (53), imperative (54a) and prohibition (54b) sentences:

(53) First person null subject:
    Ø   issyo-ni tabe-masyoo.
       together eat-let's
    'Let's eat together.'

(54) Second person null subject:
    a. Ø   mado-o   simete kudasai.
        window-ACC   close   please
     'Please close the window.'

    b. Ø   kodomo-ni okasi-o   age-naide kudasai.
        child-to   sweet-ACC give-not   please
     'Please do not give sweets to the child.'

                                                     (Kizu, to appear, p. 3-4)

The constructions shown in (53) and (54) are analogous to those in English in that subjects are not overtly expressed in these types of sentences in English either. However, in other sentence types, first and second person null subjects are identified by the morphological forms of predicates; in other words, there is agreement-matching between null subjects and predicates, as shown in (55; examples taken from Kizu, to appear, p. 4).

(55) First person null subject:

    a. Ø / {watasi/*anata/*Hanko-wa} eiga-o   mi-ni   ik-oo   (to omoimasu).
            I   you   Hanko-TOP film-ACC see-to   give-VOL C think
        'I think I will go and seea film.

    b. Ø / {watasi/*anata/*Hanko-wa} kibun-ga   waruidesu.
            I   you   Hanko-TOP feeling-NOM   be.bad
        'I feel unwell.'

Example (54) illustrates that the null subject is identified by morphological forms. Example (54a) is a volitional sentence. The lexical predicate as in *-(y)oo (to omoimasu)* indicates the speaker's desire or intension. The null subject in (54a) is interpreted as first person. Second person and third person referents require a different predicate, as in *-(y)oo (to omotteiru)*. In (54b), the predicate expresses a psychological state and a zero marker is attached. The predicate represents the speaker. If the null subject is the second or third person, a modal expression such as *–soo* ('seem, appear') must be attached to the adjective *waruidesu*. Japanese null subjects are subject to agreement matching. Agreement takes place in the

domain of modality in Japanese (Kizu, to appear).

While first/second person null subjects are licensed by agreement and are identified by predicates or sentence types, third person null subjects are contextually determined, as shown in (56):

(56) Asita   Ø kimasu yone.
     tomorrow   Ø come   SF
     'Tomorrow (someone) will come, right?'

<div align="right">(Kizu, to appear, p. 4)</div>

The subject in (56) is null. Unlike those in (53)–(54), the referent of the null subject cannot be determined in a single sentence. The referent of the third person null subject is determined in larger context like (57):

(57) Speaker A: C-san-wa   kaze-o   hiiteiru   soodesu.
                Mr.C-TOP   cold-ACC   is.catching   I.heard
                'I heard that C has had a cold.'

     Speaker B: Soo desu ka. Demo asita   Ø   kimasu yone.
                so is   Q but tomorrow Ø   come   SF
                 'Is that so? But C will come tomorrow, won't he?'

<div align="right">(Kizu, to appear, p. 5)</div>

In (57), the null subject in Speaker B's utterance is identified through the discourse. C-*san*, the topic in Speaker A's utterance, is interpreted as a discourse entity since a topic is the highest element in the hierarchy of discourse entities. Third person null subjects are identified outside the sentence (in the context of wider discourse). It is not subject to the matching between subject and domain of modality.

The identification of first and second person null subjects involves "internal" formal features and operations between syntax and morphology, whereas identification of the third person null subject involves "external" pragmatic conditions of context. Subjects, regardless of whether they are first, second, or third person, are phonologically expressed when their referent is ambiguous or when any discourse effect, such as contrastive focus or topic shift, is involved. Kizu predicts that acquiring the rules of distribution of first and second person null subjects (i.e. an internal interface process) would be less difficult than acquiring the rules of distribution of third person null subjects (i.e. an external interface

process).

A written task accessed L2 learners' ability to identify referents of null elements and to decide whether the null pronoun should be overtly expressed or not. Thirty-five non-native L2 learners of Japanese and ten native speakers of Japanese were recruited from the student body of the University of London. All L2 learners had completed at least one hundred hours formal instruction in Japanese. Among the thirty-five L2 learners, twenty-three were native speakers of English; three were native speakers of Italian; two were Russian-English bilinguals; and there was one native speaker of each of the following languages: Catalan, Chinese, Dutch, French, German, Korean, and Polish. In addition to the written task, a proficiency test was carried out to determine L2 learners' Japanese proficiency. L2 learners were divided into three groups: High, Mid, and Low.

The results indicate that third person subjects are easier to acquire than first and second person subjects. The High group identified null elements in the same way as the Native control group (High : Native = 93.48% : 100%). A comparison of the identification of first and second person null subjects and third person null subjects within each proficiency group reveals that only the Low group diverges from the rest. In addition, there is not much difference between the three groups with respect to third person null subject identification. In other words, L2 speakers of Japanese master third person null subject identification from an early stage. Furthermore, L2 speakers at every proficiency level use obligatorily overt elements more appropriately than obligatorily null elements. Recall that elements are expressed overtly because there is a discourse effect involved. Properties that involve discourse conditions are easier to acquire in Japanese. Properties at the external syntax-pragmatic discourse interface do not result in greater difficulty for the L2 learner than properties at the internal syntax-morphology interface. Therefore, the results from Kizu's study do not support the Interface Hypothesis.

3.4.4 Summary

at the interface of syntax and discourse-pragmatics are eventually acquired by L2 learners. Sanchez et al. (2010) investigate the distribution of first and third person subjects, finding evidence that interface properties are acquirable but the effect of transfer is more persistent at the syntax-discourse interface level. Sorace and Filiaci (2006) suggested that

L2 adults may have difficulty integrating information from both syntax and discourse, whereas Kizu (to appear) argued that properties at the syntax-discourse interface are not problematic for L2 acquisition. Both studies focused on L2 adult learners. As discussed in Section 3.2.2, Unsworth (2005) suggested that the ability to integrate information appears to lead to differences in language development between adult and children. If L2 adults had limited discourse integration, L2 children with even less ability to integrate different sources of information would experience greater difficulties. Can L2 children, as well as L2 adults, overcome the difficulty of integrating syntax and discourse information? Can L2 children and L2 adults eventually acquire interface-conditioned properties? The current study sets out to answer these questions.

3.5 L2 Chinese studies

The Interface Hypothesis (Sorace & Filiaci, 2006) predicts that properties at the interface of syntax and other linguistic aspects such as semantics and discourse are harder to acquire for L2 learners. The properties of Chinese null and overt arguments are related to discourse factors. Because the current study concerns Chinese null and overt arguments, two studies which are directly relevant are discussed in the following sections.

First, Yuan's (1993) study, which concentrates on whether a null argument is syntactically allowed and Zhao's (2008) study, which investigates the interpretation of null and overt arguments in embedded clauses and in time adverbial clauses will be reviewed.

3.5.1 L2 acquisition of Chinese null arguments by English-speaking adult learners (Yuan, 1993)

Following White's (1985, 1987) arguments about the learnability problem in SLA, Yuan (1993) investigated the possibility of resetting[9] parameters in L2 learners' interlanguage grammars. From a learnability point of view, Chinese grammar is more inclusive than that of English with respect to the null-subject parameter. Chinese allows both null and overt arguments in matrix and embedded clauses, while English does not. L1 English learners of L2 Chinese must learn that the L2 requires a different setting by using positive evidence in the target language input (Yuan, 1993).

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[9] In Yuan (1993), 'set/unset' was used. Basically, set/unset parameter is the same as resetting parameter.

research on the acquisition of Chinese null arguments by English-speaking adult learners of Chinese and on the 'unlearning' of null arguments by Chinese-speaking adult learners of English. Since unlearning Chinese arguments is not relevant to the current study, I will not discuss it here. Yuan's (1993) work looks at null elements in argument positions in matrix and embedded clauses in Chinese, as in example (58b)–(60b). He recruited one hundred and two English-speaking learners of Chinese (eighty-nine university students and thirteen university teachers) and twenty-four native speakers of Chinese as controls. Yuan (1993) used the scores obtained from cloze tests in dividing the L2 learners into six proficiency groups. An acceptability judgement task was conducted including pairs of sentences which the participants judged in comparison with each other. The examples below are from Yuan, 1993, p.165 -166 with the test pronoun underlined:

(58) Sentences with an overt/null subject in the matrix clause

   a. Control
    Women zuotian   kanjian-le   Li Ming de nü-pengyou$_i$, **ta$_i$** $z$hang de hen   piaoliang.
    We   yesterday see   PFV Li Ming DE girlfriend   she grow DE very beautiful
    'We met Li Ming's girlfriend$_i$ yesterday, she$_i$ looked very beautiful.'

   b. Experimental
    Women zuotian   kanjian-le   Li Ming de nu-pengyou$_i$, **Ø$_i$** $z$hang de hen   piaoliang.
    We   yesterday see   PFV Li Ming DE girlfriend   Ø grow DE very   beautiful
    'We met Li Ming's girlfriend yesterday, she looked very beautiful.'

(59) Sentences with an overt/null subject in the embedded clause

   a.Control
    Zhe ge shiyan$_i$ yijing   kaishi, wo xiangxin **ta$_i$** hui   chenggong.
    this CL experiment already start   I   believe   it   will   succeed
    'This experiment has already started. I am sure it will be successful.'

   b. Experimental
    Zhe ge shiyan$_i$ yijing   kaishi, wo xiangxin **Ø$_i$** hui   chenggong.
    this CL experiment   already start   I   believe   Ø   will   succeed
    This experiment has already started. I am sure it will be successful.

(60) Sentences with both null subject and null object

a. Control

Shang xingqi ta daying   gei wo yi   ge xinde xiezitai, danshi zhidao xianzai **ta**
last   week he promise give I   one CL new desk   but   until   now   he

ye   mei gei **wo xinde xiezitai**.
still not give me new desk
'Last week he promised to give ma a new desk, but so far he hasn't given me
  one yet.'

b. Experimental

Shang xingqi ta_i daying   gei wo_j yi   ge xinde $xiezitai_k$, danshi zhidao xianzai **$Ø_i$**
last   week he promise give I   one CL   new desk   but   until   now   Ø

ye   mei gei **$Ø_j$ $Ø_k$**.
still not give Ø Ø
'Last week he promised to give me a new desk, but so far he hasn't given
me one yet.'

(Yuan, 1993, p. 165-166)

The matrix null subject in (58b) is allowed and identified by the topic, *Li Ming de nu-pengyou* 'Li Ming's girlfriend', which was introduced in the previous sentence. The embedded null subject in (59b) is licensed and identified by the topic *zhe ge shiyan* 'this experiment' in the previous sentence. Both the null subject and the null object in example (60b) are allowed because they can refer to antecedents mentioned in the previous sentence. Discourse pragmatic rules license the distribution of null subjects and null objects.

Yuan's (1993) results show that none of the learner groups showed any significant difference from the native controls. In other words, English-speaking learners of Chinese accept both null subjects and null objects from a very early stage. Furthermore, Yuan (1993) finds that L2 Chinese English learners prefer overt object pronouns in the context which null option is more pragmatically appropriate, even though they have been exposed to Chinese for a fairly long time. Yuan (1993) pointed out that such a non-native-like sensitivity to overt object pronoun may result from the non-target-like input (foreign talk discourse) from the native Chinese speakers. It is possible that "native speakers, when communicating with foreign learners learning their mother tongue, often sacrifice stylistic conciseness to make their utterances over-explicit" (Yuan, 1993, p. 244). If this type of input affects the learners' interlanguage, it could affect the learners' understanding of the pragmatics of null arguments but not their syntax. As the results show, the learners seem to

know that null arguments are allowed early on, but they do not always use them in appropriate ways.

The results of Yuan's (1993) study indicate that it is possible to process Chinese data and reconstruct L2 interlanguage grammars in the early stages of the acquisition of Chinese null arguments. However, L2 learners were less sensitive to pragmatic constraints on the distribution of null and overt object pronouns. This suggests that L2 learners' early success could be the result of L1 English transfer from (for example) diary drop contexts.

Yuan (1993) is concerned with the acquisition of Chinese null arguments by English-speaking learners; and Zhao (2008) provides valuable data of the interpretations of null/overt arguments.

3.5.2 L2 acquisition of the interpretations of null and overt arguments in Chinese by adult L1 English speakers (Zhao, 2008)

Zhao (2008) investigated the interpretation of null and overt arguments in L2 Chinese. More specifically, she considered whether null arguments have the same interpretation as overt arguments in L2 Chinese English speakers' interlanguage grammar from the 'post beginner' to advanced stages. Two argument positions were investigated: the subject and object positions in embedded clauses; and the subject position in time adverbial clauses. Zhao tested two types of null subject: the syntactic deletion type and the discourse deletion type. The 'syntactic deletion' null subject is derived from the deletion of bare reflexives and is purely syntactic. The 'discourse deletion' null subject is derived from the deletion of topicalisation and is a syntax-discourse interface phenomenon. These two types of null subjects provide the testing ground for the Interface Hypothesis.

Zhao's (2008) participants included seventy-five English-speaking adult students attending Mandarin Chinese programmes at the universities in Beijing and sixteen native Chinese-speaking adults. All the L2 adults started learning Chinese in a non-Chinese-speaking country and had spent more than ten months in China by the time of testing. In addition to a cloze test used to test the L2 learners' proficiency, all participants took part in a written interpretation task and a picture judgement task. L2 learners were divided into four proficiency groups—post-beginner, low-intermediate, high-intermediate, and advanced.

The interpretation of a null or overt argument depends on its position[10]. To recap, an embedded null or overt subject refers to the matrix subject or discourse topic, as shown in example (61). An embedded null object refers to the discourse topic while an embedded overt object refers to the matrix subject or the discourse topic, as in example (62). A null subject in the subordinate clause refers to the subject in the main clause while an overt subject refers to the discourse topic, as in (63). The following examples are taken from Zhao (2008, p. 113-115):

(61) The embedded subject position
   Null subject
 a. Referential matrix subject NP
   Li Liang$_i$ shuo $\emptyset_{i/j}$ qu guo Lundun.
   Li Liang say $\emptyset$ go EXP London
   'Li Liang$_i$ says that he$_{i/j}$ has been to London.'

 b. Quantified matrix subject NP
   Meigeren$_i$ dou shuo $\emptyset_{i/j}$ yijing   zuowan le   zuoye.
   everybody all   say $\emptyset$ already finish   PFV   homework
   'Everyone$_i$ says that he$_{i/j}$ has already finished the homework.'

   Overt subject
 c. Referential matrix subject NP
   Xiao Zhang$_i$ shuo ta$_{i/j}$ hui zai wanhui shang tan   jita.
   Xiao Zhang say   he   will at party   on   play guitar
   'Xiao Zhang$_i$ says that he$_{i/j}$ will play guitar at the party.'

 d. Quantified matrix subject NP
   Meigeren$_i$ dou shuo ta$_{i/j}$ tongue le   kaoshi.
   everybody all say   he   pass   PFV exam
   'Everyone$_i$ says that he$_{i/j}$ has passed the exam.'

Embedded null subjects in examples (61a-b) are interpreted as co-referential with the matrix subject *Li Liang* (61a) and everyone (61b) or someone in the discourse (61a-b). Overt subjects in examples (61c-d) are interpreted as co-referential with the matrix subject *Xiao Zhang* (61c) and everyone (61d) or someone in the discourse (61c-d).

   A null or overt object in an embedded clause has a different interpretation, as exemplified in (62):

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[10] Refer to chapter 2 of Zhao (2008) for detailed discussion.

(62) The embedded object position
Null object
a. Discourse topic

Xiang Wang$_i$ shuo Lao Li bu   renshi Ø$_{*i/j}$.
Xiang Wang say   Lao Li not   know Ø
'Xiang Wang$_i$ says that Lao Li does not know (him)$_{*i/j}$.'

b. Quantified matrix subject NP

Meigeren$_i$ dou shuo Wang Laoshi   xihuan Ø$_{*i/j}$.
everybody all say   Wang teacher like   Ø
'Everyone$_i$ says that Mr Wang likes (him)$_{*i/j}$.'

Overt object
c. Referential matrix subject NP

Li Ming$_i$ shuo Xiao Liu xinren *ta$_{i/j}$*.
Li Ming say   Xiao Liu trust him
'Li Ming$_i$ says that Xiao Liu trusts *him$_{i/j}$*.'

d. Quantified matrix subject NP

Meigeren$_i$ dou shuo Lao Li bu renshi *ta$_{i/j}$*.
everybody all   say Lao Li not know him
'Everyone$_i$ says that Lao Li does not know *him$_{i/j}$*.'

A null element in the object position of an embedded clause is interpreted as someone in the discourse, as shown in (62a-b). In example (62c), an overt object pronoun in the embedded clause is interpreted as *Li Ming* or as someone in the discourse. In (62d), the overt object in the embedded clause is interpreted as everyone or as someone in the discourse.

As shown in (63), the interpretation of null subject elements in time adverbial clauses differs from that of overt elements:

(63) The subject position in the time adverbial clause
a. Null subject
Ø$_{i/*j}$ pa   shan   de shihou, Xiao Ding$_i$ bei   zhe   yi   ge   shubao.
Ø climb   mountain DE when   Xiao Ding carry PRG one   CL   bag
'When he climbs the mountain, Xiao Ding$_i$ carries a bag on his back.'

b. Overt subject
　　Ta$_{*i/j}$ kan　dianshi de shihou, Xiao Zhang$_i$ dai　　zhe　yi　　ding maozi.
　　he　　watch TV　　DE when　Xiao Zhang wear　PRG　one　CL　hat
　　'When he$_{*i/j}$ is watching TV, Xiao Zhang$_i$ is wearing a hat.'

When a null subject appears in a time adverbial clause, it is interpreted as the subject in the main clause, *Xiao Ding* (63a). However, when an overt subject appears in a time adverbial clause it is interpreted as someone other than the subject in the main clause, *Xiao Zhang* (63b). These properties are summarized in Table 3.7 below.

Table 3.7 A brief summary of the properties

Positions　Interpretations	Embedded clause				Time adverbial clause	
	Null$_{subj}$	Overt$_{subj}$	Null$_{obj}$	Overt$_{obj}$	Null$_{subj}$	Overt$_{subj}$
Discourse topic	+	+	+	+	-	+
Matrix subject	+	+	-	+	+	-

Note: "+" indicates that this reading is allowed; "-" indicates that this reading is not allowed

　　The results indicate that L2 learners seem to acquire the co-referential reading of the embedded null subject. From the 'post-beginner' stage onwards, they learn that the interpretation of the embedded null subject is not affected by status of the matrix subject NP (whether it is referential or quantified NP). In contrast, L2 learners do not correctly interpret embedded null subjects as referring to a discourse topic until the advanced stages. From the low-intermediate stage onward, L2 learners do not have any problems interpreting embedded overt subjects as co-referential with referential or discourse topics.

　　As for embedded null objects, learners from low-intermediate level onwards interpret these in like the native controls. They correctly interpret the embedded null object as referring to a discourse topic only. However, from the very earliest stages onward, learners have no problem relating the embedded overt object to the referential matrix subject or a referent in the discourse.

　　Native controls allow null subjects, but not overt subjects, in time adverbial clauses to refer to the subject in the main clause. L2 learners at all stages allow null subjects in time adverbial clauses to refer to the subject in the main clause. However, they incorrectly allow overt subjects in time adverbial clauses to refer to the subject in the main clause as well.

Zhao's (2008) data only partially confirms the Interface Hypothesis (Sorace, 2005; Sorace & Filiaci, 2006). The Interface Hypothesis proposes that properties in which syntax interfaces with discourse are more difficult for L2 learners to acquire than purely syntactic properties. Interpretive constraints in the target language may never be acquirable by L2 learners.

To summarise, Yuan's (1993) and Zhao's (2008) studies are closely related to the current study. Both studies found target-like acceptability of null arguments from the most elementary level. However, only adult L2 participants were recruited in both studies. In addition, the lowest proficiency level in Zhao's (2008) study was post-beginner. If L2 beginners were recruited, will they also allow null arguments like Zhao's post-beginners? Zhao (2008) also highlighted L1 influence in her study. In both child L2 acquisition and adult L2 acquisition, L1 transfer plays a role. With respect to adult L2 learners, the knowledge of the L1 is already acquired. The transfer of grammatical properties from the learner's L1 will lead to a 'qualitative' influence between their interlanguage grammar and the target language grammar. This qualitative difference will persist and lead to so-called L2 non-convergence (Sorace, 2005). This is also true in child L2 acquisition; the L2 grammar starts to develop when (at least part of) the L1 grammar is already in place. Therefore, influence of the L1 grammar on the L2 grammar can be expected (Schwartz & Sprouse, 1996). However, direct access to UG is possible for L2 children (Lakshmanan, 1994; Schwartz, 2003). Therefore L1 transfer will be overcome at a certain stage of development. Will L2 children, like L2 adults, be influenced by their L1?

The current study compares the paths of language development between L1 children, L2 children, and L2 adults. How does the L2 Chinese adult compare with L2 Chinese children? Can similarities between monolingual children and L2 children be predicted? In comparing child L2 and adult L2 acquisition, on the one hand child L2 and adult L2 learners share the same L1 background; on the other hand, age is the major difference. Immaturity is a source of processing limitations (Unsworth, 2005). Since the current study compares the development between child L2 and adult L2 acquisition, it is necessary to clarify the differences and similarities between them.

Zhao (2008) argues that her L2 adult participants suffered from difficulties in integrating discourse information. Recall that processing limitations may play a role in

child L2 acquisition (Unsworth, 2005) and adult L2 acquisition (Sorace & Filiaci, 2006). When comparing child L2 acquisition and adult L2 acquisition, there might be (at least) two types of processing limitations. One type stems from cognitive immaturity; the other stems from insufficient L2 knowledge. Immaturity is only a valid source for L2 children but low proficiency is relevant to both groups. Given that for L2 adults, any processing limitation can only due to insufficient L2 knowledge, it is low proficiency L2 adults who would be expected to have the processing limitations which stem from discourse integration in the current study. Such limitations would be found among low proficiency L2 children and any other limitations would be related to the L2 children's age. In other words, older children will have better discourse-integration abilities than younger children. This issue will be discussed in terms of the current study's results in Chapter 6.

3.6 Summary

This chapter started with the rationale for the present study. It explained how comparisons between child L1, child L2, and adult L2 acquisition can inform research on the involvement of UG in SLA and the processes involved in acquisition. The target language property to be investigated, namely the licensing and identification of null arguments in Chinese, goes beyond syntax - it involves aspects of both syntax and discourse. This chapter reviewed several studies on the distribution and interpretation of null arguments.

Chapter 4 Experimental study: Research questions, hypotheses, and methodology

This chapter presents a short summary of the relevant linguistic facts, research questions and hypotheses at issue in the current study and lays out its experimental framework. In Section 4.1, there is a brief summary of the main theoretical and descriptive facts given in Chapter 2 and 3. The similarities and differences between Chinese, Italian, and English concerning the acceptability of null arguments and the interpretation of null and overt subjects in embedded clauses and coordinate clauses are highlighted. Section 4.2 is dedicated to the research questions and hypotheses underpinning this study. Section 4.3 details the participants and section 4.4 describes the design of the study, including test materials and procedures. A summary is provided in Section 4.5.

4.1 Null arguments in Chinese and English: Similarities and differences

First, I will summarise the distribution of null arguments and the interpretation of null subjects in two types of clauses in Chinese in comparison with the same contexts in English (see Chapter 2 for details). Recall that English does not allow null subjects and null objects. It allows subject pronouns and object pronouns in these clauses. The null subject is allowed only in a restricted number of contexts, for example coordinated clauses. Pro-drop languages such as Greek, Italian, and Spanish allow a null element in the subject position of a finite clause, but not in the object position of a transitive verb. Overt pronouns are available in these languages. Languages such as Chinese, Japanese, and Korean are known as null subject languages. These languages are different from the others as they allow null elements in both subject and object positions. Chinese permits arguments mutually known to the speaker and listener to be null. An obligatory topic feature (optional in English and Italian-type languages) is believed to contribute to this behaviour (Huang, 1984). The overt pronoun *ta* 'he/him' can also be found in Chinese.

With respect to identifying the antecedent, there are cross-linguistic differences. Carminati (2002; 2005) proposed that the constituent in Spec IP is normally, but not exclusively, the subject of the sentence and tends to be interpreted as the topic. In English, embedded null subjects are not allowed, but an embedded overt subject pronoun can refer to either the subject or object in the matrix clause. A null subject in the coordinated clause only has a matrix subject reading, whereas an overt pronoun in the same position has no

such bias; it can refer to either the subject or the object. In Chinese, null elements in the subject position of adjoined clauses are co-referential with the topic antecedent. The embedded null subject can refer to the subject in the matrix clause or a discourse referent. Overt pronominal elements in Chinese are associated with highting or focus. Overt pronouns are used to re-introduce or to emphasise the topic, even if there is no prosodic contrast. The similarities and differences between Chinese and English in terms of null and overt subjects are summarised in Table 4.1 and Table 4.2 below:

Table 4.1 Summary of the similarities and differences in English and Chinese: Interpretation of null and overt subjects: Adjoined clauses

Interpretations	English		Chinese	
	null subject	overt subject	null subject	overt subject
Topic antecedent	+	+	+	+
Matrix object	_	+	_	_
Discourse referent	_	_	_	_

Note: "+" indicates that this reading is allowed; "-" indicates that this reading is not allowed

Chinese null subjects in adjoined clauses refer to the topic antecedent and English null subjects in the same context also refer to the topic antecedent. L2 learners are not expected to have problems interpreting a Chinese null subject. However, they may wrongly allow the object reading, which is not possible in Chinese for overt subjects in adjoined clauses.

Table 4.2 Summary of the similarities and differences in English and Chinese: Interpretation of null and overt subjects: Embedded clauses

Interpretations	English		Chinese	
	null subject	overt subject	null subject	overt subject
Topic antecedent	_	+	+	+
Matrix object	_	_	_	_
Discourse referent	_	_	+	_

Note: "+" indicates that this reading is allowed; "-" indicates that this reading is not allowed.

In terms of the embedded subject, L2 Chinese learners may interpret overt subjects in

native-like ways but are likely to have problems interpreting null subjects.

To summarise to this point, the distribution and interpretation of null subjects in Chinese, phenomena which occur at the interface of syntax and the discourse pragmatics of topicalisation are less constrained than in English. Once the syntactic properties of null subjects are in place, L2 English learners are expected to be able to interpret a null subject in embedded clauses as co-referential with the topic antecedent or a referent in the discourse. Per contra, the interpretation of overt subjects in Chinese, in which syntax interfaces with the discourse pragmatics of focus, is more restricted. In adjoined clauses, a null subject can only refer to the topic antecedent. Low-level L1 English-L2 Chinese speakers are expected to choose matrix subject NPs as antecedents for null subjects, but to be undecided to co-refer overt subjects with matrix subject NPs

4.2 Research questions and hypotheses

The main research questions of the present study are as follows:

1. Do L1 English-L2 Chinese child and adult learners allow null subjects and null objects in their L2 Chinese?

2. Do L2 children and L2 adults pass through the same developmental paths in terms of how they judge null arguments and interpret null and overt subjects in adjoined and embedded clauses? Is adult L2, like child L2, also constrained by UG?

3. Do high proficiency adult L2 learners acquire null argument properties at the syntax-discourse pragmatics interface? How does the high proficiency child L2 group compare with the adult L2 group?

4. Do L1 English-L2 Chinese children achieve native-like levels of acceptability of null arguments and interpretation of overt subjects in adjoined clauses and of null subjects in embedded clauses?

On the basis of the literature reviewed in Chapters 2 and 3, the following hypotheses correspond to the above research questions:

Hypothesis 1: Child and adult L2 learners of Chinese will allow null arguments from the early stages onward.

Hypothesis 2: Adult and child L2 learners of Chinese will follow the same developmental path with respect to (i) rate of acceptance of null arguments (ii) interpretation of null and overt subjects.

Hypothesis 3: High proficiency adult and child L2 learners will eventually acquire the requisite syntax-discourse interface properties by showing (i) native-like rates of acceptance of null arguments and (ii) native-like interpretation of null and overt arguments.   .

Hypothesis 4: Child L1 and L2 learners will follow different developmental paths with respect to (i) rates of acceptance of null arguments and (ii) interpretation of null and overt subjects.

4.3 Participants

Three different sets of learners—L1 children, L2 children, and L2 adults—plus native Chinese adults were tested using the same acceptability judgement and interpretation tasks. Thirty-two native English-speaking children and thirty English-speaking native adults learning Chinese as a second language in English-speaking countries were recruited. Thirty-three Chinese monolingual children and twenty Chinese monolingual adults participated in this experiment. Native-speaking adults served as control group.

4.3.1 L1 Chinese children and adults

The L1 Chinese children ranged in age from seven to nine years old and were principally recruited from primary schools in Sheffield. They had not learned any other languages and twenty-five of the children had only had ninety minutes of English instruction by the time of testing. None of the children had spent more than three months in a non-Chinese-speaking country.

The twenty Chinese adults ranged in age between forty-nine and sixty-three and came from various professions. They had been taught English in high school approximately from the age of sixteen but had stopped learning English by the age of twenty. None of the

participants in this group use English in their professional lives or have a high level of proficiency in English. None of these participants had spent more than three months outside of China by the time of the experiment.

Three L1 Chinese children were excluded from the test. One was raised trilingually, speaking Chinese, Vietnamese and English. The other two children were excluded because they consistently chose the same answer throughout the experiment.

4.3.2 L2 Chinese children and adults

The L2 Chinese participants were recruited from language schools or English universities via personal contacts, advertising on a mailing list for English speakers of Chinese, and word of mouth. All child and adult participants had received Chinese language instruction either at a language school or through foreign language courses. The participants had varying amounts of contact with native Chinese speakers. The children had received one hundred minutes of Chinese language instruction per week for at least six months. Some of the children and all of the adult participants had been raised in monolingual English-speaking families. All of the adults had learned one or more foreign languages at school or university, but none had started before the age of twelve. All the L2 Chinese participants regularly used English at home and at school. Individual bio-data including knowledge of other languages and amount of contact with Chinese are provided in Appendix A.1- A.2.

Two further children were tested but excluded. One child's parent is a native speaker of Chinese and they predominantly interact in Chinese. The other had been resident in China for nine years and had been exposed to Chinese since the age of four.

There were thirty L2 children. Their age at first exposure was between four years three months and fourteen years seven months (mean = 7. 2; SD = 2. 6). Their age at time of testing was between five and seventeen years (mean = 10. 3; SD = 3. 2). The duration of Chinese instruction ranged from six months to nine years (mean = 3; SD = 3. 3), and their duration of residency in a Chinese-speaking country ranged from never to four years (mean = 1; SD = 1. 6). Most of the L2 children were ethnically Chinese or of British-Hong Kong

descent but they were not heritage language speakers[11]; that is, they had varying amounts of naturalistic input from Chinese teachers and friends but not from their families. Thirty L2 adults participated in this experiment. Their age of first exposure was between seventeen years ten months and fifty (mean = 24. 7; SD = 9. 7). Their age at time of testing was between nineteen and fifty-three (mean = 27. 6; SD = 10. 1). They had studied Chinese in a classroom setting for between six months and eighteen years (mean = 3. 8; SD =3. 6). Their duration of residency in a Chinese-speaking country ranged from never to eight years (mean = 1. 2; SD = 1. 8). They had all attended university or another higher education institution.

4.3.2.1 Classroom instruction on null arguments in Chinese

This section examines whether L2 children and L2 adults in this study had received instruction in the classroom at the time of testing[12]. If they had been explicitly taught Chinese, this is considered as input.

In order to determine whether null arguments were explicitly taught in the classroom, an on-line interview was conducted with two Chinese teachers from the Sheffield Star Mandarin School, which belongs to the Sheffield Confucius Institute, and from the Sheffield and District Chinese School. Both interviewees have taught Chinese in the United Kingdom for more than two years and studied linguistics as their main degree subject. Both schools used the same textbooks for child beginner, intermediate, and advanced learners (see Appendix A.3). Younger children at beginner level study *Kuaile Hanyu* (Happy Chinese, Li, 2003), while older children at beginner level study *Zhong Wen* (Chinese, Chinese Language College of Jinan University, 2003). The beginners also use an additional text book called *My First Chinese Reader* (Chao et al, 2001). The intermediate classes use *Zhong Wen* and *My First Chinese Reader*. Advanced classes use *Chinese* and *Biaozhun Zhongwen* (Standard Chinese, Unknown author, 2008). For adult learners, *Zhong Wen* and *Biaozhun Zhongwen* are used in the classroom.

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[11] Heritage language speakers acquire the home language before acquiring the dominant language in their environment of residence. Although heritage speakers are comfortable in all registers of the dominant language, mastery of the heritage language may vary from purely receptive skills in informal spoken language to native-like fluency.

[12] Most of the advanced L2 adults and some of intermediate L2 adults had studied in China for one year as exchange students. In the post-test interview, most of them confirmed that they were not taught Chinese grammar while in China.

It was confirmed that sentences with null arguments appear in textbooks from beginner level. Sentences with null arguments are commonly used in the textbooks' main body of text. Sentences with null subjects appear first, then sentences with null objects, and then both null subjects and null objects are continuously used. Young children see null subjects and null objects within the first six months of instruction and then sentences combining both types of null arguments within the second six months. As for adult learners, they would have seen all combinations of null arguments within sentences within the first six months.

Although null argument sentences are available to L2 children and L2 adults within the first year, null arguments are not explicitly taught in the textbooks. There is no consistent instruction in the textbooks explaining how and when to use null arguments in context, nor do classroom teachers explicitly teach null arguments to learners at any level. Teachers sometimes use extra teaching materials such as story books, songs, and on-line interactive programs. Null arguments are readily available in these materials. However, teachers do not define properties related to null arguments and explain them to learners. One grammar book, *Mandarin Chinese* (Li & Thompson, 1940), at the Confucius Institute explains the use of null and overt pronouns in discourse, specifically the following topics: when the referent can be understood from the discourse; when null subjects are obligatory; and how an overt pronoun is used for highlighting, as in the following example:

(1) waibian jin   lai   le   yi   ge ren   Ø liang ge hong yanjing, yi   fu da   yuan
     outside enter come FPV one CL person Ø two   CL red   eye   one CL big round

     lian, Ø dai   zhe   yi ge xiao   maozi, **ta**   xing   Xia.
     face Ø wear DUR one CL small hat   he surname Xia

'A person came in from outside. He had two red eyes and a big round face, and he was wearing a small hat. He had the surname Xia.'

(Li & Thompson, 1940, 662)

In this example, the topic (a person) is the same from beginning to end, but only the last clause contains an overt pronoun. This is because all other clauses describe the person's

appearance, while the final clause provides something that is not connected with his appearance — his background. Although this grammar book provides general guidelines for the use of null and overt pronouns, it is a reference book for advanced learners, not a standard teaching textbook for all levels.

Sentences with null arguments) are available to beginners but they are not taught explicitly. Although L2 children and L2 adults recruited in the current study had encountered Chinese null arguments in textbooks, they had received no explicit instruction about Chinese null arguments.

4.3.3 Measuring L2 proficiency

As Tomas (1994) notes proficiency measures are necessary in L2 research when the researcher wishes to compare different groups of L2 learners in their acquisition of a given phenomenon and when cross-group or cross-sectional data are used to derive developmental sequences. These characteristics match the goals of the present study as child L2 learners will be compared with adult L2 learners, advanced L2 learners from both child and adult groups will be compared with native controls, and cross-sectional data from L2 learners of different proficiency levels will be used to determine the stages that L2 learners pass through in their acquisition of Chinese null arguments. In order to achieve these goals, we therefore need an approximate indication of the participants' level of proficiency in Chinese, which is independent of the main experimental data.

'Language proficiency' is a construct which is used as a global indicator of an L2 learner's abilities in the target language. It is also used to refer to specific aspects of linguistic competence, such as phonological, syntactic, morphological, lexical, and discourse-pragmatic skills. In general, language proficiency is divided into knowledge and some aspects of use and often involves one or more of the dichotomies between grammatical and communicative, between written and oral, between productive and receptive, and between explicit and implicit.

Tomas (1994) defines proficiency as "a person's overall competence and ability to perform L2" (p. 330). However, such definitions are somewhat tautological. For the purposes of the present study, the construct of L2 proficiency is defined as "the ability to process lexically, morphologically, and syntactically complex sentences in the target

language" (p. 330). Phonology is excluded for the purposes of this study. The proficiency measure primarily incorporates four aspects of linguistic ability (syntax, morphology, lexicon, and comprehension), which are measured in terms of their complexity. Knowledge—that is, linguistic competence, rather than use (although when testing knowledge, some aspect of use will inevitably be involved)—is the focus of the test adopted here for the present study. Pragmatic skills are excluded because (i) many of them would be classified as properties of language use, and (ii) operations above the sentence level are an important part of licensing and identifying Chinese null arguments. Including such skills in the proficiency measure would therefore make it less independent.

4.3.3.1 Choosing a test

A standard test—The Chinese Proficiency Test [the new HSK (Hanyu Shuiping Kaoshi) and the new YCT (The Youth Chinese Test)]—was adopted to evaluate both child and adult L2 Chinese proficiency. There were several practical considerations in deciding what type of test to use to measure proficiency for this study. Firstly, the test could not involve writing because this would have been too difficult and even impossible for some of the subjects, particularly for the L2 children. Consequently, a traditional cloze test, often used as a proficiency measure for L2 adults, was immediately eliminated. Secondly, the test should not be designed for different age groups because this is problematic, given that the purpose of the proficiency measure here is to find a way to compare subjects across different populations, in particular child vs. Adult learners. The YCT, a part of the HSK, is developed to measure the proficiency of a child L2 learner. Thus, The Chinese Proficiency Test is suitable for both the mature and the younger subjects. Time constraints were also considered in deciding which test to use. Due to the limited time available with each participant and the possibility of participant fatigue, especially in the child L2 learners, the proficiency measure could take no longer than twenty minutes. The test adopted here is an on-line test and does not exceed twenty minutes. The proficiency test provides an independent indication of L2 learners' proficiency for the researcher to use in order to compare participants across different populations (child vs. adult) and across different levels (low, intermediate, and advanced proficiency) with respect to their knowledge of null arguments.

4.3.3.2 The Chinese proficiency test

The new YCT and the new HSK are standardized tests for measuring L2 Chinese language proficiency. The new YCT assesses the ability of young L2 learners from different L1 groups to use Chinese in their daily and academic lives. The different levels of the new YCT are equivalent to some of the levels in the new HSK, as the following table shows:

Table 4.3 Proficiency test level detail

New HSK	New YCT	Description	Vocabulary
HSK (Level VI)		Can comprehend written & spoken information and express themselves.	Over 5,000 words
HSK (Level V)		Can read newspapers, enjoy films and plays, and give a full-length speech.	2,500
HSK (Level IV)		Can communicate fluently with native speakers on a wide range of topics.	1,200
HSK (Level III)	YCT (Level IV)	Can communicate at a basic level in their daily, academic, and professional lives.	600
HSK (Level II)	YCT (Level III)	Can communicate on familiar daily topics in a simple manner.	300
HSK (Level I)	YCT (Level II)	Can cope with basic-level communications.	150
	YCT (Level I)	Can understand and use some of the most common phrases and sentences.	80

The new YCT consists of a written section and an oral section, which are independent of each other. Due to the limited time available, the oral part was excluded. The test is composed of listening comprehension and reading comprehension sections and comprises thirty-five items. The test lasts twenty-five minutes, including five minutes in which the examiner gives instructions on how to complete the test. The maximum score is two hundred. A score of one hundred and twenty or more is considered a passing score. The new YCT level I and level II materials, including sample tests and audio material, were

used as a proficiency measurement for this study. L2 learners who did not pass level I were considered to be in the low proficiency level; and those who passed level II were considered advanced learners. Those who passed level I but not level II were classified as the intermediate group.

All of the participants either provided existing HSK/YCT scores if they had already taken one of these tests within the year before participating in the study, or they completed the YCT as part of the data collection for the present thesis if they did not have a recent existing test result. All L2 children and all advanced L2 adults had taken proficiency tests within one year of the time of testing. Intermediate and low proficiency L2 adults completed a level I test immediately before the experiment. Those who took the YCT as part of their participation had ten minutes break between the proficiency test and the experiment.

The motivations behind only using YCT levels I-III but no higher levels were the fact that children were recruited and the fact that the study aims to tap into the linguistic competence of child/adult beginners. L2 learners whose level of proficiency in Chinese was above YCT III were all classified into the advanced group. Note that because data from two different proficiency tasks were used, it is not possible to use statistical methods to find out whether the 'low', 'intermediate' and 'advanced' groups were statistically significantly different from each other in terms of proficiency test scores, and whether low, intermediate and advanced adults were really of equivalent proficiency to low, intermediate and advanced children.

4.4 Experimental method

A pilot study was conducted on ten L2 Chinese learners and six native speakers before the main experiment. After the pilot study, the experimental materials were reviewed and revised for the main experiment. Some complex sentences and difficult vocabulary items were excluded for entry-level participants.

The main experiment employs two tasks—an acceptability judgement task and an interpretation task. The format of the tasks followed those of Rothman (2009), Sorace and Filiaci (2006), Yuan (1993), and Zhao (2008). The procedures for both tasks were timed in order to capture participants' initial intuitions rather than their conscious knowledge of the

relevant structures (Bialystok, 1979; Han & Ellis, 1998; Sorace, 1996). First, I will briefly restate the hypothesis to be tested here. The details of the experimental methods and procedures used with all three learner groups (L2 children, L2 adults, and L1 children) as well as with L1 adult controls are given in Sections 4.4.1 and 4.4.2.

4.4.1 Acceptability judgement task

The purpose of the acceptability judgement task (AJT) is to determine whether learners know the distribution of null arguments by establishing whether they accept null subjects, null objects, and both null subjects and null objects in the appropriate contexts. Details of the test materials and procedures are presented in the following section.

4.4.1.1 Materials

The task was an acceptability judgement test to see whether L2 learners accept null arguments that appear in sentences. Every participant was presented with fourteen test trails, each consisting of an illustration from a book with three or four sentences. The purpose of presenting the picture is twofold. The picture serves as introducing a background for the testing sentences and helps participants to understand the vocabulary items. It also makes the task less 'test-like', particularly for child participants. Participants were told that they would hear a short sentence first, followed by one or two subsequent sentences. They were asked to judge whether the subsequent sentences sounded natural to them. Participants were instructed not to judge the sentences according to the picture but on their own merit. 33 testing sentences were divided evenly across the three structural contexts, so that each subject received a sentence testing knowledge of null subjects (as shown in (2)), null objects (3), and both null subjects and objects (4). A complete list of experimental items is provided in Appendix A.4.

Figure 4.1 Sample sentence in the acceptability judgement task

(2) Null subject:

Sentence: Xiaohong xihuan haixian，ye　xihuan cai。
　　　　Xiaohong like　　seafood　also like　　vegetable
　　　　Xiaohong likes seafood. Xiaohong also likes vegetable.

(3) Null object:

Sentence: Mingming he　niunai，Xiaohong bu　he。
　　　　Mingming drink milk　　Xiaohong not drink.
　　　　Mingming drinks milk. Xiaohong doesn't drink milk.

(4) Null subject & null object:

Sentence: Xiaohong bu xihuan mianbao，bu xihuan niunai，Mingming xihuan。
　　　　Xiaohong not like　　bread　　not like　　milk　　Mingming like
　　　　Xiaohong doesn't like bread. Xiaohong doesn't like milk. Mingming likes milk.

(5) Filler:

Sentence: Mingming he　　niunai，ni　he　　niunai ma?
　　　　Mingming drink milk　　　you drink milk- Q
　　　　Mingming drinks milk. Do you drink milk?

Figure 4.1 illustrates a situation in which two people and a dog are surrounded by seafood, vegetable, bread, milk and meat. A topic (or topics) is introduced through the first given sentence. A null element appears in the subject position in sentence (2), whereas a null element appears in the object position in sentence (3). In the sentence with both null subject and null object, as in (4), topics are introduced in the given context. Null elements appear

both in the subject and in the object position. Sentences such as (5) contain no null elements.

Table 4.4 below illustrates the number of tokens for each testing sentence type.

Table 4.4 Number of tokens for each type: Acceptability Judgement Task

Sentence type	Null subject	Null object	Both null subject and null object	Filler
Number	11	11	11	11

There were forty-four sentences in total—thirty-three testing sentences and eleven fillers (as in (5)). Fillers with overt subjects and/or objects were randomised into the sequence of testing sentences. They were included in order to distract subjects from the true purpose of the experiment and to check that subjects were paying attention and understood the nature of the task. Recall that, in Chinese, the use of overt pronouns in the subject and/or object position is pragmatically odd in the linguistic environment being tested. The presence of overt arguments would not be grammatically but pragmatically anomalous. Among the test sentences, there are two different person null arguments: first person singular null arguments (i.e. 'I' and 'me') and third person singular null arguments (i.e. he/she/it and him/her/it). The test sentences, including fillers, are all grammatical Chinese sentences. Examples are provided in Appendix A.5

To perform like Chinese speakers, L2 learners have to correctly map sentences to their associated pragmatic meanings.

4.4.1.2 Procedure

The experiment was carried out as follows. To ensure participants' comprehension, the test instructions were given in the participant's L1, so English speakers received an explanation in English, and Chinese speakers received an explanation in Chinese. Participants were told that they were going to listen to descriptions of some pictures. The researcher told L2 participants that it was not a test for their schoolwork and explained the general purpose of the experiment. This helped to put L2 children at ease. Both L1 and L2 participants were subsequently asked to fill out a short questionnaire regarding their

background and language-learning history (for some L2 children, the questionnaires were answered by their parents). This allowed the experimenter to confirm that participants fulfilled the criteria for participation, namely that L2 child participants must have been raised in an English–speaking family with an age of first exposure to Chinese of more than four years and that L2 adult participants began learning Chinese after puberty.

All participants were presented with pictures and test sentences on the screen. They all used the same paper answer sheet to provide their judgements. The test sentences were recorded by a native speaker and played to all participants. While showing the picture, sentences were read aloud and presented to participants one by one. Participants were told that sentences were to be played only once. Participants had five seconds to judge the sentence. Participants then had to evaluate whether these sentences were acceptable or unacceptable by circling one of the options on a four-point scale, plus a 'don't know/can't decide' option on the answer sheet. This is illustrated below:

Table 4.5 Sample answer options: Acceptability Judgement Task

Completely Unacceptable	Slightly unacceptable	Slightly acceptable	Completely acceptable		Don't know/ Can't decide
-2	-1	+1	+2		X

A four-point scale was used because judging felicity is not always as straightforward as judging grammaticality. Some sentences were considered grammatically correct but pragmatically odd and some were grammatically correct and pragmatically appropriate. During the real experiment, participants were instructed to circle '+2' if they thought the sentence to be a perfectly natural Chinese sentence; circle '+1' if they thought the sentence sounded odd but acceptable to them; circle '-1' if they thought there is something wrong with the sentence; and '-2' if they thought the sentence was totally wrong. If they did not understand or they could not decide, or if they missed the sentence, they could circle 'X'.

The experiment started with a short warm-up session to familiarise subjects with the task. This included a picture and three sentences. One is a grammatical sentence and the other two sentences are ungrammatical. Before proceeding to the main task, subjects had to provide target-like responses; that is, they had to correctly reject the two ungrammatical

sentences. When subjects failed provide a target-like response to in the warm-up session, the researcher explained the rules of the task once again. In particular, it was necessary to ensure that participants understood that they should judge the second or third part of the sentence itself not according to the picture and that they could understand the meanings of the numbers (-1; +2) and pictorial character (X). A picture was given to help participants, especially low-level participants, to understand the vocabulary terms and to ease their nervousness. Once this was established, the researcher proceeded to the main experiment.

There was a concern about whether this task was suitable for children, since the test items include reading and selection of negative numbers. The youngest children are aged just five, so cannot necessarily read yet and probably do not know about negative numbers. When the researcher was explaining the procedure, participants were told to circle the numbers or pictorial character which match their judgement. In order words, participants did not need to have knowledge of negative numbers to complete the task. From the results of the warm-up, even the youngest children could provide native-like responses by rejecting the two ungrammatical sentences. This means that the task was suitable for both L1 and L2 children.

The result of the AJT was determined by the participants' acceptance or rejection of the test sentences. In this task, the maximal score '+2' stands for complete acceptance of a sentence as an acceptable natural Chinese sentence; and '−2' is the maximal score representing complete rejection of the sentence as an unacceptable sentence. In principle, the scores '+1' and above are taken as a sign of acceptance, and the scores '-1' and below as a sign of rejection. The 'don't know/can't decide' option was excluded from the statistical analysis, as the participants did not understand the sentence or could not decide. The 'don't know/can't decide' option was rarely chosen. Only 1% of total answers was excluded from L2 participants' results. One L1 child consistently chose the 'don't know/can't decide' option and was excluded from the analysis.

Child participants were tested in small groups of two to six children. Adult participants were tested individually. The experiment was carried out in a quiet room at the participants' school, the University of Sheffield, the University of Leeds, or at the participants' home. Child L1 participants were rewarded for their participation with a sticker, the child L2 participants received a small snack, and the adult participants were

given refreshments.

Based on the research questions and the outlined hypotheses, the following predictions of the results are expected from the acceptability judgement task.

Prediction 1: L1 English-L2 Chinese children and adults are expected to allow null arguments in their early interlanguage. Prediction 1 is based on hypothesis 1 that L2 learners will have no problem allowing null arguments from the earliest stages.

Prediction 2: The developmental sequence of the L2 child and that of the L2 adult are predicted to demonstrate similar patterns with regards to the rate of acceptance of null arguments. This is corresponds to hypothesis 2, which states that adult L2 acquisition, like child L2 acquisition, is constrained by UG.

Prediction 3: High proficiency L2 children and L2 adults will give native-like responses with regards to the acceptability of null arguments. This prediction is linked to hypothesis 3 according to which syntax-discourse interface properties are acquirable by L2 learners.

Prediction 4: L2 children will pass through a different developmental sequence from L1 children as a result of L1 transfer regarding the acceptability of null arguments. This corresponds to hypothesis 4, which expects L1 to play a role in L2 acquisition.

The test sentences used in the AJT included either a null subject, a null object, or both a null subject and a null object. The aim of this task was to investigate whether L2 learners acquired one property of Chinese null argument — that is, that null arguments are licensed by discourse topics. The results from this task only indicate what L2 learners allow and disallow in terms of different sentence types. However, another property of Chinese null arguments —that they are identified as co-referential with the discourse topic—as well as information about whether the L2 learners know the interpretive constraints of null and overt arguments cannot be determined using the AJT. This motivated the use of an interpretation task.

4.4.2 Interpretation task

The purpose of the interpretation task is to determine whether language learners assign a target-like interpretation to null and overt subjects in embedded and adjoined clauses. The following section presents the materials and the procedure for the interpretation task.

4.4.2.1 Materials

The interpretation task aim s to investigate learners' comprehension and preferences when identifying an antecedent for overt and null arguments in embedded and adjoined clauses. Table 4.6 below illustrates the number of tokens for each type of test sentence:

Table 4.6 Number of tokens for each type: Interpretation Task

	Adjoined clause	Embedded clause	Filler
Null subject	4	5	
Overt subject	5	4	9

There were nine clauses with null pronominal form s, as in (6a-b), nine clauses with overt pronominal forms, as in (7a-b), and nine fillers, as in (8). Participants were presented with one test sentence at a time. All sentences were recorded by a native speaker and played to all participants. Following each test sentence, participants were instructed to circle the best possible answer to the corresponding question. The question itself was asked in the participants' L1. The matrix clause always includes two NPs and the embedded or adjoined clause includes a null or an overt pronoun. Details are given in Appendix A.5.

(6) **Testing null subjects:**

   In adjoined clauses

   a.Laoshi   gen yi ge xuesheng shuohua，ranhou qu   jiaoshi。
      teacher   with one CL student   talk   then   go to classroom
      'Teacher talks to a student and then s/he goes into the classroom.'

   Cartoon hero: Who goes into the classroom?

b. Gege   gen   jiejie zai fangjian，ranhou qu   chufang。
   brother   with   sister at   bedroom then   go to kitchen
   'Brother stays in the bedroom with sister and then (they) go to the kitchen.'

   Cartoon hero: Who goes to the kitchen?

In embedded clauses

   c.Xiaohong dui Xiaohai   shuo   hui   jia。

   Xiaohong   to Xiaohai   say   return   home

   'Xiaohong   says to Xiaohai   that (he) goes home.'

   Cartoon hero: Who goes home?

(7) **Testing overt subjects:**

In adjoined clauses

a. Xiaohong   gen   Mingming shuo zaijian，ranhou ta   gen   Li Xiaolong
   Xiaohong   with   Mingming say   goodbye then   s/he with LI xiaolong
   shuo   zaijian。
   say   goodbye
   'Xiaohong says goodbye to Mingming and then s/he says goodbye to Li
    Xiaolong.'

   Cartoon hero: Who says goodbye to Li Xiaolong?

b. Gege   gen   mama he   cha ranhou ta   gen   baba chi yu
   brother with mother drink tea then   s/he with father eat fish
   'Brother drinks tea with mother and then s/he eats fish with father.'

   Cartoon hero: Who eats fish with father?

In embedded clauses

c. Gege   miandui mama   shuo   ta   he   niunai。
   brother   face to mother say   s/he   drink milk
   'Brother talks to mother that s/he drinks milk.'

   Cartoon hero: Who drinks milk?

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(8) **Fillers:**

In adjoined clauses

a. Baba   gen gege   zai chufang，tamen chi   yu。
  father   with brother in kitchen   they   eat fish
  'Father is in the kitchen with brother. They eat fish.'

  Cartoon hero: Who eats fish?

In embedded clauses

b.Lili dui   mama   shuo baba   yao   kafei。
  Lili face to mother say   father want coffee
  'Lili told mother that father wants coffee.'

  Cartoon hero: Who wants coffee?

To lower the possibility that a repeated measures design might lead to an unwanted practice effect, the number of test items per clause type in this task (see Table 4.6) is much smaller than that in the acceptability judgement task (see Table 4.4). In addition, because the participants include child learners at beginner level, the test sentences in this study are much simpler than those in other similar studies. It is therefore even more important to avoid the practice effect. Each participant was tested for four or five items only per clause type. Test items such as (6b) and (7b) are designed to rule out the possibility that learners might prefer one reading to the other. All test items and fillers were randomized.

4.4.2.2 Procedure

The experiment was carried out as follows. To avoid comprehension problems, instruction was delivered in their L1s. Subjects were told that they were going to see and listen to some interesting sentences. As with the acceptability judgement task, the data collection procedure for the L2 subjects started with a brief explanation of the general purpose of the study, namely, comparing younger and older L2 learners' acquisition of Chinese. L2 children were told again that it was not a test and that what they did had no repercussions for their schoolwork.

For both L1 and L2 subjects, the experimental session started with a short warm-up

designed to train them to do the interpretation task. Subjects were told that the scenario was set with two characters talking, and they would be asked to answer the question according to what they had heard. Subjects were presented with three items similar to the fillers, but without any null arguments or third person single overt pronouns (*ta*). Each sentence contained two clauses and two noun phrases. Details are provided in Appendix F. When subjects failed to provide a target-like response in the warm-up session, the experimenter helped them. Only once it was clear that the subject understood how to complete the task did the experimenter proceed to the main experimental session. L2 adults and native adults were instructed to use their intuition, rather than relying on information in explicit knowledge. They were told not to try to work out what the experiment was about and that, if they so wished, more details regarding the focus of the experiment would be provided at the end of the experiment.

All L1 and L2 subjects were timed to ensure decisions were made on an initial intuitive judgement. All test sentences and fillers were randomly arranged. The sentences were presented to subjects one after the other. The sentences were recorded by a native speaker and played to all subjects. Questions were asked in the subjects' native language to avoid misunderstanding. Subjects were encouraged to consider every possible interpretation. Subjects had to answer the question by circling one of the options or the 'don't know/can't decide' option, as follows:

Table 4.7 Sample answer options: Interpretation Task

cat	dog	both	neither		Don't know/ Can't decide

The experiment, including the acceptability judgement task and the interpretation task, lasted between twenty to thirty minutes. The youngest L1 and L2 children, who were five-years-old, did not have any problem taking part in a session of this length. For those (adult) learners who had to complete the proficiency test, the experimental session lasted around sixty minutes.

Predictions of the results acquired from the interpretation task are listed below:

Prediction 5: L2 children will pass through the same developmental sequence in terms of interpreting null and overt subjects as L2 adults. Prediction 5 is based on hypothesis 2, which hypothesises that not only child L2 acquisition but also adult L2 acquisition is constrained by UG.

Prediction 6: High proficiency L2 children and L2 adults will behave similarly to L1 controls regarding the interpretation of null and overt subjects. This prediction is linked to hypothesis 3, which states that L2 learners can eventually overcome syntax-discourse interface difficulties.

Prediction 7: L2 children will pass through a different developmental sequence from L1 children, as the result of L1 transfer regarding the interpretation of overt and null subjects. Prediction 7 corresponds to hypothesis 4 that L1 plays a role in reconstructing L2 structure.

4.5 Summary

In this chapter, I presented the methodology used in the current study to test the acquisition of null arguments in L2 Chinese. The chapter started by presenting the research questions and hypotheses of the current study. Information about the subjects was then presented. An overview of materials and procedures used in this study was also provided. The results of the study are presented in Chapter 5 and discussed in relation to the research questions and the theoretical assumptions in Chapter 6.

Chapter 5 Results

Introduction

This chapter presents experimental data on the acquisition of null arguments in Chinese by three groups of learners: L1 English- L2 Chinese children and adults and L1 Chinese children. As outlined in Chapter 1, this thesis investigates whether linguistic properties at the syntax-discourse interface are particularly problematic and cannot be learnt by adult L2 learners and whether, broadly speaking, child and adult L2 acquisition and child L1 acquisition of a particular property of Chinese essentially involve the same processes. These issues are addressed using an acceptance judgement task and an interpretation task to determine firstly whether learners demonstrate knowledge of null arguments (subject and object) and of the interpretive constraints on null subjects and secondly what kind of developmental sequence(s) they pass through in their acquisition of this property of Chinese.

Section 5.1 presents the results from the acceptability judgement task for the acquisition of null arguments in L1 Chinese, and Section 5.2 presents the results for L2 acquisition and a brief summary. Finally, Section 5.3 presents the results from the interpretation task showing the comprehension of interpretive constraints on null subjects in L1 and L2 acquisition, and a brief summary of results follows.

The central questions addressed in this study concern the extent to which child L2 acquisition is like adult L2 acquisition and/or child L1 acquisition and whether L2 adult and child learners can overcome difficulties at the interface. To answer these questions, L1 English-L2 Chinese children will be compared with, on the one hand, with L1 English-L2 Chinese adults and, on the other, L1 Chinese children in terms of their acquisition of a property of the target language, namely null arguments in Chinese. The tasks are used to test the following hypotheses:

1. That adult L2 acquisition is constrained by UG, so L2 children and L2 adults will follow the same developmental sequence

2. That L1 transfer plays a role in acquiring L2 knowledge, so L2 children will pass through a different developmental sequence from L1 children

That L2 learners can eventually acquire the interpretable feature relevant to the syntax-discourse interface. L2 children should exhibit a pattern similar to that of L2 adults,

and advanced L2 child and adult learners will behave similarly to L1 adult controls in their rate of acceptance of null arguments and their interpretation of null subjects.

5.1 Results from the acceptability judgement task

This section presents data regarding the rates of acceptance of null arguments. The acceptability task reported in this section will be used to test Predictions 1-4, as repeated below:

Prediction 1: L1 English-L2 Chinese adults and children will accept null arguments in Chinese from the earliest stages.

Prediction 2: The developmental sequences of L2 children and L2 adults are predicted to pattern alike in terms of rates of acceptance of null arguments.

Prediction 3: High proficiency L2 children and L2 adults will give native-like responses in terms of acceptance of null arguments.

Prediction 4: L2 children will follow a different developmental sequence from L1 children as a result of L1 transfer regarding the acceptability of null arguments.

L1 children's data will be compared with L1 adults' to infer how their developmental sequences diverge and converge. Comparisons between L2 learners of every age and proficiency level and L1 native controls will be made to test the predictions made above. In order to test whether child L2 learners differ from adult L2 learners and differ from child L1 learners, the data from the child L2 group will be compared with those of the adult L2 and child L1 groups.

Figure 5.1 below shows an overview of the results from the acceptability judgement task and Table 5.1 shows a repeated measures ANOVA that includes all participant groups. The mean difference is significant to within 0.05. $F_{(7, 91)} = 4.441$ for the acceptance of null subjects, $F_{(7, 91)} = 8.188$ for null objects and $F_{(7, 91)} = 3.780$ for both null subjects and null objects. The abbreviations NS, NO, and NSO refer to the null subject, null

object, and both null subject and null object sentences. L2C-L refers for the low level L2 children; L2C-I to the intermediate level L2 children; and L2C-A to the advanced L2 children. L2A-L, L2A-I, and L2A-A refer to the low, intermediate, and advanced L2 adult groups. L1C refers to the L1 children and L1A to the L1 adults. Detailed comparisons will be presented in the following sections.

Group Means

	L2C-L	L2C-I	L2C-A	L2A-L	L2A-I	L2A-A	L1C	L1A
NS	84.35	90.48	94.68	80.13	94.65	88.64	85.99	97.73
NO	63.25	94.78	96.1	72.99	87.88	94.32	84.95	99.09
NSO	46.67	77.89	89.61	65.72	81.82	75	71.27	80.46
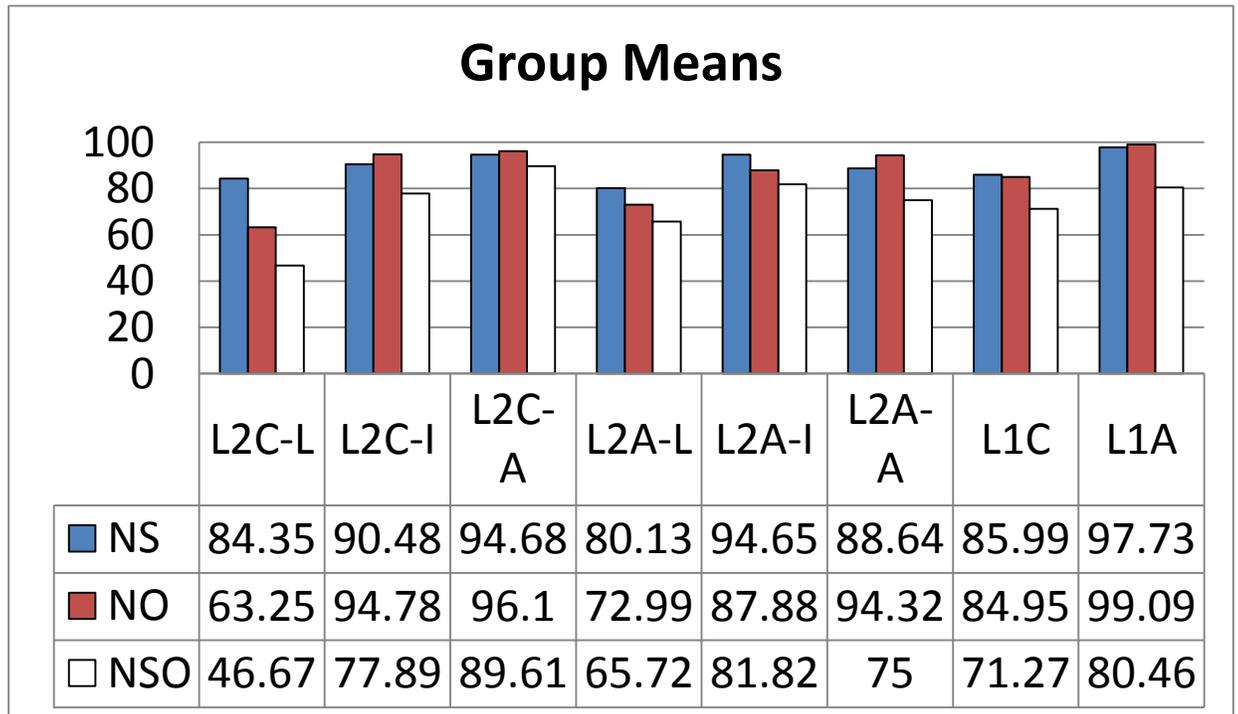
Figure 5.1 Overview: Group results: Acceptance

Table 5.1 Overview: All groups: Results of post-hoc test: Rates of acceptance

		L2C-L	L2C-I	L2C-A	L2A-L	L2A-I	L2A-A	L1C
NS	L1C	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	N/A
	L1A	*	n.s.	n.s.	*	n.s.	n.s.	*
NO	L1C	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	N/A
	L1A	*	n.s.	n.s.	*	*	n.s.	*
NSO	L1C	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	N/A
	L1A	*	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.

Note: * = significant; n.s. = not significant; N/A = not applicable.

The results show that, in accordance with the target grammar, the advanced and intermediate proficiency L2 children and L2 adults generally accept null arguments like L1 adult controls. Child L1 learners perform more like low level L2 child and adult learners. Using the data from the proficiency measure detailed in the preceding chapter to infer the developmental sequences of learners, it will be shown that English-speaking L2 children and L2 adults follow the same developmental stages in their acceptance of null arguments in Chinese. Section 5.1.1 presents the results for the L1 children and Section 5.2 those of the L2 children and L2 adults. L1 adults are used as the control group.

5.1.1　L1 acquisition: L1 children vs. L1 adults

The data are analysed in terms of the mean percentage of acceptance in each of the three sentence types. The results are first presented for the two groups (L1 children and L1 adults) as a whole and subsequently for the individual children and adults. First, the responses to fillers are considered. All fillers have an explicit subject and/or object, and they are all taken from a textbook for beginners. Examples are given in (1) and (2).

(1) Li Xiaolong jia hen　da. Ta jia　　ou　shi ge fangjian.
　　Li Xiaolong jia very big he home have ten CL room
　　'Li Xiaolong's house is big.　His house has ten rooms.'

(2) Xiao mao xihuan chi　yu. Xiaohong ye　xihuan chi　yu.
　　Small cat like　eat　fish Xiaohong also like　eat　fish
　　'The small cat likes to eat fish. Xiaohong likes to eat fish, too.'

In filler example (1), the subject 'Li Xiaolong's house' in the first sentence is introduced as the topic. Because a null subject can be licensed by a topic, 'Li Xiaolong's house' can be null in the second sentence. However, the subject is explicitly expressed as 'his house' in the second sentence. In example (2), the subject 'the small cat' and the object 'fish' in the first sentence are bound by the topic and they can be null in the following sentence. The subject and the object in the second sentence are expressed explicitly. Sentences with explicit arguments are clear and grammatical. The participants were expected to accept all

fillers. As demonstrated by native-speaking adults, virtually all (19 of 20) of them accepted fillers at near-ceiling level (90.91-100%). Only one subject accepted fillers at a lower rate (81.82%). As for native children, some children did not accept more than three of eleven grammatically correct and pragmatically appropriate fillers. Some L1 children consistently rejected all sentences including fillers (scoring the sentences at -1 or -2). The L1 children may have been affected by limited time and pressure. Eleven out of thirty-three L1 children (see Appendix B.2) failed to accept the fillers. Children come to the learning process with knowledge of using null arguments if and only if they can converge on a grammar that licenses null arguments in the first place. Before acquiring the grammar that licenses null arguments, explicit arguments are commonly used to avoid ambiguity, so the eleven L1 children who failed to accept fillers are considered unable to cope with sentences with null arguments. Hence, their results are excluded. The results of twenty-two L1 children are analysed below.

The results for both L1 children and L1 adults are presented in the following sections.

5.1.1.1 Group results

The group results for L1 children and L1 adults are provided in Table 5.2.

Table 5.2 L1 children and L1 adult control: Group results: Mean rates of acceptance

| Group | n | Argument types | | | | | |
| | | NS | | NO | | NSO | |
		%	SD	%	SD	%	SD
Children	19	85.99	15.51	84.95	17.95	71.27	27.62
Adults	20	97.73	4.04	99.09	2.80	80.46	15.68

Note: NS = null subject; NO = null object; NSO = both null subject and null object. % = rate of acceptance; SD = standard deviation

As shown in Table 5.2, the L1 adult controls accepted sentences with null arguments at a very high rate. They almost always accepted null subject (NS) and null object (NO) sentences. A one-way ANOVA reveals that the differences between NS, NO, and NSO

sentence types are significant ($F_{(2,57)}$ = 23.972; p < .01). Post-hoc tests show that there is no significant difference between NS and NO sentence acceptance (p > .05). The difference between NS and NSO acceptance is statistically significant (p < .01), as is the difference between NO and NSO acceptance (p < .01). The L1 adult controls exhibit no difference between rates of acceptance of NS and NO sentences. However, the acceptance rate of NSO sentences is lower than that of NS and NO sentences. This may due to the processing load that sentences with NSO require. Even for L1 adults, it may require greater ability to integrate information to process a sentence with two null arguments.

As for the L1 children, their results show a similar pattern to the adults. NS and NO sentences were accepted most of the time, although not quite as frequently as in the adult data, and there are significant differences between different sentence types ($F_{(2,87)}$ = 3.838; p < .05). Like the L1 adults, NS and NO rates of acceptance do not differ from each other (p > .05). There is a significant difference between NS and NSO acceptance (p < .05). The difference between NO and NSO is also near statistic significance (p = .05). Acceptance of NS and NO sentences develops in parallel, but the development of acceptance of NSO sentences is delayed.

In comparing the child and the adult groups, T-tests reveal that the two groups do not differ significantly from each other in terms of rates of acceptance of the NSO sentences ($F_{(1, 37)}$ = 1.651; p > .05). There are statistically significant differences between the two groups in terms of the NS sentences ($F_{(1, 37)}$ = 10.713; p < .01) and the NO sentences ($F_{(1, 37)}$ = 12.116; p < .01). The children accepted NS sentences at a rate of 85.99% and NO sentences at a rate of 84.95%. These figures could result from an averaging effect; that is, there might be two or three different sub-groups of children with different response patterns. This can be seen from the high number of the standard deviation (SD). Hence, it is necessary to examine the children's individual results.

5.1.1.2 Individual results

The individual L1 participants are categorised according to the response pattern they produced. Participants who incorrectly rejected all or more than half (six out of eleven) of the test items are classified as having a pattern of 'rejection'. Those who correctly accepted all or all but one of the test items are categorised as having a pattern of 'acceptance', and all

the participants who accepted six to nine items are categorised as having a 'mixed' response pattern. The distribution of these response patterns across the different sentence types by L1 adults is presented in Figure 5.2. The exact numbers and individual data are provided in Appendix B.1.
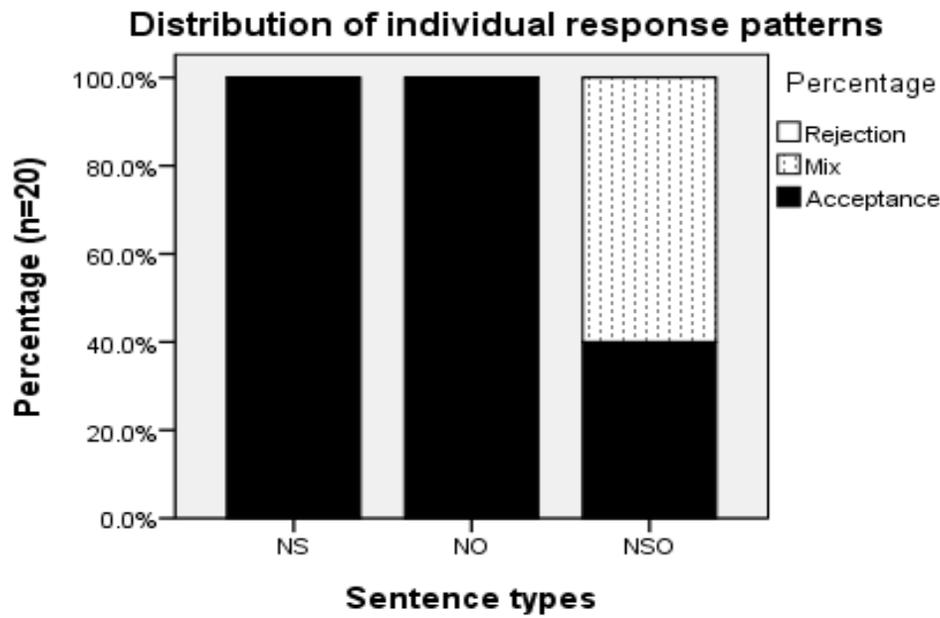
Note: NS =Null subject; NO =Null object; NSO =Both null subject and null object

Figure 5.2 L1 adult controls: Distribution of individual response patterns: Rates of acceptance

The L1 adult controls accepted all or all but one of the test items of NS and NO sentences. 40% of the participants accepted NSO sentences; the remaining 60% participants accepted more than half the test items with NSO (50%~80%). It was observed that, at both the group and the individual level, the rates of acceptance of NSO sentences are relatively low. This may result from the processing load on two null arguments. Processing ability differs according to the individual. 40% of participants did not have a problem processing two null arguments, while 60% of participants sometimes did. Although 12 L1 adults suffered from insufficient processing ability, they still accepted NSO items more often than chance would account for.

Figure 5.3 below presents the distribution of response patterns by the L1 children. Detailed data are provided in Appendix B.2.

Distribution of individual response patterns
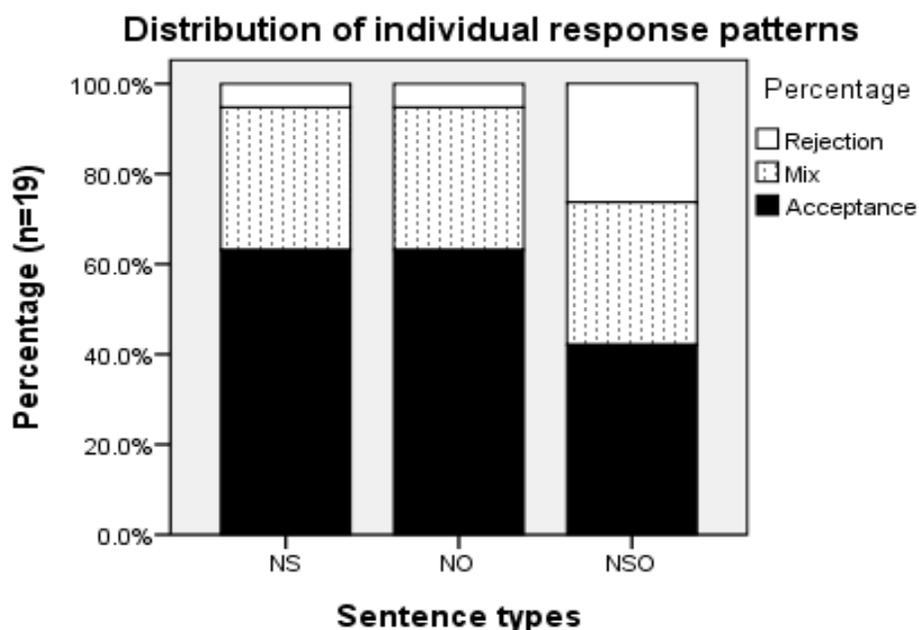
Note: NS =Null subject; NO =Null object; NSO =Both null subject and null object

Figure 5.3 L1 children: Distribution of individual response patterns: Rates of acceptance

As for the children, more than half of them (63.16%) accepted all or all but one of the test NS sentences. The rate of acceptance for the remaining seven children is between 45.45% and 75%. NO sentences were accepted to a high level by twelve of the nineteen children (63.16%). The acceptance rate for the remaining seven children ranges from 40% to 80%. Sentences with NSO are considered acceptable by 42.11% children. The rate of acceptance for the remaining children is between 0% and 81.82%. For subject NC05, sentences with null arguments are totally unacceptable.

A comparison of the individual results shows that more than half (57.89%) of the children perform like the adult controls, accepting all three types of test sentences or accepting NS and NO sentences and accepting NSO sentences more often than chance (mixed pattern). Like L1 adults, the rates of acceptance of NSO sentences develop later than of NS and NO sentences. This may result from children's insufficient ability to process two arguments in a sentence. Among the remaining eight children, NC05 failed to accept any type of null argument. In addition, NC05 and NC08 gave very few valid answers.

NC05 answered thirteen out of thirty-three questions, and NC08 answered seventeen out of thirty-three questions.

To infer the developmental stages of L1 acquisition, a close examination of the L1 individual response pattern is necessary. Participants with mixed response patterns accepted test items at more than chance level; therefore, the mixed pattern and acceptance pattern are analysed as the same development stage. The L1 adults' response pattern is inferred as the final stage. The L1 children were first grouped by age then examined according to their response pattern. Twenty out of thirty L1 children completed the acceptability judgement task. There are three age groups—seven, eight and nine. Grouped by age, three L1 children are seven years old; twelve children are eight years old; and five children are nine. The response pattern of the age seven group is expected to be the initial stage (non-target-like). The pattern of the age eight group is expected to be a later stage. The pattern of the age nine group is expected to be the stage before the final stage. Recall that the SD (see Table 5.2) is high. This implies the possibility of more different response patterns within and between groups. There might be developmental patterns that overlap between groups.

The L1 adults accepted all types of sentences with null arguments (NS, NO, and NSO[13]). The L1 adults' response pattern is the final stage of development. The L1 children's response patterns were rather varied. From the age seven group, two of three children patterned like the adults (in accepting all three types of null arguments). One seven-year old child rejected all types of null arguments. Most (10/12) of the eight-year old children performed like the adults. For the remaining two children, one child accepted NS and NO sentences but rejected NSO sentences and the other accepted NO sentences but rejected NS and NSO sentences. In the age nine group, one of the five children accepted all types of null arguments like L1 adults. Two of the five accepted NS and NO sentences but rejected NSO sentences. Two of the five accepted NO sentences but rejected NS and NSO sentences. Only one child in the age seven group had difficulty in accepting any type of null argument. However, children across all the age groups responded like the adults and there were both eight and nine year old children in the same developmental stages. In this case, younger children may have less capacity to process discourse information, but older

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[13] I categorised both 'always accept' and 'sometimes accept (mixed)' as 'accept' because the response pattern 'sometimes accept' indicates that the participant is able to accept (or has started to accept) null arguments.

children are not guaranteed to have better processing ability. Further data addressing processing issues in younger and older L1 children are needed to confirm this.

Only one seven-year-old child, but none of those aged eight or nine rejected all types of null arguments. This suggests that the response pattern of the first stage is rejection of all three null argument types. Two nine year olds and one eight year-old child accepted NS and NO but rejected NSO sentences, and two nine year-old children accepted NO but rejected NS and NSO sentences. There were both eight and nine year-old children who accepted NS and NO but rejected NSO sentences and accepted NO but rejected NS and NSO sentences. Based on the current data, it is not possible to determine whether L1 children develop NO or NS and NO acceptability first.

The data from the L1 children and L1 adults suggest that children might pass through a stage in which they reject all types of null arguments before a stage in which they accept NO but reject NS and NSO sentences or accept NS and NO but reject NSO sentences and, subsequently, a stage in which they accept all three types of sentences with null arguments.

There is no research specific to rates of acceptance in child L1 acquisition of Chinese null arguments. The L1 data collected here suggests the developmental sequence as shown in (3). More cross-sectional data and longitudinal data using the modified experiment are necessary to confirm this.

(3) | **Stage** | **Description** | **Acceptance/rejection across types** |
| --- | --- | --- |
| I | Non-native-like | Reject all types of null arguments. |
| II-a | Undetermined | Accept null subject and null object BUT reject both null subject and null object. |
| II-b | Undetermined | Accept null object BUT reject null subject and both null subject and null object. |
| III | Native-like | Accept all types of null arguments. |

5.1.1.3 Summary

The L1 adult controls consistently accepted sentences with null subjects, with null objects and with both a null subject and a null object. The L1 children tested here made similar judgements as the adults at both the group and the individual level. This indicates

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that some L1 children are aware that null arguments in Chinese are allowed. According to the data collected here, a developmental sequence for the L1 acquisition of null arguments in Chinese was inferred. More experimental data are necessary to confirm the proposed developmental sequence.

5.2   L2 acquisition

The results are analysed as follows. First, the results for the fillers are discussed. The L2 child and L2 adult groups are divided into three different proficiency levels. In Section 5.2.1, the average rate of target-like responses per group is calculated for each sentence type and the results for the different types are compared. An analysis of the individual response patterns is presented in Section 5.2.2.

5.2.1 Group results

Participants CA01 and CA02 gave no answers in this task, so their results are excluded from the analysis. The L2 participants are expected to accept all fillers. Ten participants (see Appendix B.3 & B.4), six among L2 children and four among L2 adults, failed to accept the fillers. The fillers are all grammatical sentences in the L2 participants' native language. These eight participants are considered to be unable to cope with Chinese null argument sentences. The researcher was told that some participants may not be used to the intonation and accent played to them. Given that native adults accept these fillers, these L2 participants' results are excluded.

5.2.1.1 Null subject sentences

Table 5.3 presents the mean rate of acceptance by proficiency level in the L2 child and L2 adult groups.

Table 5.3 L2 children and L2 adults: Null subject: Mean rates of acceptance

	L2 children			L2 adults			Significance
	n	%	SD	n	%	SD	
Low	8	84.35	9.47	9	80.13	21.50	p > .05
Intermediate	8	90.48	9.79	9	94.65	10.05	p > .05
Advanced	8	94.68	8.37	8	88.64	13.53	p > .05

Note: The mean difference is significant at the 0.05 level. % = rate of acceptance; SD = standard deviation

L2 children and L2 adults at all proficiency levels consistently accepted the null subject sentences (cf. adult natives who accepted on average, at a rate of 97.73). A one-way ANOVA reveals that there is no significant difference between the different proficiency levels of the L2 children ($F_{(2,21)}$ = .644; p > .05) and the L2 adults ($F_{(2,23)}$ = 1.903; p > .05). The standard deviations reported in Table 5.3 suggest that there is some overlap between the different proficiency level groups of L2 adults and between the L2 children. Furthermore, there is variation within each group. There is no significant correlation between responses on the null subject sentences and proficiency: r = .076 and p = .726 for the L2 children; and r = .377 and p = .058 for the L2 adults. The final column of Table 5.3 shows that there are no significant differences in the rate of accepting null subjects between the child and adult groups at any proficiency level. In comparing the three proficiency groups and the adult L1 Chinese speakers, a significant difference is observed for the L2 children ($F_{(3,39)}$ = 4.530; p < .05) and for the L2 adults ($F_{(3,42)}$ = 4.773; p < .05). A post-hoc analysis was carried out to determine which proficiency groups differ from each other and from the native adult controls. The results are presented in Table 5.4 below. The significant differences are asterisked:

Table 5.4 L2 children and L2 adults: Results of post-hoc tests for null subject sentences: Rates of acceptance

Learner groups	Comparison	Mean difference	Significance
L2 Child	Low vs. Controls	-13.38	p < .05
	Intermediate vs. Controls	-7.24	p > .05
	Advanced vs. Controls	-3.05	p > .05
L2 Adult	Low vs. Controls	-17.60	p < .01
	Intermediate vs. Controls	-3.08	p > .05
	Advanced vs. Controls	-9.09	p > .05

Note: The mean difference is significant at the 0.05 level.

For the L2 adults, the low proficiency group differs significantly from the adult controls, and the intermediate and the advanced groups do not significantly differ from the native controls. This suggests that L2 adult learners do not accept null subjects until the intermediate proficiency level. Although a significant difference is found between the L2 child low proficiency group and the native controls, the L2 child intermediate and advanced proficiency groups do not differ significantly from the native control group. This suggests that low L2 child learners do not acquire target-like judgement on null subjects.

Recall that the SD in the low L2 child and adult groups is relatively high (see Table 5.3), so the significant difference may be due to the averaging effect. Some low level participants might be target-like, but some are not. It is necessary to examine the individual data.

5.2.1.2 Null object sentences

The adult native controls accept null object at a fairly high rate (99.09%). The results for the L2 child and L2 adult proficiency groups are presented in Table 5.5. Both the intermediate and advanced children and adults accepted null object sentences like native adults. This is in clear contrast to the low proficiency participants, who on average accepted approximately 30% fewer sentences:

Table 5.5 L2 children and L2 adults: Null object: Mean rates of acceptance

	L2 children			L2 adults			Significance
	n	%	SD	n	%	SD	
Low	8	63.25	20.62	9	72.99	12.99	p > .05
Intermediate	8	94.78	5.69	9	87.88	15.07	p > .05
Advanced	8	96.10	10.31	8	94.32	8.33	p > .05

Note: The mean difference is significant at the 0.05 level. % = rate of acceptance; SD = standard deviation

A one-way ANOVA yields a significant difference within the L2 child groups ($F_{(2,21)}$ = 7.114; p < .05) and within the L2 adult groups ($F_{(2,23)}$ = 6.498; p < .05). The results of the post-hoc tests are given in Table 5.6. There is a significant correlation between the responses for proficiency for both groups (r = - .415, p = .044 for the L2 child; r = .463, p= .017 for the L2 adult). As with the null subject sentence results, the standard deviation for the child groups suggest that there is some overlap between the different proficiency levels and that there is considerable variation that is comparable for children (with the exception of the intermediate children). The standard deviation figures show that the variation within the adult groups is low. The results for the significance tests given in the final column of Table 5.5 show that, within each proficiency level, the children and adults do not differ significantly from each other. In comparing the three proficiency groups and the native adult controls, a significant difference exists for both the L2 children ($F_{(3,39)}$ = 16.675; p < .01) and the L2 adults ($F_{(3,42)}$ = 16.211; p < .01). The results of the post-hoc analysis used to determine whether the different proficiency levels differ from each other and from the native controls are presented in Table 5.6. The significant differences are asterisked:

Table 5.6 L2 children and L2 adults: Results of post-hoc tests for null object sentences: Rates of acceptance

Learner groups	Comparison	Mean difference	Significance
L2 Child	Low vs. Controls	-35.83	$p < .01$
	Intermediate vs. Controls	-4.31	$p > .05$
	Advanced vs. Controls	-2.99	$p > .05$
L2 Adult	Low vs. Controls	-26.10	$p < .01$
	Intermediate vs. Controls	-11.21	$p < .01$
	Advanced vs. Controls	-4.77	$p > .05$

Note: The mean difference is significant at the 0.05 level.

There is a significant difference between the L2 child low proficiency group and the control group. No significant difference exists between the intermediate and control groups nor between the advanced and control groups. The child intermediate group performs in a more native-like way than the advanced group. Again, the results for the low proficiency groups may be due to the averaging effect. This can be seen from the high SD (see Table 5.3). A close examination of individual performance is needed. The low L2 adult group differs significantly from the control group. A significant difference is found between the L2 adult intermediate and control groups but not between the adult advanced and control groups. This suggests that advanced L2 adults have native-like performance.

5.2.1.3 Both null subject and null object sentences

L2 intermediate and advanced learners accepted NSO sentences at a much higher rate than low proficiency learners. The results are presented in Table 5.7:

Table 5.7 L2 children and L2 adults: Sentences with both null subjects and null objects:
Mean rates of acceptance

	L2 children			L2 adults			Significance
	n	%	SD	n	%	SD	
Low	8	46.67	25.21	9	65.72	26.43	p > .05
Intermediate	8	77.89	14.59	9	81.82	15.07	p > .05
Advanced	8	89.61	15.24	8	75.00	15.17	p > .05

Note: The mean difference is significant at the 0.05 level. % = rate of acceptance; SD = standard deviation

There is a significant correlation between responses and proficiency within the L2 child groups (r = .485, p = .016). There is no significant correlation between responses within L2 adult groups (r = .339, p = .090). The significance tests reveal that children and adults do not differ significantly from each other within each proficiency level. The standard deviations suggest that there is some overlap between the child groups (low vs. intermediate, intermediate vs. advanced) and between the adult groups (low vs. intermediate). A one-way ANOVA yields a significant difference between the L2 child groups and the native controls ($F_{(3,39)}$ = 6.442; p < .01) but not between the L2 adult groups and the native controls ($F_{(3,42)}$ = 1.662; p > .05). The results of the post-hoc tests are presented in Table 5.8:

Table 5.8 L2 children and L2 adults: Results of post-hoc tests for sentences with both null subjects and null objects: Rates of acceptance for both null subject and null object: Acceptance

Learner groups	Comparison	Mean difference	Significance
L2 Child	Low vs. Controls	-32.79	$p < .01$
	Intermediate vs. Controls	-2.57	$p > .05$
	Advanced vs. Controls	9.15	$p > .05$
L2 Adult	Low vs. Controls	-14.74	$p < .05$
	Intermediate vs. Controls	1.36	$p > .05$
	Advanced vs. Controls	-5.45	$p > .05$

Note: The mean difference is significant at the 0.05 level.

The same pattern is observed for the L2 children and L2 adults. The low proficiency groups differ significantly from the native control group, and the intermediate and advanced groups do not differ significantly from the native control group. Both L2 children and L2 adults accepted sentences with NSO from the intermediate proficiency level onward. However, the lack of a significant difference between the proficiency groups within the child and adult groups suggest that there might be some overlap. This is also indicated by the high SD figures (see Table 5.7).

5.2.1.4 Comparing different types of sentences with null arguments

It is necessary to ascertain whether L2 learners also perform with a significant difference between NS and NSO sentences and between NO and NSO sentences and whether the acceptance of NS and NO sentences develops in parallel but the acceptance of NSO develops later because NSO requires more processing resources (see Section 5.1.1). To do this, the results from the three types of sentences are compared with each other. If NS sentence acceptance develops in parallel with NO sentence acceptance but not with NSO sentence acceptance, L2 learners may suffer from the greater processing load that comes from NSO sentences. On the contrary, if the results do not show such an NSO-delayed

phenomenon, it is possible that NSO sentences do not pose a greater processing load than NS and NO sentences for L2 learners. Table 5.9 presents the results of one-way ANOVA tests. Statistically significant responses are asterisked:

Table 5.9 L2 children and L2 adults: Comparison between different sentence types: Rates of acceptance

	Null subject vs. Null object	Null subject vs. Both null subject and null object	Null object vs. Both null subject and null object
ANOVA	Significance	Significance	Significance
L2 children			
Low (n = 8)	p < .05	p < .01	p > .05
Intermediate (n = 8)	p > .05	p < .01	p < .01
Advanced (n = 8)	p > .05	p > .05	p > .05
L2 adults			
Low (n = 9)	p > .05	p > .05	p > .05
Intermediate (n = 9)	p > .05	p > .05	p > .05
Advanced (n = 8)	p > .05	p < .05	p < .01
L1 children (n=19)			
	p > .05	p < .05	p = .05
L1 adult controls (n = 20)			
	p > .05	p < .01	p < .01

Note: The mean difference is significant at the 0.05 level. $F_{(7,91)} = 4.545$

Table 5.9 shows that, for low level L2 children, there is a statistically significant difference between NS and NO sentence acceptance and between NS and NSO sentence acceptance because the NS acceptability rate is much higher than that of NO and NSO sentences. This indicates that low level L2 children may develop acceptance of null subjects first. In the intermediate L2 child group and the advanced L2 adult group, there are

statistically significant differences between NS and NSO sentences and between NO and NSO sentences. Sentences with two arguments may pose greater difficulty for intermediate L2 children and advanced L2 adults. Although L2 children at an advanced level do not perform differently at the group level, it cannot be concluded that every child in this group does not suffer from processing difficulty. It could result from an averaging effect, which can be seen from the high standard deviation (see Tables 5.3, 5.5, and 5.7). A closer examination of L2 learners' individual results is necessary.

5.2.2 Individual results

The previous sections presented the average rates per proficiency group. There it is noted that the relatively high standard deviations suggest a certain level of variation within some proficiency levels and some overlap between adjacent levels. This section discusses the individual subjects' response patterns to determine the developmental stages. The individual data are presented in detail in Appendix B.3- B.4 and summarised in the next few sections.

5.2.2.1. Null subject sentences

Individual subjects are categorised according to whether they incorrectly rejected more than half (six out of eleven) null subject test items (indicated by '－'), correctly accepted all eleven test items or all but one null subject items ('+'), or sometimes accepted test items ('±'). Table 5.10 shows the distribution of these response patterns for each proficiency level for the child and adult groups. The first two columns provide the group results discussed in 5.2.1.1 above. The cells containing the most subjects in each proficiency level are underlined.

Table 5.10 L2 children and L2 adults: Individual response patterns: Null subject sentence acceptance

Group	Average rate within group		Number of individuals		
	%	SD	−	±	+
L2 children					
Low	84.35	9.47	0	<u>4</u>	<u>4</u>
Intermediate	90.48	9.79	0	2	<u>6</u>
Advanced	81.45	24.64	1	2	<u>5</u>
L2 adults					
Low	80.13	21.50	1	3	<u>5</u>
Intermediate	94.65	10.05	0	1	<u>8</u>
Advanced	88.64	13.53	0	2	<u>6</u>

Note: % = rate of accuracy; SD = standard deviation

Except for the low proficiency L2 child group, most participants in each group responded correctly (+) to NS sentences. For L2 children and L2 adults, most of the intermediate and advanced learners behave in a native-like way.

5.2.2.2 Null object sentences

Table 5.11 presents the distribution of the different response patterns for NO sentences. It repeats the group results discussed in Section 5.2.1.2.

Table 5.11 L2 children and L2 adults: Individual response patterns: Null object sentences acceptance

Group	Average rate within group		Number of individuals		
	%	SD	-	±	+
L2 children					
Low	63.25	20.62	<u>3</u>	<u>3</u>	2
Intermediate	94.78	5.69	0	0	<u>8</u>
Advanced	84.22	20.26	0	3	<u>5</u>
L2 adults					
Low	72.99	12.99	0	<u>8</u>	1
Intermediate	87.88	15.07	0	1	<u>8</u>
Advanced	94.32	8.33	0	2	<u>6</u>

Note: % = rate of accuracy; SD = standard deviation

The relative distribution of individuals across response patterns in the intermediate and advanced proficiency groups is similar across the L2 child and L2 adult groups. In the intermediate and advanced groups, most of the participants accepted NO sentences. In the L2 child group, most (5/8) subjects at a low proficiency level accepted NO sentences, whereas in the L2 adult low proficiency group, all the subjects accepted NO sentences.

5.2.2.3 Both null subject and null object sentences

Table 5.12 presents the distribution of response patterns for the both null subject and null object sentences. Recall that the native controls' responses to NSO sentences are always accept (+) or sometimes accept (±).

Table 5.12 L2 children and L2 adults: Individual response patterns: Both null subject and null object sentence acceptance

Group	Average rate within group		Number of individuals		
	%	SD	-	±	+
L2 children					
Low	46.67	25.21	5̲	2	1
Intermediate	77.89	14.59	0	5̲	3
Advanced	75.91	23.00	2	2	4̲
L2 adults					
Low	65.72	26.43	2	4̲	3
Intermediate	81.82	15.07	0	3	6̲
Advanced	75.00	15.17	0	6̲	2

Note: % = rate of accuracy; SD = standard deviation

Except for the low-level child group, most participants' response patterns are considered target-like (+ or ±). Five out of eight child participants at a low-level and two out.

5.2.2.4 Comparing individual response patterns across different types

As noted above in Section 5.2.1.4, by comparing the participants' response patterns across null argument types, it will be possible to determine whether L2 learners also performed significantly differently on NS and NSO sentences and on NO and NSO sentence. It will also be possible to determine whether the acceptability of NS and NO sentences and NSO sentences develop in parallel. The results presented in 5.2.1.3 indicate that, at the group level, no significant difference is observed between NS and NO acceptance in L2 child and L2 adult groups, with the exception of the child low proficiency level group. Recall that at the group level L1 adults and children develop acceptance of NS and NO sentences earlier than NSO sentences. A comparison of the individual results on NS and NO sentences is necessary. The patterns among the twenty-four L2 children and twenty-six L2 adults are presented in Tables 5.13-5.14.

Let us first consider whether the L2 learners accepted null subjects and null objects by comparing individual response patterns. As in 5.1.1.2, for the response patterns the symbol '−' is used to indicate rejection (accepted less than half the test items), '+' for participants who accepted all or all but one test items, and '±' for participants whose responses fell in between these two categories. Given that accept and mixed responses are analysed as part of the same development stage for null subject and null object sentences (cf. 5.1.1.2), the latter two categories ('+' and '±') are combined for the purpose of this analysis. The abbreviations L, I, and A refer to the low, intermediate, and advanced proficiency groups.

Table 5.13 L2 children and L2 adults: Individual response patterns across null subject and null object sentences: Acceptance

Response			Number of subjects with each pattern					
Pattern	NS	NO	L2 children			L2 adults		
			n	Participants		n	Participants	
a	-	-	0	---		0	---	
b	±/+	-	3	L:	CL04, CL06, CL08	0		
c	-	±/+	1	A:	CA08	1	L:	AL07
d	±/+	±/+	20	L:	CL03, CL05, CL07, CL09, CL10	26	L:	AL01, AL02, AL03, AL04, AL05, AL06, AL08, AL10
				I:	CM01, CM03, CM04, CM06, CM07, CM08, CM09, CM10		I:	AM01, AM02, AM03, AM04, AM05, AM07, AM08, AM09, AM10
				A:	CA01, CA02, CA03, CA04, CA05, CA11, CA12		A:	AA01, AA02, AA03, AA04, AA06, AA07, AA08, AA09

*Notes: NS = null subject; NO = null object; NSO = both null subject and null object; L = low level; I = intermediate level; A = advanced level

No L2 participant exhibit ed pattern (a) in Table 5.12 by rejecting NS and NO

sentences, which suggests that they know that Chinese allows null arguments.

The six participants exhibiting patterns (b) or (c) accepted either NS or NO sentences. With one exception (CA08), these participants are all low proficiency learners. Slightly more low proficiency participants accepted only NS sentences (pattern b) earlier than accepted only NO sentences (pattern c). This might suggest that, at the individual level, L2 learners accept NS sentences earlier than accepting NO sentences. In addition, all the participants exhibiting pattern (b) and (c) rejected NSO sentences.

The remaining forty-five participants accept NS and NO sentences (pattern d). These participants belong to different proficiency groups. So far, this is consistent with Yuan's (1993) finding that English-speaking learners accept both NS and NO sentences from a very early stage onwards (see Section 3.5.1).

I will now add in the response pattern of NSO sentences. As discussed in Chapter 4, the test sentences with NSO are designed such that there were two null arguments in the sentences. It is, unfortunately, not possible to determine whether when the participants rejected NSO sentences, they did so because of the NS, because of the NO, or because of both null arguments. NSO sentences are, however, used to test whether learners know that Chinese allows NSO to appear in a sentence. Given that two null arguments require a greater processing load for learners, the participants exhibiting pattern (b) and (c) in Table 5.13 are confirmed as unable to cope with NSO sentences. I will only continue to analyse the results observed in the data under pattern (d). Categories '+' and '±' are combined in this analysis which is given in Table 5.14:

Table 5.14 L2 children and L2 adults: Individual response patterns across null subject, null object, and both null subject and both null object sentences: Rates of acceptance

Response				Number of subjects with each pattern					
Pattern	NS	NO	NSO	L2 children			L2 adults		
				n		Participants	n		Participants
e	±/+	±/+	-	3	L:	CL03, CL07	2	L:	AL02, AL08
					A:	CA12			
f	±/+	±/+	±/+	17	L:	CL05, CL09, CL10	24	L:	AL01, AL03, AL04, AL05, AL06, AL10
					I:	CM01, CM03, CM04, CM06, CM07, CM08, CM09, CM10		I:	AM01, AM02, AM03, AM04, AM05, AM07, AM08, AM09, AM10
					A:	CA01, CA02, CA03, CA04, CA05, CA11		A:	AA01, AA02, AA03, AA04, AA06, AA07, AA08, AA09

*Notes: NS = null subject; NO = null object; NSO = both null subject and null object; L = low level; I = intermediate level; A = advanced level

As shown in Table 5.14, virtually all participants with pattern (e) (with the exception of participant CA12) are in the low proficiency level. 41 participants exhibiting pattern (f) across proficiency levels have target-like judgement on null argument sentences. Note that it is hard to distinguish which null argument (NS, NO, or both) in NSO sentences was accepted and which one was rejected. The large number of participants exhibiting pattern (f) suggests that L2 learners can obtain native-like rates of acceptance of null arguments and that most L2 learners can accept NSO sentences after learning to accept NS and NO sentences.

5.2.2.5 Developmental sequence

The first observation regarding the results of the acceptability judgement task is that in each null argument sentence type both child and adult L2 participants showed native-like responses: that is, it is possible for L1 English-L2 Chinese children and adults to acquire

the properties needed to accept null arguments in Chinese (that is, they know that Chinese allows sentences not only with a single null argument but also with multiple null arguments). No L2 learner rejected all three types of null argument sentence. However, it cannot be said that there is no transfer of the L1 English property of obligatory structural arguments. Recall that the null subject (but not the null object) is available in English in restricted contexts. L1 English-L2 Chinese learners may simply treat Chinese null subjects like English null subjects. Further experiments are needed to determine whether L2 learners accept null arguments for the right reason (i.e. because there is a topic in [Spec CP]).

Using the proficiency test results as an approximate guideline, it is possible to infer the developmental sequence of the L1 English-L2 Chinese learners. L2 children's developmental stages are inferred separately from those of L2 adults. These stages are put in the same table to determine whether there are both L2 children and L2 adults in each stage. It is expected that low proficiency learners will fall in stage I and II-a; intermediate will fall in stage II and advanced learners in stage II-b and the final stage. The developmental stages were inferred from the results are given in Table 5.15 below. Take L2 children as an example; stage I is determined because there are three low proficiency learners but no intermediate or advanced learners. There are both low- and advanced learners in Stage II-a, whereas there are no low level learners but one advanced learner in stage II-b. Note that, based on the current data, it is not possible to determine whether stage II-a or stage II-b comes first for L2 adults. However, both children and adults are in both II-a and II-b. The stage that contains most of the advanced learners is inferred to be the final stage for L2 children and adults.

Table 5.15 Developmental sequence for L2 learners: Acceptance

Stage	Description	Acceptance	L2 child			L2 adult		
			L	I	A	L	I	A
I	Non-target-like	Accept null subjects BUT reject null objects and both null subjects and null objects	3					
II-a	Undetermined	Accept null subjects and null objects BUT reject both null subjects and null objects	2		1	2		
II-b	Undetermined	Accept null objects BUT reject null subjects and both null subjects and null objects			1	1		
III	Target-like	Accept null subjects and null objects AND accept both null subjects and null objects	3	8	6	6	9	8

*Notes: L = low level; I = intermediate level; A = advanced level

There appear to be three basic stages. In stage I, the participants accept only NS sentences, whereas in stage II, the participants accept NS and/or NO sentences but reject NSO sentences. In stage III, target-like rates of acceptance occur. Stage II is split into two sub-stages. Stage I may be regarded as a period of transferring properties from the learners' L1 English. Stage II may be regarded as a period of overlap between confirming that topics license null arguments and the preceding stage. Stage III is characterised by target-like responses.

The distribution of participants by developmental stage, as given in Table 5.14, shows that target-like responses were generally—though not exclusively—made by participants from higher proficiency levels and non-target-like responses by low proficiency participants. Two advanced L2 child participants failed to make target-like responses. Nine (three L2 children and six L2 adults) low proficiency participants gave responses like native adult controls. In other words, it is the case that the intermediate and advanced participants generally gave target-like responses (the majority), but it is not the case that low proficiency participants always failed to make target-like responses. There is no

positive correlation between age and target-like response within each proficiency group across L2 children and L2 adults.

To summarise, virtually all the intermediate and advanced participants (31/33) from both the L2 child and L2 adult groups accepted all types of null argument sentences like the native controls. There are no significant differences between the L2 child and L2 adult groups in any of the proficiency levels for any kind of null argument sentences. Except for L2 children at a low proficiency level, both L2 children and L2 adults made no distinction between NS and NO sentences. L2 children and L2 adults were observed to pattern alike in terms of their null argument acceptance. There is, however, one difference between the two L2 groups: the only participants in stage I are three L2 children. This could be because L2 adults do not pass through such a stage, or it could be because of different processing abilities between children and adults. More data are needed to address this issue.

The developmental stages that L1 children pass through are also different from that of L2 children (cf. Section 5.1.1.2). L1 children start in a stage in which they reject all three types of null arguments, whereas L2 children start in a stage in which they accept NS sentences but reject NO and NSO. This difference could be due to L1 influence. More data is needed.

5.2.2.6 First and third person null arguments

We discussed above that most L2 child and adult learners accept null arguments from the intermediate proficiency stage onwards. As discussed in Chapter 2, null arguments are available in English in certain contexts, such as diary contexts (Haegeman, 1997). L2 children and L2 adults may analyze and accept null-argument sentences as English topic-drop sentences (i.e. containing first person singular pronouns) in diary contexts. Thus, L2 learners may reject third person singular pronouns but not first person. In order to ascertain whether L2 learners know that Chinese null arguments can be interpreted as first-, second-, or third person pronouns, the rate of rejection of first person singular pronouns was compared to that of third person singular pronouns. Three test sentences contain first person singular pronouns; and nineteen sentences contain third person.

It is impossible to detect whether participants were rejecting null subjects, null objects or both in the NSO sentences. For the same reason, it is also impossible to

distinguish whether participants were rejecting first person null arguments or rejecting third person null arguments. The results of NSO sentences were excluded from the analysis. Table 5.16 summarizes the rejection rates for L1 children, L2 children and L2 adults across proficiency levels and as well as how rejection rates for L1 children, L2 children and L2 adults differ from those of L1 adult controls (see appendices B.5 –B.8 for details).

Table 5.16 Mean rates of rejection of first and third person singular null arguments in L2 children and adults

Groups	First person singular null argument			Third person singular null argument		
	Rejection Rate (%)	Standard Deviation (SD)	Significance	Rejection Rate (%)	Standard Deviation (SD)	Significance
L2 CHILD						
Low	10.00	22.5	< .05	28.43	20.05	< .01
Intermediate	23.33	27.44	< .01	12.70	15.35	< .05
Advanced	13.33	23.31	> .05	27.73	17.76	< .05
L2 ADULT						
Low	18.33	33.75	< .01	24.44	11.88	< .01
Intermediate	3.33	10.54	> .05	10.73	13.13	< .05
Advanced	6.67	16.10	> .05	9.07	9.66	< .05
L1 CHILD						
	12.22	23.54	< .05	24.09	20.82	< .01
L1 ADULT						
	0.00	0.00	N/A	1.84	3.92	N/A

Note: The mean difference is significant at the 0.05 level. N/A = not applicable

Table 5.16 reveals that L2 children seem to accept first person singular null arguments but not third person singular null arguments at an advanced stage. At the low proficiency stage, L2 children show a stronger tendency to reject the third person singular null argument than the first person singular null argument (10% vs. 28.43%, respectively). When comparing first person singular null argument rejection rates, a one-way ANOVA test yields a significant difference between the L2 child group and the native control group ($F_{(7, 91)}$ = 2.784; p = .05). The difference between third person singular null argument rejection rates in the L2 child group and the native control group is also significant ($F_{(7, 91)}$ = 13.275; p

< .01).

The post-hoc test indicates that L2 children are significantly more likely than native controls to reject a third person singular null argument (p < .01) and that the low proficiency group is significantly more likely than the native control group to reject a first person singular null argument (p < .05). Although intermediate L2 children show a stronger tendency to reject first person singular null arguments than third person singular null arguments (23.33% and 12.7%, respectively), there is still a significant difference between the intermediate L2 child and control groups (p < .05). At the advanced stage, L2 children show a strong tendency to reject third person singular null arguments (27.73%) rather than first person singular null arguments (13.33%). The post-hoc test indicates that the native controls and advanced L2 children differ significantly in rejecting third person singular null arguments (p < .05) but not first person singular null arguments (p > .05).

Although L2 adults seem to acquire first person singular null arguments from the intermediate stage onward, they continue to have problems with third person singular null arguments regardless of their stage. The rate of third person singular null argument rejection is higher than that of first person singular null argument across proficiency levels (low level 18.33% vs. 24.44% respectively; intermediate level 3.33% vs. 10.73% respectively; advanced level 6.67% vs. 9.07% respectively). The mean difference between native controls and learner groups are significantly reduced at intermediate and advanced stages for both first person and third person rejection.

For L1 children, as for L2 children and L2 adults, the third person singular null argument rejection rate is higher than the first person null argument rejection rate (1st vs. 3rd = 12.22% vs. 24.09%). Because L2 child and adult participants also reject third person singular null arguments at a greater rate than first person singular null arguments, the fact that first person singular null argument acceptance develops before third person singular null argument acceptance could be a universal phenomenon for learners of Chinese. The phenomenon of first-person-before-third-person could be universal.

5.2.3 Summary

This section reports a n acceptability judgement experiment designed to examine rates of acceptance of three different types of null argument sentence — null subject, null object,

and both null subject and null object — in Chinese. Three different learner groups were tested: L1 children, L2 children, and L2 adults. For those participants, for whom the relevant data are available, the L1 child data indicate that most of them gave target-like judgements across null argument types. It is observed that most of the intermediate and advanced L1 English-L2 Chinese children and adults accepted null arguments like native controls. **Prediction 1**, which states that L1 English-L2 Chinese adult and child learners of Chinese will allow null arguments at the earliest stages, is not borne out by the results. **Prediction 3** states that high proficiency L2 children and L2 adults will give native-like responses on the acceptability of null arguments. 31 out of thirty-33 L2 child and adult learners had acquired native-like null argument acceptability. **Prediction 3** is therefore supported by the results.

The L2 individual data suggest that null subjects may be accepted earlier than null objects. Developmental sequences are established for all three groups, and it is found that L2 children and L2 adults do not pass through the same stages, as it is possible that children's ability to integrate information is less than that of adults, and that L2 children experience a possible initial L1 transfer stage, which differentiates them from L1 children. The notion that the developmental sequence of L2 children and that of L2 adults are predicted to pattern alike on the acceptability of null arguments is not borne out, so **prediction 2** is not supported by the results. **Prediction 4**, which states that L2 children will pass through a different developmental sequence from L1 children as a result of L1 transfer regarding the acceptability of null arguments, is borne out by the results.

The results from the acceptance judgement task alone cannot, however, show that L2 learners have fully acquired the properties of Chinese null arguments. Results regarding how these null subjects are interpreted are needed to determine whether L2 children and L2 adults have an underlying knowledge of the discourse effects of Chinese topics and whether they pattern alike in interpreting null subjects. In the next section, the results for the interpretation of null subjects are presented.

5.3 Results from the interpretation task

This task aimed to examine null and overt subjects in L1 English speakers' L2 Chinese to see whether they have acquired the same interpretive constraints as L1 native

speakers. The following sentence types are investigated: null and overt subjects in adjoined clauses and null and overt subjects on embedded clauses. Chinese allows either null element or the overt pronoun *ta* 'he/him' in argument positions in adjoined and embedded clauses.

(4) [$_{topic}$ Xiao Mei$_i$ [Ø$_i$ gei   Lao Wang$_j$ liwu hou], [Ø$_i$ /ta$_i$ likaile   le].
　　　Xiao Mei Ø   give Lao Wang   gift after   Ø/she left   PFV
　　　'Xiao Mei gave Lao Wang a gift and then she$_i$ left.'

(5) ($_{topic}$)$_k$ [$_{topic}$ Zhangsan$_i$ [Ø$_i$ dui Lisi$_j$ shuo [Ø$_{i/k}$/ta$_i$ zhengzai xizao]]].
　　　　　　Zhangsan Ø to   Lisi say   Ø/he   ASP   take a shower
　　'Zhangsan$_i$ says to Lisi$_j$ that he$_{i/k}$ is taking a shower.'

adjoined clauses refers to the topic antecedent (i.e., a subject antecedent in the previous clause). The overt subject in adjoined clauses also refers to the topic antecedent. In example (5), the null element in the subject position of an embedded clause can refer to either a topic antecedent or a discourse entity (i.e., someone else in the discourse context), whereas an overt element in an embedded clause's subject position can only refer to the topic antecedent.

The predictions tested here are as follows:

Prediction 5. follow the same developmental sequence regarding the interpretation of null a nd overt subjects.

Prediction 6. High proficiency L2 children and L2 adults will behave similarly to L1 controls regarding the interpretation of null and overt subjects.

Prediction 7. L2 children will follow a different developmental sequence from L1 children as a result of L1 transfer regarding the interpretation of overt and null subjects.

Figure 5.4 below shows an overview of results from the interpretation task and Table 5.17 shows a repeated measures ANOVA that includes all L1 and L2 speaker groups. The mean difference is significant to less than 0.05. The degrees of freedom are as follows: $F_{(7, 100)} = 6.393$ for the native-like interpretation of null subjects in adjoined clauses, $F_{(7, 100)} =$

4.255 for overt subjects in adjoined clauses, $F_{(7, 100)} = 2.577$ for the native-like interpretation of embedded null subjects and $F_{(7, 100)} = 6.210$ for embedded overt subjects. The abbreviations NSA, OSA, NSE and OSE refer to null subjects in adjoined clauses, overt subjects in adjoined clauses, null subjects in embedded clauses and overt subjects in embedded clauses. L2C-L refers to the low level L2 children; L2C-I to the intermediate level L2 children; and L2C-A to the advanced L2 children. L2A-L, L2A-I, and L2A-A refer to the low, intermediate, and advanced L2 adult groups. L1C refers to the L1 children and L1A to the L1 adults. Detailed comparisons between and within L1 and L2 speaker groups will be presented in the following sections.

Group Means

	L2C-L	L2C-I	L2C-A	L2A-L	L2A-I	L2A-A	L1C	L1A
NSA	41.67	70.37	93.75	25	50	78.33	56.48	96.25
OSA	64.17	77.78	91.25	60	77.83	96	65	95
NSE	36.67	51.11	71.88	66.67	31	53	61.6	71.17
OSE	45.83	66.67	77.08	52.78	67.5	67.5	79.94	90
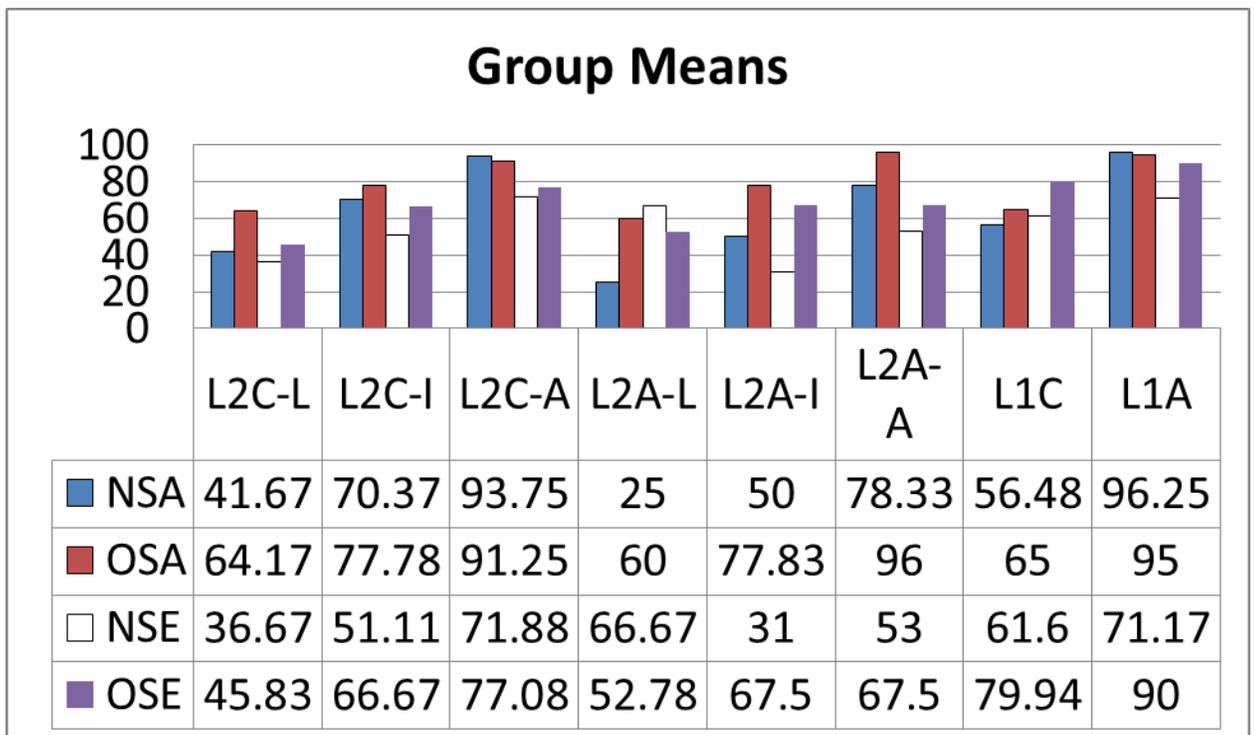
Figure 5.4 Overview: Group results: Interpretation

Table 5.17 Overview: All groups: Results of post-hoc test: Interpretation

		L2C-L	L2C-I	L2C-A	L2A-L	L2A-I	L2A-A	L1C
NSA	L1C	n.s.	n.s.	*	n.s.	n.s.	*	N/A
	L1A	*	*	n.s.	*	*	n.s.	*
OSA	L1C	n.s.	n.s.	n.s.	n.s.	n.s.	*	N/A
	L1A	*	*	n.s.	*	*	n.s.	*
NSE	L1C	*	n.s.	n.s.	n.s.	*	*	N/A
	L1A	*	n.s.	n.s.	*	n.s.	n.s.	n.s.
OSE	L1C	*	*	n.s.	*	n.s.	n.s.	N/A
	L1A	*	*	n.s.	*	*	*	n.s.

Note: * = significant; n.s. = not significant; N/A = not applicable.

The results show that the advanced proficiency L2 children interpreted both null subjects and overt subjects across sentence types like native speakers. The advanced L2 adults have acquired the syntax-discourse conditions on overt subjects in adjoined clauses and on embedded null subjects but have not acquired the syntax-discourse conditions on null subjects in adjoined clauses and on embedded overt subjects. Overall, L1 children perform more like intermediate L2 children, but not L1 adults. The individual results indicate that the interpretive rules on Chinese null and overt subjects can be acquired. Five L2 children and 12 L2 adults demonstrated native-like performance across sentence types. Using the data from the proficiency measure detailed in the preceding chapter to infer developmental sequences, it is shown that L1 English-L2 Chinese children and adults pass through the same developmental stages in their interpretation of null and overt subjects in Chinese. Section 5.3.1 presents the results from the L1 children and section 5.3.2 those of the L2 children and L2 adults. L1 adults form the control group.

5.3.1 L1 acquisition

The Critical Period Hypothesis (Lenneberg, 1967) has been widely applied to research on first-language acquisition to account for the contrasting success of child

language development in an L1 and in an L2. This theory claims that there is a constrained period of neural sensitivity that underlies language development. Children's limited processing abilities might prevent them from combining information from different sources (e.g. syntactic and pragmatic sources). This would lead to a failure to interpret null and overt arguments in a target-like fashion.

The L1 data is maximally comparable to the L2 data because both groups sat the same test. The results will first be analysed according to group (in section 5.3.1.1), and subsequently, the individual participants' response patterns will be analysed (in section 5.3.1.2). First, I briefly consider the fillers. There are nine fillers, as illustrated in (6)–(7).

(6) Baba gen   gege   zai chufang, tamen zai chi yu.
    Father with brother in kitchen   they ASP eat fish
    'Father and brother are in the kitchen and they are eating fish.'

(7) Lili dui   mama   shuo baba   yao   kafei
    Lili face to mother say   father want   coffee
    'Lily told mother that father wants coffee.'

In (6), the first sentence includes two NPs, and the second sentence includes an overt third person plural pronominal subject 'they'. A filler like (6) is not an ambiguous sentence in Chinese or in English. The participants were expected to interpret 'they' as referring to both the NPs in the first sentence. As in example (7), the matrix clause includes a subject NP and object NP, and the embedded clause includes another different subject NP. The English equivalent of the Chinese filler like (7) is unambiguous. Participants who could not give a correct answer more than three times are considered unable to understand the vocabulary or sentence structure in the task. All 20 L1 adults succeeded in answering the fillers. Three L1 children, however, failed in answering the fillers. Three L1 child participants (NC06, NC11, and NC18) are excluded because they failed on more than three fillers. For the remaining fillers, 88.11% of them were answered correctly.

5.3.1.1 Group results

The group results for twenty-seven L1 children and twenty L1 adults are provided in Table 5.18 below.

Table 5.18 L1 children and L1 adults: Group results: Mean rates of native-like interpretation

Group	n	Null/overt subject and sentence type							
		Null subject in adjoined clause (target: topic antecedent)		Overt subject in adjoined clause (target: topic antecedent)		Null subject in embedded clause (target: topic antecedent or discourse entity)		Overt subject in embedded clause (target: topic antecedent)	
		%	SD	%	SD	%	SD	%	SD
Child	27	56.48	26.99	65.00	25.67	61.60	27.87	79.94	28.24
Adult	20	96.25	9.16	95.00	8.89	71.17	29.12	90.00	12.57

Note: % = mean accuracy; SD = standard deviation

For the L1 adult group, null subject interpretation differs significantly from overt subject interpretation ($F_{(5, 27)}$ = 4.194; p < .05). The difference between null subject and overt subject interpretation for the L1 child group is also significant ($F_{(5, 29)}$ = 6.420; p = .013). For L1 children and adults, the ability to interpret null subjects does not correlate with the ability to interpret overt subjects.

A one way-ANOVA yields a significant difference between the child and adult groups with regards to interpreting adjoined clauses both with null subjects ($F_{(5, 26)}$= 39.829; p < .01) and with overt subjects ($F_{(5, 29)}$ = 24.972; p < .01). There is no significant difference between the child and adult groups with regards to interpreting embedded clauses with null subjects ($F_{(5, 27)}$= 1.302; p > .05) and with an overt subjects ($F_{(5, 26)}$= 2.206; p > .05). According to the group results, it seems that the interpretation of null and overt subjects in adjoined clauses is harder for L1 children. The significant interpretation difference between children and adults in the adjoined clause might result from a lack of syntactic knowledge about adjoined clauses or a lack of ability in integrating discourse information. Recall that these remaining participants could answer the fillers correctly. The fillers consisted of adjoined or embedded clauses containing referential NPs or overt plural pronouns. These remaining participants therefore had syntactic knowledge of adjoined and embedded clauses. L1 children might therefore have difficulty processing discourse information rather than syntactic knowledge.

5.3.1.2 Individual results

The distribution of individual performance for L1 adults is presented in Figure 5.3 below. Participants who correctly interpreted all test items or all but one test item are categorised as displaying 'target-like' performance. The rest of the participants are deemed to display 'non-target-like' performance. This means of analysis is different from that of the acceptability task because the number of test items of each sentence type in the interpretation task is much smaller than that in the acceptability judgement test. There are five test items per sentence type in the interpretation task, while there are eleven test items in the acceptability task. There is no 'mixed' performance category in this current analysis. The detailed results are provided in Appendix B.9- B.10.
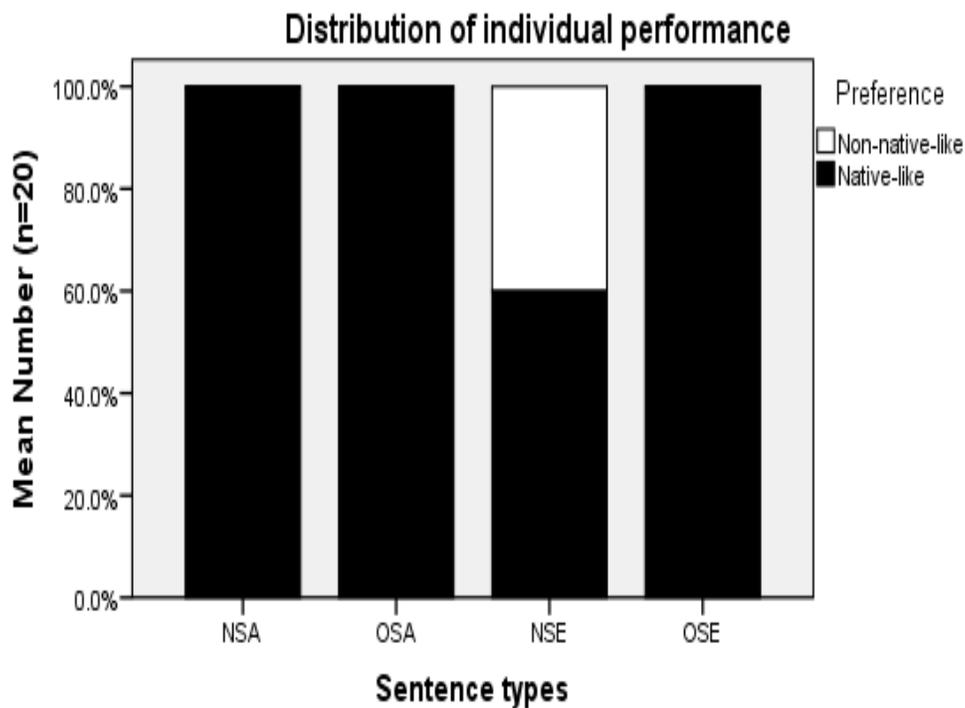
Note: NSA = Null subject in adjoining clause; OSA = Overt subject in adjoining clause; NSE = Null subject in embedded clause; OSE = Overt subject in embedded clause

Figure 5.5 L1 adult controls: Distribution of individual performance

60% of L1 adults preferred the topic antecedent reading in interpreting null and overt subjects in adjoined clauses (NSA and OSA) and overt subjects in embedded clauses (OSE). While all the adult participants interpreted overt subjects across sentence types as expected, 40% of the adult participants failed more than one test item in interpreting null subjects in embedded clauses (NSE). Among the unexpected interpretation of NSE, 15.25% of cases were interpreted as co-referential with the matrix object and 13.58% as co-referential with both the topic antecedent and the matrix object. The different words used to introduce the object (*miandui* 'face to'; *dui* 'to'; *gen* 'with'; and *kanzhe* 'look at') could have had an effect. There is no particular test item on which the number of unexpected responses is particularly high. The numbers of unexpected responses for test items with *dui* (40.9%) and *kanzhe* (40.9%) are relatively higher than *miandui* (13.6%) and *gen* (4.5%). Recall that all the participants could answer the fillers as expected. The fillers also contained all four words in embedded clauses. Participants were therefore familiar with these words. By further exploring the response patterns, it is clear that 86.4% of unexpected responses were provided by eight participants (NA08, NA11, NA12, NA14, NA16, NA18, NA19, and NA20). For these eight (out of twenty) L1 adults, NSE posed greater difficulties. This suggests that even L1 adults could suffer from interface difficulties and that not all L1 adults have the same level of processing ability. Individual variation needs to be considered.

The distribution of individual results for the L1 children is given in Figure 5.6 below.
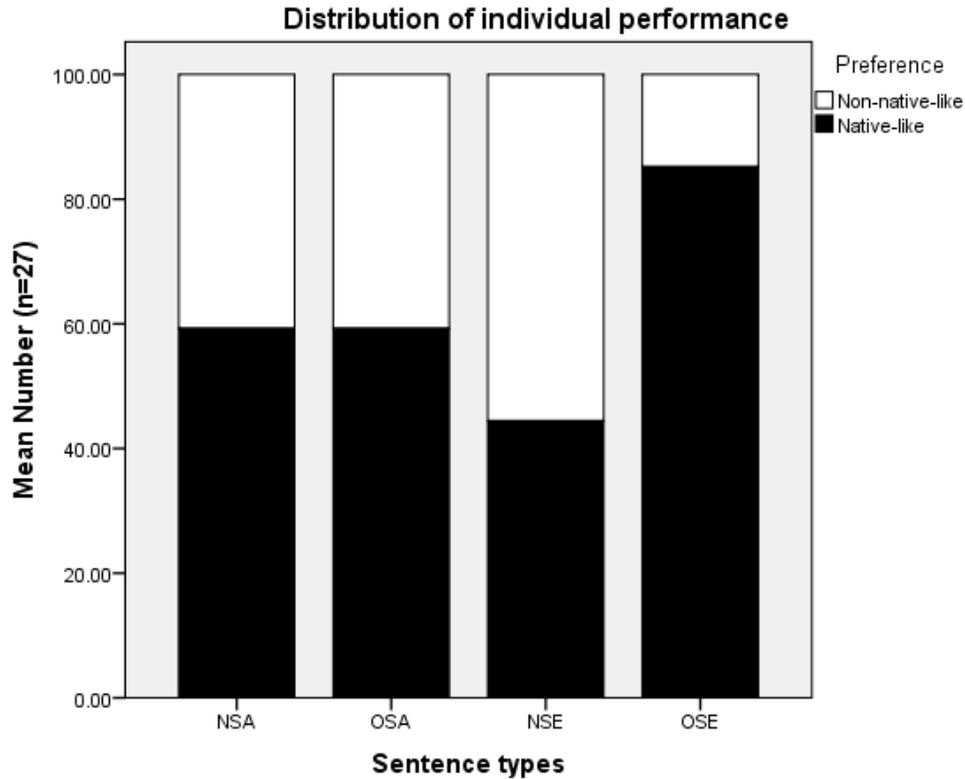
Note: NSA = Null subject in adjoining clause; OSA = Overt subject in adjoining clause;
NSE = Null subject in embedded clause; OSE = Overt subject in embedded clause

Figure 5.6 L1 children: Distribution of individual performance

According to Figure 5.6, 59.26% of the children interpreted the NSAs as co-referential with the topic antecedent like L1 adults. 59.26% of the children interpreted the OSAs as co-referential with the topic antecedent. Most of the L1 children (85.19%) could interpret OSEs like L1 adults. 44.44% of the children were native-like (adult-like) for all or all but one of the NSEs. Like L1 adults, interpretation of NSE contexts seems to be harder to acquire than that of NSA, OSA, and OSE for some (but not all) L1 children. Among the non-native-like interpretation of NSE, 23.11% of cases are interpreted as co-referential with the matrix object and 14.61% of cases with both the topic antecedent and the matrix object. L1 children (23.11%) were more likely than L1 adults (15.25%) to interpret the NSE as co-referential with the matrix object. Participants NC04 and NC08 failed on almost every test sentence. Recall that NC04 also failed and NC08 gave very few

answers on the acceptability judgement task[14]. NC04 and NC08 may not yet have enough processing ability to process sentences associated with discourse information.

Following the methodology used to infer the developmental stages in the acceptance of null subjects, L1 children's individual results are first grouped according to age. Together with the L1 adults' results, the L1 data collected here suggest the following developmental stages for null subject interpretation, as shown in (8). Stage III-a and III-b are not in a particular order because both L1 children (aged seven, eight, and nine) and L1 adults are present in these two stages. It is necessary to obtain more cross-sectional and longitudinal data using a modified experiment to confirm this.

(8)

Stage	Description	Interpretation of null subject
I	Non-target-like performance	Non-target-like interpretation of both NSA and NSE.
II	Undetermined	Target-like interpretation of NSE but not NSA.
III-a	Target-like performance	Target-like interpretation of NSA but not NSE.
III-b	Target-like performance	Target-like interpretation of both NSA and NSE.

The L1 data collected from overt subject test sentences informs the following hypothesised developmental stages for the L1 acquisition of overt subject interpretation, as shown in (9):

(9)

Stage	Description	Interpretation of overt subject
I	Non-target-like performance	Non-target-like interpretation of both OSA and OSE.
II-a	Undetermined	Target-like interpretation of OSE but not OSA.

---

[14] NC05 also gave very few answers on the acceptability judgement task. NC05 failed to answer fillers correctly and is excluded from the results of the interpretation task.

| II-b | Undetermined | Target-like interpretation of OSA but not OSE. |
| III | Target-like performance | Target-like interpretation of both OSA and OSE. |

5.3.1.3 Summary

L1 adult controls overwhelmingly interpreted NSA and OSA and OSE as co-referential with topic antecedents. They were (relatively) less accurate on the interpretation of NSE. L1 children were less accurate than L1 adults across the test sentence types. The L1 children tested here do not show the same responses as the adults at either the group or the individual level. The group data suggest that L1 children's non-target-like interpretation may result from limited discourse integration abilities. In other words, L1 adults may have an advantage in processing interface properties. Based on the data collected here, developmental stages for the L1 acquisition of the interpretive rules for null and overt subjects are suggested.

5.3.2. L2 acquisition

The purpose of the L2 acquisition task is to determine whether L1 English-L2 Chinese learners are able to acquire the interpretive constraints associated with properties at the syntax-discourse interface. To determine whether L2 children are affected by limited discourse integration abilities in the same way as L1 children and, thus, whether they differ from L2 adults, the same task was used with the L2 learners as with the L1 speakers. The group results are presented first, in section 5.3.2.1, followed by the individual results in section 5.3.2.2.

In English, a null subject in an adjoined clause is interpreted as co-referential with the topic antecedent (i.e. the subject in the previous clause). An embedded null subject is not allowed. Recall that the English equivalent of the Chinese overt subject test sentences in this task is ambiguous; that is, the overt subject could be interpreted as co-referential with either the subject or the object in the matrix clause in English, as exemplified in (10)–(11) (cf. Chinese examples (4)–(5)).

(10) John$_i$ went out with Kevin$_j$ and *(he$_{i/j}$) had a great time.

(11) John$_i$ says to Kevin$_j$ that *(he$_{i/j}$) is in danger.

L2 learners must acquire the fact that Chinese null and overt subjects cannot take a matrix object reading. One consequence of the ambiguity in English is that, if L2 learners interpret null and overt subjects as co-referential with the topic antecedent, it cannot automatically be assumed that they have target-like knowledge of the relevant interpretive constraints because it may be the result of L1 transfer. What is expected is that when learners interpret the null and overt subjects correctly for the right reason (that is, because of knowledge of the target constraint), the proportion of subjects with target-like interpretation should increase with proficiency. As with L1 children, it is possible that some L2 children might provide non-target-like responses because they cannot access the discourse-related interpretation at all rather than because of non-target-like syntactic knowledge in their interlanguage.

5.3.2.1 Group results

Seven children (CL02, CL03, CL05, CL06, CM10, CA05, and CA12) and four adults (AL01, AL04, AL06, and AL09) are excluded because they failed on more than three fillers. This indicates that they could not interpret typical sentences or that they might not understand the task. Most (86.76%) of the remaining fillers were answered correctly. The remaining 23 L2 children and 26 L2 adults are discussed below. The results for null and overt subjects in adjoined clauses by proficiency group will be presented first. Subsequently, the results for null and overt subjects in embedded clauses will be presented.

5.3.2.1.1 Null subjects in adjoined clauses

Table 5.19 presents the mean rates of native-like responses for NSA by proficiency group.

Table 5.19 L2 children and L2 adults: Group results: Adjoined clauses: Mean rates of null subject interpretation

	L2 children			L2 adults			Significance
	n	%	SD	n	%	SD	
Low	6	41.67	40.82	6	25	31.62	$p > .05$
Intermediate	9	70.37	25.72	10	50	37.27	$p > .05$
Advanced	8	93.75	11.57	10	78.33	16.76	$p > .05$

Note: The mean difference is significant at the 0.05 level.

As shown in Table 5.19, the accuracy rate for both L2 children and adults increases with proficiency. The average rate of target-like responses for advanced groups is between 78.33% and 93.75%. This is in clear contrast to the low proficiency groups, whose average target-like response is between 25% and 41.67%. There is a significant moderate correlation between accuracy and proficiency: for the L2 children $r = .632$ and $p = .001$, and for the L2 adults $r = .597$ and $p = .001$. The standard deviations for all groups suggest that there is some overlap between the different proficiency levels and that there is considerable variation within each group. The amount of variation is high for both children and adults. The only exception is the advanced proficiency children. No significant difference is found between the child and adult groups at any proficiency level. When taking L1 adult controls as a comparison, a significant difference is observed for the L2 children (ANOVA: $F_{(2, 23)} = 12.963$; $p < .01$) and for the L2 adults (ANOVA: $F_{(2,21)} = 19.561$; $p < .01$). The results of the post-hoc analyses are presented in Table 5.20. The mean difference is significant at the 0.05 level.

Table 5.20 L2 children and L2 adults: Results of post-hoc tests for interpretation of null subjects in adjoined clauses

Learner groups	Comparison	Mean difference	Significance
L2 Child	Low vs. Controls	-54.58	$p < .01$
	Intermediate vs. Controls	-25.88	$p < .01$
	Advanced vs. Controls	-2.50	$p > .05$
L2 Adult	Low vs. Controls	-71.25	$p < .01$
	Intermediate vs. Controls	-46.25	$p < .01$
	Advanced vs. Controls	-17.92	$p > .05$

Note: The mean difference is significant at the 0.05 level. $F_{(5, 43)} = 5.838$.

All proficiency groups (with the exception of the advanced level) differ significantly from the L1 controls. The advanced L2 children and L2 adults have acquired target-like null subject interpretation in adjoined clauses. Recall that the results for rates of acceptance of null subjects do not run contrary to these results: advanced L2 adults and L2 children accepted null subjects like L1 adults. One would expect to accept the presence of null subjects first before learning how to interpret them. As the English NSA is interpreted as co-referential with the topic antecedent, which is similar to Chinese, the native-like interpretation in the advanced L2 child and adult groups could be the result of L1 transfer. Null subject interpretation in adjoined clauses alone cannot determine whether L2 learners have acquired interpretive properties of null subjects in Chinese. Data regarding the interpretation of NSE is needed.

5.3.2.1.2 Overt subjects in adjoined clauses

The target response of OSA also requires participants to interpret overt subjects in adjoined clauses as co-referential with the topic antecedent. The results for the L2 child and adult proficiency groups are presented in Table 5.21. Like the pattern observed for null subjects, the accuracy rate increases with proficiency level. The children and adults in the advanced groups were very accurate in interpreting overt subjects. Again, this contrasts with the children and adults in low proficiency groups.

Table 5.21 L2 children and L2 adults: Group results: Adjoined clauses: Mean rates of native-like overt subject interpretation

	L2 children			L2 adults			Significance
	n	%	SD	n	%	SD	
Low	6	64.17	21.07	6	60	40	p > .05
Intermediate	9	77.78	24.89	10	77.83	31.90	p > .05
Advanced	8	91.25	18.08	10	96	8.43	p > .05

Note: The mean difference is significant at the 0.05 level; % = mean accuracy; SD = standard deviation

At first glance, L2 learners' interpretation of overt subjects is generally more target-like than that of null subjects (cf. Table 5.19). There is a significant correlation between the responses in this test condition and proficiency in both groups ($r = .468$ and $p = .016$ for the L2 children and $r = .641$ and $p = .027$ for the L2 adults). The standard deviation figures suggest that there is some overlap between the low and intermediate groups. There is variation within each group. When comparing the L2 groups with native adults, a significant difference is found between native adults and L2 children ($F_{(2, 21)} = 6.287$; $p < .01$) and L2 adults ($F_{(2, 24)} = 5.299$; $p < .01$). The post-hoc analyses that reveal the significant differences between groups are presented in Table 5.22.

Table 5.22 L2 children and L2 adults: Results of post-hoc tests on the interpretation of overt subjects in adjoined clauses

Learner groups	Comparison	Mean difference	Significance
L2 Child	Low vs. Controls	-30.83	p < .01
	Intermediate vs. Controls	-17.22	p < .05
	Advanced vs. Controls	-3.75	p > .05
L2 Adult	Low vs. Controls	-35.00	p < .01
	Intermediate vs. Controls	-17.17	p < .05
	Advanced vs. Controls	-3.75	p > .05

Note: The mean difference is significant at the 0.05 level. $F_{(5, 43)} = 2.387$.

The same pattern is observed for the L2 children and for the L2 adults: the low

proficiency groups differ significantly from the native controls. The intermediate and advanced groups do not differ significantly from each other, but the intermediate group differs significantly from the control group. Both the advanced L2 child and L2 adult groups do not differ significantly from the native controls. This suggests that L2 children and L2 adults acquire target-like interpretation of OSA as they attain an advanced level of proficiency. The results of OSA interpretation alone cannot determine whether L2 learners have knowledge of overt subject interpretation in Chinese. It is necessary to take OSE into consideration.

As discussed earlier, the English equivalent of the Chinese OSA test sentence is ambiguous (see Section 4.1). That is, L2 learners' target-like judgement may come from their L1 English. Target-like interpretation at the group level alone cannot prove that the learners have acquired knowledge of the relevant constraints. It may be a result of L1 transfer. It is necessary to examine the individual data to see whether the proportion of target-like responses from L2 learners increases with proficiency.

5.3.2.1.3 Null subjects in embedded clauses

In an ambiguous Chinese sentence, a null subject in an embedded clause refers either to the topic antecedent or to someone else in the discourse, but not to the matrix object. Given that both topic antecedent and discourse entity readings are allowed in Chinese, both interpretations are counted as target-like. Table 5.23 presents the average percentage of target-like responses by proficiency group.

Table 5.23 L2 children and L2 adults: Group results: Embedded clauses: Mean rates of null subject interpretation

	L2 children			L2 adults			Significance
	n	%	SD	n	%	SD	
Low	6	36.67	34.45	6	66.67	41.31	p > .05
Intermediate	9	51.11	34.80	10	31.00	26.54	p > .05
Advanced	8	71.88	33.59	10	53.00	29.00	p > .05

Note: The mean difference is significant at the 0.05 level; % = mean accuracy; SD = standard deviation.

A gradual increase in target-like responses with increasing proficiency is observed for L2 children but not for L2 adults. The results for the significance tests given above indicate that the L2 children and L2 adults do not differ significantly from each other. No significant positive or negative correlation is found between the accuracy and proficiency levels either for L2 children ($r = .396$; $p = .062$) and for L2 adults ($r = -.093$; $p = .651$). Standard deviations reveal that there is some overlap and variation between and within L2 groups.

In comparing the percentage of target-like responses for the three proficiency levels and the native controls, no significant difference is found between L2 children and native controls ($F_{(2, 21)} = 2.419$; $p > .05$), but a significant difference is observed for the L2 adults ($F_{(2,24)} = 4.160$; $p < .05$). Post-hoc analyses were carried out to determine for the child and adult groups which proficiency groups differ from each other and/or from the native controls. The results of these analyses are presented in Table 5.24.

Table 5.24 L2 children and L2 adults: Results of post-hoc tests for the interpretation of null subjects in embedded clauses

Learner groups	Comparison	Mean difference	Significance
L2 Child	Low vs. Controls	-34.50	$p < .05$
	Intermediate vs. Controls	-20.06	$p > .05$
	Advanced vs. Controls	0.71	$p > .05$
L2 Adult	Low vs. Controls	-4.50	$p > .05$
	Intermediate vs. Controls	-40.17	$p < .01$
	Advanced vs. Controls	-18.17	$p > .05$

Note: The mean difference is significant at the 0.05 level. $F_{(5, 43)} = 1.915$

The intermediate and advanced L2 children do not differ significantly from the native controls. The intermediate L2 adults differ significantly from the native controls, but the advanced L2 adults do not. Both L2 children and L2 adults have target-like responses at the advanced proficiency level. Although NSE is not allowed in English, L2 child and adult learners at an advanced level can acquire the relevant interpretive constraints of NSE.

5.3.2.1.4. Overt subjects in embedded clauses

The target-like interpretation of an overt subject in an embedded clause is that it is co-referential with the topic antecedent. Table 5.25 presents the average accurate interpretation rate for each proficiency level among the L2 children and L2 adults.

Table 5.25 L2 children and L2 adults: Group results: Embedded clauses: Mean rates of overt subject interpretation

	L2 children			L2 adults			Significance
	n	%	SD	n	%	SD	
Low	6	45.83	18.82	6	52.78	36.00	$p > .05$
Intermediate	9	66.67	27.95	10	67.50	15.44	$p > .05$
Advanced	8	77.08	34.14	10	67.50	27.63	$p > .05$

Note: The mean difference is significant at the 0.05 level; % = mean accuracy; SD = standard deviation.

The accuracy rates for OSE are generally higher than those for NSE. As shown in the table above, there is a gradual increase in target-like responses as proficiency levels increase for the L2 children. As for the L2 adults, there is an increase between the low proficiency and intermediate levels, but there is no increase between the intermediate and advanced levels. No significant difference is found between the L2 children and adults at any proficiency level. According to statistical tests, there is no significant correlation between target-like responses and proficiency level for L2 adults ($r = .202$; $p = .322$), though it approaches significance for L2 children ($r = .407$; $p = .054$).

Again, the three proficiency groups are compared with each other and the native adult controls. One-way ANOVA tests show significant differences between the native controls and both the L2 children ($F_{(2,21)} = 6.887$; $p < .01$) and the L2 adults ($F_{(2,23)} = 6.496$; $p < .01$). Table 5.26 presents the results of the post-hoc analyses. The significant differences are at the 0.05 level.

Table 5.26 L2 children and L2 adults: Results of post-hoc tests for the interpretation of an overt subject in an embedded clause

Learner groups	Comparison	Mean difference	Significance
L2 Child	Low vs. Controls	-44.17	$p < .01$
	Intermediate vs. Controls	-23.33	$p < .05$
	Advanced vs. Controls	-12.92	$p > .05$
L2 Adult	Low vs. Controls	-37.22	$p < .01$
	Intermediate vs. Controls	-22.50	$p < .01$
	Advanced vs. Controls	-22.50	$p < .01$

Note: The mean difference is significant at the 0.05 level. $F_{(5, 43)} = 1.196$

Within the L2 child groups, the low proficiency group differs significantly from the native adult control groups. A significant difference is also observed between the intermediate L2 children and the native adult controls. The advanced L2 children interpreted overt subjects in embedded clauses at the same accuracy level as the native controls. As for the L2 adult groups, there is a statistically significant difference between each of the three L2 adult proficiency levels and the native controls. The L2 adults, even at the advanced level, did not give target-like responses in interpreting overt subjects in embedded clauses. Recall that the English equivalent of the Chinese OSE test sentence is ambiguous. It was expected that the proportion of individuals giving target-like responses would increase with proficiency level. The individual data is needed.

5.3.2.1.5 Comparing null subject and overt subject interpretations

To ascertain whether L2 learners performed differently on null and overt subjects and whether the ability to interpret null subjects and overt subjects develops at the same time, the results from the null subject test items and the overt subject test items were compared with each other.

Table 5.27 L2 children and L2 adults: Null subject interpretation vs. overt subject interpretation

	Null subject interpretation		Overt subject interpretation		ANOVA	
	%	SD	%	SD	$F_{(7, 79)}$	Significance
L2 Child						
Low (n = 6)	39.17	36.11	55.00	21.32	1.711	p > .05
Intermediate (n = 9)	60.74	31.30	72.22	26.30	1.420	p > .05
Advanced (n = 8)	82.81	26.77	84.17	27.39	0.020	p > .05
L2 Adult						
Low (n = 6)	45.83	41.28	56.39	36.48	0.441	p > .05
Intermediate (n = 10)	40.50	32.96	56.75	31.75	2.522	p > .05
Advanced (n = 10)	56.67	26.46	81.45	24.68	3.952	p > .05
L1 Child (n = 27)						
	59.04	27.29	72.47	27.77	6.420	p < .05
L1 Adult (n = 20)						
	83.71	24.81	92.50	11.04	4.194	p < .05

Note: Note: The mean difference is significant at the 0.05 level.

Table 5.27 shows that, for both the L2 children and the L2 adults, there is no significant difference between null subject responses and overt subject responses. At the group level, overt subject responses are more target-like than null subject responses. Null subject and overt subject responses for both the L2 children and L2 adults become more target-like with increases in proficiency levels. It is interesting to note that overt subject responses are not significantly more accurate than null subject responses for either the L2 children and L2 adults, even though overt subjects are present in their native language.

When comparing the advanced L2 children with the L1 adults, there is no significant difference found between their null subject responses (p > .05) or between their overt subject responses (p > .05). For the advanced L2 adults, both their null subject and overt subject responses differ significantly from the L1 adults (null subject: p < .01 and overt subject: p < .01). While the advanced L2 children behaved similarly to L1 adults, the advanced L2 adults did not.

5.3.2.2 Individual results

The previous sections presented the accuracy rate by proficiency group. The high standard deviations suggest a certain level of variation within some groups and some overlaps between proficiency levels. This section examines the results for individual participants. As with the group data, the individual data are categorised according to proficiency. The individual results are summarised below and presented in Appendix B.11-B.12 in detail.

5.3.2.2.1 Null and overt subjects in adjoined clauses

Individual subjects are categorised according to whether they show non-target-like performance ($-$) or show target-like performance ($+$). Table 5.28 shows the distribution of these response patterns for each proficiency level for the child and adult groups. The first two columns provide the group results presented in section 5.3.2.1.1. The cells containing the most participants at each proficiency level are underlined.

Table 5.28 L2 children and L2 adults: Individual results: Adjoined clauses: Null subject interpretation

Group	Average rate within group		Number of individuals	
	%	SD	$-$	$+$
L2 Child				
Low	41.67	40.82	<u>4</u>	2
Intermediate	70.37	25.72	2	<u>7</u>
Advanced	93.75	11.57	0	<u>8</u>
L2 Adult				
Low	25	31.62	<u>5</u>	1
Intermediate	50	37.27	<u>5</u>	<u>5</u>
Advanced	78.33	16.76	1	<u>9</u>

Note: % = mean accuracy; SD = standard deviation

The proportion of target-like responses is higher in the child and adult L2 advanced proficiency groups than in any other proficiency group. All of the child and virtually all adult advanced participants exhibited target-like performance. Among the non-target-like responses, 31.71% of the null subject test items are interpreted as co-referential with the matrix object and 100% of these non-target-like object readings are made by low and intermediate learners. This might be the influence of L1. Table 5.29 presents the distribution of the accuracy of overt subject interpretation, which repeats the group results reported in section 5.3.2.1.2.

Table 5.29 L2 children and L2 adults: Individual results: Adjoined clauses: Overt subject interpretation

Group	Average rate within group		Number of individuals	
	%	SD	-	+
L2 Child				
Low	64.17	21.07	4	2
Intermediate	77.78	24.89	3	6
Advanced	91.25	18.08	1	7
L2 Adult				
Low	60	40	3	3
Intermediate	77.83	31.90	3	7
Advanced	96	8.43	0	10

Note: % = mean accuracy; SD = standard deviation

Most of the participants in the L2 child low proficiency group did not interpret overt subjects in adjoined clauses like L1 adults, whereas most of the participants in the intermediate and advanced groups responded in a more target-like way. Most of the participants in the L2 adult intermediate group and all participants in the advanced group show target-like performance. Three participants (CL07, AL02, and AM10) chose both subject and object readings for the overt pronoun *ta* ('he'), which can only be interpreted as a single referent. Among the non-target-like interpretations, 83.87% of the overt subject test

items are interpreted as co-referential with the matrix object. 81.25% of non-target-like object readings are from low and intermediate groups. This implies a possible L1 influence.

Generally, the proportion of participants with target-like performance increases with proficiency in both the L2 child and L2 adult groups. At the advanced level, nearly all the participants in the L2 child and adult groups interpreted null and overt subjects in the adjoined clauses correctly. The non-target-like matrix object reading suggests that L1 transfer may play a role in the early stages of acquiring interpretive rules on overt subjects in adjoined clauses.

5.3.2.2.2 Null and overt subjects in embedded clauses

Tables 5.30 and 5.31 present the distribution of target-like responses in the embedded clause test situation.

Table 5.30 L2 children and L2 adults: Individual results: Embedded clauses: Null subject interpretation

Group	Average rate within group		Number of individuals	
	%	SD	-	+
L2 Child				
Low	36.67	34.45	<u>5</u>	1
Intermediate	51.11	34.80	<u>5</u>	4
Advanced	71.88	33.59	3	<u>5</u>
L2 Adult				
Low	66.67	41.31	<u>3</u>	<u>3</u>
Intermediate	31.00	26.54	<u>9</u>	1
Advanced	53.00	29.00	<u>6</u>	4

Note: % = mean accuracy; SD = standard deviation

Most of the participants from both the L2 child and adult groups did not exhibit target-like

interpretation of null subjects in embedded clauses. Only eighteen (ten L2 children and eight L2 adults) participants responded in a target-like way.

As shown in Table 5.30, two-thirds of the L2 children at the low and intermediate levels exhibited non-target-like behaviour. Advanced children are more target-like than advanced adults, with slightly more children giving correct responses (child vs. adult = 5:4). In the target-like category, there are more advanced-level participants than low- and intermediate-level participants among the L2 children (advanced vs. intermediate vs. low = 5:4:1). However, the proportion of L2 adult participants with target-like performance does not increase with proficiency. 77.17% of non-target-like responses to NSE test items involved interpreting the NSE as co-referential with the matrix object. Of incorrect matrix object readings, 74.65% are made by low and intermediate level L2 learners. This implies the possible influence of L1.

Table 5.31 L2 children and L2 adults: Individual results: Embedded clauses: Overt subject interpretation

Group	Average rate within group		Number of individuals	
	%	SD	-	+
L2 Child				
Low	45.83	18.82	<u>5</u>	1
Intermediate	66.67	27.95	2	<u>7</u>
Advanced	77.08	34.14	1	<u>7</u>
L2 Adult				
Low	52.78	36.00	2	<u>4</u>
Intermediate	67.50	15.44	1	<u>9</u>
Advanced	67.50	27.63	4	<u>6</u>

Note: % = mean accuracy; SD = standard deviation

More L2 children at advanced level display target-like performance than at any other

proficiency level. However, the proportion of L2 adults with target-like performance does not increase with proficiency. The participants seemed to be aware that the overt subject *ta* ('he') in an embedded clause can refer only to a single referent. Among the non-target-like responses, 81.13% of overt subject test items were interpreted as co-referential with the matrix object, of which 76.74% were made by low and intermediate learners. This suggests that L1 may play a role in identifying the antecedent for OSE.

5.3.2.2.3 Comparing individual null and overt subject interpretations

To determine whether L2 learners performed differently on null and overt subjects and whether the ability to interpret null subjects and overt subjects in target-like ways develops at the same time, the responses to null and overt subject test items are compared. The results presented in previous sections indicate that at the group level, there is a near statistical difference between the number of target-like null subject responses and overt subject responses for advanced L2 adults. The interpretation of overt subjects is more target-like than that of null subjects at the group level. A closer examination of the individual results is presented in Appendix B.13- B.14.

In both the L2 adult and child low proficiency groups the number of individuals giving target-like null subject responses is the same as that giving target-like overt subject responses (null subject vs. overt subject= 4:4). Fewer individuals gave target-like responses to null subjects than to overt subjects in both the L2 child and L2 adult intermediate groups (null subject vs. overt subject= 3:11). Fewer advanced learners across the two groups were more accurate in their responses to null subject test items than to overt subject test items (null subject vs. overt subject= 13:21). This more target-like performance of L2 learners with regards to the interpretation of overt subjects can also be confirmed at the group level. This suggests that the ability to interpret null subjects and overt subjects may develop at the same time during the early stages of development but null subject identification is delayed in the later stages for L2 learners at both the group and individual levels. Recall that L1 adults and L1 children also showed a relatively lower accuracy rate in interpreting null subjects than overt subjects at both group and individual levels.

5.3.2.2.4 The developmental sequence

Regarding the results of the interpretation task, both child and adult participants exhibited target-like interpretation in each condition. Thus, it is possible for L2 children and adults to acquire interpretive constraints in Chinese.

The developmental progression of the ability to interpret null and overt subjects in overt and embedded clauses is inferred in the same way as that of the ability to accept null arguments. Along with L1 adult data, Table 5.32 shows the hypothesised developmental sequence for L2 learners with regards to the interpretation of null subjects.

Table 5.32 Developmental sequence for L2 learners: Interpretation of null subjects

Stage	Description	Interpretation of null subject	L2 child			L2 adult		
			L	I	A	L	I	A
I	Non-target-like performance	Non-target-like interpretation of both NSA and NSE.	3	1		3	5	
II	Undetermined	Target-like interpretation of NSE but not NSA.	1	1		2		1
III-a	Target-like	Target-like interpretation of NSA but not NSE.	2	3	3	1	4	6
III-b	Target-like	Target-like interpretation of NSA and NSE		4	5		1	3

Note: L = low proficiency; I = intermediate proficiency; A = advanced proficiency

The inferred developmental sequence of L2 learners with regards to the interpretation of overt subjects is shown in Table 5.33. Stages II-a and II-b are not in a particular order for L2 children because there are both low proficiency and advanced learners in each of these two stages. Table 5.33 shows that there are both child and adult participants in each developmental stage.

Table 5.33 Developmental sequence for L2 learners: Interpretation of overt subject

Stage	Description	Interpretation of overt subject	L2 child			L2 adult		
			L	I	A	L	I	A
I	Non-target-like performance	Non-target-like interpretation of both OSA and OSE.	3	2		1	1	
II-a	Undetermined	Target-like interpretation of OSE but not OSA.	1	1	1	2	2	
II-b	Undetermined	Target-like interpretation of OSA but not OSE.	2		1	1		4
III	Target-like	Target-like interpretation of both OSA and OSE.		6	6	2	7	6

Note: L = low proficiency; I = intermediate proficiency; A = advanced proficiency

To summarise, according to the reported responses of the L2 learners, the advanced L2 children's performance falls in the native-like range both at the group level and at the individual level. For both the L2 child and the L2 adult groups, target-like performance generally (though not definitively) increases with proficiency. This indicates that the advanced proficiency groups are more target-like than the intermediate and low proficiency groups. It is observed that both L2 children and L2 adults pass through the same developmental stages.

5.3.3 Summary

This section considered whether L2 children and adults can learn the interpretive constraints on overt and null subjects and whether L2 children and L2 adults develop in a similar fashion by means of an interpretation task. The data indicate that, although not all advanced L2 learners acquire knowledge of the interpretive constraints on null and overt subjects, some L2 learners can reach target-like performance across sentence types. In other words, they demonstrated knowledge how null and overt subjects are interpreted in Chinese. It is important to note that every stage in the inferred developmental sequence contains both adult L2 learners and child L2 learners.

There are a few other results worth noting. Firstly, both L2 children and L2 adults

exhibited target-like performance in interpreting null and overt subjects in adjoined and embedded clauses. The proportion of both L2 children and L2 adults interpreting null and overt subjects in target-like ways increases with proficiency level. However, these L2 learners are spread across the different proficiency levels within the L2 child and L2 adult groups. Recall that English NSA has the same topic antecedent reading as Chinese NSA and that the English equivalent of the Chinese OSA and OSE in this task is ambiguous. It is possible therefore that some of the learners who responded in target-like ways are affected by L1 transfer rather than actually possessing target-like knowledge. However, without actually testing each individual L2 learner's interpretation of English subjects in embedded and adjoined clauses, it is unfortunately impossible to distinguish between these two possibilities. What is clear is that the gradual increase in target-like performance with increasing proficiency was observed for both the L2 child and the L2 adult groups. For both the L2 children and the L2 adults, a discernible developmental pattern emerges. The advanced proficiency groups have more learners with target-like interpretation than the intermediate and low proficiency groups. Virtually all the advanced L2 children and L2 adults performed similarly to L1 adults in their identification of antecedents for null subjects. **Prediction 6** states that advanced proficiency L2 children and L2 adults will behave similarly to L1 controls in the interpretation of null and overt subjects. This prediction is supported by the results.

Secondly, by using the L2 proficiency measure as a guideline, a developmental sequence for the L2 learners is inferred. In this developmental sequence, every stage contains adult L2 learners and child L2 learners. L2 children and L2 adults were found to follow the same developmental sequence for this syntax-discourse interface phenomenon, namely the interpretation of null and overt subjects. According to the results, **Prediction 5** is therefore borne out.

Thirdly, the developmental stages suggested for L2 children do not differ much from those suggested for L1 children. **Prediction 7** predicts that L2 children will follow a different developmental sequence from L1 children as a result of L1 transfer in the cases of overt subjects in adjoined clauses and null subjects in embedded clauses. Data from the L2 children suggest that the ability to interpret overt subjects in embedded clauses may occur before the ability to interpret these items in adjoined clauses. Data from the L1 children

clearly suggest that adult-like interpretation of overt subjects in embedded clauses occurs before adult-like interpretation of overt subjects in adjoined clauses. **Prediction 7** is not borne out here. More data are needed to determine whether this is indeed the case in the L1 and L2 acquisition interpretive constraints on overt subjects.

Chapter 6 Discussion

Introduction

The previous chapter presented data on the acceptance of null arguments and the interpretation of null and overt subjects. The acceptability judgement experiment tested whether L1 children, L2 children and L2 adults were able to accept null arguments in the sentences in the appropriate contexts. The interpretation task determined whether the three learner groups assigned a target-like interpretation of subjects. Based on previous L2 research, I hypothesised that L1 English-L2 Chinese adult and child learners as well as and L1 child learners of Chinese will pass through the same developmental stages and that interpretive constraints on null and overt subjects, a phenomenon at the syntax-discourse interface, are acquirable by L2 learners. The acceptability judgement and interpretation task results from the individual L2 L1 English-L2 Chinese adult and child learners who participated in both experiments support both claims.

In this chapter, the results reported in Chapter 5 will be discussed in relation to the research questions and predictions. This chapter is organized as follows: Section 6.1 is a brief recap of research questions and hypotheses. Section 6.2 recapitulates the findings for the L1 and L2 learners and L1 native controls. In Section 6.3, the observed results relating to null argument acceptability are interpreted. Finally, in Sections 6.4 and 6.5, an account of how L1 children, L2 children, and L2 adults acquire the interpretive constraints on arguments and their developmental sequence is proposed. Further discussion and a summary follow in Section 6.6 and 6.7.

6.1 Recap: Research hypotheses and predictions

This thesis is based on (i) the methodological approach proposed by Schwartz (1992, 2003, 2004), (ii) the Interface Hypothesis proposed by Sorace (2000; 2003; 2004; 2005), (iii) the previous findings in L2 acquisition research as detailed in Chapter 2 and (iv) previous findings relating to adult L2 acquisition of null arguments (Yuan, 1993; Zhao, 2008). In order to compare Chinese null argument acquisition by L2 children and adult L2 adults, the following hypotheses were tested in this study.

Hypothesis 1: L1 English-L2 Chinese adult and child learners will allow null arguments in Chinese sentences from an early stage onward.

Hypothesis 2: Adult L2 acquisition is constrained by UG if L2 L1 English-L2 Chinese adult and child learners follow the same developmental sequence.

Hypothesis 3: L1 English-L2 Chinese adult and child learners will eventually acquire syntax-discourse interface properties.

Hypothesis 4: L1 transfer plays a role in L2 acquisition if L1 children and L2 children follow different developmental sequences.

These hypotheses translate into 7 predictions within the context of the following experiments:

Acceptability judgement task:
> **Prediction 1:** L1 English-L2 Chinese adult and child learners are expected to allow null arguments in their early interlanguage grammars.
> **Prediction 2:** The developmental sequences of L2 children and L2 adults are predicted to pattern alike on the rates of acceptance of null arguments.
> **Prediction 3:** High proficiency L2 children and L2 adults will give native-like responses regarding the acceptability of null arguments.
> **Prediction 4:** L2 children will follow a different developmental sequence from L1 children as the result of L1 transfer regarding the acceptability of null arguments.

Interpretation task:
> **Prediction 5:** L2 children will follow the same developmental sequence of the acquisition of interpretive constraints on null and overt subjects as L2 adults.
> **Prediction 6:** High proficiency L2 children and L2 adults will behave similarly to L1 controls regarding their interpretation of null and overt subjects.
> **Prediction 7:** L2 children will follow a different developmental sequence from L1

children as the result of L1 transfer regarding the interpretation of null and overt subjects.

In terms of linking predictions and hypotheses, Prediction 1 corresponds to the hypothesis that L2 learners of Chinese will have no problem allowing null arguments from the earliest stages of acquisition. Predictions 2 and 5 are based on the hypothesis that both child L2 acquisition and adult L2 acquisition is constrained by UG. Predictions 3 and 6 are linked to Hypothesis 3, which predicts that syntax-discourse interface properties do not cause problems for L2 learners of Chinese. Finally, Prediction 4 and Prediction 7 correspond with Hypothesis 4 that L1 transfer plays a role in L2 acquisition.

6.2 Summary of results

An acceptability judgement task and an interpretation task were conducted using four participant groups—L2 child and L2 adult learners, L1 child learners and L1 adult native speakers. The first task tested participants' acceptance of null argument sentences as seen in example (1) below. The interpretation task tested whether learners assigned the target-like antecedent to the null or overt subject in adjoined clauses, as in example (2), and in embedded clauses, as in example (3):

(1) Null argument sentences in the acceptability judgement task

   a. Zhangsan you   san   zhi xiao   mao, Ø mei   you   xiao   gou
     Zhangsan have three   CL small cat   Ø not   have   small   dog .
     'Zhangsan has three small cats. He doesn't have small dogs.'

   b. Wo he   qishui，   baba he   mama bu   he   Ø，tamen   he   cha。
     I   drink soft drinks father and mother not drink Ø   they   drink   tea
     'I drink soft drinks. Father and mother don't drink soft drinks. They drink tea.'

   c. Xingqiliu Zhangsan you   ke ma? Ø Mei you   Ø.
     Saturday Zhangsan   have   class-Q Ø no   have Ø
     'Does Zhangsan have class on Saturday? He doesn't have class.'

(2) Subjects in adjoined clauses

a. Null subject:

Laoshi$_i$ gen xuesheng$_j$ shuohua，ranhou Ø$_i$　qu　　jiaoshi。
teacher with student　talk　　　then　Ø　go to　classroom
'The teacher talks to a student and then he goes to the classroom.'

Question: Who goes to the classroom?

Target answer: The teacher.

b. Overt subject:

Laoshi$_i$ gen xuesheng$_j$ shuohua，ranhou ta$_i$ qu　　jiaoshi。
teacher with student　　talk　　then　he go to　classroom
'The teacher talks to a student and then he goes to the classroom.'

Question: Who goes to the classroom?

Target answer: The teacher.

(3) Subjects in embedded clauses

a. Null subject:

Gege$_i$　dui Xiaohai$_j$ shuo Ø$_{i/k}$　hui　　jia。
brother to　Xiaohai say　Ø　　return　home
'Brother says to Xiaohai that he goes home.'

Question: Who goes home?

Target answer: Brother or someone else.

b. Overt subject:

Gege$_i$　dui Xiaohai$_j$ shuo Ø$_{i/k}$ hui　　jia。
brother to　Xiaohai say　Ø　return home
'Brother says to Xiaohai that he goes home.'

Question: Who goes home?

Target answer: Brother.

In the case of subjects in adjoined clauses (2), both null and overt subjects are

co-referential with the topic antecedent (the subject in the preceding clause). In embedded clauses (3), null subjects can co-refer with the topic antecedent (the matrix subject) or the discourse topic (someone else in the discourse), whereas overt subjects can only co-refer with the topic antecedent (the matrix subject). The data obtained from both the acceptability judgement task and the interpretation task are summarised in Figure 6.1.
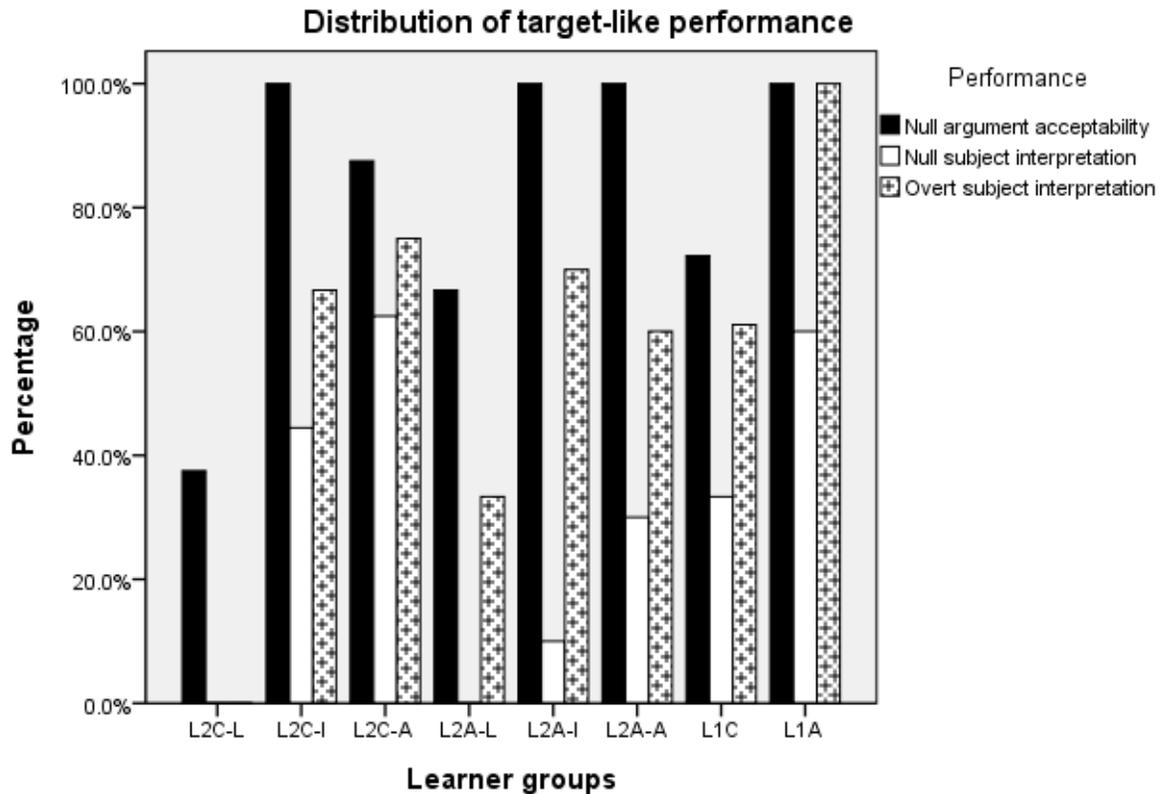
Note: L2C-L = Low L2 children; L2C-I = Intermediate L2 children; L2C-A = Advanced L2 children; L2A-L = Low L2 adults; L2A-I = Intermediate L2 adults; L2A-A = Advanced L2 adults; L1C = Native L1 children; L1A = Native L1 adults

Figure 6.1 Summary of findings

Figure 6.1 shows the performances for the child and adult L1 groups and for each proficiency level within the child and adult L2 groups (see Chapter 4 for details).

First, I will consider the judgements of the acceptability of null arguments. Individual participants are categorised as target-like according to whether they accept null subject (NS), null object (NO), or both null subject and null object (NSO) sentences. The L1 adults performed as predicted: They accepted null arguments across all sentence types. As for the

L1 children, 72.22% of children exhibited target-like performance. In low proficiency levels across the L2 child and L2 adult groups, target-like performance was lower than in the intermediate and advanced proficiency levels. All L2 child and L2 adult participants from the intermediate and advanced levels performed like L1 native adults. Both child and adult L2 learners improved greatly between low and intermediate proficiency. Both the child and adult L2 learners (with one exception) gave target-like judgements from the intermediate stage onwards. In terms of acquiring the syntax of null subjects, L2 children and L2 adults follow a clearly defined developmental path.

For the interpretation task, participants were categorised according to the pattern of responses they gave. Participants who correctly interpreted null and overt subjects in adjoined and embedded clauses were deemed to exhibit target-like performance. The results show that all L1 adult controls correctly interpreted overt subjects as co-referntial with topic antecedents in both adjoined and embedded clauses. While all L1 adults interpreted overt subjects in a target-like manner, only 60% of them responded in a target-like way to the null subject test condition across clause types. For the L1 children, the number of participants giving target-like null subject responses is also half (54.55%) of those giving target-like overt subject responses.

The data presented here show a gradual increase toward target-like behaviour as proficiency increases for both the L2 child and L2 adult groups, with the exception of the L2 adult intermediate group. The L2 children at the low proficiency level failed to interpret null subjects and overt subjects across clause types in a target-like way. Likewise, only two low proficiency L2 adults interpreted overt subjects correctly. One of them also consistently correctly interpreted null subjects. Intermediate L2 children were much more target-like in their interpretation of both overt and null subjects. The intermediate L2 adults also were more target-like in interpreting overt subjects and null subjects. The number of participants with target-like interpretations of null and overt subjects in the L2 child advanced group is more than other proficiency level in the child group. With the exception of the L2 adult intermediate group, the number of participants with target-like null and overt subject interpretation increases with proficiency in the L2 adult groups. Although not exactly the same, the performances of L2 children and L2 adults are consistent. Although not all advanced L2 children and L2 adults reach a native-like interpretation of null subjects

(62.5% for L2 children; 30% for L2 adults) and overt subjects (75% for L2 children; 60% for L2 adults), there was no statistically significant difference between the L2 child and L2 adult advanced groups and the L1 adult control group in terms of average performance (see Section 5.3.2).

As seen in Figure 6.1, some low proficiency child and adult learners have target-like acceptance of null subjects but rarely have target-like interpretations of overt and null subjects. At the intermediate proficiency stage, when target-like acceptance is already in place, L2 children show a large increase in target-like responses in terms of overt and null subject interpretation. The proportion of target-like responses in the overt subject test condition (but not the null subject condition) also rises sharply after target-like acceptance is in place. The current study tests Chinese null arguments and the interpretation of overt and null subjects to see whether L2 Chinese learners can acquire the properties of Chinese topics at the syntax and discourse interface. As detailed in Sections 3.1.1 and 3.1.2, topics are obligatory in the Spec CP/TopicP of every Chinese sentence (Huang, 1984), whereas in English topicalisation is optional. In Chinese, simple SVO sentences like (4) and (5) are topic constructions. Spec CP/TopicP must be obligatorily filled. From Huang's (1984) analysis, I assume that topicalisation is an obligatory process in every Chinese sentence. Chinese allows the subject 'Zhangsan' to be topicalised, that is, moved out from IP to Spec CP/TopicP, as seen in examples (4-5). The rest of the sentence is used to say something about the topic. Since a fronted topic is obligatory in Chinese, the co-presence of the topic 'Zhangsan' and the overt pronoun *ta* ('he') in example (6) does not make the sentence ungrammatical, though the pronoun is considered redundant. In an English sentence, topics are optional, as in example (7), in which the object is topicalised. Although example (8) is grammatical in the surface string (8a), the topicalisation of the subject 'John' makes the analysis of the sentence structure ungrammatical (8b). Pragmatically speaking, English speakers tend to view the subject 'John' as the topic of the sentence. At the structural level, however, the topic position need not be obligatorily filled.

(4) Speaker A: Zhangsan xihuan mao ma?

          Zhangsan like   cat   Q

          'Does Zhangsan like cat?'

Speaker B: Xihuan.

like

[topic Ø$_i$ Ø$_j$ [Ø$_i$ xihuan Ø$_j$]

'Zhangsan likes cats.'

(5) Zhangsan Ø xihuan mao.

Zhangsan Ø like   cat

[topic Zhangsan$_i$ [Ø$_i$ xihuan mao]

'Zhangsan likes cats.'

(6) Zhangsan ta xihuan mao.

Zhangsan he like   cat

??[topic Zhangsan$_i$ [ta$_i$ xihuan mao]

'*Zhangsan he likes cats.'

(7) Cats, [John likes Ø]

[topic cats$_j$, [John likes Ø$_j$]

(8) John likes cats.

a. [John likes cats]

b. *[topic John$_i$ [Ø$_i$ likes cats]

One consequence of this obligatory-optional difference between Chinese and English is that if L2 participants accept sentences with null elements, it cannot automatically be assumed that they have acquired target-like knowledge of the relevant topic construction in Chinese. In other words, L2 learners have to know that a topic position must be filled in every Chinese sentence before they learn how to interpret null and overt subjects. Naturally, one would expect L2 learners to accept null arguments before knowing how to interpret them. Recall that the test sentences with overt subjects included in this study are also constrained by the obligatory topic. To interpret an overt subject as co-referential with the correct antecedent, one must know that every Chinese sentence requires a topic first. As

null arguments are the most commonly used in Chinese, they are visible in learners' L2 Chinese input. It is possible that target-like acceptance (acceptance of NS, NO and NSO sentences) develops before target-like interpretations of null and overt subjects are possible. The data support this assumption.

In the following sections, I first discuss whether L2 Chinese learners acquire the licensing of null arguments. Then a discussion of the acquisition of interpretive constraints follows.

6.3 Acquisition of licensing null arguments

As discussed in Chapter 2, English is a 'hot' language while Chinese is a 'cool' language on Huang's (1984) 'hot-cool' continuum. An English sentence can be understood by its overt elements and structural relations, whereas a Chinese sentence requires 'inference, context, and knowledge of the world, among other things' (Huang, 1984, p. 531) in order to fully understand and use the structures of the language. The appearance of null arguments is one aspect that reflects this 'hot-cool' distinction between English and Chinese. Null subjects and null objects are not allowed in English, whereas null subjects and null objects as well as the overt subject and object pronoun '*ta*' are allowed in Chinese.

The acceptability judgement task was designed to test whether child L2 and adult L2 learners come to acquire the licensing of null arguments, that is, whether L2 children and L2 adults accept null elements in subject, object, and both subject and object positions. Corresponding to the hypotheses, the following predictions were made of the results of the acceptability task:

> **Prediction 1:** L1 English-L2 Chinese adult and child learners are expected to allow null arguments in their early interlanguage grammars.
> **Prediction 2:** The developmental sequences of L2 children and L2 adults are predicted to pattern alike on the rates of acceptance of null arguments.
> **Prediction 3:** High proficiency L2 children and L2 adults will give native-like responses regarding the acceptability of null arguments.
> **Prediction 4:** L2 children will follow a different developmental sequence from L1 children as the result of L1 transfer regarding the acceptability of null arguments.

According to both the group and individual results, L2 children and L2 adults at the low level have undetermined knowledge regarding the presence of null arguments. At the group level, both low proficiency L2 children and L2 adults have undetermined knowledge of NS sentences and reject NO and NSO sentences. At the individual level, only three out of eight low level L2 children and six out of nine low level L2 adults made target-like judgements. In total, only around 50% of low level L2 learners accepted null argument sentences. Prediction 1 is not supported in either group or individual results. In the current study, L2 learners accept the use of null arguments at intermediate and advanced proficiency level. It is hypothesised that child and adult L2 learners of Chinese will not have problems accepting the presence of null arguments from the earliest stages of acquisition. This hypothesis, however, cannot be confirmed based on the results presented in this study.

At both group and individual levels, advanced L2 adults were target-like across sentences with different null argument types. The individual results show that all advanced L2 adults made target-like judgements. As for advanced L2 children, they were undetermined about NS and NO sentences but accept NSO sentences at the group level. However, at the individual level, only one out of eight advanced L2 children did not exhibit target-like behaviour. Virtually all the advanced-level L2 learners bar one behave like L1 adults. Prediction 3 is borne out from the results. Furthermore, the expectation from Prediction 3 that advanced child and adult L2 learners will acquire interface properties can be confirmed from the analysis of the acceptability judgment task results.

Prediction 2 and Prediction 4 deal with developmental stages. Based on the individual results, the following developmental stages for L2 children (9) and L2 adults (10) were inferred:

(9) L2 children's developmental stages

Stage I   Accept NS sentences

Stage II-a   Accept NS and NSO sentences

Stage II-b   Accept NO sentences

Stage III   Accept NS, NO and NSO sentences

(10) L2 adults' developmental stages

      Stage I   Accept NS sentences

      Stage II-a   Accept NS and NSO sentences

      Stage II-b   Accept NO sentences

      Stage III   Accept NS, NO and NSO sentences

As seen in (9) and (10), L2 children pass through the same developmental stages as L2 adults. Together with group and individual data from L1 native adults, L2 adults are observed to exhibit a developmental pattern like that of   L2 children, and both L2 children and L2 adults achieve native-like performance in accepting Chinese null arguments (see Section 5.2). In Stage I, null subjects are allowed in L2 learners' grammar. Although English requires arguments to be expressed overtly, null elements in subject position are still available in certain contexts. The acceptance of null subjects in Stage I could be transfer from L2 learners' L1. This stage may be therefore regarded as a period of transferring. It is too early to say that L2 learners have acquired Chinese null arguments at Stage I. Stage II may be regarded as a period of overlap between the stage confirming topic licensing of null arguments and the preceding stage. It is divided into two sub-categories: in Stage II-a, L2 learners seem to accept null subjects in Chinese as they accept NS and NSO sentences. They have therefore started to establish the importance of topic structures in Chinese. At this stage, L2 learners may accept NSO sentences merely because of their knowledge of null subjects without knowing that null objects are also allowed if licensed by the discourse. In the later stage, Stage II-b, L2 learners come to know that null objects are allowed. Because null objects are absent in English, the acceptance of null objects cannot come from the learners' L1. Stage III is characterised by target-like responses. L2 learners give target-like judgements on NS, NO, and NSO sentences. The effects of the Chinese topic are in their mental grammar. Recall that the knowledge of null arguments is not explicitly taught. This indicates that UG may play a role here.

     Let us first consider the comparison between L2 children and L2 adults. L2 children and L2 adults are observed to exhibit similar patterns in accepting Chinese null arguments. All intermediate and advanced L2 children and L2 adults make target-like judgements.

Sorace (2004; 2005) suggested that compared with purely syntactic properties, syntax-discourse interface-conditioned properties make the integration of information more difficult for L2 learners. If this is true, this means that it is difficult for the L2 adults to integrate discourse information. Integrating discourse information poses problems even for L2 adults; thus, for the L2 children, age-related information processing deficiencies complicate the situation. L2 children should pass through different developmental stages, at least in the early stages. L2 children and L2 adults in this study, however, pass through the same developmental stages. Chinese allows arguments mutually known to the speaker and listener to be null. All null arguments in the experiment refer to antecedents that have been explicitly mentioned in the preceding discourse. The ability to obtain mutual knowledge is closely related to the use of null arguments. Cross-linguistic research has shown that children use null arguments readily from the age of two or three years (Japanese and English: Guerriero et al., 2001; Korean: Clancy, 1997). The L2 children recruited for this study are older than the age of five, that is, they already have the ability to recognise and take account of mutual knowledge. Although the L2 children tested here are older than the age at which language is thought to be affected by the processes of discourse integration, it seems too early to say that L1 English-L2 Chinese children are able to process discourse knowledge like L2 adults (and L1 adults) at the age of five. L2 children and L2 adults might have passed through different stages if younger L2 children had been recruited. Both L2 children and L2 adults have target-like rates of acceptance from the intermediate proficiency stage onwards. They seem to be able to overcome difficulties in integration information which are related to the acceptance of Chinese null arguments. By following Schwartz's (1992) proposal that comparisons should be made between the developmental sequence data from adult L2 and child L2 acquisition, researchers could answer the question of whether adult L2 acquisition makes use of UG or general problem-solving mechanisms. UG is involved in the underlying process if L2 adults and L2 children pass through the same developmental sequence. The results of this study show that L2 children and L2 adults pass through the same developmental stages. L2 adults might therefore be constrained by UG like L2 children. Prediction 2 states that L2 adults and L2 children will pass through the same developmental sequence in acquiring the syntax of null arguments. This prediction is therefore borne out. Like child L2 acquisition, adult L2 acquisition is also

constrained by UG. Thus, the results of the acceptability judgement task support Hypothesis 2.

Prediction 4 predicts that L2 children will pass through a developmental sequence that is different from that of L1 children in their acquisition of the syntax of null arguments due to L1 transfer effects. The developmental stages inferred from the results of the L1 children are given in (11) (the L2 children's developmental stages in (9) are repeated here for comparison):

(11) L1 children's developmental stages   (9) L2 children's stages

Stage I   Reject NS, NO and NSO sentences   Stage I   Accept NS sentences

Stage II-a Accept NS and NO sentences   Stage II-a Accept NS and NSO sentences

Stage II-b Accept NO sentences   Stage II-b Accept NO sentences

Stage III   Accept NS, NO and NSO sentences   Stage III   Accept NS, NO and NSO sentences

The comparison between L2 children (9) and L1 children (11) reveals that L2 children and L1 children do not pass through the same developmental stages. L1 children pass through the first stage that failed to accept any type of null argument sentences while L2 children (and L2 adults) accept NS sentences in the first stage. Chinese null arguments are licensed by topics and as such syntax interfaces with discourse. Both L2 and L1 children recruited in the experiment were older than the age of five. In other words, they should have had a basic ability to analyse discourse information. That transfer from L2 learners' L1 English could lead to a different developmental sequence between L2 children and L1 children. Regarding the data for the acceptability judgement task presented in the previous chapter, there is a difference between L2 and L1 children; that is, L2 children and L1 children pass through different developmental stages. However, it is too early to assume anything about the role of L1 in child L2 acquisition. A vulnerable syntax-discourse interface also causes difficulties for L1 children (Platzack, 2001). As shown in Figure 6.1, less than 80% of L1 children had target-like rates of acceptance, and at the group level, L1 children differed significantly from L1 adults in accepting null arguments (see Section 5.1). This suggests that some of the L1 children in the current study might not yet have adult-like knowledge in their L1, which could mean that they might not be able to access knowledge from the

discourse or context of utterance like L1 adults. Studies (Guerriero et al., 2001: Japanese and English; Clancy, 1997: Korean) have shown that L1 children have some ability to use null arguments as young as age three. However, full adult-like use of discourse information is not achieved until at least age seven or older; in some cases it is not reported as adult-like until age eleven (Ackerman et al. 1990; Hickmann, 1995). In terms of language acquisition, the child must be able to remember antecedents earlier mentioned and interpret null arguments according to the correct available antecedents in the preceding discourse. As for L2 children, Hulk and Cornips (2006), following Sorace (2005), found evidence which indicates that the integration of information poses difficulties for bilingual children (who share characteristics of L2 children and L1 acquisition) and whose development is delayed compared with monolingual children of the same age. Their findings suggest that L2 children under age eleven might not yet be able to process discourse information even in their L1. Therefore, failure to accept null argument sentences in Chinese might be a consequence of their inability to integrate syntactic knowledge and discourse information rather than the result of L1 transfer or lack of target-like L2 knowledge (e.g. syntax or semantic knowledge). It is impossible, however, to draw a conclusion on this without testing the L2 children's English. More data are needed to address this issue. L2 children who have limited discourse integration abilities should behave similarly to the L1 children in the current study. Nevertheless, L2 children are also expected to make a non-target-like judgement as a result of transfer.

Let us consider the effects of limited discourse integration abilities first. On the assumption that the ability to integrate discourse-pragmatics with syntax develops with age, then a correlation between age and target-like judgement would be expected regardless of proficiency level. If in the age effect seen in child L1 acquisition also plays a role in child L2 acquisition, younger L2 children at advanced levels are predicted to fail to accept Chinese null arguments. If L1 transfer is the crucial factor, a positive correlation is expected between L2 proficiency and target-like performance. As L2 learners become increasingly proficient in L2, they should become more target-like regardless of their age. If both factors—limited discourse integration abilities and L1 transfer—are in play, it would be expected that only older, higher proficiency L2 child learners would be more likely to make target-like judgements in an acceptability task. From the results of current study, there is no

significant correlation between age and target-like judgement for the L1 child group (see Section 5.1.1), though there is a near-significant correlation for the L2 child groups (see Section 5.2.1). Data from an acceptability judgment task alone cannot tell us much about L2 children's discourse integration abilities because null argument sentences are not totally absent from their L1 English and are so commonly used that L2 children might be able accept the presence of null arguments without being able to refer back to previous discourse. That is, they will accept Chinese null arguments without knowing that an appropriate discourse context is required. Interpretation data is needed to determine L2 children's information integration abilities. We will discuss this in greater detail with a closer examination of the interpretation data in Section 6.4.

I now turn to consider the role of the learner's L1. White's (1986) study suggested that L1 plays a role in constructing L2 knowledge. Schwartz and Sprouse (1996) hypothesized that the L1 grammar constitutes the entire initial stage of L2 acquisition. English does not allow sentences with null arguments. If L1 transfer takes place here, L2 learners initially should not accept null arguments. The group results in the current study suggest that low proficiency participants have difficulty accepting NO and NSO sentences. According to the individual results, only half of the low proficiency participants (9/17) accept NS sentences. Schwartz and Sprouse (1996) also hypothesized that learners are not always 'stuck' with an interlanguage grammar based on their L1 and that reconstruction of the initial stage can take place at the same time. It is possible that reconstruction of the L2 grammar should take place at the low proficiency stage. Reconstruction could be possible for the low proficiency participants. Null argument sentences are commonly used in Chinese textbooks and daily conversations. L2 learners are exposed to a large amount of positive evidence of null arguments. This positive evidence serves as a trigger to inform L2 learners that null arguments are allowed in Chinese. In response to this positive input, L2 learners of low proficiency start to restructure their initial grammar which does not allow null arguments and they become aware that null arguments are possible in Chinese. The reconstruction of the L2 grammar may take place at a low proficiency stage and finish after the intermediate proficiency stage. At both the group and individual levels, L2 child and adult learners accept null argument sentences from the intermediate stage onwards. This indicates that L2 grammars are likely to have been reconstructed from a state of not

allowing null arguments to allowing null arguments by the intermediate stage. It is possible that L2 learners do not pass through the same early stages as L1 learners, and this may be the result of L1 transfer. The results support Prediction 4, which expected that L2 children will pass through a different developmental sequence from L1 children. In addition, L1 plays a role in re-constructing L2 structures, and thus, Hypothesis 4 is confirmed by the results of acceptability judgement task.

The predictions for the results of the interpretation task and the corresponding hypotheses will be discussed in the next section.

6.4 Acquisition of interpretive constraints on null and overt subjects

The following predictions are set to the results of interpretation task:

Prediction 5: L2 children will follow the same developmental sequence of the acquisition of interpretive constraints on null and overt subjects as L2 adults.

Prediction 6: High proficiency L2 children and L2 adults will behave similarly to L1 controls regarding their interpretation of null and overt subjects.

Prediction 7: L2 children will follow a different developmental sequence from L1 children as the result of L1 transfer regarding the interpretation of null and overt subjects.

As outlined in Chapter 3, a topic is an obligatory component of every matrix clause in Chinese, while it is optional in English. The topic in Chinese licenses null arguments and is identified by the discourse or context of utterance. In the interpretation of a null subject, there is a cross-linguistic difference. In Chinese, a null subject in an adjoined clause is co-referential with the topic antecedent(s) as shown in examples (12) and (13):

(12) Zhangsan$_i$ gei Lisi$_j$ liwu hou, $\emptyset_{i/*j}$ jiu   likaile.
[$_{topic}$ Zhangsan$_i$ [$\emptyset_i$ give Lisi$_j$ gift after]   [$_{topic}$ $\emptyset_i$ [EXP leave-EXP]
     'Zhangsan$_i$ gave Lisi$_j$ a gift and then he$_{i/*j}$ left.'

(13) Zhangsan$_i$ gen Lisi$_j$ chuquwan, $\emptyset_{i+j}$ wande hen   kaixin.
[$_{topic}$ Zhangsan$_i$ with Lisi$_j$ [$\emptyset_{i+j}$ go out]   [$\emptyset_{i+j}$ play   very happy]
     'Zhangsan$_i$ went out with Lisi$_j$ and they$_{i+j}$ had a very good time.'

In sentence (12), the null subject refers to the topic antecedent 'Zhangsan' in the previous clause. The null subject in example (13) refers to both topic antecedents 'Zhangsan' and 'Lisi'. In English, a null subject is co-referential with the subject antecedent only:

(14) John$_i$ gave Kevin$_j$ a gift and Ø$_{i/*j}$ left.

(15) John$_i$ went out with Kevin$_j$ and Ø$_{i/*j}$ had a very good time.

The null subjects in the adjoined clauses in examples (14) and (15) can only refer to the subject 'John'.

Given the similarity between Chinese (12) and English (14) in terms of null subject interpretation in adjoined clauses, it cannot be automatically assumed that L2 learners have acquired target-like knowledge if they give target-like answers in Chinese, as those responses could result from L1 influence. If L1 influence plays a role here, English learners would have the interpretation wrong in a sentence like (13). In fact, 46.34% of test items like (13) were interpreted incorrectly. Among these incorrect interpretations, 94.73% were interpreted as co-referential with the subject antecedent (like in 15). So possible L1 influence cannot be excluded. What we expected is that the proportion of L2 individuals giving target-like responses will increase with proficiency levels.

When a null subject appears in an embedded clause as in the Chinese example in (16), the null subject can refer to either the topic antecedent or someone else in the discourse, whereas in the English sentence (17), a null subject is not allowed.

(16)   Zhangsan$_i$ dui Lisi$_j$ shuo   Ø$_{i/*j/k}$ hen   kaixin.
[$_{topic}$ Ø$_k$] [$_{topic}$ Zhangsan$_i$ [Ø$_i$ to Lisi   say   [Ø$_{i/k}$ very happy]
                    'Zhangsan$_i$ says to Lisi$_j$ that he$_{i/*j/k}$ is very happy.'

(17) John says to Kevin that * Ø is very happy.

In the embedded clause (example (16)), an English learner would have difficulty interpreting the null subject because embedded null subjects are not allowed in English.

Recall that target-like null subject interpretation is assessed on the basis of a learner giving target-like responses in both adjoined and embedded cases. To obtain a target-like performance, an L2 learner must reconstruct their null subject grammar from its status in their L1, English to its status in Chinese.

As summarized in Section 5.3, the advanced proficiency child L2 group exhibits target-like performance but the advanced proficiency adult L2 group does not. This suggests that the acquisition of knowledge of interpretive constraints in Chinese null subjects is possible for L2 children and for L2 adults. At the individual level, a discernible developmental pattern was found in adult and child L2 acquisition. As shown in Figure 6.1, there is no low proficiency L2 child who produces target-like interpretations. The proportion of L2 children who interpret null subjects in a target-like way increases with their proficiency level. This is also the case with L2 adults. No low proficiency L2 adult gave target-like responses. One out of ten intermediate proficiency L2 adults and three out of ten advanced proficiency L2 adults gave target-like null subject responses. There are more child L2 and adult L2 participants exhibiting target-like null subject interpretation at the advanced level than at any other proficiency level. All (8/8) advanced child L2 participants and most (9/10) advanced adult L2 participants are deemed to have target-like knowledge. The results in the current study show that advanced L2 participants perform similarly to L1 controls. A Chinese null subject is identified according to the topic. This property belonging to the syntax-discourse interface is acquirable for both L2 children and for L2 adults.

Using the L2 proficiency measure as a guideline, together with the individual results, the following developmental stages of the acquisition of knowledge necessary for the interpretation of null subjects are inferred for L2 children (18) and L2 adults (19):

(18) L2 children's developmental stages: null subjects

Stage I   Non-target-like responses to NSA and NSE

Stage II   Target-like NSE responses

Stage III-a Target-like NSA responses

Stage III-b Target-like NSA and NSE responses

(19) L2 adults' developmental stages: null subjects

Stage I   Non-target-like responses to NSA and NSE

Stage II   Target-like NSE responses

Stage III-a Target-like NSA responses

Stage III-b Target-like NSA and NSE responses

As shown in (18) and (19), L2 children and L2 adults pass through the same developmental stages regarding their interpretation of null subjects. In the initial developmental stage, L2 learners do not give target-like responses in either NSA or NSE contexts. The effects of the Chinese topic are not in their mental grammar at this stage. Stage I may be regarded as a period of transferring their L1 English grammar to Chinese and Stage II may be a period of overlap between the stages at which topic licensing of null subjects is acquired. In Stage II, L2 learners seem to give target-like responses to NSE, but not NSA test items. Despite the similarity between Chinese (12) and English (14), L2 learners do not yet understand the dissimilarities between two languages (cf. (13) and (15)) at this stage. Topics may be part of the L2 learners' grammars but L2 learners have not yet realized that Chinese topics are obligatory in every sentence. Stage III is characterised by target-like responses. In the Stage III, the Chinese topic construction is in learners' mental grammar. However, some L2 learners suffer from insufficient processing ability and failed to correctly respond to NSE contexts (Stage III-a). Others did not experience any processing difficulties (Stage III-b). At this stage, L2 children and adults have acquired knowledge of the interpretive constraints on null subjects, which is underdetermined both in the L2 learners' first language and the target language and is not taught in the L2 classroom. The innate learning mechanism, UG, may be involved in acquiring the interpretive constraints on null subjects.

Data from L1 adults and L1 children suggest the following developmental stages for L1 children (20) (the L2 children's developmental stages (18) are repeated here for comparison):

(20) L1 children developmental stages: null subjects

    Stage I   Non-target-like responses to NSA and NSE

    Stage II   Target-like NSE responses

    Stage III-a Target-like NSA responses

    Stage III-b Target-like NSA and NSE responses

(18) L2 children's developmental stages: null subjects

    Stage I   Non-target-like responses to NSA and NSE

    Stage II   Target-like NSE responses

    Stage III-a Target-like NSA responses

    Stage III-b Target-like NSA and NSE responses

As seen in (20), L1 children pass through a stage in which they fail to identify the correct antecedents for NSA and NSE. Next comes a stage in which L1 children interpret NSE (but not NSA) like L1 adults, followed by a stage in which L1 children give target-like interpretations of NSA but not NSE and finally a stage with target-like responses to both NSA and NSE. Why are NSE contexts acquired earlier than NSA contexts? L1 children may develop embedded structure before adjoined ones so they learn how to interpret NSE contexts first. Further investigations of the L1 acquisition of null subjects is required to elucidate the acquisition sequence of interpretive rules in embedded and in adjoined clause contexts.

Now let us turn to discuss the interpretation of overt subjects. As noted earlier, topics are an obligatory component of every Chinese sentence. The interpretations of both null subjects and the overt subject pronoun *ta* are associated with topics. In Chinese, an overt subject pronoun can re-introducing a singular topic as shown in example (21) (cf. also (12)). Unlike a null subject pronoun, an overt subject pronoun can only have a single referent reading in adjoined clauses as in (22) (cf. (13)).

(21) Zhangsan$_i$ dui Lisi$_j$ shuo zaijian ranhou   ta$_{i/*j}$ dui laoshi shuo zaijian.
$_{[topic}$ Zhangsan$_i$ [Ø$_i$ to Lisi$_j$ say goodbye then] [$_{topic}$ Ø$_i$ [he to teacher say   goodbye]
    'Zhangsan$_i$ says goodbye to Lisi$_j$ and then he$_{i/*j}$ says goodbye to the teacher.'

(22)   Zhangsan$_i$ gen Lisi$_j$ he   cha   hou,   ta$_{i/*j}$ shuizhaole.
[$_{topic}$ Ø$_i$ Ø$_j$ [Zhangsan$_i$ with Lisi$_j$ drink   tea   after] [$_{topic}$ Ø$_i$ [he$_i$ sleep-EXP]
        'Zhangsan$_i$ had tea with Lisi$_j$ and he$_{i/*j}$ fell asleep.'

As shown in examples (21) and (22), an overt subject in the adjoined clause can be co-referential with just one antecedent. There is no such co-referential rule for overt subject pronouns in English; the subject pronoun 'he' in example (23) can refer to either John or Kevin (cf. (14)–(15)).

(23) John$_i$ hugged Kevin$_j$ and he$_{i/j}$ left.

When an overt subject pronoun appears in an embedded clause, it refers to the topic antecedent in Chinese (cf. (16)):

(24) Zhangsan$_i$ dui Lisi$_j$ shuo ta$_{i/*j}$ yu   weixian.
[$_{topic}$ Zhangsan$_i$ [Ø$_i$ to Lisi$_j$ say [he$_i$ have   danger]
    'Zhangsan$_i$ says to Lisi$_j$ that he$_{i/*j}$ is in danger.'

However, in English an overt subject pronoun in an embedded clause can refer to either the matrix subject or the matrix object (cf. (17)):

(25) John$_i$ says to Kevin$_j$ that he$_{i/j}$ is in danger.

The ambiguity in English complicates the results for the interpretation task in that target-like responses could be the result of transfer rather than a result of knowing the interpretive constraints on overt subjects in Chinese. The current study found that 46.15% of OSA test items and 76.67% of OSE test items were correctly interpreted. Among the incorrect interpretations, 83.87% of OSA and 81.13% of OSE were interpreted as co-referential with the matrix object. Most of these incorrect interpretations were made by low and intermediate learners. This suggests that L1 may play a role in L2 acquisition. If L1 plays a role here, the proportion of L2 individuals giving target-like responses is expected to increase as their proficiency increases. As seen in Figure 6.1, the number of L2

children giving target-like responses did increase with proficiency levels. The proportion of L2 adults giving target-like responses also increased with proficiency from the low to the intermediate group. However, there was a slight decrease in the proportion of correct answers from the intermediate group to the advanced group. Generally, L2 learners' were more likely to interpret overt subjects in a target-like way as their proficiency improved. At the group level, both L2 children and adults in the low proficiency groups could not interpret overt subjects like the native control group (see Section 5.3.2). Intermediate L2 children were indeterminate about the interpretation of the overt subject. Intermediate L2 adults were not able to interpret overt subjects correctly. Both child and adult L2 learners in the advanced level displayed target-like interpretation of overt subjects. A Chinese overt subject, like a null subject, is identified by the sentential topic. The topic is an example of a locus at which syntax interfaces with discourse. The advanced L2 learners in the current study overcome interface difficulties and acquire the properties needed to interpret overt subjects.

Again, using the L2 proficiency measure as a guideline, the hypothesised developmental stages for the interpretive constraints on overt subject interpretation for L2 children are given in (26) and for L2 adults in (27):

(26) L2 children's developmental stages: overt subjects

  Stage I   Non-target-like responses to OSA and OSE

  Stage II-a   Target-like OSE responses

  Stage II-b   Target-like OSA responses

  Stage III   Target-like OSA and OSE responses

(27) L2 adults' developmental stages: overt subjects

  Stage I   None-target-like responses to OSA and OSE

  Stage II-a   Target-like OSE responses

  Stage II-b   Target-like OSA responses

  Stage III   Target-like OSA and OSE responses

As shown in (26) and (27), L2 children and L2 adults pattern alike in the acquisition of

interpretive constraints on overt subject interpretation. Despite the ambiguity between English and Chinese ((22) vs. (23); (24) vs. (25)), L2 children and adults did not exhibit target-like performance in terms of interpreting overt subjects in the initial stages. In Stage I, L2 learners had not learnt that the overt subject is co-referential with the topic in Chinese. L1 influence played a role in Stage I. Stage II may be regarded as a period of overlap between the stage at which topic licensing of overt subjects is acquired and the preceding stage. In Stage II, L2 learners gradually realise that overt subjects are bound by topics in embedded clauses and adjoined clauses. At this stage, the topic construction is still undetermined. Stage III is characterised by target-like performance. In the final stage, the Chinese topic structure has been acquired by the L2 learners. Both L2 children and adults acquired target-like interpretation on overt subject.

Based on results from L1 adults and L1 children, the following developmental stages were inferred (28) (the L2 children's developmental stages (26) are repeated here for comparison):

(28) L1 children's developmental stages: overt subjects

    Stage I   Non-target-like responses to OSA and OSE

    Stage II-a   Target-like OSE responses

    Stage II-b   Target-like OSA responses

    Stage III   Target-like OSA and OSE responses

(26) L2 children's developmental stages: overt subjects

    Stage I   Non-target-like responses to OSA and OSE

    Stage II-a   Target-like OSE responses

    Stage II-b   Target-like OSA responses

    Stage III   Target-like OSA and OSE responses

Comparing (26) and (28), it is clear that there is no difference between the child L2 developmental stages and child L1 developmental stages. L1 children and L2 children (and L2 adults) pass through the same developmental stages.

Prediction 6 predicts that the advanced proficiency L2 children and L2 adults will

behave similarly to L1 controls on the interpretation of null and overt subjects. The advanced L2 children achieve target-like performance at both group and individual levels. Although the advanced L2 adults differ from L1 controls in terms of interpreting null subjects at group level, virtually all (9/10) advanced L2 adults were deemed to respond in target-like ways. The advanced L2 adults do not differ from L1 controls on the overt subject interpretation at either the group or individual levels. L2 children and L2 adults were confirmed to behave similarly to L1 controls. Prediction 6 is supported in the current study. Interface-conditioned properties relating to the interpretation of Chinese null and overt subjects are not problematic for advanced L2 learners. Hypothesis 3 is confirmed by the data from the interpretation task.

Prediction 5 states that L2 children will follow the same developmental sequence in the acquisition of interpretive constraints on null and overt subjects as L2 adults. As detailed in Chapter 5, L2 children at group level do not differ significantly from L2 adults at any proficiency level. However, every developmental stage contains both individual adult L2 learners and individual child L2 learners. L2 children and L2 adults pass through the same developmental stages in their acquisition of interpretive constraints on null and overt subjects. From the results, Prediction 5 is supported. L2 adults and L2 children are constrained by the same innate learning mechanism, namely UG. Hypothesis 2 is confirmed by the results of the interpretation task.

Prediction 7 states that L2 children will follow a different developmental sequence from L1 children. The developmental stages inferred for L2 children and L1 children do not support this. As discussed earlier, in their acquisition of interpretive constraints on null and overt subjects, L2 children and L1 children pattern alike. Hypothesis 4 is not confirmed here.

To summarise, **Hypothesis** 1, which predicted that L1 English-L2 Chinese child and adult learners will allow null arguments from the earliest stages is not confirmed in the current study. Not until intermediate proficiency level did L2 learners allow the use of null arguments. **Hypothesis 2** predicted that both the L2 children and the L2 adults would pass through the same development stages. This is confirmed in the current study. As seen in Chapter 5, both L2 children and L2 adults follow through the same developmental sequence in each task. The fact that L2 adults are constrained by UG like L2 children and follow the

same developmental sequences is affirmed by the null argument data. **Hypothesis 3** predicted that L2 adults in the advanced group would overcome difficulties at the interface to acquire interpretive constraints on null and overt subject interpretation like native adults. The advanced proficiency L2 adults and L2 children were not significantly different from the native adults in the two tasks. Regarding **Hypothesis 4**, it was predicted that L2 children would follow a different developmental sequence from L1 children as a result of transfer. The data from the acceptability task lend support to this hypothesis, but the data from the interpretation task do not. The early developmental stages in the acquisition of the syntax of null arguments by L1 children and by L2 children are different. As for the acquisition of interpretive constraints on null and overt subject interpretation, L1 children and L2 children pass through the same developmental stages. The data here cannot confirm this hypothesis. This may be because the developmental stages are inferred according to limited data. Further studies on L1 and L2 acquisition of Chinese null arguments are required to confirm this.

With regards to the research question of whether L1 English-L2 Chinese child and adult learners allow null subjects and null objects in their L2 Chinese, the findings suggest that L1-English-L2-Chinese learners will allow null subjects and null objects, and the acceptance of null arguments is present in their L2 mental grammars from the intermediate proficiency level onwards. However, the results of the current study are different from those of Yuan's (1993), which will be discussed later. To answer the question of whether an adult L2, like a child L2, is constrained by UG, the results show that L2 children and L2 adults pass through the same developmental stages in terms of accepting null arguments and interpreting null and overt subjects in adjoined and embedded clauses. Adult L2 acquisition and child L2 acquisition are constrained by UG, meaning that the FDH is not supported by the current study. Can syntax-discourse interface properties be fully acquired by L2 adult and L2 child learners? The acquisition of L2 Chinese null arguments, a syntax-discourse interface process, is eventually achieved by adult and child L1 English-L2 Chinese, so the Interface Hypothesis is not supported here. Will L1 English-L2 Chinese children acquire the syntax of null arguments and the interpretive constraints on null and overt subjects in the same way as native Chinese children? The results imply that the L2 learner's L1 may play a role in the acceptance of null arguments and in the interpretation of

null and overt subjects. L1 English-L2 Chinese children acquire the syntax of null arguments and the interpretive constraints on null and overt subjects in the same way as Chinese-speaking children (see (9) vs. (12), (18) vs. (20) & (26) vs. (28)).

Next to be examined is whether the findings in the current study conform with other L2 Chinese studies. Low proficiency level L2 children and L2 adults in the current study did not accept the use of null arguments. This does not conform with the findings in Yuan (1993) and Zhao (2008), whose L2 adult learner data indicated acceptance of null elements from an early developmental stage. These L2 studies were discussed previously in sections 3.3.2 and 3.3.3. To explore the possible explanations for the different findings, Yuan (1993) and Zhao (2008) are reviewed again.

Yuan's (1993) study concentrated on whether null arguments are allowed in L1 English-L2 Chinese adult learners' interlanguage grammar. An acceptability judgement task was conducted. The participants were instructed to judge whether a sentence with a null argument is acceptable. In fact, the participants were instructed to judge whether 'a given sentence sounds more or less acceptable than another' (Yuan, 1993, p. 317). The participants had to assign a score to the first sentence and then another to the second based on the first score they assigned. If the second sentence felt more acceptable than the first, they were instructed to assign a higher score; if the second sentence felt less acceptable, they were instructed to assign a lower score. Yuan (1993) did not give any standard scale for participants. Participants had to set up their own scale for the task when they were comparing sentences. In addition, Yuan (1993) admitted that most of the participants, both L1 and L2, had complained about the design of the task in the post-task interview. During the experiment, the participants had difficulty remembering what number they had assigned to the previous sentence and were therefore unable to assign numbers to reflect their real judgements for later sentences. In the current study, the participants were instructed to judge only whether the test sentence itself sounded acceptable or unacceptable, not whether it was acceptable in comparison with a second sentence. There was no another sentence to prepare participants for the real test sentence. Participants in the current study had to work out that null arguments are permitted if they are mentioned in the preceding context. This might be the reason why low proficiency L2 participants in the current study show less acceptability of null arguments than those in Yuan's (1993) study.

Zhao's (2008) study examined the interpretation of null and overt arguments in L1 English-L2 Chinese speakers. She used a picture judgement task to test adult L2 learners' interpretation of overt and null subjects in embedded clauses only. Her results indicated that L2 adults at an advanced stage can co-refer an embedded overt subject and a discourse entity like native speakers. L2 learners at an advanced level of proficiency obtain target-like knowledge.

Zhao (2008) tested L2 adult learners' acceptance of null arguments by allowing speakers to judge sentences with null subjects and null objects as 'incorrect'. This option was very rarely chosen by L2 learners at any stage. She therefore concluded that L2 learners accept null subjects and null objects from an early stage onward. Again, the findings in the current study do not conform with Zhao's findings. Zhao tested sentences containing a null subject or a null object. The low proficiency L2 learners in the current study rejected sentences with null objects. In addition, Zhao (2008) did not test sentences with both a null subject and a null object. One of the salient features of the Chinese language is that it allows multiple arguments to be null as long as both have a topicalised antecedent in Spec CP/TopicP. In other words, the Chinese language allows both a null subject and a null object to appear in the same sentence. Zhao's (2008) study did not test L1 English-L2 Chinese learners' acceptance of sentences with both null subjects and null objects, whereas in the current study sentences with both null subjects and null objects tested and the responses to these subjects were included in the assessment of undetermined performance and target-like performance. As L1 adults accepted all types of null arguments, L2 participants who accepted null subject sentences, null object sentences and sentences with both null subjects and null objects were classified as having target-like knowledge. According to both the group and individual results, it is not until the intermediate proficiency level that L2 learners accept null arguments to a target-like level.

The other possible reason is that the least proficient participants that Zhao (2008) recruited were post-beginners from universities in China who had spent a certain period in China by the time of testing. In the current study, the first development stage contains three low proficiency participants. The low proficiency participants were beginners recruited from different professions in England and they had never visited a Chinese-speaking country before. In other words, the low proficiency participants in the current study are a

stage earlier than the first stage in Zhao's (2008) study.

It is worth comparing the results of this study with those of studies on other L2 languages. Serratrice (2007) conducted a study of the interpretation of null and overt subjects in subordinate clauses (example (29)) by bilingual English-Italian children and age-matched L1 Italian children. She used a picture verification task to collect data.

(29) Il portiere$_i$ saluta   il postino$_k$,   mentre lui$_k$/pro$_i$ apre   la porta.
     the porter   greetves the postman, while   he   open   the door
     'The porter greets the postman, while he/pro opens the door.'

(Serratrice, 2007, p. 230)

Serratrice (2007) suggested that the interpretation of overt subject s at the syntax-discourse pragmatics interface causes difficulties for bilingual children. Sorace and Filiaci (2006) conducted a similar study with L1 English speakers of near-native L2 Italian. They proposed that the difficulties that L2 learners experience with interface properties may occur because they do not have the adequate processing resources to coordinate and integrate different types of knowledge. This conforms with Belletti et al. (2007) whose L1 English-L2 Italian learners misinterpreted overt subjects because of their inability to co-ordinate syntactic knowledge and discourse knowledge. Recall that Zhao (2008) suggested that L2 adults can overcome syntax-discourse interface difficulties at an advanced stage. In the current study, L2 adults and L2 children show target-like acceptance from intermediate proficiency onward and target-like knowledge of interpretive rules by the advanced level. These properties belong to the interface between syntax and discourse pragmatics. In the current study, both child and adult L2 learners seem to be able to co-ordinate knowledge between syntax and discourse. However, it is too early to conclude that both child and adult L2 Chinese learners exhibit the ability to integrate different sources of information. In the current study, L2 learners were grouped by their proficiency level and then by the categories 'child' and 'adult' rather than by a finer-grained concept of age. Unsworth (2005) reported age effects in L2 learners' ability to integrate information (see section 3.2.2). To discuss L2 integration ability in more detail, it is necessary to consider the present data in terms of age. The ability to integrate information will be

discussed in the next section.

6.5 Further discussion

6.5.1 Integration of syntax and discourse information

The results presented in this study show that it is possible for L1English-L2 Chinese learners to acquire properties at the syntax-discourse interface. Some L2 children (17/23) and L2 adults (23/26) consistently showed target-like rates of acceptance. Furthermore, the interpretation judgements that half of these participants (9/17 L2 children; 10/23 L2 adults) made during the interpretation task show that they made the judgements on the basis of their knowledge of interpretive constraints in Chinese. For those who did not, it was suggested that this might be due to the L1 influence.

A proficiency effect is observed in the data. A significant correlation was found between null argument acceptance and proficiency. Although there was no significant positive correlation between null and overt subject interpretation and proficiency, both L2 children and L2 adults generally became more target-like with increasing proficiency in the null and overt subject interpretation task. The advanced proficiency L2 adults and children did not behave significantly differently from the L1 controls. In addition, virtually all (18/19) L2 participants who gave target-like responses in both tasks were from the intermediate and advanced-level groups. The only exception was one low level L2 adult participant (AL05) who had had 18 years of exposure to Chinese and had lived in China for 7 years. However, the methodology of the proficiency test is such that participant AL05 was classified in the low level. Although she had been learning Chinese for 18 years and had lived in China for a long time, she had never learnt to read Chinese characters. Therefore, she failed the test and was classified as a low proficiency learner. For this participant, the test used here might have underestimated her actual proficiency level.

One might argue that target-like judgements are related to the learners' length of exposure to the L2 rather than their proficiency level. The correlation between the length of attendance at Chinese classes and target-like judgement is significant for L2 children but not for L2 adults. The 19 (child and adult) L2 participants who behaved at target-like levels across all tasks had been learning Chinese for a period ranging from two to 18 years. Many

other L2 (child and adult) participants who also fell in this range failed to give target-like judgements. It is interesting that the correlation between the length of living in a Chinese-speaking country and target-like judgement is also significant for L2 children but not for L2 adults. Six out of nine L2 children who achieved target-like performance in this study had lived in China for more than 4 years. The other three L2 children who gave target-like judgements had never been to China. As for L2 adults, no such pattern exists. The duration of time spent in a Chinese-speaking country by the adults ranged from five months to 9 years.

When the presented data are considered in terms of the age of the participants, the L2 data becomes even more difficult to interpret. It is possible that target-like performance by older L2 children and L2 adults may be due to their higher proficiency or their length of attendance at Chinese lessons rather than to their age. In both the acceptability and the interpretation task data, the correlation between age and target-like performance for L2 adults is virtually non-existent (as for L1 children). For L2 children, the correlation between age and target-like performance is near-significant. Seven of the nine L2 children displaying target-like performance were more than 11 years old. The other two were seven and eight years old. All of them had been exposed to Chinese for more than two years. Recall that the L1 children are mostly around 8 years old, so it is possible that eight-year-old L1 children might have problems in integrating discourse and syntax knowledge. If eight is the cut-off age, the lack of age effects within the adult L2 and child L1 groups could be explained. If age is a significant factor for child L2 acquisition, advanced L2 children younger than eight should not be target-like. Unfortunately, no advanced L2 child participant is younger than eight years old, so I do not have the data to support this claim. In general, the relevant data are rather limited. More data is needed to confirm whether limited ability in terms of discourse integration plays a role in child L2 (and in child L1) acquisition.

The confusion between proficiency and age makes my predictions rather difficult to assess. The correlations between target-like performance and proficiency on the one hand and between target-like performance and age on the other suggest that both L1 transfer and the limited ability to integrate discourse play a role in child L2 acquisition of Chinese null arguments. If this is the case, only the older advanced proficiency participants should

achieve target-like performance. This is not confirmed by the data. With a closer examination of L1 and L2 children's and L2 adults' data, no significant correlation emerges between age and target-like performance for either the L1 or the L2 child groups (see Chapter 5). In addition, one L1 child (NC15) who failed to give target-like responses in either task was eight years old. This suggests that at the age of eight or older, L1 children might still be limited in their ability to integrate discourse. As for L2 children, two low level participants—CL04 aged nine and CL08 aged five—fall into the non-target-like category. This suggests that L2 children might still have problems integrating discourse at the age of nine. Recall that the L1 child participants' ages are only between seven and nine years. The L1 data collected in this study is insufficient to determine the age range in which L1 and L2 children are limited in their ability to integrate discourse. If L1 transfer is involved, the L2 children who made non-target-like judgements should all fall in the low proficiency level. Given that no L2 children, and only one L2 adult (AL10), made non-target-like judgements at the low proficiency level, it is possible that L1 plays a role in early L2 acquisition. Consider the possibility that both factors are involved; only older and advanced proficiency L2 children are expected to give target-like judgements in both tasks. This assumption is not supported by the data presented in the current study. L2 children with target-like knowledge were found in both the intermediate and advanced proficiency levels, regardless of their age. L2 children in the current study did not show any problems in integrating knowledge, nor did the L2 adults. These results do not support Sorace and Filiaci's (2006) proposal that interface difficulties stem from learners' abilities to coordinate syntactic knowledge with discourse knowledge. Advanced L2 children and adults in the current study both exhibited target-like acceptance and interpretation. It seems that L2 children and L2 adults can overcome the predicted difficulties at the syntax-discourse interface and can acquire the interpretive constraints on Chinese null arguments.

The data available in this study show that L2 children with target-like knowledge are from the intermediate and advanced proficiency groups and mainly older than the age of eight (see Chapter 5). Although an effect of proficiency was observed in both the L2 child and L2 adult groups, an age effect was observed only in the child L2 data. Given that knowledge of Chinese null arguments involves the integration of syntactic structures and discourse information, younger L2 children with limited abilities in integrating discourse

are not able to make target-like judgements. To the extent that the relevant data are available, this syntax-discourse-interface condition seems to be problematic for the L2 children. This conforms with Hulk and Cornips's (2006) findings; their L2 subjects also had problems integrating different types of knowledge. Note that without data regarding L2 Chinese children's abilities to integrate knowledge in their L1 English, it is still unclear whether the difficulty comes from the L2 interface condition or maturational effects.

As for L2 adults, like L2 children, L1 transfer plays a potential role in their interlanguage. As argued in Chapter 5, L2 adults and L2 children pass through the same developmental stages. L2 adults should have the same difficulties in integrating information as L2 children. It was observed that proficiency affects child L2 acquisition; and a proficiency effect was observed in adult L2 acquisition. Evidence of a proficiency effect in the adult L2 data comes from the observation that the most proficient L2 adults did not significantly differ from the native controls across tasks. Advanced L2 adult learners are aware that Chinese null arguments are licensed and identified by the sentential topic and that there are interpretive constraints on null and overt subjects. Adult and child L2 learners can eventually acquire properties at the syntax-discourse interface.

The same observation can be found in Zhao's (2008) findings: advanced English-speaking L2 adult learners successfully acquired the interpretive constraints on null subjects. Sorace and Filiaci (2006) proposed in their Interface Hypothesis that the interpretive features relevant to the syntax-discourse interface are particularly problematic for and are not acquirable by L2 learners. The Interface Hypothesis suggests that interface-conditioned properties pose difficulties for L2 learners, as they may not have adequate processing resources to integrate their syntactic knowledge with their discourse knowledge. Following this assumption, in the current study, it might be too demanding for child and adult L2 learners to coordinate the syntax of the obligatory topic with the discourse context and content in terms of processing. Younger L2 learners may experience greater processing difficulties than older learners. This assumption is challenged by the data presented here. The age-related effect in the child L2 data was not significant. In addition, according to the individual child L2 data, some (but not all) of the L2 children exhibited target-like performance by the age of seven or eight. It seems that children have this underlying knowledge but sometimes fail to use it. Furthermore, the advanced proficiency

L2 children and L2 adults do not differ significantly from the L1 controls. L2 adults and children are able to successfully integrate discourse-related information with syntactic information about topics in this study. The Interface Hypothesis cannot be therefore supported here.

Child and adult L2 learners seem to have knowledge of discourse topics as early as the intermediate proficiency stage. This is similar to Zhao's (2008) findings, as her L2 Chinese participants were aware of discourse topics from the low-intermediate stage onwards. Her findings suggest that non-target-like interpretation of null arguments is due to L1 transfer. It is syntactic information transferred from the learner's L1 that delays language development rather than discourse integration difficulties. Gurel's (2006) results suggest that while end-state English-speaking L2 Turkish learners are able to acquire subtle discourse conditions on the distribution of overt and null subject pronouns, they fail to acquire the syntactic options due to L1 inference. In the current study, the ability to interpret null and overt subjects develops in a similar fashion. The similarity between the L2 child and adult groups and between the L1 and L2 child groups suggests that L2 acquisition, like L1 acquisition, is constrained by UG.

If adult L2 acquisition is constrained by UG, L2 adults will eventually acquire interpretive constraints on properties at the syntax-discourse interface *contra* the Interface Hypothesis. Recall that there is an age-effect found in child L2 data and that child L2 participants exhibiting target-like performance were mainly older children. Whether interface difficulties or maturation effects are the source of L2 learners' non-convergence remains ambiguous. If L1 transfer is the significant factor for L2 non-convergence, L2 learners should not exhibit target-like performance until the most advanced level. In the early stages, it is not only syntactic structures but also discourse rules that are transferred from the learner's L1. Recall that the L2 participants recruited in this study are not near-native speakers (see Chapter 4). Though L1 transfer is present in the initial stages (Schwartz & Sprouse, 1996; Scarcella, 1983), intermediate and advanced level participants are still influenced by their L1's syntax and discourse rules.

One of the possibilities is that early success may result from L1 transfer. As outlined in Chapter 2, topic constructions are also used in English, though in restricted specific contexts. While topics are obligatory in every Chinese sentence, this is not true of English

sentences. L2 learners must be aware that topics are obligatory in Chinese. Once L2 learners are exposed to enough L2 input including sentences with obligatory topics, L2 learners accept topics in every Chinese sentence. In response to this positive evidence of Chinese topic structures, L2 learners allow an argument to be null if the argument can be identified through the discourse context, and they know that null subject arguments in adjoined and embedded clauses are co-referential with a topic antecedent. Meanwhile, the results of the interpretation task show that L2 learners are also aware of the difference between English topics and Chinese topics. However, there is no standard as to how much input is necessary for each individual. It is hard to measure the quality of input that an L2 individual receives. In the initial stages of acquisition, L2 adults and children may make use of their L1 to help to reconstruct their L2 grammar on the one hand, while L2 adults' grammar is constrained by UG like L2 children's grammar on the other hand. Though individual variation exists, L2 adults and L2 children eventually acquire interface-conditioned knowledge of Chinese topics.

6.5.2 First person null arguments vs. third person null arguments

The data presented in Section 5.2.2.6 show that L2 learners accept first person singular null arguments before third person singular null arguments. This discussion considers several reasons why this should be the case. It addresses the role of L1 transfer, input, and topic prominence.

In L2 learners' inter-language grammars, Chinese null arguments could be null for the same reason as English null arguments (i.e., topic-drop; see Haegeman, 1990):

(30) (I) Went out last night, (I) bumped into Mary. (I) can't stand that woman.

In diary contexts in English, the first person pronoun is discourse-linked and can be null (Haegeman, 1990). Haegeman (1990) also pointed out that the diary context allows only the first person pronoun to be null, so third person null subjects are not grammatical in the diary context. For example:

(31) (I/We/*He/*It/*They) Had a wonderful time today.

The pragmatic strategies that English speakers apply in diary contexts involve the fact that a first person null pronoun is bound by a discourse topic and only a first person pronoun that is a topic (old information) in discourse can be null. In contexts where there is no overt antecedent in the discourse, first person null subjects tend to be interpreted as null topics. When L1 English-L2 Chinese speakers encounter null argument sentences in Chinese, they assume that Chinese null arguments are similar to English null arguments. For English speakers, the consequence of this is that topics in the discourse are assumed to have a first person referent, even in contexts in which any pronoun can be interpreted as a discourse topic in Chinese. Thus L2 learners, especially low level beginners, reject third person singular null arguments more often than first person singular null arguments. The results presented in Section 5.3 show that both L2 children and L2 adults across proficiency levels reject third person null arguments at a greater rate than they reject first person singular null arguments. Both L2 children and L2 adults become more native-like as their proficiency improves. This suggests that pragmatic strategies transferred from their L1 may play a role in accepting null arguments. Because different pragmatic strategies are adopted in English (the learners' L1), L2 participants misanalyse Chinese topic-licensed null arguments as English first person null arguments in a diary context. L2 learners may apply English pragmatic strategies to analyse Chinese null argument sentences in the early stages. As proficiency develops, L2 learners are exposed to more and more Chinese discourse constraints. These discourse constraints provide unambiguous evidence that third person null arguments are permitted in Chinese. Non-native-like third person rejection rates thus decrease as proficiency improves. In other words, L2 participants' non-native-like rejection of third person null arguments may be the result of L1 pragmatic strategy transfer.

Another possibility is that this rejection of third person null arguments may be attributed to the length of exposure to input. Naturalistic discourse input is the basis for language learners to construct pragmatic conditions related to syntax. Unlike other features such as aspect, there is no topic feature encoded in the lexicon in Chinese. Logically, language learners (children and adults alike) who have been exposed to the discourse pattern for a sufficient period of time (which may vary from person to person) are able to acquire this pragmatic feature. It is possible that a contributing factor to this residual

rejection of third person null arguments for L2 learners is the type of input they have received. Recall that all the L2 learners started to learn Chinese in the United Kingdom. The L2 learners almost unavoidably received non-native input from their peers and from non-native instructors. Most of the L2 adults were first taught Chinese by non-native language teachers, and some L2 children were taught by their non-native parents. Because they received non-native input, it cannot be taken for granted that L2 learners received enough positive evidence from their input to reconstruct their grammar to allow the pragmatic topic-related strategies of Chinese. Recall that the L2 adult participants in the current study were all recruited from the university community in the UK. They had limited time exposure to Chinese input in a naturalistic context. Moreover, these L2 learners were likely to receive non-target-like input from their peers. In the current study, participant AL05, in the low level L2 adult group whose overall performance was target-like (rate of acceptance = 80% and accuracy of interpretation = 87.5%) had had the longest period of exposure to Chinese. This participant had lived in China and has been exposed to naturalistic input for four years by the time of testing. Her third person singular null subject rejection rate, however, was still significantly higher than that of the L1 native controls (AL05 vs. L1 control = 25% vs. 1.84%), though it was not significantly higher than those of other participants in the same proficiency group (AL05 vs. low proficiency L2 adults = 25% vs. 24.44%). Moreover, the average time spent living in a Chinese-speaking country for the advanced L2 adults was nine months. The group's third person singular null argument rejection rate (9.07%) was still significantly higher than that of the L1 control group (1.84%, p = .05). This made me consider the possibility that deficient input could cause delays in the acquisition of pragmatic constraints. For instance, when a native Chinese adult speaks to a foreigner, he or she would tend to use more overt pronouns than null pronouns in the interest of clarity.

Although all advanced L2 adults who had been living in China or Taiwan for at least ten months received naturalistic input, they still had difficulty in accepting third person null arguments. There is no person, gender or number agreement in Chinese. Native adults might more commonly use emphatic speech acts to help non-native speakers (and native children) to understand. A referential subject is understood to be the most 'economical' way to address a third person. To avoid ambiguity when talking to a non-native speaker (or to a

native child), native adults tend to employ a greater frequency of third person referential pronouns than pragmatically appropriate third person null subjects. In other words, third person null subjects are not used as frequently as first or second person null subjects. While L2 learners encounter a large use of first and second person null subjects, they have relatively less exposure to appropriate situations in which a third person null subject is pragmatically allowed. This input deficit would explain the delay in target-like acceptance of third person null arguments for even the most proficient L2 learners in this study. First or second person null subjects share the same syntactic property as third person null subjects. If the input causes delay in syntax (but not in pragmatics), L2 learners should reject first person null subjects at the same rate as third person null subjects. From the L2 results, it is the rejection rate of third person null subjects (but not that of first person null subjects) that differs significantly from L1 adults. If the input is a contributing factor, the delay would be expected with the pragmatics, but not the syntax, as predicted by the Interface Hypothesis. Recall that using referential subjects where null subjects are more appropriate is odd pragmatically but is still grammatical. Although the appearance of null subjects is salient to the L2 learner, the pragmatic constraints on using null subjects are not salient to the learners who are just focused on the meaning. Together with the possibility that L2 learners receive ambiguous evidence from non-native speech, a greater frequency of referential third person subjects in native input could combine the difficulty for L2 learners. In fact, as Rothman (2009) argued, "different situations of exposure to input itself could confer delays in the acquisition of pragmatic conditions." Tsimpli et al. (2004) showed that some native Italian speakers used overt pronouns in contexts where null subjects were more pragmatically appropriate. There are native speakers who vary in their own use of overt and null subjects. The possibility of deficient input cannot be ignored. However, there is little literature to support this idea. More research on the corpus of interaction between native speakers of Chinese and that of interaction between non-native speakers of Chinese and native speakers of Chinese is needed. By comparing two kinds of interaction, we could determine whether monolingual speakers of Chinese use overt pronouns in contexts in which a null subject is the preferred pragmatic option more frequently when interacting with non-native speakers of Chinese. Such corpora could support this analysis of this problem.

It is worth comparing the results of this study with those of Sanchez et al.'s (2010) study, which offers implications for L1 transfer and input (see Chapter 3). L1 Shipibo speakers transfer the discourse pattern of first person subjects in Shipibo to their to L2 Spanish and deficits in the pragmatics cause non-native-like behaviour in L2 performance, even after prolonged input. In the current study, L1 English speakers transferred English pragmatic strategies for the interpretation of null arguments in diary contexts to null arguments in their L2 Chinese. In terms of possible pragmatic input deficits, the participants in Sanchez et al.'s (2010) study all had been living in a Spanish-speaking environment for more than three years, but the L2 learners still overused overt first person subjects. While the L2 learners had acquired the syntactic properties of null subjects after prolonged exposure, they still not had acquired the discourse constraints on null subjects. Deficient pragmatic input might cause delays in the acquisition of syntax-pragmatic interface properties in L2 Spanish. The current study shows that advanced L2 participants had difficulty accepting third person null arguments, even though they had been exposed to naturalistic input for nearly a year. I have explained how pragmatic input deficits could possibly cause delays in the L2 Chinese speakers' interlanguage grammar (though no literature supports this notion). That L1 transfer and pragmatic input deficit or a combination of the two could be possible contributing factors is supported by the present data.

Another possible explanation for the asymmetry in the acceptance of first person null arguments and third person null arguments will be considered. According to the results for both L2 child and L2 adult learners, their rejection rate generally decreased as the proficiency improved. It was observed that they tended to reject third person singular null arguments to a greater degree than first person singular null arguments. Note however that such an asymmetry can also be found in the L1 native control group (rejection rate: 1st vs. 3rd = 0% vs. 1.84%). The possible explanation is that a first person argument is the prominent topic. Naturally, L1 or L2 speakers learn how to express themselves as speakers before learning how to express ideas about others. For L2 English learners, first person null arguments would be accepted before third person null arguments. That the prominent topic is first person may explain the observed first-person-before-third-person phenomenon. If this is the case, the same phenomenon should also be found in other null subject language

studies. Sanchez at al. (2010) is the only study looking at different person pronouns in the L2 Spanish of L1 Shipibo speakers. In their study, the average number of correct matches between null subjects and agreement were divided into first person, second person, and third person pronouns. L2 learners produced sentences with first person null and overt subjects more often than any others. Their results showed that the matching between the first person null subject and verb agreement comes before that of the third person. The percentages of matching first person null subjects were higher than those matching third person null subjects in both Group 1 (1st vs. 3rd = 68.01% vs. 65.83%) and in Group 2 (1st vs. 3rd = 80.52% vs. 58.52%). L2 learners seem to acquire core morphosyntactic properties related to first person before third person. However, when the researchers examined the distribution of first person null subjects, even advanced L2 learners overused overt subjects significantly differently from L1 controls. Even advanced L2 learners seem to have difficulties acquiring discourse constraints on first person null subjects in Spanish. This is different from the findings in the current study. Advanced L1 English-L2 Chinese speakers acquire the discourse constraints on first person null subjects, leading to target-like acceptance and target-like interpretation of null arguments. Further studies investigating the distribution of first person and third person null pronouns across different tasks such as picture judgement and narrative tasks testing near-native L2 learners should reach a conclusion about whether discourse constraints are acquirable or not.

Sanchez et al.'s (2010) study also showed that not all interfaces will lead to residual difficulties: the syntax-morphology interface is acquirable while the syntax-discourse interface is not. The production data of advanced Russian learners of Greek in Tsimpli and Sorace's (2006) study show the absence of problems at the syntax-semantics interface but not at the syntax-discourse interface. The data indicate that the syntax-semantics interface is not like the syntax-discourse interface. Their results support the recent version of Interface Hypothesis (Sorace & Filiaci, 2006; Sorace & Serratrice, 2009; Sorace, 2011; Tsimpli & Sorace, 2006) in that properties at external interfaces are more vulnerable than those at internal interfaces in various L2s. Sorace and Filiaci (2006) suggested that residual difficulties with the interpretation of null and overt subjects indicate that features at the syntax-discourse interface are un-acquirable. However, the success of advanced learners in interpreting null and overt subjects indicates that the topic feature in Chinese is acquirable

(Zhao, 2008). The current study also provides empirical evidence that Chinese null argument properties at external interfaces are not problematic for L1 English learners of L2 Chinese. At the syntax-discourse interface, not all phenomena are necessarily problematic. As seen in Section 3.3.2 and 3.3.3, clitic doubling of topics is found to be problematic in Valenzuela's (2005; 2006) studies but not in Ivanov's (2009) study.

Note that the inconsistencies between studies on interface phenomena do not result from methodological differences. Belletti et al. (2007) and Liceras (1988) show that the overuse of overt subjects is problematic across different methodologies. In the present study, acquiring Chinese null arguments is not problematic, as evidenced by both L2 children's and L2 adults' target-like performance at the advanced stage. It is the subset of pragmatic strategies transferred from the L2 learners' L1 that causes the acceptance of third person singular null subjects to be delayed. The current study partially confirms the recent version of the Interface Hypothesis which states that properties at the external interface pose greater difficulties than those at the internal interface in L2 acquisition. Next, Kizu (to appear) reported the findings on the acquisition of properties at an external interface.

6.5.3 First and second person null subjects vs. third person null subjects

The recent version of interface hypothesis (Tsimpli & Sorace, 2006) splits between phenomena that involve only formal features (i.e., internal interfaces) and phenomena that involve pragmatic conditions and syntax (i.e., external interfaces). Sorace and Filiaci (2006), Sorace and Serratrice (2009), Sorace (2011), and Tsimpli and Sorace (2006) argue that residual optionality remains inevitable, even in advanced/near-native L2, when acquiring properties at external interfaces. There are a few studies (Gurel, 2006; Ivanov, 2009; Rothman, 2009; and Kizu, to appear) against the interface hypothesis. The recent version of Interface Hypothesis (Tsimpli & Sorace, 2006) differentiates between phenomena that involve only formal features (i.e., internal interfaces) and phenomena that involve pragmatic conditions and syntax (i.e., external interfaces). Sorace and Filiaci (2006), Sorace and Serratrice (2009), Sorace (2011), and Tsimpli and Sorace (2006) argue that residual optionality remains inevitable even in advanced and near-native L2 learners when acquiring properties at external interfaces. There are a few studies (Gurel, 2006; Ivanov, 2009; Rothman, 2009; and Kizu, to appear) which provide evidence against the

Interface Hypothesis.

Kizu's (to appear) study suggests that L2 learners have no problem acquiring syntax-discourse interface properties. This is supported by the current study. Kizu's (to appear) L2 Japanese participants displayed mastery of a syntax-discourse interface property by integrating discourse information and syntax knowledge at an early developmental stage. In the current study, L2 Chinese participants have no problem accepting null arguments, which involves 'external' pragmatic conditions and operations between syntax and discourse. The current study and Kizu's study (and many others: Gurel, 2006; Ivanov, 2009; Rothman, 2009; Slabakova et al., in revision) suggest that it is not the case that all phenomena at syntax-discourse interface are necessarily problematic, and it is not the case that residual difficulty is inevitable.

From this discussion on the effect of different person features in acquisition of null arguments, it is clear what future work can be introduced to further the analysis provided so far. A series of experiments which control for the salience of null arguments with different person features would be informative, for example, an investigation of the L2 acquisition of Chinese first and third person null subjects by speakers of null subject languages, such as Spanish. Such a study could provide evidence whether null subject licensing at the syntax-discourse interface remains problematic.

6.5.4 Core pragmatics

It is possible that the interface between syntax and discourse in terms of topicalisation is not as demanding for L2 learners as properties at the interface between syntax and discourse such as focus or topic shift. There are core pragmatic rules that every L1 and L2 language learner has universally, such as a sensitivity to phonetic stress, raising intonation for questions, and topicalisation. In a quantitative cross-language study, Givón (1983) found enough evidence to suggest that topics exist in every language and that topics are always available to speakers and hearers of the same cultural background. According to Givón (1983), the pragmatic module is active both in discourse-oriented languages (such as Chinese, Japanese, and Korean) and in sentence-oriented languages (such as English and French). Topic chains are formed in both types of languages. A difference among languages is whether they use null pronouns and how they use null and overt pronouns to refer to the

discourse topic. For example, Wang et al. (1992) found that the average use of null pronouns is over 40% (null subject pronouns: 45.6%; null object pronouns: 40.1%) in Chinese. Givón (1983) analysed spoken English texts to examine the existence of topic chains. His analysis showed that both null (subject and object) pronouns and overt pronouns were used to refer to the discourse topic. English also has topic chains formed at the pragmatic level. Recall that topic constructions can be found in English. Thus, English, like Chinese, has the same topic in the C or Topic head. The only difference between them is whether the topic is obligatory or optional. In other words, L1 English speakers also need to integrate knowledge in the syntax and discourse domains. Once English-speaking L2 learners have recognised that topicalisation is obligatory in every Chinese sentence at the syntactic level, they have no difficulty integrating syntax and discourse information at the pragmatic level.

This study argues that the property at the interface of syntax and core pragmatics is not problematic for L2 learners. In the current study, the difficulty comes from the transfer of pragmatic strategies which are salient in L1 rather than from a processing overload at the interface domain. A significant proficiency effect is found in both adult L2 and child L2 data, while a near-significant age effect is found in child L2 data only. This age effect could result from maturation constraints. In other words, L2 children may have the same knowledge integration problems in their L1. More data are needed to confirm this. Further evidence that supports the idea that properties at the syntax-discourse interface are acquirable comes from the findings in Zhao's (2008) study, in which L2 Chinese learners achieved target-like interpretations of the discourse topic.

6.6 Summary

This chapter interpreted data from the acceptability judgement task and the interpretation task. According to the comparison of child L2 and adult L2 acquisition, L2 children and L2 adults were found to follow the same developmental sequence. This finding is compatible with Schwartz's (1992) proposal. L2 adult acquisition, like L2 child acquisition, is constrained by UG and learners are able to acquire target-like linguistic representations, including components at the syntax-discourse interface. Child and adult L2 learners appear to have knowledge that null arguments are permitted in Chinese, and they

have also worked out the discourse constraints on the interpretation of null and overt subjects. The delay in accepting third person singular null subjects is the result of L1 transfer rather than difficulties at the interface. However, I still cannot rule out residual difficulties that might arise from L1 transfer alone. The Interface Hypothesis is not confirmed by the data presented here. Finally, I hypothesised that property at the interface of syntax and core pragmatics will not be problematic for L2 learners. Once the syntactic structures of the L2 are in place, target-like interpretive constraints are acquirable.

The discussion in this chapter will be further informed by new data. The following sets of data are needed: (i) a series of experiments that control for the salience of the different argument positions in the experimental scenario to confirm that the external-interface properties required for Chinese topics are acquirable; (ii) more data from L1 children from different age groups to infer a more solid developmental sequence in L1 acquisition; and (iii) data from L2 learners' native L1 language knowledge to determine their ability to integrate different types of knowledge and information.

Chapter 7 Conclusion

This chapter presents a summary of the findings and conclusions of this thesis. It reviews some of the methodological issues which were raised in the course of this study. Finally, some suggestions are provided for areas for future research.

7.1 Summary of main findings

This study compares and contrasts three different groups of learners—L2 children, L2 adults and L1 children—in their acquisition of null arguments in Chinese. The rationale behind the present study was to test a proposal put forward by Schwartz (1992), as well as the Interface Hypothesis (Sorace, 2003). Schwartz claims that child L2 acquisition can inform the debate on whether adult L2 acquisition is constrained by UG or whether it relies on general learning mechanisms. By comparing the developmental sequences of child L2 learners with those of adult L2 learners while holding the L1 constant, researchers can provide evidence for (or against) UG involvement in adult L2 acquisition. The Interface Hypothesis assumes that syntax-discourse interface properties are the locus of difficulty for L2 learners.

It was argued that, for the L2 participants in the present study whose L1 was English, the acquisition of the interpretive constraints on null arguments suggests that UG is involved; the interpretive constraints on null and overt subjects cannot be transferred from an L1 which does not have null arguments. It was concluded that, if L2 adults and L2 children demonstrate target-like knowledge of the interpretive constraints on null arguments, their interlanguage grammars must somehow be constrained in the same way as L1 acquisition. Furthermore, if the performance of advanced L2 adults and children is not different from that of L1 native controls, L2 learners can eventually overcome syntax-discourse interface difficulties.

From the observations made in previous studies, the acceptability of null arguments in L2 adult becomes target-like at a fairly early stage (Yuan, 1993; Zhao, 2008). The present study builds on the previous research (i) by systematically investigating the acceptance and interpretation of null and overt arguments by L2 adults and L2 children, and (ii) by expanding the domain of enquiry by providing child L1 data and data from low proficiency L2 adult learners.

An acceptability judgement task and an interpretation task were conducted using the same methodology with all three groups of learners. The judgement task examined whether learners demonstrated target-like rates of acceptance in a context in which null arguments are allowed. The interpretation task investigated whether learners assigned a target-like interpretation to null and overt subjects. The main findings were as follows: L2 children and L2 adults were found to follow the same developmental sequence. This finding is compatible with Schwartz's (1992) work. Advanced child and adult L2 learners appear to have knowledge that null arguments are permitted in their L2 interlanguage grammars and they appear to have worked out the discourse constraints on the interpretation of null and overt subject pronouns in Chinese. Properties at the syntax-pragmatics interface are not problematic for either L2 children or L2 adults. The Interface Hypothesis is not confirmed in the present study.

That the acceptance of first person null subjects is much higher than that of third person null subjects, however, reveals that L2 learners might transfer pragmatic strategies from their L1. The residual difficulty comes from a long-term L1 effect on an interface-conditioned property. Learners do not always have problems with all types of interface-conditioned property (Sorace, 2011; Slabakova, 2011). While topic constructions are not problematic for L2 learners, an asymmetry in the acceptance of first and third person null subjects remains in their language development.

7.2 Contribution towards SLA research

This section considers the contribution of the finding s of the present study towards research into L2 acquisition.

The present study is the one of the first to systematically compare L2 children, L2 adults and L1 children in their acquisition of an interface-conditioned property, that is, null arguments. The L1 was held constant across the child and adult L2 groups, the same methodology was employed across all L1 and L2 groups and a proficiency measure was used to make cross-group comparisons.

Where differences were observed, namely in the interpretation of null and overt subjects, an independent explanation was available in the form of limitations on the ability to integrate discourse information, which was assumed to be the source of the observed

general age effect within child L1 and child L2 groups. It was only as a result of a comparison of the child L2 (aged five to fourteen) and child L1 (aged seven to nine) groups that such an effect could be detected. The present study thus demonstrated and supported Schwartz's (1992) proposal that child L2 acquisition plays a crucial role in any L1/L2 comparison as well as the debate on the role of UG in adult acquisition.

Previous studies on L2 null arguments focused only on adult learners. By systematically investigating the interpretive properties of null arguments, the present study furnishes us with a more complete picture of how this particular property of Chinese develops in L2 acquisition. In particular, it also provides valuable information about the development of the syntax-discourse interface in child L2 acquisition. This study has demonstrated that (i) advanced L2 children and advanced L2 adults are able to overcome syntax-discourse difficulties in L2 acquisition; and (ii) external-interface-conditioned properties are not necessarily difficult for L2 learners, at least as far as null arguments in Chinese are concerned. Neither version of the Interface Hypothesis is confirmed by the current study. Furthermore, the current study suggests that properties at external interface may not be vulnerable in the L2 acquisition of Chinese.

7.3 Limitations of the present study

In the course of the study, certain limitations became apparent. In this section, I discuss two problematic aspects of the present study which should be borne in mind when interpreting the results and in future research in this area. These include the age range of child L2 learners and the limitations of the proficiency measure.

Throughout this thesis, I have argued that because the L1 English-L2 Chinese learners tested here demonstrated target-like knowledge of the interpretive constraints on null and overt arguments in Chinese, their interlanguage grammars must be constrained in the same way as L1acquisition. The fact that L1 children aged eight and nine still produced non-target-like responses in the interpretation task indicates that at this age, L1 acquisition still involves constructing features which lie at the interface between discourse-pragmatics and narrow syntax. Some L2 children aged nine and older were also observed to give non-target-like responses. The age range of the L1 children is narrower than that of the L2 children. A more straightforward comparison would perhaps focus on a target language

property which was acquired by L1 children before the age of four and/or after the age of 15.

The proficiency measure discussed in Chapter 4 formed an important part of the present study. Although it was a standard test and was carefully designed so that it did not disadvantage the L2 children in favour of the L2 adults and did not test the same property as the experimental tasks, it is not without its limitations. First, it was not possible to assign participants an appropriate proficiency level if they had failed to learn Chinese characters. Second, the participants' levels are dependent on whether they can pass a certain test. Only the advanced proficiency group according to this test might be considered to be near-native. A participant's level should instead depend on where his/her score falls in that group of L2 learners as a whole. Consequently, it is imperative that the subjects in a sample span the full proficiency range.

7.4 Further research

The present study raised a number of interesting issues to be addressed in future research. With respect to the acquisition of interface-conditioned null arguments, further research will be needed to pinpoint the exact interface area which causes L2 non-integration and the exact cause of the delay for L1 and L2 children, including the nature of any hypothesized limitation in discourse integration abilities. Ideally, one would test both knowledge of null arguments and discourse integration in children within a certain age range in order to establish the extent of any link between the two.

In order to determine the generalisability of the findings of this thesis, more studies comparing L2 child and L2 adult acquisition with L1 acquisition are needed. These should investigate the acquisition of different phenomena and different L1 and target language combinations.

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Appendix A (Chapter 4)

Appendix A.1 L2 children: Bio-data

Participants	Age at time of testing	Age at first exposure (years; months)	Length of exposure (years; months)	Length of living in Chinese-speaking country (years; months)	Contact with Chinese	Other languages	Note
CL01	8	7	0;6	0	Ltd.	Beginner's Cantonese	
CL02	7	5	2	0	Ltd.	Beginner's Cantonese	
CL03	9	8; 8	2	0	Ltd.		
CL04	9	8; 4	0;6	0	Ltd.		
CL05	10	8; 4	2	0	Ltd.		
CL06	12	11; 4	0;6	1;0	Ltd.		
CL07	5	4; 3	0;6	0	Mod.		twins
CL08	5	4; 3	0;6	0	Mod.		twins
CL09	9	6;10	2	2;0	Ltd.		
CL10	8	6; 1	2	2;0	Ltd.		
CM01	8	5; 9	2	0	Ltd.		
CM02	12	6; 7	6	0	Ltd.		
CM03	8	4; 6	4	0	Ltd.		
CM04	11	4; 5	7	4;0	Ltd.		
CM05	9	7; 2	2	2;6	Ltd.		
CM06	7	4; 10	2	0	Ltd.		
CM07	11	7; 0	4	4;0	Ltd.		
CM08	11	9; 4	2	0	Ltd.		
CM09	8	6; 0	2	0	Ltd.		
CM10	8	7; 4	1	0	Ltd.		
CA01	17	14; 7	2	4;0	Ltd.		
CA02	16	7	9	4;0	Ltd.		
CA03	15	7	8	4;0	Ltd.		
CA04	11	6	5	0;2	Ltd.		twins
CA05	11	6	5	0;2	Ltd.		twins
CA06	11	7	4	0;2	Ltd.		
CA07	13	11; 1	2	0	Ltd.		

CA08	13	8; 4	5	0	Ltd.		
CA09	13	3; 10	4	9;2	Ext.		excluded
CA10	13	4	2	7;0	Ext.		excluded
CA11	16	4; 5	2	3;0	Ltd.	Advanced Cantonese	
CA12	15	13	2	0	Ltd.		

*Note: Limited (Ltd.) contact with Chinese means that the subject's only contact with Chinese is at foreign language classes. Moderate (Mod.) contact means that the subject has some Chinese-speaking friends and/or neighbours. Extensive (Ext.) contact means that subject meet (at least) one of the following criteria: the subject lives with one or more native-speakers who speak Chinese to him or her; and/or the subject works in a Chinese-speaking environment (at least some of the time).

*Note: Subjects CL07 and CL08 are twins, as are subjects CA04 &CA05.

Appendix A.2 L2 adults: Bio-data

Subject	Age at time of testing	Age at first exposure (years; months)	Length of exposure (years; months)	Length of living in Chinese-speaking country (years; months)	Contact with Chinese	Other languages	Note
AL01	53	50	3	0	Ltd.		
AL02	32	25	8	0	Ltd.		
AL03	32	28	5	0	Ltd.		
AL04	19	18; 10	1	0	Ltd.	Beginner's French.	
AL05	43	25	18	7	Ext.		
AL06	26	19; 1	7	0;1	Ltd.		
AL07	19	18; 8	0;6	0	Ltd.	Beginner's French.	
AL08	20	19; 3	1	0	Ltd.		
AL09	49	48; 5	1	0	Ltd.		
AL10	46	45;1	0;6	0	Ltd.	Advanced French& Russian; Intermediate Polish &Spanish.	
AM01	25	21; 7	4	0	Mod.		
AM02	26	22; 4	4	2;6	Ltd.		
AM03	24	22	2	1;10	Ltd.		
AM04	28	25; 2	3	1	Ltd.		
AM05	22	17; 10	4	0;6	Ltd.		
AM06	25	18; 1	7	0;3	Ltd.		
AM07	20	18; 3	2	0;9	Ltd.		
AM08	23	22; 6	0;6	0	Mod.	Advanced Greek.	
AM09	23	20; 8	3	0;5	Ltd.	Beginner's French &Italian& Spanish.	
AM10	50	45; 7	4	3	Ltd.	Advanced Spanish.	
AA01	22	18; 4	4	1	Ext.		
AA02	32	21; 10	11	8	Ext.		
AA03	21	19; 4	2	0;9	Ltd.		
AA04	22	18; 3	4	1	Ltd.		
AA05	21	19; 7	2	1	Ltd.		
AA06	20	18; 6	2	0;11	Ltd.		
AA07	22	19; 5	3	1;3	Ltd.		

AA08	20	18; 3	2	0;11	Ltd.		
AA09	21	18; 10	3	0;10	Ext.		
AA10	24	19;7	5	2	Ext.		

*Note: Limited (Ltd.) contact with Chinese means that the subject's only contact with Chinese is at foreign language classes. Moderate (Mod.) contact means that the subject has some Chinese-speaking friends and/or neighbours. Extensive (Ext.) contact means that subject meet (at least) one of the following criteria: the subject lives with one or more native-speakers who speak Chinese to him or her; and/or the subject works in a Chinese-speaking environment (at least some of the time).

Appendix A.3 Teaching scheme and textbooks

Class name, 班级名称		**Textbook 1** Kuaile Hanyu 《快乐汉语》	**Textbook 2** Chinese 《中文》	**Textbook 3** My First Chinese Reader 《快乐儿童华语》	**Textbook 4** Standard Chinese 《标准中文》
1	Beginners class 1	Vol 1	Vol 1+Vol 2 (first half)	My First Chinese Words+ Vol 1	
2	Beginners class 2	Vol 2	Vol 2 (final half) + Vol 3	Vol 2+ 3	
3	Intermediate class 1	Vol 3	Vol 4+Vol 5 (first half)	Vol 4	
4	Intermediate class 2		Vol 5(final half) + Vol 6		
5	Advanced class 1		Vol 7+Vol 8 (first half)		Level 2, Vol 3
6	Advanced class 2		Vol 8(final half) + Vol 9		Level 3, Vol 1
7	Proficiency class 1		Vol 10+Vol 11 (first half)		Level 3, Vol 2
8	Proficiency class 2		Vol 11(final half) + Vol 12		Level 3, Vol 3
9	Mastery class 1		Chinese for AS 2		
10	Mastery class 2		Chinese for Advanced Level		

Appendix A.4 **Experimental items: Acceptability Judgement Task**

Warn-up:
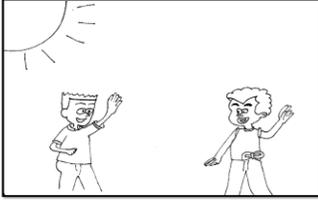
1. Jintian tianqi   hen   hao。
   today   weather very good
   The weather is nice today.
2. *Ni   hao ma? Hen wo hao。
   you good-Q   very I   good
   How are you? I am fine.
3. *Xianzai jidian?   Xianzai ban wu   dian。
   now   what time   now   half five o'clock
   What time is it now? It is half past five.

Experimental items:
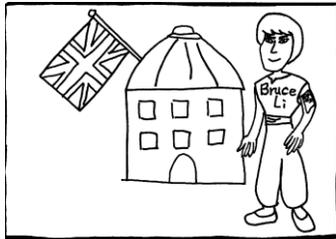
A.

Test sentences:

1. Null subject:
   Sentence: Wo jiao   Li Xiaolong. Wo liu sui.   Shi   Zhongguoren
                I   to call Li Xiaolong I   six year   to be Chinese
                I am Li Xiaolong. I am six years old. (I) am Chinese.
2. Null subject & null object:
   Sentence: Wo jia   zai Yingguo. Hen da. Wo hen xihuan.
                I   home in UK   very big I   very like
                I live in UK. (It is) very big. I like (it) very much.
3. Distractor:
   Sentence: Zhongguo ye   hen da. Wo ye   hen xihuan Zhongguo.
                China   also very big I   also very like   China
                China is also big. I like China, too.

B.
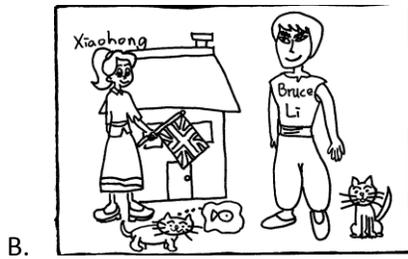
Test sentences:
4. Null subject:
   Sentence: Zhe shi wo tongxue, jiao   Xiaohong
             This is I classmate to call Xiaohong
             This is my classmate. (my classmate) is Xiaohong.
5. Null object:
   Sentence: Ta   you   yi   zhi xiao mao. Wo ye   you
             She have one CL small cat.   I   also have
             She has a small cat. I have (it), too.
6. Distractor:
   Sentence: Xiao mao xihuan chi   yu. Xiaohong ye   xihuan chi   yu.
             Small cat like   eat   fish Xiaohong also like   eat   fish
             The small cat likes to eat fish. Xiaohong likes to eat fish, too.

C.
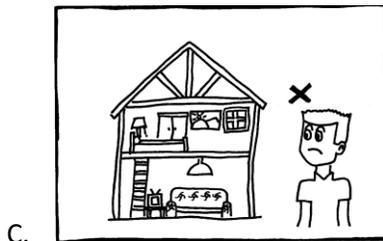
Test sentences:
7. Null subject:
   Sentence: Zhe ge   fangzi bu da, zhi   you liang ge   fangjian
             This CL house not big only have two CL   room
             This house is not big. (It) only has two rooms.
8. Null subject & null object:
   Sentence: Zhe fangzi you   chufang ma? Mei you.
             This house have   kitchen-Q   not have
             Does this house have kitchen? (it) doesn't have(kitchen).
9. Null object:
   Sentence: Zhe ge   fangzi mei you   chufang. Wo bu   yao.
              This CL house not   have kitchen   I   not want
              This house doesn't have kitchen. I don't want (it).

10. Distractor:

    Sentence: Li Xiaolong jia hen   da.   Ta jia   you   shi ge fangjian.
                       Li Xiaolong jia very big   he home have ten CL room
                       Li Xiaolong's house is big.   His house has ten rooms.

D.
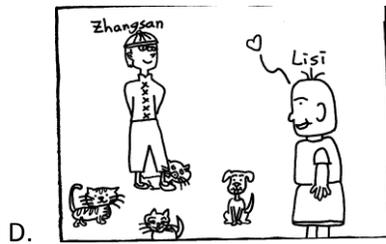
Test sentences:

    11. Null subject:
        Sentence: Zhangsan you   san   zhi xiao mao, mei you   xiao gou
                     Zhangsan have   three CL small cat   not have small dog .
                     Zhangsan has three small cats. (he) doesn't have small dogs.
    12. Null subject & null object:
        Sentence: Lisi xihuan xiao mao, ye xihuan xiao   gou, ta you   yi   zhi.
                     Lisi like   small cats also like   small dog   he have one CL
                     Lisi likes small cats. (He) also likes small dogs. He has one (dog).
    13. Distractor:
        Sentence: Zhangsan xihuan mao. Ta ye   xihuan gou.
                     Zhangsan like   cat   he also like   dog
                     Zhangsan likes cats. He likes dogs, too.

E.

Test sentences:

    14. Null subject & null object:
        Sentence: Baba   he   kafei, bu   he   niunai, mama   ye   bu he.
                     Father drink coffee not drink milk   mother also not drink
                     Father drinks coffee. (He) doesn't drink milk. Mother doesn't drink (it),
    either.
    15. Null object:
        Sentence: Gege   xihuan he   guozhi, wo bu xihuan he.
                     Brother like   drink juice   I   not like   drink
                     Brother likes to drink juice. I don't like to drink (it).
    16. Distractor:

Sentence: Jiejie he   niunai, jiejie bu   he   kafei
                 Sister drink milk   sister not drink coffee
                 Sister drinks milk. Sister doesn't drink coffee.

F.

Test sentences:

17. Null subject:
Sentence: Wo zaoshang chi mianbao, bu   chi   jidan
                 I   morning eat bread   not eat   egg
                               I eat bread in the morning. (I) don't eat eggs.

18. Null subject & null object:
Sentence: Baba   chi jidan, ye   chi niurou, mama   ye   chi.
                 Father eat egg   also eat   beef   mother   also eat
                 Father eats eggs. (He) also eats beef. Mother eats (it), too .

19. Null object:
Sentence: Jiejie you mianbao, wo mei you.
                 Sister have bread   I   not have
                 Sister has bread. I don't have (it).

G.

Test sentences:

20. Null subject:
Sentence: Zhangsan bu   he   guozhi. Yao   chi shuiguo.
                 Zhangsan not drink juice   want eat   fruit
                 Zhangsan doean't drink juice. (He) wants to eat fruits.

21. Null object:
Sentence: Lisi yao   qishui.   Zhangsan yao ma?
                 Lisi want soft drinks. Zhangsan want-Q
                 Lisi wants soft drinks. Does Zhangsan Want (it)?

22. Distractor:
Sentence: Wo yao   pingguo, ni ne?
                 I   want apple,   you-Q
                 I want an apple. And you?

H.

Test sentences:

23. Null subject:

Sentence: Wo jia   zai yingguo. Wo xihuan Zhongguo. Ye xihuan Yingguo
I   home in UK   I like   China   also like   UK
My home is in the UK. I like China. (I) also like the UK.

24. Null object:

Sentence: Wo you   yi zhi   gou. Meimei ye   you.
I   have one CL   dog. Sister   also have
I have a dog. Sister has (a dog), too.

25. Distractor:

Sentence: Mama   you mao ma? Ta   you liang zhi mao
Mother have cats- Q   she   have two CL cat
Does mother have cats? She has two cats.

9.

Test sentences:

26. Null subject:

Sentence: Xiaohong xihuan haixian.   Ye   xihuan cai
Xiaohong like   seafood   also like   vegetable
Xiaohong likes seafood. (she) also likes vegetable.

27. Null object:

Sentence: Mingming he   niunai. Xiaohong bu he.
Mingming drink milk   Xiaohong not drink.
Mingming drinks milk. Xiaohong doesn't drink (it).

28. Distractor:

Sentence: Xiao   gou xihuan niurou. Xiao   gou bu   xihuan cai.
Small dog   like   beef   small dog   not like   vegetable
Small dog likes beef. Small dog doesn't like vegetable.
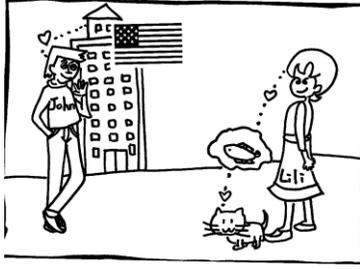
10.

Test sentences:

29. Null subject:

Sentence: Ta jiao John. Shi Meiguo ren
He call John to be USA people
He is John. (he) is American.

30. Null subject & null object:

Sentence: John bu xihuan mao. Mei you mao. Lily you.
John not like cat no have cat Lily have
John doesn't like cats. (he) doesn't have cats. Lily has (cats).

31. Null object:

Sentence: Lily xihuan yu. Xiao mao ye xihuan.
Lily like fish small cat also like
Lily likes fish. Small cat also likes (fish).
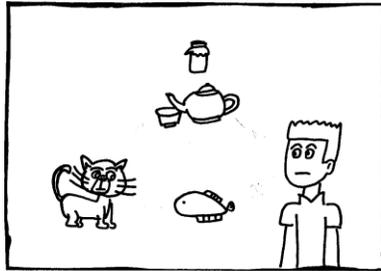
11.

Test sentences:

32. Null subject & null object:

Sentence: Wo he cha. Xiao mao bu he. Yao yu.
I drink tea small cat not drink want fish
I drink tea. Small cat doesn't drink (tea). (small cat) wants fish.

33. Null object:

Sentence: Xiao mao chi yu. Wo bu chi.
Small cat eat fish I not eat
Small cat eats fish. I don't eat (fish)

34. Distractor:

Sentence: Wo bu yao haixian. Ni yao haixian ma?
I not want seafood you want seafood- Q
I don't want seafood. Do you want seafood?

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12.
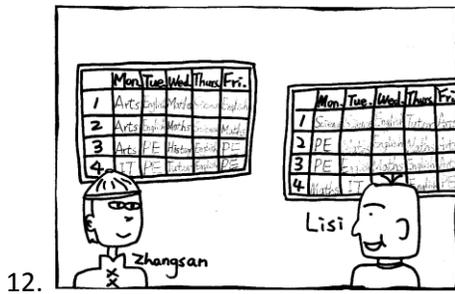
Test sentences:

    35. Null subject:

        Sentence: Zhangsan you   Yingwenke.   Mei you   Zhongwenke.

                    Zhangsan have English lesson   no   have Chinese lesson

                    Zhangsan has English lesson. (he) doesn't have Chinese lesson.

    36. Null subject & null object:

        Sentence: Xingqiliu Zhangsan you ke ma?   Mei you.

                    Saturday Zhangsan have class-Q   no have

                    Does Zhangsan have class on Saturday? (he) doesn't have(class).

    37. Distractor:

        Sentence: Lisi xihuan tiyuke. Zhangsan ye   xihuan tiyuke.

                    Lisi like   PE   Zhangsan also like   PE

                    Lisi likes PE. Zhangsan likes PE, too.

13.
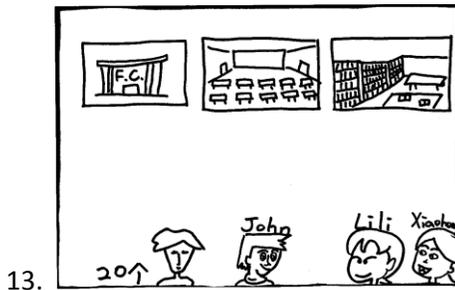
Test sentences:

    38. Null subject & null object:

        Sentence: Xiaohong bu   qu   tiyuguan. Qu   tushuguan. Lily ye qu.

                    Xiaohong not   go to gym.   go to library.   Lily also go to

                    Xiaohong doesn't go to the gym. (she) goes to the library. Lily also

                      goes to (the library).

    39. Null object:

        Sentence: Lily qu   tushuguan. John bu qu.

                    Lily go to library   John not go to

                    Lily goes to the library. John doesn't go to (the library).

    40. Distractor:

        Sentence: Wo xihuan women ban.   Ni   ne?

                    I   like   we   class   you- Q

                    I like our class. And you?
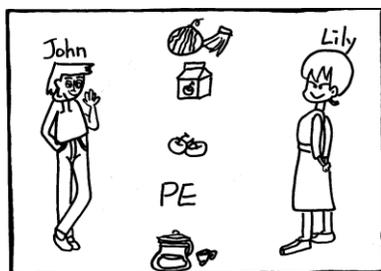
14.

Test sentences:

    41. Null subject:
        Sentence: Lily xihuan shuiguo, ta   chi pingguo, ye   he   guozhi.
                      Lily like   fruits   she eat apple   also drink juice
                      Lily likes fruits. She eats apples. (she) drinks juice, too.

    42. Null subject & null object:
        Sentence: Lily xihuan shuiguo, John xihuan shuiguo ma? Bu xihuan .
                      Lily like   fruit   John like   fruit   Q   not like
                      Lily likes fruits. Does john likes fruit? (he) doesn't like (fruits)

    43. Null object:
        Sentence: John xihuan tiyuke. Lily ye   xihuan.
                      John like   PE   Lily also like
                      John likes PE. Lily likes (it), too.

    44. Distractor:
        Sentence: Lily bu yao   kafei,   John ye   bu yao   kafei.
                      Lily not want coffee   John also not want coffee
                      Lily doesn't like coffee. John doesn't like coffee, either.
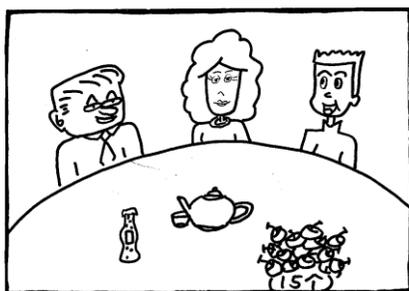
15.

Test sentences:

    45. Null subject:
        Sentence: Baba、mama bu   he   qishui.   He   cha.
                      Father mother not   drink soft drinks drink tea
                      Father and mother don't drink soft drinks. (They) drink tea.

    46. Null object:
        Sentence: Baba、mama he   cha. Wo bu   he.
                      Father mother drink tea   I   not drink
                      Father and mother drink tea. I don't drink (tea).

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47. Distractor:

    Sentence: Wo he   guozhi. Ni   he   shenme?.
                    I   drink juice   You drink what
                    I drink juice. What do you drink?

Appendix A.5 **Experimental items: Interpretation Task**

Warm-up:

1. Gege xihuan haixian，meimei xihuan cai。
   brother like　　seafood　　sister　　like　　　vegetables
   Brother likes seafood. Sister likes vegetables.
   Question: Who likes seafood?
2. Mama　you　yi　zhi xiao　mao，baba　you　liang zhi gou。
   mother have one CL　small cat　　　father have two　CL dog
   Mother has one small cat. Father has two small dogs.
   Question: Who has two dogs?
3. Zhangsan he　　gouzhi，Lisi he　　cha。
   Zhangsan drink juice　　Lisi drink tea
   Zhangsan drinks juice. Lisi drinks tea.
   Question: Who drinks tea?

Experimental items:

Adjoining clause

Null subject (Target answer: Topic antecedent)

1. Laoshi　gen　yi　ge xuesheng shuohua，ranhou qu　　jiaoshi。
   teacher　with one CL student　talk　　then　go to　classroom
   Teacher talks to a student and then Ø goes to the classroom.
   Question: Who goes to the classroom?

2. Gege　　gen　jiejie zai　fangjian，ranhou qu　　chufang。
   brother with sister at　　bedroom　then　go to　kitchen
   Brother stays in the bedroom with sister and then Ø go to the kitchen.
   Question: Who goes to the kitchen?

3. Gege　　gen mama　he　　cha，ranhou qu　　litang。
   brother with mother drink tea　then　　go to　assembly hall
   Brother drink tea with mother and then Ø goes to the assembly hall.
   Question: Who goes to the assembly hall?

4. Xiaohong　gen　　Mingming shuo zaijian，　ranhou dui　Li Xiaolong shuo zaijian。
   Xiaohong　with　Mingming say　goodbye　then　　to　LI Xiaolong say　goodbye
   Xiaohong says goodbye to Mingming and then Ø says goodbye to Li Xiaolong.
   Question: Who says goodbye to Li Xiaolong?

Overt subject 'ta' (Target answer: Topic antecedent)
1. Laoshi　gen　ge　xuesheng　shuohua，ranhou ta　　qu　　　jiaoshi。
   teacher　with　CL student　　talk　　then　s/he　go to　classroom

Teacher talks to a student and then s/he goes to the classroom.
Question: Who goes to the classroom?

2. Gege   gen mama   he   cha，ranhou ta   gen   baba   chi yu。
   brother with mother drink tea   then   s/he   with father   eat   fish
   Brother drinks tea with mother and then s/he eats fish with father.
   Question: Who eats fish with father?

3. Xiaohong gen   Mingming shuo zaijian，ranhou ta   gen   Li Xiaolong shuo zaijian。
   Xiaohong with Mingming say   goodbye then   s/he with   LI Xiaolong say   goodbye
   Xiaohong says goodbye to Mingming and then s/he says goodbye to Li Xiaolong.
   Question: Who says goodbye to Li Xiaolong?

4. Gege   gen jiejie zai fangjian，ranhou ta   qu   chufang。
   brother with sister at   bedroom then   s/he go to   kitchen
   Brother stays in the bedroom with sister are and then s/he goes to the kitchen.
   Question: Who goes to the kitchen?

Embedded clause

Null subject (Target answer: Topic antecedent or referent in the discourse)

1. Baba miandui mama   shuo   he   kafei。
   father face to   mother say   drink coffee
   Father says to mother that Ø drinks coffee.
   Question: Who drinks coffee?

2. Xiaohong dui Xiaohai   shuo   hui   jia。
   Xiaohong   to Xiaohai   say   return   home
   Xiaohong says to Xiaohai that Ø goes home.
   Question: Who goes home?

3. Xiao   mao dui   xiao   guo shuo chi jidan。
   small cat   to   small dog   say eat egg
   Small cat tells small dog that Ø eats the egg.
   Question: Who eats the egg?

4. Xiaohong gen   jiejie   shuo yao   gu   tushuguan。
   Xiaohong with sister   say   want go to library
   Xiaohong says to her sister that Ø has to go to the library.
   Question: Who has to go to the library?

5. Xiao   mao kan   xiao   guo shuo qu   tiyuguan。
   small cat   look at   small dog say   go to gym
   Small cat tells small dog that Ø goes to the gym.

Question: Who goes to the gym?

Overt subject 'ta' (Target answer: Topic antecedent)

1. Gege   miandui mama shuo   ta   he   niunai。
   brother face to mother say   s/he drink milk
   Brother talks to mother that s/he drinks milk.
   Question: Who drinks milk?

2. Xiao mao kan   xiao   guo shuo ta chi jidan。
   small cat   look at small dog   say   it eat egg
   Small cat says to small dog that it eats the egg.
   Question: Who eats the egg?

3. Li Xiaolong gen   gege   shuo xihuan Zhongguo，ranhou   ta   qu   Yingguo。
   Li Xiaolong with brother say   like   China   then   he   go to UK
   Li Xiaolong tells brother that Ø likes China and then he goes to the UK.
   Question: Who goes to the UK?

4. Xiaohong   miandui jiejie shuo ta   yao   gu   tiyuguan。
   Xiaohong   face to sister say   she   want go to gym
   Xiaohong says to sister that she has to go to the gym.
   Question: Who has to go to the gym?

5. Xiao   mao dui   xiao guo shuo ta yao   hui   jia。
   small cat   to   small dog say   it want   return home
   Small cat says to small dog that it has to go home.
   Question: Who has to go home?

Fillers: Interpretation Task

1. John dui Mary shuo   zaijian，ranhou tamen dui laoshi   shuo zaijian。
   John to Mary say   goodbye then   they   to teacher say goodbye
   John says goodbye to Mary and then they say goodbye to teacher.
   Question: Who says goodbye to teacher?

2. Laoshi   gen   xuesheng zai jiaoshi，ranhou tamen qu   yundongchang。
   Teacher with students   in classroom then   they   go to sports ground
   Teacher and students are in the classroom and then they go to the sports ground.
   Question: Who goes to the sports ground?

3. Baba   gen   gege   zai chufang，tamen chi   yu。
   Father with brother in   kitchen   they eat fish
   Father and brother are in the kitchen. They eat fish.

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Question: Who eats fish?

4. Lili dui   mama   shuo baba   yao   kafei。
    Lili face to mother say   father want coffee
    Lili told mother that father wants coffee.
    Question: Who wants coffee?

5.   Li Xiaolong gen   Mingming bu   qu   jiaoshi，   tamen qu   tiyuguan。
     Li Xiaolong with Mingming   not go to classroom   they   go to gym
     Li Xiaolong and Mingming don't go to the classroom. They go to the gym.
     Question: Who goes to the gym?

6.   Baba   shuo Xiaohong you   liang zhi mao。
     Father say   Xiaohong have two   CL mao
     Father says that Xiaohong has two cats.
     Question: Who has two cats?

7.   Xiao   mao miandui   xiao   guo shuo   wo jia   hen   da。
     Small cat   face to   small dog say   I   home very big
     Small cat says to small dog,' my house is very big.'
     Question: Whose house is very big?

8.   Jiejie xihuan haixian，Xiaohai xihuan cai。
      sister like   seafood Xiaohai like   vegetable
      Sister likes seafood Xiaohai likes vegetable.
      Question: Who likes seafood?

9.   Xiaohong gen   Mingming   xingqiyi   you   tiyuke，   tamen xihuan tiyuke。
     Xiaohong with Mingming   Monday   have PE   they   like   PE
     Xiaohong and Mingming have PE lesson on Monday. They like PE class.
     Question: Who likes PE class?

Appendix B (Chapter 5)

Appendix B.1 L1 Adult controls: Individual results: Acceptance

Subject	Null subject		Null object		Both null subject and null object	
	%	n	%	n	%	n
NA01	90.91	10/11**	100	11/11**	72.73	8/11*
NA02	100	11/11**	100	11/11**	72.73	8/11*
NA03	100	11/11**	100	11/11**	90.91	10/11**
NA04	100	11/11**	100	11/11**	100	11/11**
NA05	100	11/11**	100	11/11**	100	11/11**
NA06	100	11/11**	100	11/11**	100	11/11**
NA07	100	11/11**	100	11/11**	81.82	9/11*
NA08	100	4/4**	100	8/8**	100	6/6**
NA09	100	11/11**	100	11/11**	100	11/11**
NA10	90.91	10/11**	100	11/11**	63.64	7/11*
NA11	100	11/11**	100	11/11**	63.64	7/11*
NA12	90.91	10/11**	100	11/11**	72.73	8/11*
NA13	100	11/11**	90.91	10/11**	63.64	7/11*
NA14	90.91	10/11**	90.91	10/11**	54.55	6/11*
NA15	100	11/11**	100	11/11**	100	11/11**
NA16	100	11/11**	100	11/11**	72.73	8/11*
NA17	100	11/11**	100	11/11**	63.64	7/11*
NA18	90.91	10/11**	100	11/11**	90.91	10/11**
NA19	100	11/11**	100	11/11**	72.73	8/11*
NA20	100	11/11**	100	11/11**	72.73	8/11*

Note: ** Target-like response pattern; * Mix response pattern; No asterisk Non-target-like

response pattern .

Appendix B.2 L1 Child: Individual results: Acceptance

Subject	Null subject		Null object		Both null subject and null object	
	%	n	%	n	%	n
NC01	100	11/11**	100	11/11**	100	11/11**
NC03	100	11/11**	100	11/11**	90.91	10/11**
NC05	66.67	4/6*	40	2/5	0	0/2
NC06	75	6/8*	75	6/8*	55.56	5/9*
NC08	85.71	6/7**	100	7/7**	100	3/3**
NC09	100	11/11**	100	11/11**	90.91	10/11**
NC12	90.91	10/11**	100	10/10**	81.82	9/11*
NC15	45.45	5/11	63.64	7/11*	36.36	4/11
NC16	63.64	7/11*	90.91	10/11**	45.45	5/11
NC18	100	9/9**	100	10/10**	100	10/10**
NC19	100	11/11**	100	11/11**	81.82	9/11*
NC20	100	11/11**	100	11/11**	72.73	8/11*
NC21	90	9/10**	72.73	8/11*	72.73	8/11*
NC24	90.91	10/11**	90.91	10/11**	90.91	10/11**
NC26	72.73	8/11*	62.5	5/8*	36.36	4/11
NC27	90.91	10/11**	90.91	10/11**	90.91	10/11**
NC28	100	8/8**	87.5	7/8**	71.43*	5/7*
NC29	81.82	9/11*	80	8/10*	90.91	10/11**
NC31	80	8/10*	60	6/10*	45.45	5/11

Note: NC02, NC04, NC07, NC10, NC11, NC13, NC17, NC23, NC30, NC32, and NC33 are excluded.
Note: ** Target-like response pattern;   *   Mix response pattern; No asterisk   Non-target-like response pattern.

Appendix B.3 L2 children: Individual results: Acceptance

subject	Null subject			Null object			Both null subject and null object		
	%	n	pattern	%	n	pattern	%	n	pattern
L2 CHILDREN : LOW (8)									
CL03	90.91	10/11	+	60.00	6/10	±	50.00	5/10	-
CL04	72.73	8/11	±	45.45	5/11	-	27.27	3/11	-
CL05	81.82	9/11	±	77.78	7/9	±	66.67	6/9	±
CL06	90.91	10/11	+	36.36	4/11	-	18.18	2/11	-
CL07	80.00	8/10	±	55.56	5/9	±	50.00	5/10	-
CL08	85.71	6/7	+	50.00	3/6	-	16.67	1/6	-
CL09	72.73	8/11	±	90.00	9/10	+	54.55	6/11	±
CL10	100.00	11/11	+	90.91	10/11	+	90.00	9/10	+
L2 CHILDREN : INTERMEDIATE(8)									
CM01	100.00	11/11	+	100.00	11/11	+	81.81	9/11	±
CM03	72.73	8/11	±	88.89	8/9	+	55.56	5/9	±
CM04	100.00	11/11	+	100.00	11/11	+	100.00	11/11	+
CM06	90.91	10/11	+	90.91	10/11	+	72.73	8/11	±
CM07	100.00	11/11	+	100.00	11/11	+	63.64	7/11	±
CM08	90.91	10/11	+	90.91	10/11	+	81.82	9/11	±
CM09	81.82	9/11	±	100.00	10/10	+	90.91	10/11	+
CM10	87.50	7/8	+	87.50	7/8	+	85.71	6/7	+
L2 CHILDREN : ADVANCED(8)									
CA01	100.00	11/11	+	100.00	11/11	+	90.91	10/11	+
CA02	100.00	11/11	+	100.00	11/11	+	100.00	11/11	+
CA03	100.00	11/11	+	100.00	11/11	+	100.00	11/11	+
CA04	72.73	8/11	±	72.73	8/11	±	72.73	8/11	±
CA05	72.73	8/11	±	90.91	10/11	+	90.00	9/10	+
CA08	27.27	3/11	-	54.55	6/11	±	50.00	5/10	-
CA11	90.00	9/10	+	100.00	10/10	+	63.64	7/11	±
CA12	88.89	8/9	+	55.56	5/9	±	40.00	4/10	-

Note: CM02, CM05, CA06, CA07, CA09, and CA10 are excluded.

Appendix B.4 L2 adults: Individual results: Acceptance

subject	Null subject			Null object			Both null subject and null object		
	%	n	pattern	%	n	pattern	%	n	pattern
L2 ADULTS : LOW (9)									
		6/7	+		6/8	±		5/7	±
AL01	85.71			75.00			71.43		
AL02	66.67	4/6	±	75.00	6/8	±	20.00	1/5	-
AL03	100.00	9/9	+	100.00	10/10	+	100.00	10/10	+
AL04	85.71	6/7	+	75.00	6/8	±	66.67	6/9	±
AL05	100.00	9/9	+	60.00	6/10	±	77.78	7/9	±
AL06	55.56	5/9	±	62.50	5/8	±	55.56	5/9	±
AL07	40.00	4/10	-	63.64	7/11	±	63.64	7/11	±
AL08	100.00	11/11	+	72.73	8/11	±	36.36	4/11	-
AL10	87.50	7/9	±	80.00	8/10	±	100.00	7/7	+
L2 ADULTS : INTERMEDIATE(9)									
AM01	100.00	11/11	+	81.82	9/11	+	90.91	10/11	+
AM02	100.00	11/11	+	100.00	11/11	+	90.91	10/11	+
AM03	70.00	7/10	±	54.55	6/11	±	81.82	9/11	+
AM04	100.00	11/11	+	100.00	11/11	+	63.64	7/11	±
AM05	90.91	10/11	+	81.82	9/11	+	81.82	9/11	+
AM07	90.91	10/11	+	81.82	9/11	+	63.64	7/11	±
AM08	100.00	11/11	+	100.00	11/11	+	100.00	11/11	+
AM09	100.00	11/11	+	90.91	10/11	+	63.64	7/11	±
AM10	100.00	11/11	+	100.00	11/11	+	100.00	11/11	+
L2 ADULTS : ADVANCED(8)									
AA01	90.91	10/11	+	100.00	11/11	+	90.91	10/11	+
AA02	100.00	11/11	+	100.00	11/11	+	72.73	8/11	±
AA03	100.00	11/11	+	100.00	11/11	+	100.00	11/11	+
AA04	90.91	10/11	+	100.00	11/11	+	81.82	9/11	±
AA06	72.73	8/11	±	90.91	10/11	+	54.55	6/11	±
AA07	100.00	11/11	+	81.82	9/11	±	63.64	7/11	±
AA08	63.64	7/11	±	81.82	9/11	±	72.73	8/11	±
AA09	90.91	10/11	+	100.00	11/11	+	63.64	7/11	±

Note: AL09, AM06, AA05, and AA10 among the L2 adults)

Appendix B.5 L2 children: Null arguments rejection rate

subject	1st person null arguments		3rd person null arguments	
	%	n	%	n
L2 CHILDREN : LOW (10)				
CL01	0	0	66.67	2/3
CL02	0	0	0	0
CL03	0	0/3	27.78	5/18
CL04	33.33	1/3	42.11	8/19
CL05	0	0/3	23.52	4/17
CL06	0	0/3	27.78	8/19
CL07	0	0/3	43.75	7/16
CL08	0	0/2	36.37	4/11
CL09	66.67	2/3	11.11	2/18
CL10	0	0/3	5.26	1/19
L2 CHILDREN : INTERMEDIATE(10)				
CM01	0	0/3	0	0/19
CM02	66.67	2/3	38.89	7/18
CM03	33.33	1/3	11.76	2/17
CM04	0	0/3	0	0/19
CM05	66.67	2/3	42.11	8/19
CM06	0	0/3	10.53	2/19
CM07	0	0/3	0	0/19
CM08	0	0/3	10.53	2/19
CM09	33.33	1/3	5.56	1/18
CM10	33.33	1/3	7.69	1/13
L2 CHILDREN : ADVANCED(10)				
CA01	0	0/3	0	0/19
CA02	0	0/3	0	0/19
CA03	0	0/3	0	0/19
CA04	33.33	1/3	26.32	5/19
CA05	33.33	1/3	15.79	3/19
CA06	0	0/3	0	0/19
CA07	0	0/3	0	0/19
CA08	66.67	2/3	52.63	10/19
CA11	0	0/3	5.88	1/17
CA12	0	0/3	26.67	4/15

* Note: Participant CL01 and CL02 were excluded because they produce too less data.

Appendix B.6 L2 adults: Null argument rejection rate

subject	1st person null arguments		3rd person null arguments	
	%	n	%	n
L2 ADULTS : LOW (10)				
AL01	33.33	1/3	16.67	2/12
AL02	0	0/2	33.33	4/12
AL03	0	0/3	0	0/16
AL04	0	0/2	23.08	3/13
AL05	0	0/3	25.00	4/16
AL06	50	1/2	40	6/15
AL07	100	3/3	38.89	7/18
AL08	0	0/3	15.79	3/19
AL09	0	0/3	26.67	4/15
AL10	0	0/3	25.00	4/16
L2 ADULTS: INTERMEDIATE(10)				
AM01	0	0/3	10.53	2/19
AM02	0	0/3	0	0/19
AM03	33.33	1/3	38.89	7/18
AM04	0	0/3	0	0/19
AM05	0	0/3	10.53	2/19
AM06	0	0/3	26.32	5/19
AM07	0	0/3	15.79	3/19
AM08	0	0/3	0	0/19
AM09	0	0/3	5.26	1/19
AM10	0	0/3	0	0/19
L2 ADULTS : ADVANCED(10)				
CA01	0	0/3	5.26	1/19
CA02	0	0/3	0	0/19
CA03	0	0/3	0	0/19
CA04	0	0/3	0	0/19
CA05	33.33	1/3	10.53	2/19
CA06	33.33	1/3	15.79	3/19
CA07	0	0/3	10.53	2/19
CA08	0	0/3	31.58	6/19
CA11	0	0/3	5.26	1/´9
CA12	33.33	1/3	11.76	2/17

Appendix B.7 L1 Child: Null arguments rejection rate

Subject	1st person null arguments		3rd person null arguments	
	%	n	%	n
NC01	0	0/3	0	0/19
NC02	0	0/1	33.33	2/6
NC03	0	0/3	5.26	1/19
NC04	0	0/2	29.41	5/17
NC05	0	0/2	55.56	5/9
NC06	50	1/2	23.08	3/13
NC07	100	3/3	80.00	12/15
NC08	0	0/2	8.33	1/12
NC09	0	0/3	0	0/19
NC10	0	0/3	27.78	5/18
NC11	0	0/2	58.33	7/12
NC12	33.33	1/3	0	0/18
NC13	0	0/3	47.37	9/19
NC15	33.33	1/3	47.37	9/19
NC16	0	0/3	26.32	5/19
NC17	0	0/2	40	4/10
NC18	0	0/2	0	0/16
NC19	0	0/3	0	0/19
NC20	0	0/3	0	0/19
NC21	0	0/2	10.53	2/19
NC23	33.33	1/3	26.32	5/19
NC24	33.33	1/3	0	0/19
NC26	0	0/3	37.5	6/16
NC27	33.33	1/3	10.53	2/19
NC28	0	0/2	7.14	1/14
NC29	0	0/3	22.22	4/18
NC30	50	1/2	38.89	7/18
NC31	0	0/3	29.41	5/17
NC32	0	0/3	26.32	5/19
NC33	0	0/3	31.58	6/19

Appendix B.8 L1 Adult controls: Null arguments rejection rate

Subject	1st person null arguments		3rd person null arguments	
	%	n	%	n
NA01	0	0/3	5.26	1/19
NA02	0	0/3	0	0/19
NA03	0	0/3	0	0/19
NA04	0	0/3	0	0/19
NA05	0	0/3	0	0/19
NA06	0	0/3	0	0/19
NA07	0	0/3	0	0/19
NA08	0	0/1	0	0/11
NA09	0	0/3	0	0/19
NA10	0	0/3	0	0/19
NA11	0	0/3	0	0/19
NA12	0	0/3	5.26	1/19
NA13	0	0/3	5.26	1/19
NA14	0	0/3	15.79	3/19
NA15	0	0/3	0	0/19
NA16	0	0/3	0	0/19
NA17	0	0/3	0	0/19
NA18	0	0/3	5.26	1/19
NA19	0	0/3	0	0/19
NA20	0	0/3	0	0/19

Appendix B.9 L1 Adults: Individual results for interpretation task

Subjects	Adjoining clause				Embedded clause			
	Null subject		Overt subject		Null subject		Overt subject	
	%	n	%	n	%	n	%	n
NA01	100	4/4*	100	5/5*	100	5/5*	100	4/4*
NA02	100	4/4*	100	5/5*	80	4/5*	75	3/4*
NA03	100	4/4*	80	4/5*	100	3/3*	100	4/4*
NA04	100	4/4*	100	5/5*	100	3/3*	100	4/4*
NA05	100	4/4*	100	5/5*	80	4/5*	75	3/4*
NA06	100	4/4*	80	4/5*	100	3/3*	100	4/4*
NA07	100	4/4*	100	4/4*	100	3/3*	100	4/4*
NA08	100	4/4*	100	5/5*	50	2/4	100	3/3*
NA09	100	4/4*	100	5/5*	50	1/2	100	4/4*
NA10	100	3/3*	100	5/5*	100	1/1*	100	4/4*
NA11	100	4/4*	100	5/5*	0	0/2	100	4/4*
NA12	100	4/4*	80	4/5*	40	2/5	75	3/4*
NA13	100	4/4*	100	5/5*	80	4/5*	75	3/4*
NA14	75	3/4*	100	5/5*	80	4/5*	75	3/4*
NA15	100	4/4**	100	5/5**	80	4/5*	75	3/4*
NA16	75	3/4*	100	5/5**	40	2/5	100	4/4**
NA17	100	4/4**	100	5/5**	100	5/5**	75	3/4*
NA18	100	4/4**	80	4/5*	50	2/4	100	3/3**
NA19	100	4/4**	100	5/5**	60	3/5	100	4/4**
NA20	75	3/4*	80	4/5*	33.33	1/3	75	3/4*

Note: * Target-like performance; No asterisk Non-target-like performance.

Appendix B.10 L1 children: Individual results for interpretation task

Subjects	Adjoining clause				Embedded clause			
	Null subject		Overt subject		Null subject		Overt subject	
	%	n	%	n	%	n	%	n
NC01	50	2/4	60	3/5	100	5/5*	100	4/4*
NC02	50	2/4	80	4/5*	60	3/5	75	3/4*
NC03	66.67	2/3*	100	4/4*	100	5/5*	100	4/4*
NC04	0	0/4	20	1/5	0	0/5	0	0/4
NC05	50	1/2*	40	2/5	80	4/5*	100	4/4*
NC07	66.67	2/3*	100	5/5*	60	3/5	100	4/4*
NC08	0	0/4	0	0/3	40	2/5	0	0/3
NC09	33.33	1/3	100	2/2*	80	4/5*	66.67	2/3*
NC10	66.67	2/3*	80	4/5*	80	4/5*	100	4/4*
NC12	75	3/4*	66.67	2/3*	75	3/4*	75	3/4*
NC13	0	0/4	66.67	2/3*	40	2/5	50	2/4
NC15	25	1/4	60	3/5	80	4/5*	100	4/4*
NC16	66.67	2/3*	75	3/4*	33.33	1/3	100	3/3*
NC17	50	2/4	40	2/5	50	2/4	75	3/4*
NC19	75	3/4*	80	4/5*	60	3/5	75	3/4*
NC20	75	3/4*	80	4/5*	20	1/5	100	4/4*
NC21	75	3/4*	80	4/5*	100	4/4*	66.67	2/3*
NC23	50	2/4	60	3/5	80	4/5*	100	4/4*
NC24	66.67	2/3*	75	3/4*	40	2/5	100	4/4*
NC26	75	3/4*	66.67	2/3*	40	2/5	50	2/4
NC27	75	3/4*	100	5/5*	60	3/5	100	4/4*
NC28	66.67	2/3*	40	2/5	25	1/4	75	3/4*
NC29	50	2/4	40	2/5	40	2/5	75	3/4*
NC30	75	3/4*	25	1/4	40	2/5	75	3/4*
NC31	100	4/4*	60	3/5	80	4/5*	100	4/4*
NC32	100	4/4*	80	4/5*	100	5/5*	100	4/4*
NC33	75	3/4*	80	4/5*	100	5/5*	100	4/4*

Note: * Target-like performance; No asterisk Non-target-like performance.

Appendix B.11 L2 children: Individual results for interpretation task

Subjects	Adjoining clause				Embedded clause			
	Null subject		Overt subject		Null subject		Overt subject	
	%	n	%	n	%	n	%	n
L2 CHILDREN : LOW (6)								
CL01	75	3/4*	60	3/5	60	3/5	75	3/4*
CL04	100	4/4*	60	3/5	60	3/5	50	2/4
CL07	0	0/3	40	2/5	0	0/5	25	1/4
CL08	0	0/1	50	2/4	0	0/5	25	1/4
CL09	50	2/4	75	3/4*	20	1/5	50	2/4
CL10	25	1/4	100	4/4*	80	4/5*	50	2/4
L2 CHILDREN : INTERMEDIATE (9)								
CM01	100	4/4*	100	5/5*	80	4/5*	75	3/4*
CM02	25	1/4	50	2/4	0	0/5	50	2/4
CM03	33.33	1/3	50	2/4	0	0/2	0	0/2
CM04	75	3/4*	80	4/5*	80	4/5*	100	4/4*
CM05	75	3/4*	100	5/5*	60	3/5	75	3/4*
CM06	75	3/4*	80	4/5*	60	3/5	75	3/4*
CM07	75	3/4*	100	5/5*	20	1/5	75	3/4*
CM08	100	4/4*	100	5/5*	80	4/5*	75	3/4*
CM09	75	3/4*	40	2/5	80	4/5*	75	3/4*
L2 CHILDREN : ADVANCED (8)								
CA01	100	3/3*	100	1/1*	0	0/2	100	3/3*
CA02	75	3/4*	100	4/4*	100	5/5*	100	3/3*
CA03	100	2/2*	100	4/4*	100	5/5*	100	3/3*
CA04	100	3/3*	50	2/4	75	3/4*	66.67	2/3*
CA06	100	4/4*	100	5/5*	100	5/5*	0	0/4
CA07	100	2/2*	100	3/3*	60	3/5	75	3/4*
CA08	100	4/4*	80	4/5*	60	3/5	75	3/4*
CA11	75	3/4*	100	5/5*	80	4/5*	100	4/4*

Note: * Target-like performance; No asterisk Non-target-like performance.

Appendix B.12 L2 adults: Individual results for interpretation task

Subjects	Adjoining clause				Embedded clause			
	Null subject		Overt subject		Null subject		Overt subject	
	%	n	%	n	%	n	%	n
L2 ADULTS : LOW (6)								
AL02	25	1/4	40	2/5	100	2/2*	0	0/2
AL03	0	0/2	100	3/3*	40	2/5	25	1/4
AL05	75	3/4*	100	4/4*	100	4/4*	75	3/4*
AL07	0	0/3	40	2/5	100	3/3*	66.67	2/3*
AL08	50	2/4	80	4/5*	60	3/5	100	4/4*
AL10	0	0	0	0/1	0	0	50	1/2*
L2 ADULTS : INTERMEDIATE (10)								
AM01	50	2/4	100	3/3*	50	1/2	66.67	2/3*
AM02	75	3/4*	100	5/5*	0	0/5	75	3/4*
AM03	0	0/3	40	2/5	40	2/5	66.67	2/3*
AM04	75	3/4*	100	5/5*	25	1/4	75	3/4*
AM05	75	3/4*	100	5/5*	60	3/5	75	3/4*
AM06	75	3/4*	100	5/5*	75	3/4*	75	3/4*
AM07	50	2/4	80	4/5*	40	2/5	75	3/4*
AM08	0	0/3	25	1/4	0	0/2	66.67	2/3*
AM09	100	4/4*	100	5/5*	20	1/5	75	3/4*
AM10	0	0/4	33.33	1/3	0	0/2	25	1/4
L2 ADULTS : ADVANCED (10)								
AA01	75	3/4*	80	4/5*	80	4/5*	100	4/4*
AA02	75	3/4*	100	5/5*	40	2/5	100	4/4*
AA03	100	4/4*	100	5/5*	33.33	1/3	66.67	2/3*
AA04	100	4/4*	100	5/5*	40	2/5	75	3/4*
AA05	75	3/4*	100	5/5*	0	0/1	75	3/4*
AA06	66	2/3*	100	4/4*	50	2/4	50	2/4
AA07	100	2/2*	100	5/5*	66.67	2/3*	33	1/3
AA08	50	2/4	100	5/5*	80	4/5*	100	4/4*
AA09	66.67	2/3*	100	5/5*	40	2/5	25	1/4
AA10	75	3/4*	80	4/5*	100	3/3*	50	2/4

Note: * Target-like performance; No asterisk Non-target-like performance.

Appendix B.13 L2 children and L2 adult: individual response: Null subject interpretation

Performance			Number of subjects with each pattern					
Pattern	NSA	NSE	L2 children			L2 adults		
			n		Subjects	n		Subjects
A	-	-	5	L:	CL07, CL08, CL09	8	L:	AL03, AL08,*AL10
				I:	CM02, CM03		I:	AM01, AM03, AM07, AM08, AM10
B	-	+	1	L:	CL10,	3	L:	AL02, AL07
							A:	AA08
C	+	-	8	L:	CL01, CL04,	10	I:	AM02, AM04, AM05, AM09
				I:	CM05, CM06, CM07		A:	AA02, AA03, AA04, AA05, AA06, AA09
				A:	CA01, CA07, CA08			
D	+	+	9	I:	CM01, CM04, CM08, CM09	5	L:	AL05
				A:	CA02, CA03, CA04, CA06, CA11		I:	AM06
							A:	AA01, AA07, AA10

Note: NSA = Null subject in adjoining clause; NSE = Null subject in embedded clause; L = Low proficiency;
I = Intermediate proficiency; A = Advanced proficiency; Note: *AL10 gave on answer.

Appendix B.14 L2 children and L2 adult: individual response: Overt subject interpretation

Performance			Number of subjects with each pattern					
Pattern	OSA	OSE	L2 children			L2 adults		
			n		Subjects	n		Subjects
a	-	-	10	L:	CL04, CL07, CL08	5	L:	AL02
				I:	CM02, CM03		I:	AM10
b	-	+	3	L:	CL01	4	L:	AL07, AL10
				I:	CM09		I:	AM03, AM08
				A:	CA04			
c	+	-	2	L:	CL09, CL10	5	L:	AL03
							A:	AA06, AA07, AA09, AA10
d	+	+	12	I:	CM01, CM04, CM05 CM06, CM07, CM08	15	L:	AL05, AL08
				A:	CA01, CA02, CA03, CA07, CA08, CA11		I:	AM01, AM02, AM04, AM05, AM06, AM07, AM09
							A:	AA01, AA02, AA03, AA04, AA05, AA08

Note: OSA = Overt subject in adjoining clause; OSE = Overt subject in embedded clause.