L2 acquisition of epistemic modality in English by L1 Thai-speaking children and adults

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The candidate confirms that the work submitted is his/her own and that appropriate credit has been given where reference has been made to the work of others.

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Abstract

The current study investigates the L2 acquisition of epistemic modals e.g. MUST, WILL, and MAY/MIGHT by Thai-speaking children and adults. The most crucial differences between Thai and English regarding epistemic modality are the syntactic mechanisms which indicate the reference time of the modal complements. The reference time of the modal complements in English is indicated by certain syntactic patterns, while the reference time of the modal complements in Thai is indicated by temporal adverbials or the context. These differences were therefore assumed to be the most difficult aspects of the epistemic modals in English which the Thai L2 learners of English have to acquire.

The fundamental research questions were addressed on the grounds of the Full Transfer, Full Access Hypothesis (Schwartz and Sprouse 1996) which acknowledges the role of L1 properties and the involvement of UG-constrained SLA. Child L2 acquisition was compared with both adult L2 acquisition, and child L1 acquisition. The motivation of the comparison comes from Schwartz (1992, 2003a, b) who argues that comparison of child L2 acquisition with adult L2 acquisition, and with child L1 acquisition potentially provides evidence in support or against theories of L1 and L2 acquisition.

A truth value judgment task was conducted, whereby the subjects were asked to decide whether the statements given were temporally felicitous to the test stories. The results show that, in terms of L1 transfer, the L1 properties were observed in both child L2 acquisition and adult L2 acquisition. The L2 children and the L2 adults allowed the interpretations which are not possible for the modal statements in English, but whose counterparts are possible in Thai. In terms of the acquisition of the syntactic patterns which constrain reference time, the L2 children have not acquired the syntactic patterns which constrain the reference time of the modal complements. These results suggest no clear evidence to support that the L2 children have overcome the poverty of the stimulus. Some of the L2 adults, on the other hand, appear to have acquired some syntactic patterns. This finding leads to speculation about the role of cognitive development in the acquisition of epistemic modality.

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The Thai transcriptions

The following are charts of Thai consonant, vowel and tone phonemes which I use in the transcription of the data in this thesis.

Consonants

		Bilabial	Labiodental	Alveolar	Palatal	Velar	Glottal
Stops	-voiced unaspirated	b		d		k	
	-voiceless unaspirated	p		t	tɕ		ʔ
	-voiceless aspirated	ph		th	tɕh	kh	
Fricatives			f	s			h
Nasals		m		n		ŋ	
Liquids				r. l			
Glides		w			j		

Vowels

	Front Short , Long	Central Short , Long	Back Short , Long
High	i, ii	ɯ, ɯɯ	u, uu
Mid	e, ee	ə, əə	o, oo
Low	ɛ, ɛɛ	a, aa	ɔ, ɔɔ
	iia, ɯɯa, uua		

Tones

Mid 1
Low 2
Falling 3
High 4
Rising 5

Abbreviations

PROG	progressive
FP	final particle
PERF	perfective
IMP	imperfective
NEG	negation
POSS	possessive
CP	complementizer
PART	particle
REL	relativizer
CLAS	classifier
PASS	passive marker

Chapter 1

Introduction

The roles of UG and L1 knowledge, which constitutes the heart of this thesis, are issues much discussed in second language acquisition (SLA) research. A number of SLA studies have been conducted to investigate involvement of UG and L1 knowledge in second language acquisition. The argument that the L2 learner's grammar is underdetermined by the input or that it could not be induced from the input alone gives rise to the *'poverty of the stimulus'* or *'the logical problem'* (White 2003: 4).

The observance of L1 properties in the L2 grammar suggests the involvement of L1 knowledge i.e. L1 transfer in L2 acquisition. Accordingly, hypotheses concerning these issues were formulated e.g. No Access to UG (Clahsen and Muysken 1986; Scharchter 1988; Bley Vronman 1988, 1989), Direct Access to UG (Flynn 1989; Epstein et al. 1996; Martohardjono 1993), Indirect Access (Vainikka and Young-Scholten 1994; Schwartz and Sprouse 1994, 1996; Eubank 1996). No Access to UG position argues for unavailability of UG in adulthood, and posits that L2 adult learners arrive at the L2 grammar by means of general cognitive problem-solving or learning mechanism. The Direct Access to UG position, on the other hand, convincingly argues for the availability of UG in adulthood, but denies the role of the L1 knowledge in L2 acquisition. Indirect Access to UG acknowledges the role of L1 knowledge at the initial state and UG constraints in L2 acquisition. Among these three hypotheses, Indirect Access to UG hypothesis seems to be, from my point of view, the most credible model for explaining the processes underlying L2 acquisition. I therefore assume this position, particularly Full Transfer Full Access Model (Schwartz and Sprouse 1994, 1996), for my current research, looking for evidence supporting this hypothesis.

Acknowledging the importance of child L2 acquisition as well as adult L2 acquisition in furthering our understanding of SLA and refining SLA theories, the current study investigates the L2 acquisition of epistemic modality in English by Thai-speaking children and adults.

Epistemic modality is concerned with speakers' assumption or assessment of possibilities. It indicates the degree of the speaker's confidence e.g. high or less, in the truth of the proposition expressed (Coates 1983: 18). In other words, it concerns an estimation of the likelihood that a certain state of affairs under consideration will occur, is occurring, or has occurred in the possible worlds (Nuyts 2001: 21).

It is generally agreed that modal verbs in English share some formal features with other auxiliaries, such as occurrence with negation, inversion, and emphatic affirmation. Accordingly, modal verbs are categorized as a kind of auxiliary, like *be, have, do*. The set of epistemic modal auxiliaries in English includes *may, might, must, will, should, would,* and *could.*

Linguistic forms in Thai which are often treated as equivalent forms of epistemic modal auxiliaries in English include *tɔɔŋ*^{3}, *ʔaat*^{2}, *khoŋ*^{1}, *naa*^{3}*tɕaʔ*^{2} and *tɕaʔ*^{2}. These forms have often been treated as preverbal auxiliaries because they usually precede a main verb, and signify modal meanings. The details of the syntactic and semantic properties of the epistemic modals in English and Thai are provided in Chapter 3.

The early stages of the current research, in 2008, focused on exploring and indentifying the areas which were likely to be problematic, or pose difficulties for Thai learners in acquiring epistemic modality in English. At first I explored research on the L1 acquisition of epistemic modality in English. I found that there was little research in this area. The research (Wells 1979, 1985; Hirst & Weil 1982; Byrnes & Duff 1989; Noveck 2001; Noveck, Ho, & Sera 1996; Papafragou 1998a, 1998c; Papafragou and Ozturk 2007), as presented in chapter 4, was not concerned with only epistemic modality, but also deontic modality. Common questions frequently addressed in the research on the acquisition of the modality were (1) when do the modal expressions emerge in a child's language?; (2) does a child know the differences between the modals regarding the relative strength? The results from longitudinal data and experiments showed that the deontic modal expressions emerged before the epistemic expressions, and young children knew the relative strength of the modal expressions quite early.

After exploring research on the L1 acquisition of epistemic modality in English, I searched for research which investigated the acquisition of epistemic modality in English by non-native speakers. There were only three studies available at the time the current research was conducted (Gibbs 1990; Mason 1994; Bardovi-Hralig 2005), and these studies focus on both deontic and epistemic modalities. Accordingly, the tasks and developmental paths of the acquisition of epistemic modality by non-native speakers are still mysterious. This, therefore, calls for the need of cautious investigation of the L2 acquisition of the epistemic modality.

In the second stage of the current research, a pilot study was conducted. The fundamental aim of the pilot study was to explore and identify the areas which were likely to crucially cause difficulties for native speakers of Thai in acquiring epistemic modality in English. A truth value judgment was designed to test whether Thai-speaking children and adults who resided in England were able to acquire basic meanings and certain structures of the epistemic modals in English. The results of the experiments showed that some of the L2 children and the L2 adults were likely to acquire the basic meanings e.g. inference, prediction, possibility and the relative strength of the epistemic modal auxiliaries. However, they did not acquire the structures which indicate past reference time of the modal complements. These results suggested that the Thai-speaking children and adults were likely to have difficulties in acquiring the syntactic properties of the epistemic modal auxiliaries. Therefore, the aspect which causes difficulties for Thai learners of English in acquiring the epistemic modal auxiliaries is the structures that indicate the reference time of modal complements of the epistemic modal auxiliaries.

Although the aspect which causes difficulties for Thai learners of English in acquiring the epistemic modal auxiliaries was identified, the researcher also conducted a survey of the use of the epistemic modal expressions in Thai. The aim was to explore whether the preverbal auxiliaries, the relevant forms of the modal auxiliaries in English, are typically used to express the epistemic modality. It was hypothesized that if the linguistic forms in English which the Thai learners have to acquire are rarely used in their native language, the task of the acquisition the epistemic modal auxiliaries for such learners will be even more complicated. The data used in the survey was selected from Thai Concordance Online Corpus provided by the Department of Linguistics,

Chulalongkorn University, Thailand. The results of the survey, as shown in Chapter 5, revealed that the preverbal auxiliaries are the typical means for expressing epistemic modality. Therefore, learning the linguistic forms which were typical in both L1 and the target language may not be particularly difficult for the L2 learners of English.

The results of the survey have emboldenced the assumption that the syntactic structures which indicate the reference time of epistemic modal complements in English crucially cause difficulties for the Thai learners of English.

In English, reference time of the modal complement is sensitive to the situational aspect of verb in the complements. In other words, present or future reading of a non-finite verbal complement is determined by the situational aspect or certain types of verbs in the complement, but not temporal adverbials. For example when the verbal complement of an epistemic modal is a stative predicate, which has imperfective aspect, the reference time of the situation can be construed as either present or future as in (1).

(1) Amina may/might/could/should be in Ottawa (now/tomorrow)
(Demirdarche, and Uribe-Etxebarria 2008: 92)

I shall call such linguistic structures '*syntactic patterns*' that indicate the reference time of the modal complement. The combination of a certain modal and a certain type of verbal complement in this case yields a certain reference time of the modal complement. It cannot be derived from either the modal or the verbal complement itself. In other words, the reference time of the modal complement results from the interplay between inherent semantic properties and aspectual properties of the verbal complement.

Unlike English, the reference time of the modal complement in Thai is unpredictable regardless of the types or the lexical aspect of the verb. The reference time of the modal complement in Thai is indicated by the temporal adverbial, or the context, as shown below.

(2) a. dæŋ[1] ʔaat[2] pen[1] wat[2]
Dang may/might be cold
'Dang may have a cold (now, yesterday, tomorrow)'

b. dæŋ[1] ʔaat[2] pen[1] wat[2] mua:[3]wa:n[1]nii[4]
Dang may/might be cold yesterday
'Dang may have had a cold yesterday'

c. dæŋ[1] ʔaat[2] maa[1] saaj[5] pruŋ[3]nii[4]
Dang may/might come late tomorrow
'Dang may may/might come late tomorrow'

We can notice that no matter what the lexical aspect of the modal complement is e.g. either imperfective as in (2a), the reference time of the modal complement can be the present, past or future. However, in (2b) and (2c) the reference time of the modal complements can only be past and future respectively due to the presence of the temporal adverbs.

The syntactic structures that indicate reference time of the epistemic modal complements in English are presumed to make difficulties for native speakers of Thai in acquiring the epistemic modal auxiliaries in English, as the reference time of the modal complements in Thai is indicated by temporal adverbials, and can be derived from the context. In general terms, Thai L2 learners of English have to acquire the L2 properties which are not present in their L1. In order for Thai L2 learners of English to express correct reference time of the modal complements, they need to acquire those kinds of syntactic structures. In other words, they need to work out what reference time is or is not allowed for certain structures.

Crucially, the L2 properties under consideration are not explicitly taught in typical English language classrooms in Thailand. Although, teachers in some classrooms may introduce epistemic modals to learners, they do not normally draw learners' attention to the specific syntactic structures used to indicate certain reference time of the epistemic modal complements in English. For instance, the occurrence of a particular modal like

might with an eventive verb like *come* manifests future reference time. This is part of implicit knowledge of English native speakers. This gives rise to '*the poverty of the stimulus*' that the Thai learners of English will encounter. The '*poverty of the stimulus*' in this case is, however, is quite broad as it refers to the situation where the reference time of the modal complements is not explicitly taught or described, and the relevant L1 knowledge does not account for the acquisition of the properties in question. The L2 learners eventually appear to acquire the properties in question after exposure to limited evidence.

We cannot deny, however, that the Thai learners are likely to be exposed to positive evidence i.e. correct examples of modality with particular reference time interpretation in the context of English language teaching and learning in schools. So, one may argue that the L2 learners do not encounter *'the poverty of the stimulus'*, in stricter sense, in acquiring the syntactic patterns that indicate the reference time of the epistemic modality. Nevertheless, I argue that '*the poverty of the stimulus*' still holds. Consider that the task for the L2 learners is to acquire the interpretations which are possible and impossible for certain syntactic patterns. Yet the L2 learners are exposed to only correct examples. This leads to the question of how the learners know that particular interpretations are not possible in English. Certainly, the data available to them do not contain the impossible interpretations. For these reasons, the L2 learners in the current study are assumed to encounter '*the poverty of the stimulus*'. '*The poverty of the stimulus*' in the in this case is therefore narrower.

With reference to the differences with respect to the reference time of the modal complements between English and Thai, the fundamental research questions addressed in the experimental study in Chapter 8 are as follows.

(1) *Do L2 English acquisition patterns show L1 properties with regard to reference time of modal complements?*
(2) *Can the Thai children and adults overcome the poverty of the stimulus in acquiring the syntactic patterns that constrain the reference time of modal complements in English? In other words, can the Thai L2 learners of English acquire the syntactic patterns that indicate the reference time of modal complements?*

(3) *If the Thai children and adults appear to acquire those syntactic patterns, the next question is, which patterns are acquired early and which patterns are acquired late i.e. by the L2 children and the adults with high proficiency?*

It is hypothesized along with the Full Transfer full Access position that Thai L2 learners of English will start off with their L1 knowledge. Specifically, the Thai L2 learners with low proficiency will allow interpretations which are not possible for certain modal statements in English because they do not know that the reference time of modal complements is constrained by certain syntactic patterns. This will be reflected in inaccurate acceptance when the modal statements are presented in temporally infelicitous conditions.

It is also hypothesized that an L2 learner will have access to UG if (s)he demonstrate the knowledge about the syntactic patterns that constrain the reference time of the modal complement. That is, the L2 learner has to consistently provide accurate acceptance when the modal statements are presented in felicitous conditions and accurately reject the modal statements when they are presented in infelicitous conditions. The rate of accuracy will increase with proficiency levels.

This thesis is organized as follows: chapter 2 provides conceptualization of L1 and L2 language acquisition in regard to Universal Grammar (UG) as well as a Principles and Parameters framework. This chapter also discusses the arguments of the poverty of the stimulus as well as the arguments of access to UG in SLA e.g. Direct Access, Indirect Access, and No Access. Besides, the issue of ultimate attainment in SLA and the rationale for the comparison of child L2 acquisition with adult L2 acquisition, and with child L1 acquisition is also presented.

Chapter 3 outlines the syntactic and semantic properties of epistemic modality in English and Thai. The chapter begins with basic concepts of modality showing differences between deontic and epistemic modality. The chapter also provides a review of the analysis of the syntactic and semantic properties of the epistemic modal auxiliaries in English in light of the Minimalist Programme (Chomsky 1993). The syntactic and semantic properties of the epistemic modal auxiliaries in relation to tense and aspect in English and Thai are also discussed. Finally, this chapter highlights the

similarities and the differences between the epistemic modal auxiliaries in the two languages in order to provide the rationale for the experiment in the current research.

Chapter 4 reviews previous research concerning acquisition of epistemic modality in English. As there are very few studies on the L2 acquisition of modality in English by non-native speakers, the L1 acquisition of epistemic modality in English is reviewed in order to establish relevant background for the further experiment as well as the implications for the L2 acquisition of epistemic modality in English by Thai learners of English. Moreover, the acquisition of deontic and dynamic modality will also be referred to at relevant points because most research on the acquisition of modality are always concerned with these types of modality as well.

Chapter 5 is the pilot study: an experimental study of the acquisition of the epistemic modal auxiliaries in English by Thai L2 learners of English, which aimed to explore syntactic and semantic aspects of the epistemic modal auxiliaries in English which were likely to pose difficulties for Thai L2 learners of English.

Chapter 6 presents the survey of the use of epistemic modal expressions in Thai. The modal expressions which were the focus of the survey include: preverbal auxiliaries, sentential-initial particles, sentential-final particles, and adverbs.

Chapter 7 reports on the L2 proficiency measurement. In the current research, the child L2 acquisition was compared with the adult L2 acquisition, and the child L1 acquisition. The L2 proficiency is therefore considered to be an independent mean that makes the cross-group comparison possible. A picture description task (Whong-Barr and Schwartz 2002) was used for eliciting L2 data. The L2 proficiency scores were based on three measures: the verbal density, the lexical diversity, and the rate of error-free clause (Unsworth 2005). The scores of the three measures were converted into a proficiency score by a statistical mean i.e. the 'Principal Component Analysis' (PCA). However, after obtaining the data, the PCA mean seems to be problematic as it could not handle the uncorrelated scores of the three measures. Accordingly, I proposed a simple alternative to the calculation of the L2 proficiency, and the proficiency scores by the simple alternative mean are used in the analysis of the results from the experiment in chapter 8.

Chapter 8 reports on the experiment: acquisition of the syntactic patterns that constrain the reference time of epistemic modal complements in English. A truth value judgment task was designed to trace the L2 learners' temporal interpretations of modal statements. The participants were asked to judge whether a certain modal statement was OK or NOT in felicitous and infelicitous contexts. The L2 child results were compared with L2 adult results, and with the L1 child results. The findings from the experiments are evidence supporting the claim that the initial state is based on L1 knowledge.

Chapter 9 summarises the results of the experimental study, and discusses them in relation to the theories of access to UG. Some methodological issues are also reviewed, and implications for future research are indentified.

Chapter 2

Theoretical background

2.0 Introduction

This chapter reviews the general conceptualization of language acquisition regarding the Universal Grammar (UG) and Principles and Parameters frameworks (Chomsky 1981b). Section 2.1 deals with the conceptualization of UG and first language acquisition. Section 2.2 outlines the arguments of the poverty of the stimulus as well as the arguments of access to UG in SLA e.g. Direct Access, Indirect Access, and No Access. The arguments of the poverty of the stimulus and the arguments access to UG in SLA constitute the research questions for the current study. Previous research in support of the three arguments is briefly reviewed at relevant points. Section 2.3 discusses the issue of ultimate attainment in SLA, whereas the rationale for the comparison of child L2 acquisition with adult L2 acquisition, and with child L1 acquisition is presented in section 2.4. Finally, section 2.5 presents a summary.

2.1 Universal Grammar in language acquisition

The fact that a child comes to master complex properties of grammar of his/her native language rapidly without explicit instructions hints at an innate predisposition. In addition, research on child language development has shown that linguistic forms children produce frequently go beyond, or are more advanced than, the input to which they were exposed. In other words, the children's grammar is underdetermined by the input or it could not be induced from the input alone. The successful acquisition of the complex properties points to a built-in system of universal principles and grammatical properties, and the mismatch between the input and the output gives rise to '*the logical problem* or *the poverty of the stimulus*' (White 2003: 4).

'*The poverty of the stimulus*' is generally conceived as the phenomenon where input that contains information about certain subtle and abstract linguistic properties are absent from the input a child is exposed to. The child, nonetheless, appears to unconsciously acquire abstract knowledge relevant to those properties, which (s)he has never heard, without benefit of instruction or corrections from people around them. One example of

the poverty of the stimulus is the acquisition of overt pronoun constraint (cf. White 2003).

The argument that the data available to children are simplified may account for some aspects of the very early stages of acquisition. However, those arguments somehow fail to provide an adequate explanation for the complex structures which children perform.

Children effortlessly overcome "*The poverty of the stimulus or the logical problem*" and acquire their native language with assistance i.e. Universal Grammar (UG), (Chomsky 1965, 1981a, 1981b, 1986a, 1986b, 1988; Pinker 1984, 1994).

In the early days of Generative Approach, language acquisition was conceptualized in terms of the initial state and final state of mind (Chomsky 1995a: 18). The mind of a new-born baby who had not yet acquired a language was conceived as being in an initial zero state or S_0, whereas the mind of an adult native speaker was conceived as being in a steady state or S_s. It was claimed that in the steady state, an adult has full knowledge of a language, and that the complete competence of the adult is unchanging. In this respect, acquiring a language meant progressing from the state of not knowing any language to the state of complete competence (Cook and Newson 1996: 78). This notion can be illustrated in Figure 2.1.

$$S_0 \longrightarrow S_s$$

Figure 2.1 State of the language faculty

(Cook and Newson 1996: 78)

In the course of native language acquisition, the transition from S_0 to S_s involves setting parameters. That is, a child applies principles of UG and sets the value of parameters appropriately for their native language (White 2003: 10). In setting a parameter, the child relies on positive evidence – the data containing grammatical sentences, rather than negative evidence – information about language, i.e. metalinguistic knowledge, correction, etc. In this case, positive evidence is conceived of as *'triggers'* for setting

parameter values. A parameter might start in a neutral position where any value is possible, or start in a particular value and need particular evidence to adopt the other value (Cook & Newson 1996: 115). The process of language acquisition can be illustrated by a model of L1 acquisition below.

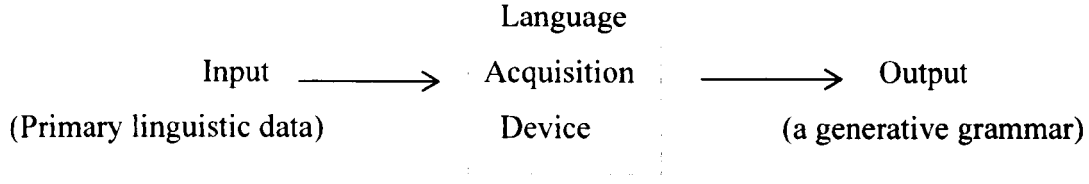

Figure 2.2 The LAD model of L1 acquisition
(Cook and Newson 1996: 80)

Chomsky (1964) used the model above to describe the process of language acquisition, and to explain the innate properties which enable children to arrive at the grammar of a language. At first, children hear a number of sentences (i.e. input/primary linguistic data) said by people around them. Then, the input is processed within LAD, and the children finally acquire linguistic competence in the language.

This model, however, was rephrased within the framework of Principles and Parameters (Cook and Newson 1996: 81), and more recently within the Minimalist Program (Chomsky 1993). According to Cook and Newson, the LAD is seen as Universal Grammar, whereas the output which emerges from LAD consists of grammar couched in principles and parameter forms. The knowledge that children acquire includes, for example, structure dependency, and the children's grammar contains the value appropriate for the parameters of a particular language. In addition, this knowledge consists of lexical entries which specify how individual words can behave in a sentence. The Universal Grammar model of L1 acquisition is illustrated below.

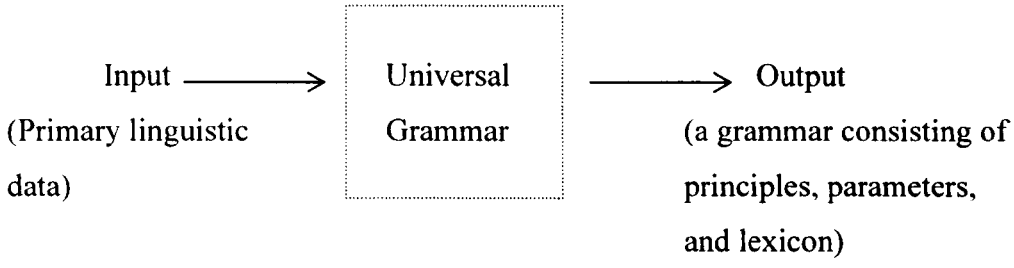

Figure 2.3 The Universal Grammar model of L1 acquisition (Cook and Newson 1996: 81)

Traditionally, it is broadly accepted that UG is the system of general principles that represent abstract properties of all human languages, with parameters that are possible across languages. It is the system which consists of principles, conditions, and rules that define the architectural structures of human language (Hawkins 2001:13). The principles are said to be common to all languages. The variations between languages, however, are considered to be '*parameters*'. Parameters are assumed to have two *'settings or values'*. With UG, very young children are unconsciously capable of acquiring a native language. Regardless of what native languages children are acquiring, the pattern of acquisition seems to be uniform (White 2003: 3). Although the proposal of principles and parameters seemed to explain general language properties, in today's Generative Approach, a number of linguists who assume this approach have struggled to identify what principles and parameters are exactly like. Accordingly, the proposal of principles and parameters has been put aside, and the Minimalism and linguistic interface has offered promising paths to the explanation of human language properties.

2.2 Universal Grammar in Second Language Acquisition

Researchers in the area of second language acquisition seem to agree that L2 children and L2 adults encounter the poverty of the stimulus as found in L1 acquisition. That is, the L2 learners appear to acquire the complex and subtle properties of language which could not be induced from L2 input. In other words, the L2 learners demonstrate the relevant existing grammatical knowledge which cannot be derived from their L1. Hence, the L2 adults' grammar is underdetermined by the input.

In addition, it is generally accepted that L2 learners come to the task of second language acquisition with their L1 knowledge, which is constrained by UG. The initial state of L2 acquisition may be called $S_i = (S_0 + S_s)$. The final state of L2 acquisition is, however, difficult to define because some L2 learners may complete the L2 native competence, while others do not. Therefore, the terminal state of L2 learners is referred to as S_t.

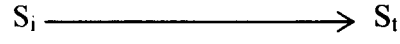

Figure 2.4 State of L2 learning

(Cook and Newson 1996: 126)

Although the issue of the poverty of the stimulus in L2 acquisition is acknowledged, the role of UG in L2 acquisition is still controversial. Much research on L2 acquisition has investigated the involvement of UG in L2 learners' grammar. Some research reveals evidence in support of the argument that L2 learners' grammar is constrained by UG, while others reported counterevidence to the argument.

Apart from this, despite the fact that L2 learners commence the task of L2 acquisition with their L1 knowledge, the extent to which L1 knowledge facilitates L2 acquisition is also debatable.

As a result of such controversy, three basic positions concerning the accessibility of UG as well as the involvement of L1 knowledge have been proposed i.e. *Direct Access, Indirect Access, No Access*. The next section discusses these three positions.

2.2.1 The hypotheses of access to UG in Second Language Acquisition

The issue of accessibility to Universal Grammar has a long history in research on second language acquisition (Felix 1991; Schachter 1989, 1991; Hilles 1991). Since the current study is concerned with the issue of the poverty of stimulus and the issue of L1 transfer, the following sub-sections discuss the hypotheses concerning the issue of access to UG and the involvement of L1 properties in SLA .i.e. No Access, Direct

Access, Indirect Access. The arguments put forward for each position will be highlighted, and the position assumed for the current study will also be identified.

2.2.1.1 No Access

No Access to UG hypothesis has always been associated with the Critical Period Hypothesis (CPH) by Lenneberg (1967): acquisition of a language is not possible after puberty, in its strong version, because parts of the brain which function for language acquisition no longer operate. An implication of this argument is that the innate properties i.e. UG, is not available to L2 adult learners. As a result L2 adult learners seek alternative means i.e. general problem-solving for language learning.

Similarly, in the strong version of the *No Access* position, it is claimed that, during the course of SLA, UG which is available for L1 acquirers, is no longer accessible to L2 learners. The unused parameters values are pruned. The evidence which the proponents of this position use in formulating the hypothesis are the differences between child L1 and adult L2 acquisition such as variations in L2 adult learners' ultimate attainment. Given that the UG is a system of principles that constrain L1 grammar, it guarantees success in first language acquisition. L2 adults should master L2 competence in the same way as in their L1 acquisition if the L2 learners appear to have access to UG (Scharchter 1988: 221). The L2 adult learners should not fail to achieve a complete state of L2 grammar.

Clahsen and Muysken (1986) compared the acquisition of word orders in German by adult non-native speakers and German-speaking children. They argued, in support of the No access to UG position, that the observed differences between L1 and L2 acquisition can be explained by assuming that L1 children's grammar is constrained by UG, while L2 adults' grammar is not. They argue that L2 adults arrive at L2 grammar by means of various cognitive mechanisms such as problem-solving strategies.

Bley Vroman (1988; 1989) identified differences between child L1 acquisition and adult L2 acquisition proposing the Fundamental Difference Hypothesis (FDH) in favour of the No Access position. According to this hypothesis, in the strong version, UG is not available to L2 adult learners. Bley Vroman argues that adult L2 acquisition differs

from child L1 acquisition in many aspects, such as lack of success, general failure, variation in success, variation in goal, fossilization, indeterminate intuition, the importance of instruction, negative evidence, and the role of affective factors. These characteristics lead him to assume no accessibility to UG in adult L2 development. Bley Vroman explained that L2 learners somehow acquire the target language by other cognitive module guidance (Bley Vroman 1988: 5). However, in this strong version, it is not clear what he means by cognitive module. The model of adult L2 acquisition can be illustrated as shown in figure 2.5.

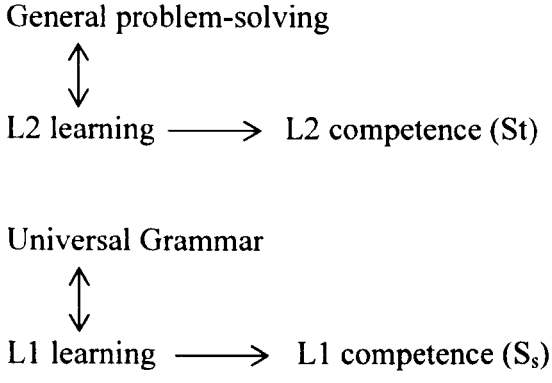

Figure 2.5 No Access model of L2 learning

(Cook and Newson 1996)

Bley Vroman later developed his proposal, and it is known as the weak version of the Fundamental Difference Hypothesis. He, nonetheless, does not deny the role of the native language in adult L2 development. In its weak version, he argues that L2 adult learners may arrive at L2 grammar using the instantiations of UG in their L1, hence L1 knowledge, and the general cognitive problem-solving. In this case, L2 adult learners have indirect access to UG by observing the most obvious large-scale characteristics of their native language, and then constructing a kind of UG-surrogate (Bley Vroman 1989: 52). This, however, implies partial access to UG.

Like Bley Vroman, Schatcher (1988) assumes differences between child first language acquisition and adult second language acquisition. Schatcher considers that child first language acquisition differs from adult second language acquisition in four respects: completeness, equipotentiality, previous knowledge, and fossilization. He also argues

that adult second language learners have a set of cognitive systems, or procedures and inference rules available for second language learning. However this is not particularly designed for language learning. There are several sources for adult learners such as their first language knowledge, L2 input data, as well as fully developed conceptual structures. The adult learners also have the ability to abstract regularities from their L1 knowledge and L2 input data (Schatcher 1988: 230).

It can be noticed that Schatcher accepts the role of the first language in second language acquisition. Based on Bley Vroman's weak version of FDH and Schatcher's argument, the model of adult L2 acquisition can be illustrated as shown in figure 2.6.

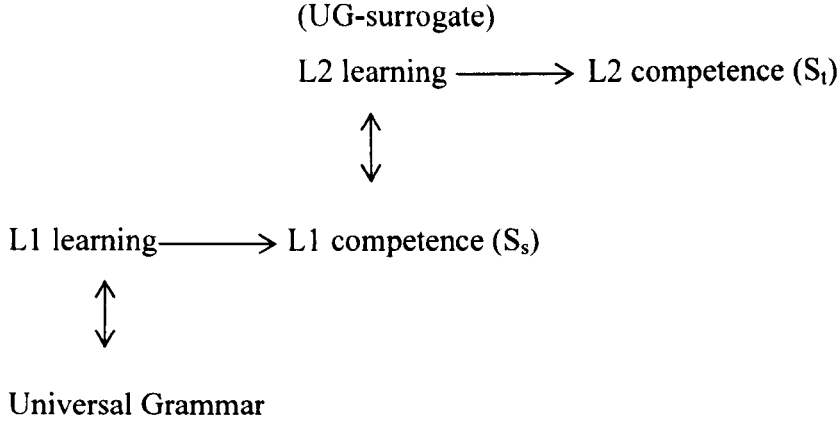

Figure 2.6 Partial Access model of L2 learning

(Cook and Newson 1996:293)

In sum, if the No Access to UG hypothesis, particularly its weak version, holds for adult L2 acquisition, then the adults' L2 knowledge would be limited to the properties that are only instantiated in their L1, and they would not be able to go beyond UG-based knowledge which is not available in their L1 grammar. This hypothesis seems to be flawed since recent research (c.f. Kanno 1998; Dekydspotter 2001; Slabakova 2001; Marden 2005) on L2 acquisition has demonstrated that adult learners are able to develop UG-parameter values which cannot be induced from their L1 grammar. This therefore suggests that adult learners have access to UG.

2.2.1.2 Direct Access

This position is sometimes referred to as *Full Access (without Transfer)*. According to this position, as suggested by its label, L2 learners have direct access to UG, and employ the principles of UG in setting parameter values in their second language. The proponents of this position argue that the initial state of interlanguage is not L1 grammar, but UG. They deny the role of L1 properties in L2 acquisition. That is, the parameter values in L1 do not affect the course of L2 acquisition because the L2 learners have parallel competence: L1 competence (S_s) and L2 competence (S_t) (Cook and Newson 1996: 291). The relationship between UG and language learning within this proposal can be illustrated by a model of L2 learning, as shown in figure 2.7.

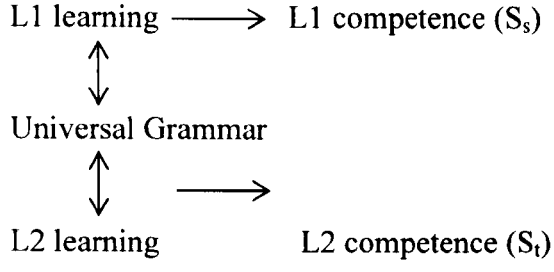

Figure 2.7 Direct Access model of L2 learning

(Cook and Newson 1996:292)

Flynn (1987, 1989, 1996) and Flynn and Martohardjono (1994) argue that L2 learners use principles and parameters isolated in L1 acquisition to construct L2 grammar. At the early stage of L2 acquisition, L2 learners recognize a match or a mismatch of parameter settings in L1 and L2. If the settings between the two languages match, the learners do not assign a new value to the parameters. On the other hand, if a mismatch is observed, a new value will be assigned by the facilitation of UG.

In formulating her hypothesis, Flynn used as evidence the findings from her study in 1989 on the investigation of the role of head-direction parameters in the acquisition of restrictive relative clauses in English by Spanish-speaking learners of English, and Japanese-speaking learners of English. Flynn predicted that the speakers of Spanish

would not have difficulty in acquiring such properties in English because Spanish and English are both head-initial languages. Indeed, the findings suggest that speakers of Spanish did not need to assign a new value to the parameter. The speakers of Japanese, conversely, were expected to have difficulty in acquiring English grammatical anaphors because Japanese is a head-final language, and they, in this case, would need to assign a new value to the parameter.

Epstein et al. (1996, 1998) argue against the partial-access hypothesis, the weak version of No Access to UG position, that L2 learners have full access to UG. There are new parameter settings in L2 acquisition. Parameter resetting is not possible since the parameter values in L1 are fixed, and cannot be reset (Epstein et al. 1996: 686). The results from Martohardjono's (1993) study of the acquisition of *wh*-movement in English by non-native speakers of English were assumed to confirm the new parameter settings in L2 acquisition.

In her study, Martohardjono (1993) tested the L2 learers's L2 knowledge of UG principles governing syntactic movement i.e. *wh*-question movement in English. The subjects, including speakers of Chinese, Indonesian and Italian were asked to judge the grammaticality of sentences. Martohardjono found the same patterns in the subjects' responses across L2 groups. That is, regardless of whether *wh*-question movement is instantiated in the subjects' L1 or not, the subjects tend to reject the sentences which violate the UG principles. Given that the corresponding sentences e.g. *wh*-question-*in-situ* in Chinese and Indonesian are grammatical, the Chinese and Indonesian speakers' L2 knowledge of ungrammaticality therefore cannot be derived from their L1. Martohardjono's view is that the source of this kind of knowledge must be based in UG principles (1993).

Although the results of the two studies appear to confirm the prediction of the Direct Access position, they are questionable. As Slabakove (2001: 14) points out, the subjects in the studies were not beginner learners of English. Accordingly, they did not demonstrate the initial state of the L2 acquisition. This, therefore, cannot disprove the role of L1 knowledge at the initial state of L2 acquisition, which is a fundamental conceptual of Indirect Access to UG hypothesis.

2.2.1.3 Indirect Access

This position acknowledges the role of L1 and UG in L2 acquisition. The proponents of this position argue that the initial state of L2 acquisition is L1 grammar. That is, L2 learners start off with their L1 grammar and adopt L1 parameter values in dealing with L2 input. As a result, L1 properties can be observed in L2 learners' interlanguage. If the L1 grammar fails to accommodate the L2 grammar, 'restructuring' or 'parameter resetting' may occur (White 2003: 61). The L2 grammar is then constrained by UG. The model of adult L2 acquisition under the Indirect Access hypothesis can be illustrated by figure 2.8.

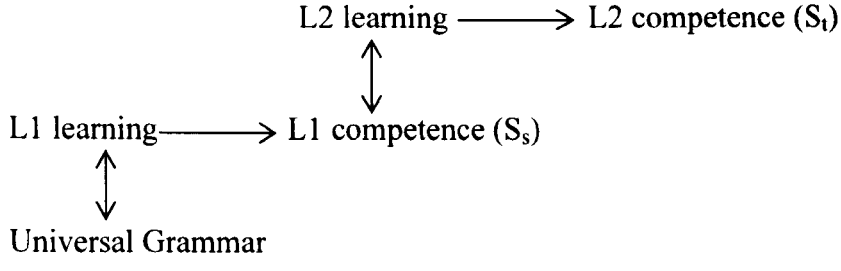

Figure 2.8 Indirect Access model of L2 learning

(Cook and Newson 1996:293)

Although the proponents of the Indirect Access to UG position unanimously acknowledge the role of L1 grammar and UG at the initial stage of second language acquisition, the extent to which L1 grammar constitutes the L2 initial state has been interpreted differently. Accordingly, several models concerning the role of L1 grammar and UG in L2 SLA have been proposed e.g. Minimal Tree Hypothesis (Vainikka and Young-Scholten 1994), Full Access Full Transfer (Schwartz and Sprouse 1994, 1996), and Valueless Features Hypothesis (Eubank 1996).

2.2.1.3.1 Minimal Tree Hypothesis (Vainikka and Young-Scholten 1994)

Vainikka and Young-Scholten (1994) investigated the interlanguage of Turkish, Korean, Italian and Spanish-speaking adults acquiring phrase structures in German. They observed that at the initial stage of the learners' L2 grammar, the learners transfer their L1 VPs. However, only lexical categories are present. L2 functional categories such as IP or ARGP gradually emerge during the development (Vainikka and Young-Scholten 1994: 293). This suggests that L2 learners start off with a minimal syntax tree.

Vainikka and Young-Scholten also point out that although functional categories are not present in the initial stages of interlanguage, the UG inventory of functional categories remains available (White 2003: 69). L2 child learners will gradually add functional categories by triggering L2 input, and consequently acquire the associated properties of the functional categories such as IP, CP and DP etc.

2.2.1.3.2 Full Transfer Full Access (Schwartz and Sprouse 1994, 1996)

Schwartz and Sprouse (1996) proposed the Full Transfer Full Access Model based on their findings from a longitudinal study of the acquisition of German word order and nominative case by a Turkish-speaking child in 1994. Schwartz and Sprouse argue, as opposed to Vainikka and Young-Scholten's Minimal tree model, that the initial state of the L2 acquisition is the entirety of L1 knowledge, which is constrained by UG – with the exception of the phonetic matrices of lexical/morphological items. Subsequently, if the learners fail to assign the L1 existing parameter values to an L2 parameter, there will be 'restructuring' or 'parameter resetting' by the apparatus of UG (Schwartz and Sprouse 1996: 40-41).

Schwartz and Sprouse (1996: 42) additionally argue that although the L2 development is guided by UG, which constrains L1 grammar, the final state of L2 acquisition will not necessarily resemble the final state of L1 acquisition, because of the lack of input necessary for restructuring e.g. negative evidence, or the obscurity or scarcity of the positive evidence. Nevertheless, the cognitive processes underlying L1 and L2 acquisition do not necessarily differ. The course that L2 development takes is

determined, in part, by the initial state, in part by input, in part by the apparatus of UG, and in part by learnability consideration (Schwartz and Sprouse 1996: 41).

2.2.1.3.3 Valueless Features Hypothesis (Eubank 1993/94, 1996)

Eubank (1993/94, 1996) investigated negation in German-English interlanguage assuming 'weak transfer' of L1 grammar to interlanguage at the initial state of acquisition. This position challenges Vainikka and Young-Scholten's Minimal tree model and Schwartz and Sprouse's *Full Transfer Full Access Model*. Firstly, in contrast to the Full Transfer Full Access model, L1 grammar does not entirely determine interlanguage initial state. Second, in contrast to the *Minimal Tree Hypothesis*, Eubank argues that both lexical and functional categories can be observed in interlanguage. However, the functional categories are claimed to be 'valueless' or 'inert'. That is, lexical and functional projections, the headedness of those projections are transferred, but morphology-driven values of features like the strength of agreement are not transferred (cf. Eubank 1993/94).

2.2.1.4 Summary

The hypotheses discussed in this chapter attempt to identify the logical options with regard to the accessibility of UG and the role of L1 knowledge in L2 acquisition. Of note is that early hypotheses (i.e. No Access to UG) were formulated based on differences between L1 child data and L2 adult data. The adult data that was used as evidence in support the hypothesis, however, does not well represent paths in L2 development since the adult subjects in those studies were not L2 beginners. Moreover, it denies the influence of L1 in L2 grammar. This position has therefore been disproved by L2 researchers from the Direct Access position and the Indirect Access positions.

Direct Access to UG has motivated further steps in L2 research under the generative tradition. First, L2 child data has been taken into consideration in formulating hypotheses concerning the nature of L2 initial state in relation to UG. Many of the arguments put forward under the Direct Access position are based on both adult L2 and child L2 acquisition. Although the proponents of this position claim that UG constrains L2 acquisition, the role of L1 knowledge is not acknowledged. As for the Indirect Access position, it acknowledges the role of UG and L1 knowledge in L2 acquisition.

Under this position, child L2 acquisition is usually compared with adult L2 acquisition. Moreover, L2 cross-sectional data is used in exploring the nature of the initial state of interlanguage through to its final state. Although the roles of UG and L1 knowledge in L2 acquisition are acknowledged, there is disagreement regarding the extent to which L1 grammar influences L2 initial state among the proponents of the hypothesis. As a result, different models concerning this issue were proposed to characterize the initial state of interlanguage.

Since the Full Transfer Full Access Model is, in the point of view of this author, the most credible model for explaining the processes underlying L2 acquisition, I will assume this position for my current research. This model does not limit the role of L1 knowledge to lexical categories and functional categories, but it assumes the entirety of L1 knowledge as well as the role of UG in L2 acquisition. In addition, it also takes into account learnability consideration of learners. It is hoped that the acquisition of epistemic modality in English by Thai-speaking children and adults will contribute to this model.

2.3 Ultimate attainment

The final state or the ultimate attainment in L2 acquisition is, however, difficult to define, as mentioned in the previous section. Some L2 learners may complete the L2 native competence, while others may not. Nevertheless, it is believed that a child typically succeeds with respect to the ultimate attainment of the native language. An adult L2, on the other hand, frequently fails to acquire L2. This leads to the question of whether or not UG is still available to L2 adult learners.

In the case of L2 acquisition, the issue of ultimate attainment has also been addressed in comparing child L2 acquisition with adult L2 acquisition. Much research on SLA reveals that an L2 child tends to succeed with respect to ultimate attainment of the target language, while an L2 adult frequently fails in acquiring L2 (e.g. Krashen, Long & Scarcella 1982). This notion implies the effects of age in SLA, and has influence in later research on SLA.

The frequently cited studies on SLA which provide evidence for the argument of the effects of age in SLA include Johnson & Newport (1989) and Birdsong (1999). Johnson & Newport investigated the English proficiency attainment of 46 native speakers of Korean or Chinese, who had arrived in the United States at between 3 and 39 years of age, and who had lived in the US from 3 to 26 years by the time of testing. In the study, the subjects were tested with a grammatical judgment task. The results of the study revealed the relationship between the age of arrival and the ultimate attainment of L2 grammar. That is, the subjects who arrived in the US before puberty performed better than those who arrived in the US after puberty in every type of grammatical and morphological rule test. The results of the study therefore support the notions that young children have an advantage over adults in acquiring a second language.

The study by Johnson & Newport (1989) has shed light on second language acquisition. The authors formulated the Critical Period Hypothesis in SLA; a hypothesis that has been tested in much research concerning ultimate attainment in SLA. After their research, came an important work that has also been frequently cited in research on SLA, viz. Birdsong (1992), who found age effects among the participants who began learning their L2 as adults.

Birdsong (1992) replicated the study by Johnson & Newport (1989) using a grammatical judgment task to investigate the acquisition of French by 20 native speakers of English aged between 19 – 48 years, who were exposed to French after puberty and who had resided in France for at least 3 years. The age of arrival (AOA) of the subjects ranged between 11 – 28 years old. The results of the study surprisingly show some effects of age after the end of the presumed critical period. That is, even though the subjects began learning their L2 when they were adults, 6 of 20 participants performed well within the range of native controls. Regarding the results of his study, Birdsong argues for age effects in second language acquisition that AOA is, however, predictive of success in learning SLA.. In other words, the Age Effects in second language acquisition are not only limited to prior to puberty, but they can also be observed after this period.

In summary, variations in the ultimate attainment in L2 adults do not lead only to the issue of the accessibility to UG, but also lead to the issue of age effects in SLA. These

two issues crucially constitute the rationale for comparison of child L2 acquisition with adult L2 acquisition. The current research compares child L2 acquisition with adult L2 acquisition. The rationale for the comparison of child L2 acquisition with adult L2 acquisition and with child L1 acquisition is outlined below.

2.4 The rationale for comparing child L2 acquisition with adult L2 acquisition

Dating back to early arguments on accessibility of UG in SLA, the study of acquisition order of English grammatical morphemes by Spanish-speaking children by Dulay and Bert (1973) was a groundbreaking study on child L2 acquisition. However, after Dulay and Bert (1973), most research on L2 acquisition within Government and Binding Theory were mainly concerned with adult L2 acquisition. Furthermore, adult L2 acquisition has frequently been compared with child L1 acquisition. Child L2 acquisition was thus left behind. Until the 1990s, child L2 acquisition received more attention, and was the focus of research on L2 acquisition (Hyams 1992; Lakshmanan 1991, 1994; Schwartz 1992, 2003a, 2003b; Haznedar 1997; Jaeggli and Hyams 1988; Rocca 2007). The studies of child L2 acquisition address several issues in L2 acquisition such as the role of UG and L1 grammar in L2 acquisition, the L2 developmental stages, and the differences between child L2 and adult L2, and child L2 and child L1 acquisition (Lakshmanon 1994: 19). The results from child L2 acquisition research have become crucial evidence for disproving or supporting SLA hypotheses.

Child L2 acquisition is also the focus of the present study. In addition, it is compared with adult L2 acquisition and child L1 acquisition. Schwartz (1992, 2003a, 2003b), argues that the comparison of child L2 acquisition with adult L2 acquisition will provide the answer to the question of whether or not UG underlies adult L2 acquisition, and whether or not such acquisition is the result of general learning mechanisms or general problem solving (Clahsen and Muysken 1989). On the other hand, comparing child L1 acquisition with child L2 acquisition helps refine our understanding of L1 acquisition. These assumptions constitute the fundamental rationale for the present study in comparing child L2 acquisition with adult L2 acquisition, and child L1 acquisition.

Since the present study is concerned with child L2 acquisition and adult L2 acquisition, it is necessary to distinguish L2 children from L2 adults. To do this, linguists who are interested in child L2 acquisition often take into account the starting point of a decline in the ability to reach native level L2 proficiency. Consequently, various ages have been considered to represent the start of such a decline, including, for example, 5 years, 7 years, 8 years and 9 years. Nevertheless, identifying an exact age is somewhat problematic.

It is generally accepted that the bulk of L1 grammar is in place by the age of 4. As such, acquiring a new language at this point constitutes a case of L2 acquisition (Unsworth 2005b: 7). In addition, results of studies on age and L2 ultimate attainment show that L2 children who are exposed to the target language before the age of 8 perform as native speakers do on a variety of tasks on a variety of (morpho-syntactic) phenomena (Schwartz 1992: 39). Accordingly, I distinguish L2 children from an L2 child from and an L2 adult following Schwartz (2003a) and Unsworth (2005).

An L2 child refers to a non-native acquirer whose initial exposure to the target language is between the approximate age of 4 and 7. An L2 adult, on the other hand, refers to a non-native acquirer whose initial exposure to the target language occurs after the age of eight years old (Schwartz 2003a: 48).

2.5 Summary

This chapter presented the theoretical background in language acquisition including Principles and Parameters, the poverty of stimulus, and UG in first language and second language acquisition. It also outlined the arguments of access to UG in SLA and the issue of ultimate attainment. The rationale for comparing child L2 acquisition with adult L2 acquisition and child L1 acquisition is also presented. As already mentioned, the current research assumes the Full Transfer Full Access model. The acquisition of English modal auxiliaries by Thai L2 learners will be investigated, with the aim of obtaining evidence that contributes to the model. The next chapter outlines the general conceptualization of modality in English and Thai.

Chapter 3

The syntactic and semantic properties of epistemic modal auxiliaries in English and Thai

3.0 Introduction

This chapter outlines the syntactic and semantic properties of epistemic modality in English and Thai. The chapter begins with basic concepts of modality. It is followed by details of epistemic modality, particularly preverbal auxiliaries, in English and Thai. Section 3.2 discusses the syntactic and semantic properties of epistemic modal auxiliaries in English. The syntactic framework, namely the Minimalist Program (Chomsky 1993) relevant to the epistemic modal auxiliaries is also reviewed. Section 3.3 presents the syntactic and semantic properties of the epistemic modal auxiliaries in Thai. The similarities and the differences between the epistemic modal auxiliaries in the two languages are highlighted in section 3.4. Section 3.5 is a summary.

3.1 The basic concepts

Modality is a grammatical category commonly found in most languages, and is closely associated with the other two grammatical categories e.g. tense and aspect. These three categories are characteristics of clauses (Bybee, Perkins, and Pagliuca 1994; Bybee, and Fleischman 1995). While tense is concerned with the time of events, aspect is concerned with the nature of events. However, modality differs from tense and aspect in that it does not refer directly to any characteristics of the event, but simply to the status of the proposition that describes the event (Palmer 2001: 1).

Modal expressions are widely recognized to communicate two broad clusters of meanings: epistemic and deontic. Apart from these two clusters of modality, a third type of modality is often proposed, namely, dynamic modality. Dynamic modality involves ability, intention, and willingness (Palmer, 1990, Hoye 1997). Sentences (3) and (4) below contain epistemic and deontic modal auxiliaries respectively, whereas sentence (5) below contains dynamic modal auxiliaries.

(3) a. She *must* be John's daughter.
b. He *may* be at home.
c. It *should* be colder at night

(4) a. He *must* finish his homework before going out with friends.
b. You *may* go home now.
c. Nina *should* study harder if she wants to pass the exam.

(5) a. Tom *can* run very fast.
b. I *will* come to see you tomorrow.

Dynamic modality and deontic modality are sometimes classified and included in the same category i.e. 'root modality' (Coates 1983). This is because both deontic and dynamic modality are agent-oriented, whereas epistemic modality is speaker-oriented. In this chapter, I will not further elaborate upon the details of deontic and dynamic modality. Rather, I will concentrate on epistemic modality as it is the main focus of the present study. The next section discusses the system of epistemic modal auxiliaries in English.

3.2 Epistemic modal auxiliaries in English

3.2.1 The syntactic status of epistemic modal auxiliaries in English

It is generally agreed that modal verbs in English share some formal features with other auxiliaries, such as occurrence with negation, inversion, code, and emphatic affirmation. These features are known as NICE properties (Huddleston 1976):

N They take negation directly without the need for DO support e.g. *can't, mustn't, etc.*.

I They are inverted with the subject in interrogative sentences e.g. *Can I...?, May I ...*, etc..

C They encode the proposition in elliptic constructions: *John can swim and so can Bill.*

E They convey emphatic meaning: *He will be there.*

Apart from the four features above, Warner (1993) and Palmer (2001) argue that although these modals share some features with other auxiliaries like BE and HAVE, they have their own features which can be summarised as follows.

(i) No co-occurrence. This means that the modal auxiliaries never occur with other auxiliaries. There is no **may will, *must can,* etc. (except in some dialects[1]).

(ii) No –s forms for third person singular. For example **cans, *mights,* etc.

(iii) No non-finite forms. There is no **I hope to can come tonight.*

(iv) Although, *could, would, should* can be used as past time references, it is not the common function of these auxiliaries. Rather, they are usually used to express hypothetical meaning or tentativeness.

According to the properties above, modal verbs are categorized as a kind of auxiliary, like *be, have, do*. The set of epistemic modal auxiliaries in English includes *may, might, must, will, should, would,* and *could.* Since modal verbs are categorized as a type of auxiliary, it is therefore worth discussing the syntactic analysis of the auxiliaries as it will reflect the syntactic status and the structural position of the epistemic modal auxiliaries in English, which is the focus of this chapter.

The syntactic analysis of auxiliaries in English within the Generative Approach can be divided into two tenets, one that treats auxiliaries as predicates (Ross 1969; Pullum and Wilson 1977), and the other that treats auxiliaries as feature carriers (Jackendoff 1977; Chomsky 1995). The former is known as aux-predicate analysis, and the latter is known as aux-feature analysis or separate analysis.

Under the aux-predicate analysis, auxiliaries are treated as a kind of verb taking verbal complements. The tree representation of the clause that contains an auxiliary can be illustrated in (6).

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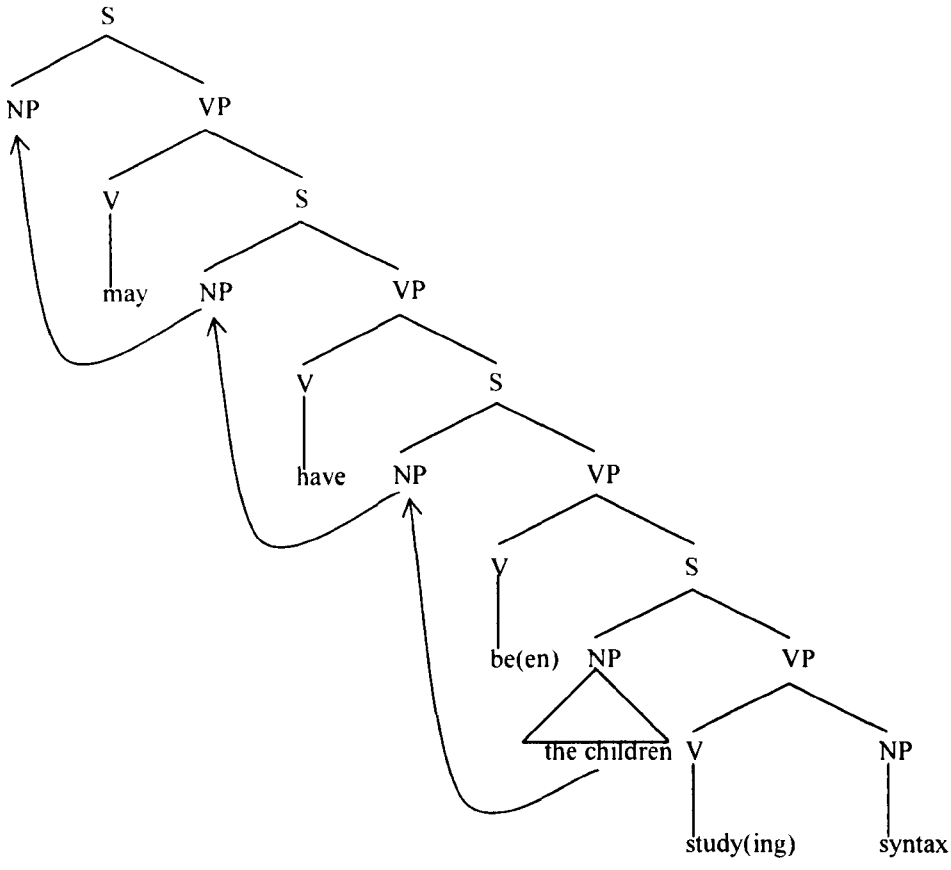
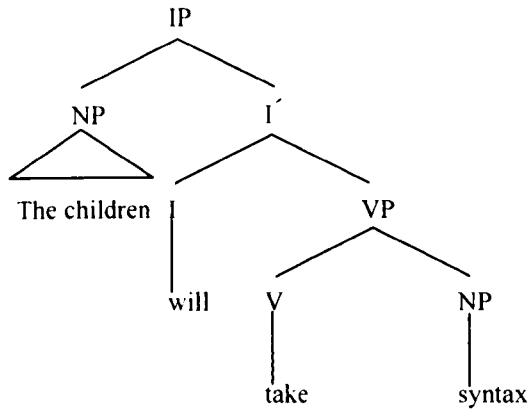
[1] Double modals can be found in Southern American and African American English, and Scottish. English example '*I might could get it for you*' (Battistella 1995).

(6)



However, Jackendoff (1977) points out that although auxiliaries generally take verb expressions as their complement, they do not have semantic features e.g. predicate-argument structure, like typical verbs. In other words, they do not take a range of different types of complements (Radford 1997: 50). The auxiliary and modal verbs are rather associated with the semantic function or grammatical categories such as *tense, aspect, voice, mood,* or *modality*. In addition, the auxiliaries are conceived as categorical heads e.g. INFL or I under the IP of the sentence (Falk 2008: 865). For these reasons, the auxiliaries are treated as functional categories. The tree representation of the clause that contains an auxiliary within aux-feature analysis can be illustrated in (7).

(7)



Falk (2008) argues that the aux-predicate analysis is more plausible because modals such as *may/might* can be used as predicates, which can be paraphrased with a predicate like *possible*, as illustrated in (8). However, he proposes the aux-feature analysis for the modals *will* and *would* because the modal *will* behaves like a carrier of future tense feature, and the modal *would* behaves like an auxiliary in a *rather* construction, e.g. *would rather* (cf. Falk 2008).

(8) a. He might be at home.
b. It is possible that he is at home.

In summary, although there are two separate proposals for the syntactic status of modals in English, i.e. the aux-feature analysis and the aux-predicate analysis, there seems to be a general agreement that auxiliaries and modals belong to functional categories. Since the investigation of the genuine syntactic status of modal auxiliaries is not the main aim of the current research, I will simply assume that, like other auxiliaries, epistemic modals are functional categories which take a VP as their complements.

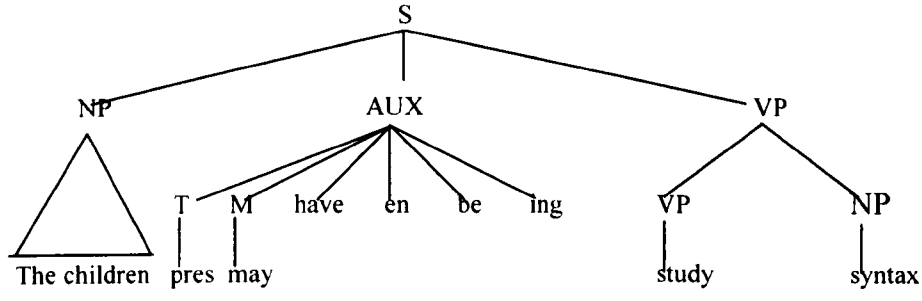
3.2.2 The structural position of epistemic modal auxiliaries

The epistemic modals are assumed to occupy the same structural position as auxiliaries in literature. That is, all auxiliaries occupy the AUX node like *have*, *be* and *do*. This idea, however, has recently changed. In this section, I first briefly discuss the development of the arguments on the structural position of the auxiliaries under the

Minimalist approach as it is relevant to the structural position of the epistemic modals, which will be presented afterward.

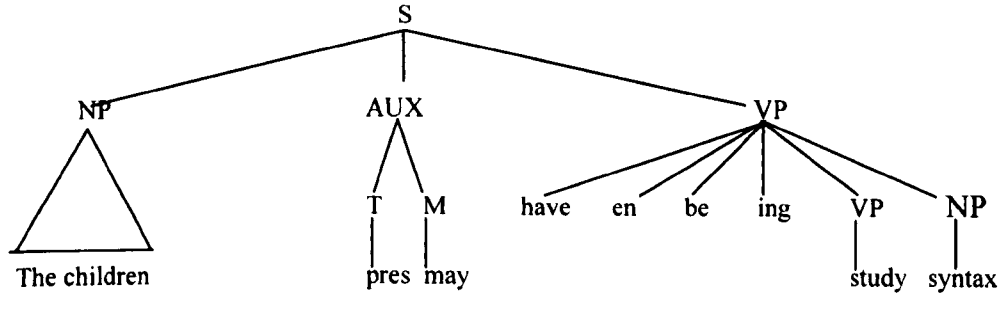
Dating back to the 1960's, in the traditional version of generative syntax, auxiliaries were thought to be under an AUX node, as in (9). Hence, all functional categories, including modals, were seen as dominated by an AUX node. This thinking was, however, later reconsidered by Jackendoff (1972, 1976), and an alternate version of the analysis was proposed due to the awkwardness of the inclusion of all auxiliaries in the AUX node.

(9)

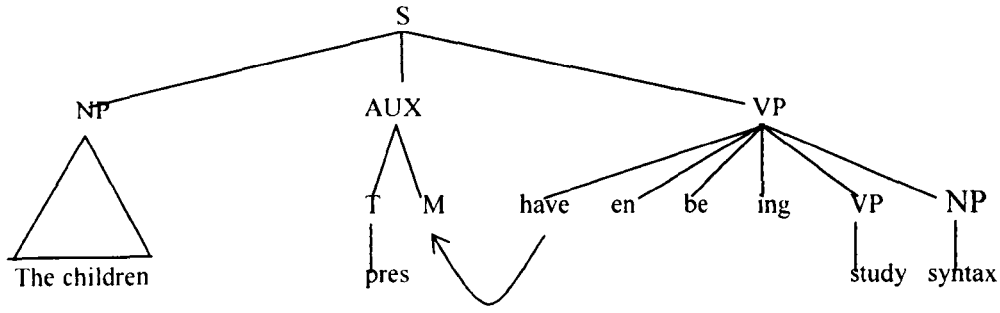


In Jackendoff's alternate version, if a clause contains a modal auxiliary like *may* and an auxiliary like *have* as in (10), only the first auxiliary *may* is included in the AUX constituents, and the second auxiliary *have* must remain in the VP. However, if there is no modal in the clause, but it consists of only an auxiliary like *have* as in (11), the auxiliary *have* will encounter transformation and move to AUX node (Falk 2008: 863).

(10)

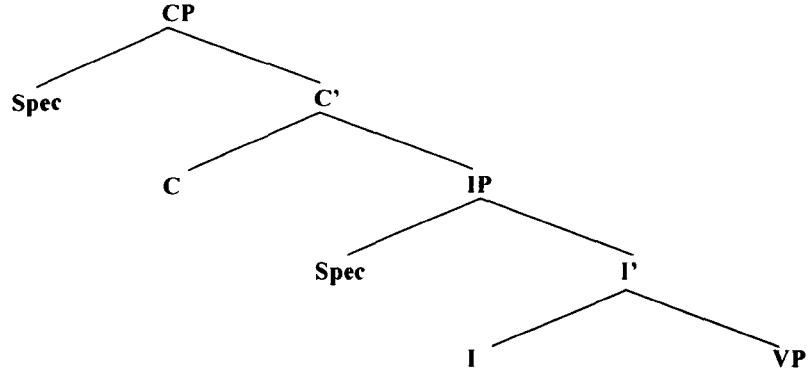


(11)



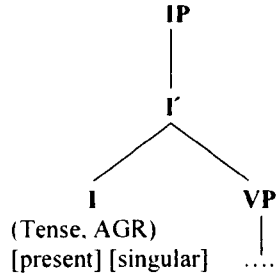
In the 1980s, Chomsky (1986a) postulated the structure of a clause consisting of three layers of projections: CP, IP, VP, each with a specialized function (Haegeman 1997: 25). The projection of V, VP is the thematic layer. The lexical head, which is a verb, is included in V node. It assigns the thematic roles to the arguments within the VP. The projection of I, IP is the level where inflectional morphology such as tense and agreement are licensed. The specifier position of IP is occupied by the subject. Within the CP level the illocutionary force of the clause is encoded. The structure of a clause can be illustrated as follows.

(12)



Chomsky (1991) argues that the IP is a kind of functional phrase which has two internal levels: I″ and I′. The I″ includes I′ and a specifier, whereas the I′ includes I and a complement i.e. VP. This conforms to the X bar theory. The head I can be an auxiliary like BE, DO and HAVE or an abstract element that includes the features of tense and agreement (Cook & Nelson 2006: 148).

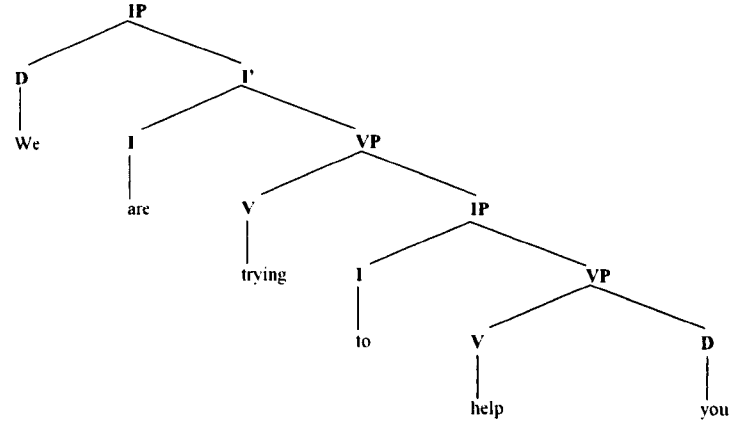
(13)



The auxiliaries occupy I node in an IP because they carry three sets of grammatical features: head-features, complement-features, and specifier-features (Radford 1997: 67). The head-features describe the intrinsic grammatical properties. The complement-features describe the kind of complement they take, and the specifier-features describe the kind of subject they can have.

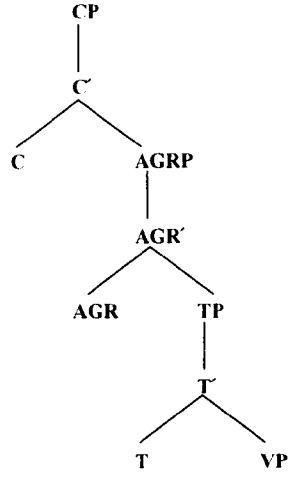
For example, *are* in the IP *we are trying to help you*. *Are* in the example carries the head-features [Pres], indicating present tense. It also carries complement-features [+ing], and selects a complement whose head is a verb which carries the participle inflection *–ing*. In addition, *are* carries the specifier-features which include case-features and agreement-features. Regarding the case-features, *are* requires a nominative subject like *we*, and it requires a subject which is either second person like *you* or plural like *they/we* due to the agreement-features.

(14)



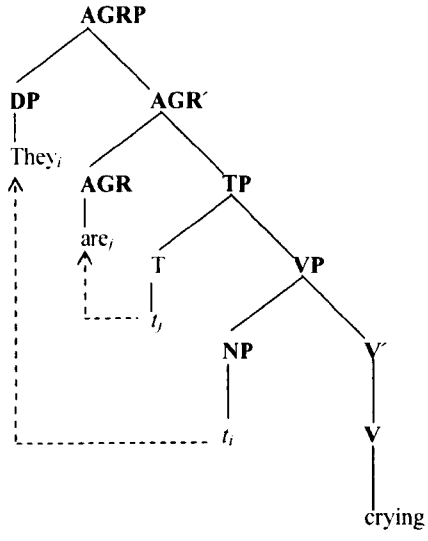
The fact that auxiliaries like *have* and *be* typically inflect for tense and agreement leads to a separation between AGRP (Agreement Phrase) and TP (Tense Phrase) i.e. the *split INFL hypothesis* (Pollock 1989). Pollock (1989) argues that the functional category INFL should not be considered as one category that includes more than one set of features. Instead, each set of features should form its own syntactic head of a maximal projection. As illustrated in (15), the AGRP is higher than TP (Belletti 1990; Chomsky and Lasnik 1993; Schaeffer 1994).

(15)



Regarding the *split INFL hypothesis*, auxiliaries such as *have* and *be* are generated in the T position, and then move into AGR position, and nominative subjects rise from SPEC-VP to the specifier position in the agreement phrase to check their case features (Radford 1997:225). As for the bare V, it first moves to T to pick up the tense morphology, then to AGR to pick up the agreement morphology (Haegeman 1997: 37). The movement of auxiliaries from T position to AGR can be illustrated as in (16).

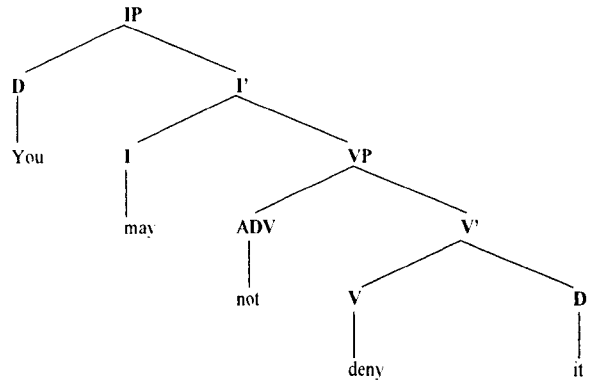
(16)



In (16) we can see that the auxiliary *are* is generated in T position, then moves to check its feature of agreement in AGR position which is located higher than T. The nominative subject *they* raises from SPEC position of VP to the specifier position in the agreement phrase to check its case feature.

Now let us consider the structural position of the modal auxiliaries in English. The claim that modal auxiliaries also occupy I node in the IP may be misleading because modal auxiliaries do not have case features or agreement features, unlike *have* and *be*. In addition, modal auxiliaries do not inflect for tense. For these reasons one may argue that the modal auxiliaries are neither generated in T, nor end up occupying ARG position after movement. This leads to the argument that modal auxiliaries are generated in I, as shown in (17). Nevertheless, such an argument may not yield the intrinsic properties of modal auxiliaries. In other words, the attempt to identify the exact position of modal auxiliaries in the tree representation continues.

(17)



Cinque (1999, 2006) proposes the hierarchy of the functional head, which provides a detailed and exhaustive capture of functional projection. The hierarchy has an impact on the analyses of position of the modal auxiliaries in relation to other elements of clause such as tense and aspect in the IP. Integral to the hierarchy is that different functional categories are generated in different positions. Cinque garners overt evidence in support of the hierarchy of the functional head from the order of suffixes, the order of inflectional suffixes and auxiliaries, and the order of functional particles, etc. in different languages. The relative order of the functional heads can be shown as in (18).

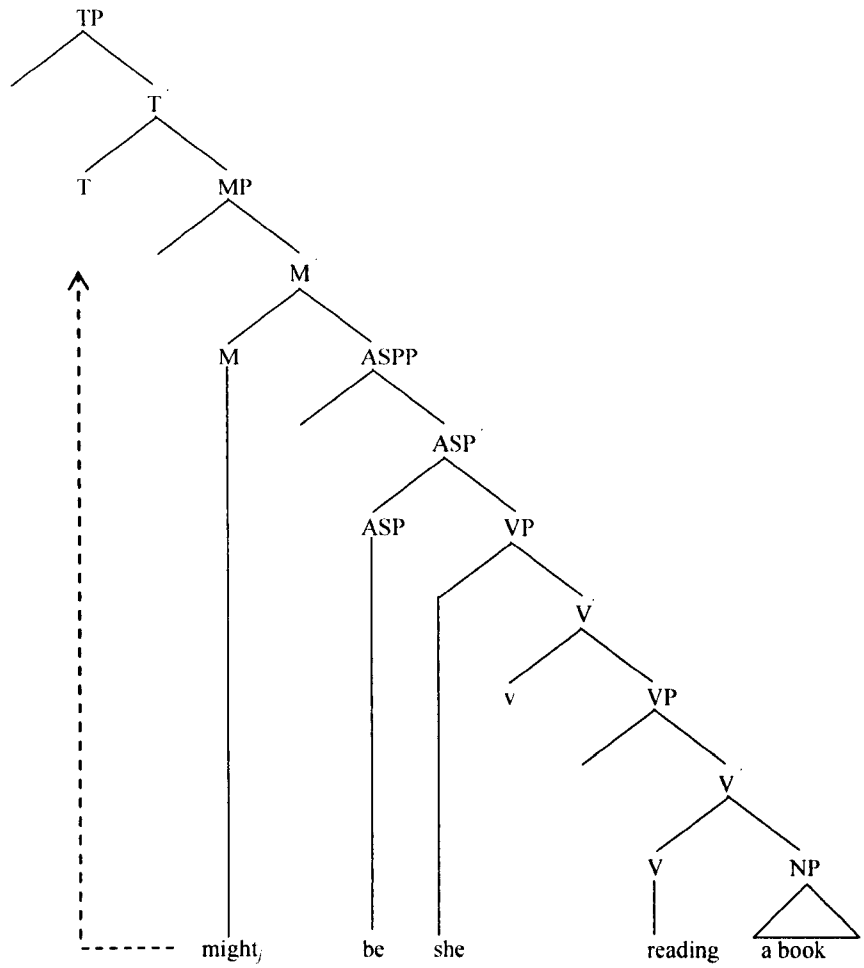
(18)

$$\begin{aligned}&\text{MoodP}_{\text{speech act}} > \text{MoodP}_{\text{evaluative}} > \text{MoodP}_{\text{evidential}} > \text{ModP}_{\text{epistemic}} > \\ &\text{TP(Past)} > \text{TP(Future)} > \text{ModP}_{\text{irralis}} > \text{ModP}_{\text{alethic}} > \text{AspP}_{\text{habitual}} > \\ &\text{AspP}_{\text{repetitive(I)}} > \text{AspP}_{\text{frequentative(I)}} > \text{ModP}_{\text{volitional}} > \text{AspP}_{\text{celerative(I)}} > \\ &\text{T(Anterior)} > \text{AspP}_{\text{terminative}} > \text{AspP}_{\text{continuative}} > \text{AspP}_{\text{retrospective}} > \\ &\text{AspP}_{\text{proximative}} > \text{Asp}_{\text{durtative}} > \text{AspP}_{\text{generic/progressive}} > \text{AspP}_{\text{prospective}} > \\ &\text{ModP}_{\text{obligation}} > \text{ModP}_{\text{permission/ability}} > \text{AspP}_{\text{completive}} > \text{VoiceP} > \\ &\text{AspP}_{\text{celerative(II)}} > \text{AspP}_{\text{repetitive(II)}} > \text{AspP}_{\text{frequentative(II)}}\end{aligned}$$

(cf. Cinque 1999; 2006)

Following Cinque (1999; 2006), van Gelderen (2003) argues that epistemic modal auxiliaries originate in the Modal Phrase (M); they then move into T. However, epistemic modal auxiliaries have no tense. I postpone the discussion of epistemic modal auxiliaries in relation to tense until Section 3.2.3. The tree structure of the clause that contains epistemic modal auxiliaries can be illustrated in (19). van Gelderen assumes, as Chomsky (1995) does, that there is no separate Agreement Phrase (AGRP).

(19)



In summary we can now see the position of epistemic modal auxiliaries in English in relation to other elements in the clause. That is, they originate in the Modal Phrase (M), and they then move into T. In this study, I assume the structural position of epistemic modal auxiliaries as proposed by van Gelderen (2003).

3.2.3 Epistemic modals and tense

In section 3.2.2 we have seen that epistemic modal auxiliaries end up in the head position of T (Tense Phrase) after movement, even though they are not checking tense nor agreement features there. Although epistemic modal auxiliaries are not inflected for tense, they behave as if they semantically present tense. This fact gives rise to the question of whether or not tenses are intrinsic features of modal auxiliaries. This section thus discusses the relationship between the epistemic modals and tense.

Padovan (2006) argues that epistemic modals are outside the scope of tense. However, this argument was questioned by some linguists. Stowell (2004), for example, disagrees with Padovan's claim, arguing that epistemic modals behave like present-tense verbs because they are situated in the deictic present time/tense. In other words, the time of epistemic modals is claimed to be simultaneous to the speech time[2], as illustrated in (20). It is therefore impossible for epistemic modal verbs themselves to express a real past reading (Guéron 2008: 144), as illustrated in (21). Consequently, they do not exhibit any morphological present/past alternation.

(20) John must be ill. (Padovan 2006: 2)

(21) *John must be ill yesterday.

Although, epistemic modals lack future-shift or past-shift evaluations of time, we can see a shift of reference time of the verbal complement (Drubig 2001; Hacquard 2006). The non-finite verbal complement of epistemic modals may have present reference time, future reference time or past reference time.

(22) John must have been ill. (Padovan 2006: 2)

(23) He might read that letter. (van Gelderen 2003)

In (22) the speaker is making an inference on an event in the past. It can be noticed that the verbal complement *'...have been ill'* refers to an event in the past. Accordingly, it has past reference time. In (23) the speaker is speculating on an event in the future. The verbal complement *'...read that letter'* refers to an event subsequent to the time of speaking. Accordingly, it has future reference time.

[2] The conceptualization of time involved in the interpretation of epistemic modals includes speech time, modal time, situational time, and reference time. Speech time is the moment of speech. Modal time refers to the time at which the modal evaluation under consideration holds. Situational time is the time at which the situation or event described in the modal complement in the scope of the modal holds. Finally, reference time gives temporal perspective or standpoint (Guéron 2008).

Demirdarche and Uribe-Etxebarria (2008) point out that the reference time of the modal complement is sensitive to the lexical aspect[3] of certain types of verbs. In other words, the situational aspect or the verb type in the complement determines particular reference time of an individual epistemic modal. The rest of this section thus discusses the relationship between epistemic modals and the reference time of modal complements. I will focus on the modals: *may, might, must* and *will* that are the focus of the current research. I will consider future, present, and past reference time in that order.

3.2.3.1 Future reference time and epistemic modal complements

When the verbal complement of epistemic *may/might* is a stative predicate, which has an imperfective aspect, as in (24), the reference time of the modal complement can be construed as either present or future.

(24) Amina may/might be in Ottawa (now/tomorrow)

(Demirdarche and Uribe-Etxebarria 2008: 92)

On the other hand, if the verbal complement of the epistemic *may/might* is an eventive predicate or an action verb, which has a perfective aspect, as in (25), the reference time of the modal complement is construed as future.

(25) Amina may/might win the marathon.

(Demirdarche and Uribe-Etxebarria 2008: 92)

As for *must*, the verbal complement has to be stative in order to receive epistemic reading and present reference time as in (26). If the modal is followed by an eventive verb, the complement will receive a deontic reading as in (27).

(26) He must know that person. (epistemic)

(van Gelderen 2003: 34)

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[3] Smith (1983) makes a distinction between lexical aspect or situational aspect and grammatical aspect or viewpoint aspect. According to him, situational aspect concerns the internal temporal character of an event, whereas viewpoint aspect concerns the perspective taken on a situation by relating it to a reference point.

(27) He must read that letter. (deontic)

(van Gelderen 2003: 34)

However, this is not the case for epistemic *will*. When it is used to indicate probability, it always has future implication no matter what type the verb is. This might be the reason for why *will* is often used as a future marker (Lyons 1977).

(28) John will be in his office.

(Palmer 2001: 28)

3.2.3.2 Present reference time and epistemic modal complements

The modals *may/might* may take an eventive predicate as the complement, and usually have present reference time by the addition of BE + ING.

(29) He might be coming to the party.

This is also the case for *must*. In other words, it is possible for *must* to take an eventive verb as the complement. However, the progressive form BE + ING needs to be added to the verb. The verbal complement is usually construed as present, as in (26).

(30) He must be reading the book.

3.2.3.3 Past reference time and epistemic modal complements

As mentioned earlier, epistemic modals do not have a real past reading. However, it is possible for the modal complement to be read as past by the addition of HAVE + EN. Although the verb form in the modal complement is perfective, it does not have perfective reading, but rather a real past reading. This mechanism is known as 'Past Tense Replacement (PTR) effect' (Drubig 2001: 16). Generally, present perfect in English cannot be used with reference to a specific time in the past. However, in epistemic contexts like (31), the perfective receives a past reading and no longer expresses a perfective reading. This is shown by the compatibility of the perfective verb with the simple past temporal adverbial *last Tuesday*.

(31) He may have left last Tuesday. (Past)

(Drubig 2001: 17).

Although the situational aspect of the verb in the modal complement seems to play a crucial role in determining the reference time of the complement, the situational aspect of the verb alone cannot give rise to any reference time interpretation of the modal complement. Rather, the reference time of the modal complement results from the interplay of a certain epistemic modal auxiliary with a certain type of a verb. In other words, the occurrence of a certain epistemic modal auxiliary with a certain type of a verb yields different reference time interpretations of the modal complement. In the current research I shall call such occurrences 'syntactic patterns'.

The syntactic patterns that indicate the reference time of epistemic modal complements in English are shown in Table 3.1.

Table 3.1: Syntactic patterns that indicate reference time of modal complements

	Patterns	**Reference Time**		
		Present	**Future**	**Past**
1	MAY/MIGHT + A STATIVE VERB e.g. *Ben may like the chocolate.*	√	√	X
2	MAY/MIGHT + AN EVENTIVE VERB e.g. *He might study math.*	X	√	X
3	MAY/MIGHT + BE AN EVENTIVE VERB – ING e.g. *He might be studying math.*	√	X	X
4	MUST + A STATIVE VERB e.g. *The teacher must be angry.*	√	X	X
5	MUST + BE + AN EVENTIVE VERB –ING e.g. *Ben must be cooking dinner.*	√	X	X
6	WILL + STATIVE/EVENTIVE VERB e.g. *Jerry will be late, or Ben will miss the bus.*	X	√	X
7	EPISTEMIC MODALS + HAVE -EN = PAST e.g. *Ben might have been at home.*	X	X	√

3.2.4 English epistemic modals and aspect

The relationships between epistemic modals and aspect have been discussed in studies concerned with the syntax of modality (Dubrig 2001; van Gelderen 2003; Stowell 2004; Padovan 2006; Boogaart 2007; Demirdarche and Uribe-Etxebarria 2008; Guéron 2008). It has been claimed that the grammatical aspect or viewpoint aspect of the non-finite verbal complement plays a crucial role in determining epistemic and deontic readings. van Gelderen (2003) points out that epistemic modals take perfective and imperfective as their complements, while deontic modals do not. This is one of the properties that distinguish epistemic from deontic modals in English.

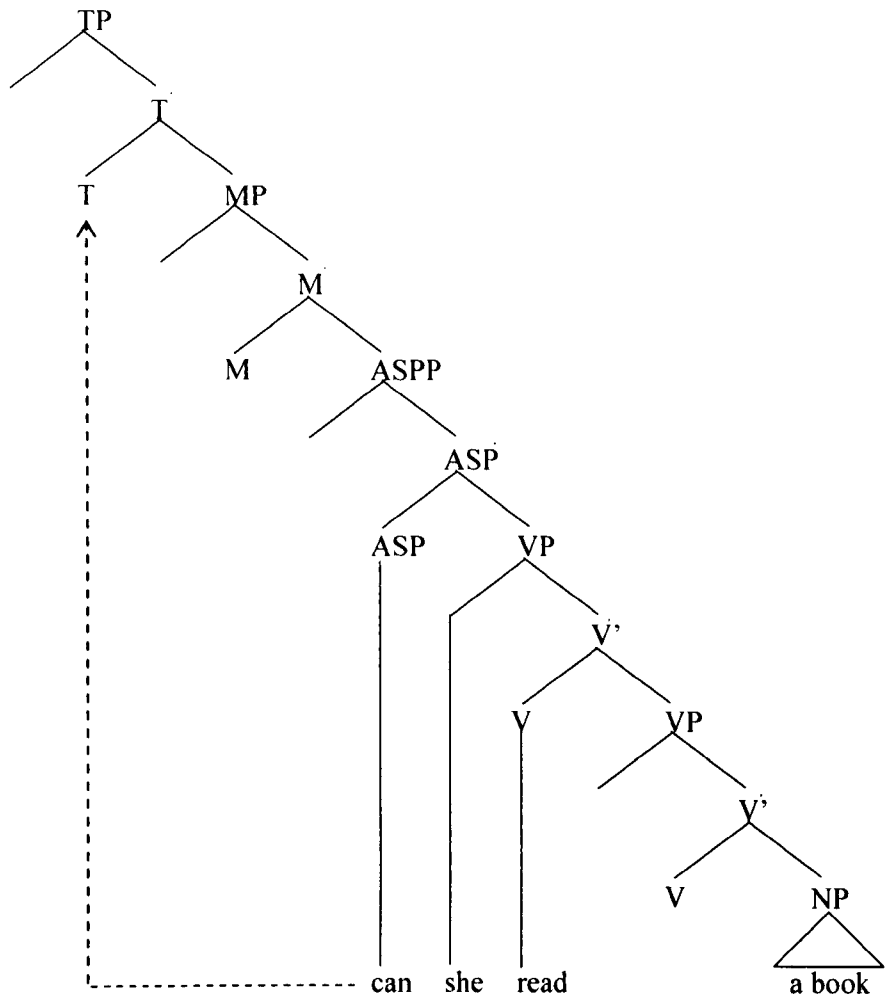
(32)	He must have read that letter.	(epistemic)
(33)	He must be looking for that letter.	(epistemic)
(34)	He must read that letter.	(deontic)
(35)	He must look for that letter.	(deontic)

(van Gelderen 2003: 32)

We will notice that sentences (32) and (33) have epistemic readings because the verbs in the complement have perfective and imperfective aspects respectively. However, sentences (34) and (35) have deontic readings due to the absence of the perfective HAVE + -EN and the progressive BE + -ING markers.

van Gelderen also argues that since deontic modal auxiliaries originate in Aspect Phrase (AspP) and move to T via M, as shown in (36), deontic modal auxiliaries are therefore in complementary distribution with other aspectual markers/auxiliaries. Consequently, deontic modals cannot occur with perfective or progressive auxiliaries e.g. *have* and *be*, as shown in (37) and (38). Since the present study focuses on epistemic modals, I will, however, not pursue this argument further. I will, instead, discuss the relationship between epistemic modals and aspect.

(36)



(37) *I can have read that book (deontic and perfective).

(38) *I can be swimming (deontic and progressive).

(van Gelderen 2003: 32)

3.2.4.1 English epistemic modals and perfective complements

Epistemic modals may take the perfective aspect as their complements. However, these complements do not have perfect reading due to the 'Past Tense Replacement (PTR) effect', as discussed earlier. They have a simple past reading. This can be illustrated by the compatibility of HAVE + EN with the temporal adverbials indicating simple past as in (39). In English, the present perfective is incompatible with past time adverbials such as *yesterday, last night, two months ago* etc. as in (40). However, this is not the case when an epistemic modal precedes perfective auxiliaries such as *have* as in (41).

(39) You should have made him ill yesterday.

(40) *I have made him ill yesterday

(van Gelderen 2003: 32)

In (39) the perfective complement no longer has a perfective meaning when it is preceded by an epistemic modal. This is also true when it is preceded by the future marker *will*. The perfective complement in this case has a past reading as shown in (41).

(41) Mary will have arrived by now.

(Palmer 2001: 33)

3.2.4.2 English epistemic modal and imperfective complements

The imperfective aspect or progressive in English is indicated by BE + ING. The epistemic modal also takes the progressive aspect as its complement, as shown in the previous section. The progressive complements of epistemic modals usually have present reference time, as in (42), and future reference time in certain cases as in (43).

(42) John may/might be writing a letter *now*.

(43) John may/might be writing a letter *tomorrow/ when you get home*.

(Demirdarche and Uribe-Etxebarria 2008: 96)

In summary, it is the viewpoint aspect that distinguishes epistemic modals from deontic modality. It can be noted that epistemic modals take perfective and imperfective aspects as their complements, while deontic modals do not. However, the perfective complement preceded by an epistemic modal no longer has perfective meaning. It has a past reading instead. As for the progressive which precedes an epistemic modal, it generally has a present reading, except in the context where the future reference is specified.

We have seen so far the syntactic properties of epistemic modals, and their relationship with other elements in the clause. Now let us consider the semantic properties of epistemic modality. The next section reviews semantic types of epistemic modality in English.

3.2.5 Types of epistemic modality in English

Epistemic modality is concerned with speakers' assumptions or assessment of possibilities, and it indicates the speaker's degree of confidence e.g. high or low, in the truth of the proposition expressed (Coates: 1983: 18). In other words, it concerns an estimation of the likelihood that a certain state of affairs under consideration will occur, is occurring, or has occurred in the possible world (Nuyts 2001: 21). Epistemic modality is also known as the modality of proposition because it is concerned with the speaker's judgment on the truth or the factual status of the proposition expressed, whereas deontic modality is of events since it is concerned with the necessity or possibility of the acts performed by responsible agents (Lyons 1977: 823).

The subjectivity of epistemic modality has also been discussed in the previous studies of modality. Epistemic modality is essentially subjective in that it is concerned with the speaker's attitude to the proposition expressed in the main predication (Coates 1983: 46). Regarding its subjective interpretation, the epistemic modality can be placed at the two ends of a scale whose extremes represent confidence and doubt, as illustrated by figure 3.1.

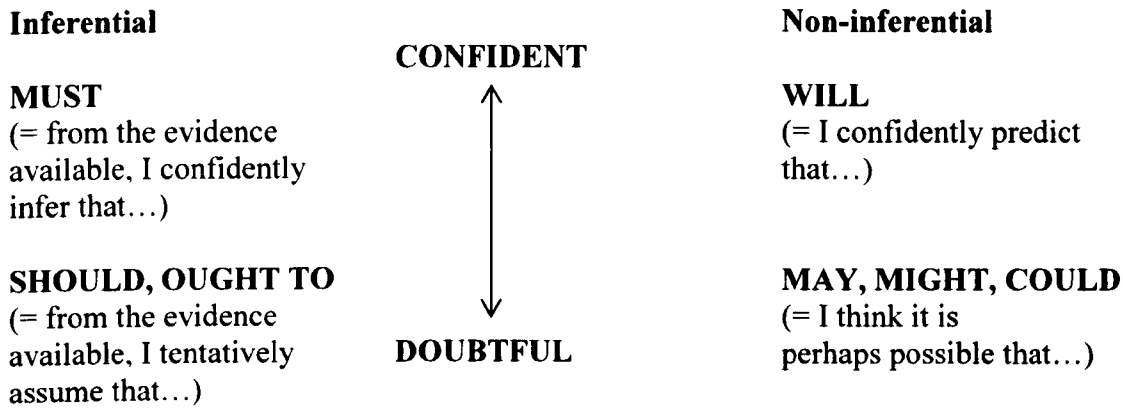


Figure 3.1 Epistemic modals

(Coates 1983: 19)

3.2.5.1 Possibility

The first type of epistemic modality which will be discussed is 'possibility'. The modal auxiliaries of this category are *may*, *might*, and *could*. *May* is used to indicate less certainty about the possibility of an action or event, and to express the speaker's lack of confidence in the proposition expressed. On the other hand, the speaker uses *may* to avoid committing him/herself to the truth of the proposition. The meaning of the two modals can be paraphrased by '*it is possible that* ... (Coates 1983: 133).

(44) John may be in his office.
'It is possible that John is in his office.'

(Palmer: 2001: 25)

Might, like *may*, is used to express epistemic possibility. However, *might* is sometimes used as the past form of *may* in reported speech. Research on English modality in modern English (Wells 1979; Perkins 1983; McDonald 1981; Coates 1983; Palmer 2001) has shown that *may* and *might* can be used interchangeably without changing the meaning or the degree of possibility. Nevertheless, *may* is considered more formal than *might*. *Might* normally expresses 'likelihood' in colloquial speech (Coates 1983: 146).

Could is sometimes used as past form of *can* in reported speech, and as a general hypothetical marker expressing the speaker's lack of confidence in the proposition expressed. *Could*, like *may* and *might*, can be used to express possibility. However, *may* and *might* covers a 50/50 assessment of possibility, whereas *could* indicates only tentative possibility (Coates 1983: 165).

3.2.5.2 Inferential

The modals of this category include *must*, *should*, and *will*. In an epistemic sense, *must* is used to indicate the speaker's confidence in the truth of what (s)he is saying based on a logical process of deduction from observable evidence available to him/her (which may or may not specified) (Coates 1983: 41). *Must* can be paraphrased by '*it is necessary that...*" or "*the only possible conclusion is that...*".

(45) John must be in the office.

"It is necessary that John is in the office."

(Palmer: 2001: 25)

In example (45) the speaker makes an inference based on evidence known to him/her such as, it is nine o'clock now, and the lights and the air conditioning in the office are on.

Palmer (2001) argues that *must* is usually related to actions or events in present. It is rarely used with future time reference because it is open for deontic interpretation, as illustrated by example (46) which allows deontic obligation interpretation. This ambiguity, however, can be avoided by using the progressive form of the verb, as shown in example (47).

(46) John must come tomorrow. (deontic)

(47) John must be coming tomorrow. (epistemic)

(Palmer: 2001: 91)

The modal *should* is used to indicate extreme likelihood, or a reasonable conclusion if circumstances are as the speaker believes they are. However, it allows the speaker to be mistaken. In other words, it allows for the action or the event not to take place (Palmer 2001: 59).

(48) Well both of them should be on the Modern Board.

(Palmer 2001: 59)

Coates (1983: 64) argues that *should* is similar to the epistemic *must* in that it expresses an inference based on a logical process. However, it expresses less confidence than *must*.

As for *will*, it can also be used to indicate an inference based on common sense, or repeated experience (Coates 1983: 177). It usually refers to present events or actions when expressing the inferential meaning as illustrated by example (49).

(49) A commotion in the hall /.../ *"That will be Celia"* said Janet.

(Coates 1983: 177)

Palmer (2001: 51) argues that, for the inferential *will*, it can be paraphrased by '*it is a reasonable conclusion that...*'. It differs from *must* which indicates the only possible conclusion.

3.2.5.3 Probability/Prediction

Will is the modal of this category. The use of *will* in this sense is different from *will* in inferential sense in that *will expressing* probability/prediction has a future time reference while the inferential *will* has a present time reference. The meaning of prediction *will* can be paraphrased by '*It is predicted that ...*'. Since prediction *will* has a future time reference, it is always used as a future marker (Coates 1983: 179).

(50) It will be lovely to see you.

(Coates 1983: 179)

3.2.5.4 Hypothetical/Tentative

The hypothetical meaning is always difficult to distinguish. Coates (1983) argues that it is related to the unreal conditional. It is not necessary for the condition to be explicit. The modals of hypothetical category are *might*, and *would*.

Might can function as unreal or tentative forms of *may*. The hypothetical meaning of *might* can be paraphrased by '*it is possible that ... would ...*'.

(51) A cornflake packet might have these offers.
'It is possible that a cornflake packet would have these offers.'

(Coates 1983: 159)

The modal *would* can be used as the past tense form of *will*, and as a general hypothetical marker expressing unreal conditions, and tentativeness (Coates 1983: 214). The latter function is of far more importance than the former. The meaning of the hypothetical *would* in this sense can be paraphrased by '*it is predictable that...would...*'.

(52) The housewife would find life far less tiring if she made a list.
'It is predictable that the housewife would find life far less tiring.'
(Coates 1983: 214)

3.2.6 Summary

We can see that epistemic preverbal modals in English belong to functional categories, and share some features with auxiliaries like *be* and *have*. However, modal auxiliaries, particularly epistemic modal auxiliaries behave differently from other auxiliaries. In other words, they have their own features as mentioned earlier. In addition, they have a closer relationship with the present tense. The simultaneity of the evaluation time and the speech time gives rise to the claim that epistemic modals have only present tense, and do not have future or past tense. Nevertheless, we can see the future-shift or past-shift in modal complements. As illustrated, the reference time of the event expressed in the modal complement is sensitive to certain types of verbs, which intrinsically have a different situational aspect. Moreover, when considering the grammatical aspect of the modal complement, I found that although the verb form in the modal complement is perfective, it does not express present perfective meaning. On the other hand, it has real past reading due to the PTR effect. The syntactic and semantic properties of epistemic modals, particularly the syntactic patterns which indicate the reference time of the modal complements reviewed in this section, are quite crucial for an L2 learner of English. Accordingly, the task of the learner of English is to master these syntactic patterns.

As the current research is concerned with the acquisition of epistemic modals in English by Thai L2 learners, it is therefore relevant to discuss the syntactic properties of epistemic modals in Thai paralleling English epistemic modals in order to identify differences that may cause difficulties for the learners in acquiring the epistemic modals in English. The remaining sections thus discuss the syntactic properties of epistemic modals in Thai.

3.3 The epistemic preverbal modals in Thai

Modality in Thai has been described in several reference grammar books such as Noss (1964), Higbie and Thinsan (2002), Smyth (2002) Iwasaki and Ingkaphirom (2005). It has also been an interest of linguists (Panupong 1962, 1970; Shimpaiboon 1966; Kullavanijaya 1968; Bandhumedha 1982; Savetamalya 1988; Sookgasem 1990; Andrew, 2001; Muansuwan 2002; Rangkupan 2005; and Srioutai 2004, 2007). The concepts relevant to modality in Thai, like English, are expressed by various linguistic devices: (i) preverbal particles, (ii) post verb particles (iii) sentence-initial particles, (iv) adverbs, and (v) sentence-final particles (Rangkupan 2005: 53). See examples below.

(i) Preverbal particles

(53) Jit **khoŋ**^{1} kin^{1} khaaw^{3} yuu^{2}
Jit might eat rice PROG
'Jit might be eating'

(ii) Post verbal particles

(54) Jit klap^{2} baan^{3} **day**^{3}
Jit return home can
'Jit can return home.'

(iii) Sentence-initial particles

(55) **thaa**^{3}**thaaŋ**^{1} Jit yaak^{2} yuu^{2} baan^{3}
gesture Jit want stay home
'It seems that Jit wants to stay home.'

(iv) Adverbs

(56) Jit pen^{1} soot^{2} **nɛɛ**^{3}**nɔɔn**^{1}
Jit be single certain
'Jit is definitely single.'

(v) Sentence-final particles

(57) Jit klap^{2} baan^{3} lɛɛw^{4} **maŋ^{4}**

Jit return home PER FP

'Maybe, Jit already went back home.'

Although modality in Thai is expressed by various linguistic devices, the present study will focus on only preverbal particles because these linguistic forms are assumed to have syntactic properties similar to epistemic modal auxiliaries in English. And these properties have more potential in being transferred to the task of L2 acquisition. The post verb particle, initial particles, adverbs, and final particles, on the other hand, are grammatically different from auxiliaries. They may not have transfer potential. Therefore, these modal expressions were not included in the current study. The syntactic properties of the preverbal modal particles will be discussed in the next section.

3.3.1 The syntactic status of the epistemic preverbal modals in Thai

Linguistic forms in Thai which are often treated as equivalent forms of epistemic modal auxiliaries in English include *tɔɔŋ^{3}* 'must', *ʔaat^{2}* 'may/might', *khoŋ^{1}* 'may/might', *naa^{3}tɕaʔ^{2}* 'should' and *tɕaʔ^{2}* 'will', as shown in Table 3.2. These forms can also be used in deontic and dynamic senses. It is the view point aspect of the modal complement and the context that determine types of modal interpretation. However, I will reserve further discussion of this until section 3.3.4

Table 3.2: The Thai relevant forms of epistemic modal auxiliaries in English

Thai preverbal modals	**English modal auxiliaries**
tɔɔŋ^{3}	must
ʔaat^{2}	may, might
khoŋ^{1}	may, might
naa^{3}tɕaʔ^{2}	should
tɕaʔ^{2}	will

The forms in Table 3.2 above have often been treated as helping verbs or preverbal auxiliaries because they usually precede the main verb, and signify modal meanings (Kullayavajijya 1968; Panupong 1984; Sookgasem 1990). Thai linguists generally agree that the linguistic forms in Table 3.2 are not full verbs because they cannot head a verb phrase by itself. Simply said, they cannot function alone as predicates as illustrated in (58) and (59) because they are not semantically complete in themselves. They need a non-finite verb as their complement. For these reasons, the preverbal modals are considered to be a kind of complement-taking verb (Mueanjai and Thepkanjana 2008:).

(58) *khaw^{5} **tɔɔŋ^{3}**
he/she must

(59) *khaw^{5} ʔaat^{2}
he/she may/might

(60) khaw^{5} khit^{4}
he/she think
'He/she thinks'

(61) khaw^{5} nii^{5}
he/she escape
'He/she escaped'

The verb *khit^{4}* 'to think' in (60) and the verb *nii^{5}* 'to escape' in (61) are full verbs because they do not need a non-finite verb to complete their meanings.

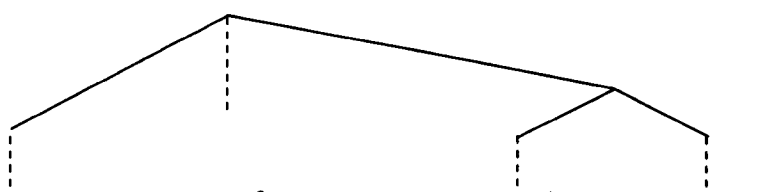
Wilawan (1992) argues that a finite verb refers to as a verb that takes a nominative NP as its subject, whereas a non-finite verb refers to as the verb whose overt grammatical subject does not occur. In Thai, although a clause may contain more than one verb, namely verb concatenation/serial verb, only the first verb in the concatenation is considered to be finite, and the second verb is co-indexed with the first verb, hence non-finite.

(62) khaw^{5} khit^{4} nii^{5}
he/she think escape
'He thought of escaping'

In (62), verbs *khit*^{4} 'to think' and *nii*^{5} 'to escape' occur in concatenation/serial verb. The verb *khit*^{4} 'to think' occurs in the first place, and takes *khaw*^{5} 'he/she' as its grammatical subject. Accordingly it is considered to be a finite verb[4] by the definition of a finite verb and a non-finite verb by Wilawan (1992). As for the verb *nii*^{5} 'to escape', it occurs in the second place, and is co-indexed with the *khaw*^{5} 'he/she'. The verb *nii*^{5} 'to escape' is therefore considered to be a non-finite verb.

Savetamalya (1987), Indrambarya (1998), Rangkupan (2005) agree that the so-called 'preverbal modals' take non-finite verbs as their complements. The dependent structure of a clause containing a modal verb is shown in (63).

(63)



'He may think of escaping' (Indrambarya 1998: 83-83).

We can see that in (63) the modal *ʔaat*^{2} 'may/might' precede a non-finite verb *khit*^{4} 'to think', which is actually its complement, and has a wider scope over the verb *khit*^{4} 'to think'. Indrambarya (1998) also argues that other epistemic modal auxiliaries *tɔɔŋ*^{3}, *khoŋ*^{1}, *naa*^{3}*tɕaʔ*^{2}and *tɕaʔ*^{2} also behave like *ʔaat*^{2} in a clause.

[4] The finiteness of this verb is also reflected in its past translation in English.

Although there seems to be agreements among Thai linguists that preverbal modals have some syntactic and semantic properties that are similar to modal auxiliaries in English, I am still reluctant to conclude that they are auxiliaries like those in English. Instead, my observation is that preverbal modals in Thai behave rather differently from auxiliaries in English. For example, modals in English are unbounded morphemes which can occur alone, while in Thai they are bound and at the very least they must occur with full verbs. Nonetheless, since I do not have sufficient evidence at hand to substantiate this argument, I will leave it for further study. In the present study I assume, as Thai linguists do, that syntactically the so-called preverbal modals are not full verbs. Rather, that they are a kind of functional words which select non-finite verbs as their complements, and contribute modal meanings to the clause.

3.3.2 The structural position of epistemic preverbal modals in Thai

As there has been no study explicitly arguing for the structural position of epistemic modals in Thai, it is necessary to look for the characteristics of epistemic preverbal modals that can be clues for identifying their structural position. In doing so, I will gather relevant information from the literature concerning epistemic modals in Thai.

The characteristic that will be discussed first is the occurrence of an epistemic modal with other elements in a clause i.e. deontic modals and negation. Rangkupan (2005) points out that an epistemic modal may co-occur with a deontic modal in a clause. The epistemic modal always precedes the deontic one, not vice versa. In (64) the epistemic modal *khoŋ*^{1} 'may/might' precedes the deontic modal *tɔɔŋ*^{3} 'must'. This order cannot be reversed otherwise the sentence will be ungrammatical, as shown in (65). This restriction on ordering suggests that epistemic modals are higher than deontic ones after any syntactic derivation that may occur.

(64) phom^{5} khoŋ^{1} tɔɔŋ^{3} paj^{1} juu^{2} nee^{1}paan^{1}
I may must go stay Nepal
'I may have to go to stay in Nepal'

(65) *phom^{5} tɔɔŋ^{3} khoŋ^{1} paj^{1} juu^{2} nee^{1}paan^{1}
I must may go stay Nepal

The second point that should be discussed is the relationship between epistemic modals and the negation *maj*^{3} 'not'. Before discussing this relationship, I need to show how negation works in Thai.

Indrambarya (1998) points out that the negation *maj*^{3} 'not' precedes the element being negated whether a verb, as in (66), or a sentential-final adverb such as *bɔɔy*^{2} 'often', as in (67).

(66) khaw^{5} **maj^{3}** pay^{1} rooŋ^{1}riian^{1}
he/she NEG go school
'He/she doesn't go to school'

(67) khaw^{5} pay^{1} thii^{3} nan^{3} **maj^{3}** bɔɔy^{2}
he/she go at there NEG often
'He/she doesn't often go there'

In relation with epistemic modals, the negation *maj*^{3} 'not' always follows epistemic modals as shown in (68), but not deontic modals. The negation *maj*^{3} 'not', on the other hand, always precedes deontic modals, as shown in (69). Thus, this suggests that epistemic modals are in a higher position than a Negation Phrase (NegP).

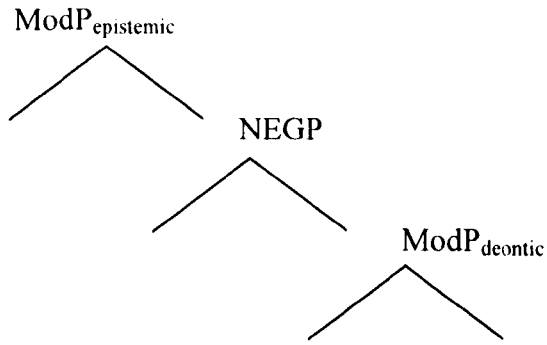
(68) khaw^{5} ʔaat^{2} **maj^{3}** pay^{1} rooŋ^{1}riian^{1} (epistemic)
he/she may NEG go school
'He may not go to school'

(69) khaw^{5} **maj^{3}** saa^{3}maat^{3} pay^{1} rooŋ^{1}riian^{1} (deontic)
he/she NEG can go school
'He/she cannot go to school'

Because of the absence in the literature of an existing syntactic analysis, I assume, based on the data given above, that the schema of the structural position of those elements

relative to each other and after any derivation/movement that might take place is as illustrated in (70).

(70)



3.3.3 The modal complements in Thai and reference time

We have seen that epistemic modals in Thai, like English, select non-finite verbs as their complements. In this section, I will discuss some properties of the modal complement, e.g. reference time and aspect. Since tenses are not morphologically marked or do not exist in Thai, I will discuss the relationship between epistemic modals and reference time instead.

In Thai, adverbials and context play a crucial role in specifying the reference time of the verb. This is because verbs are not morphologically marked for tense. Without a temporal adverbial or without context, the reference time of a verb is vague. People who are not present at the time of speaking will not know whether the event in focus has taken place or not. For example, the verb in (71) may have present, past or future reference time. In order to specify the reference time of the verb, a temporal adverbial such as *mua*^{3}*wa:n*^{1}*nii*^{4} 'yesterday', and *pruŋ*^{3}*nii*^{4} 'tomorrow' etc. is required, as in (72) and (73). In other words, temporal adverbials are grammatical means for specifying reference time of the clauses.

(71) dæŋ yuu^{2} baan^{3}

Dang be/stay house/home

'Dang is at home

Or Dang was at home

Or Dang has been at home

Or Dang will be at home'

(72) dæŋ yuu^{2} baan^{3} mua$^{:3}$wa:n^{1}nii^{4}

Dang be/stay house/home yesterday

'Dang was at home yesterday'

(73) dæŋ yuu^{2} baan^{3} pruŋ^{3}nii^{4}

Dang be/stay house/home tomorrow

'Dang will be at home tomorrow'

We notice that the verb *yuu*^{2} 'be/stay' in (71) can have present, future and past reading. However, the sentence in (72) has only past reading because of the presence of the adverbial *mua*$^{:3}$*wa:n*^{1}*nii*^{4} 'yesterday', which contributes the meaning of past to the sentence. In (73), the sentence has only future reference time because of the presence of the adverbial *pruŋ*^{3}*nii*^{4} 'tomorrow', which contributes the meaning of future to the sentence.

The temporal adverbials do not only play a crucial role in determining the reference time of the verb, but also the reference time of the modal complements. Unlike English, the reference time of epistemic modal complements in Thai is not sensitive to lexical aspect or certain types of verbs. In other words, the reference time of the modal complement is unpredictable regardless of the type or the lexical aspect of a verb. The reference time of the modal complement is thus determined by temporal adverbials or contexts, as shown below.

(74) dæŋ[1] ʔaat[2] pen[1] wat[2]
Dang may/might be cold
'Dang may have a cold (now, yesterday, tomorrow)'

(75) dæŋ[1] ʔaat[2] maa[1] saaj[5]
Dang may/might come late
'Dang may may/might (have) come late (now, yesterday, tomorrow)'

(76) dæŋ[1] ʔaat[2] pen[1] wat[2] mua:[3]wa:n[1]nii[4]
Dang may/might be cold yesterday
'Dang may have had a cold yesterday'

(77) dæŋ[1] ʔaat[2] maa[1] saaj[5] pruŋ[3]nii[4]
Dang may/might come late tomorrow
'Dang may may/might come late tomorrow'

We notice that no matter the lexical aspect of the modal complement e.g. either imperfective as in (74) or perfective as in (75), the reference time of the modal complement can be present, past or future. However, in (76) and (77) the reference time of the modal complements can only be past and future respectively due to the presence of the temporal adverbs.

3.3.4 Thai modal complements and aspect

In this section, I consider the aspect of complements of epistemic modals in Thai. Like English, view point aspect seems to play a crucial role in distinguishing between epistemic and deontic modals. Before discussing view point aspect of epistemic modal complements, I will briefly present general facts of view point aspect in Thai.

In Thai, the perfective aspect is expressed by final particle *lææw*[4] 'already' and preverbal particle *khəəj*[1] 'used to, ever', as shown in (78) and (79). Imperfective aspect is expressed by the final particle *juu*[1] (imperfective) and preverbal particle *kam*[1]*laŋ*[1] (progressive) as shown in (80) and (81).

(78) dæŋ^{1} ʔaan^{2} naŋ^{5}sɯɯ^{5} **lææw^{4}**
Dang read book PERF
'Dang has already read the book' (perfective)

(79) dæŋ^{1} **khəəj^{1}** ʔaan^{2} naŋ^{5}sɯɯ^{5}
Dang PERF read book
'Dang has/used to read the book' (perfective)

(80) dæŋ^{1} ʔaan^{2} naŋ^{5}sɯɯ^{5} **juu^{1}**
Dang read book IMP
'Dang reads a book now' (imperfective)

(81) dæŋ^{1} **kam^{1}laŋ^{1}** ʔaan^{2} naŋ^{5}sɯɯ^{5}
Dang PROG read book
'Dang is reading a book' (imperfective: progressive)

As mentioned at the beginning of this section, in Thai, apart from context, view point aspect plays a crucial role in distinguishing between epistemic and deontic modals. That is, epistemic modals may take perfective or imperfective aspect as their complement, while deontic modals do not. When the aspect markers like *lææw^{4}* 'already', *khəəj^{1}* 'used to, ever', *juu^{2}* 'to stay/IMP' and *kam^{1}laŋ^{1}* (progressive) occur in modal complements, the modals will have only epistemic reading as illustrated in (82) and (83).

(82) dæŋ^{1} tɔɔŋ^{3} ʔaan^{2} naŋ^{5}sɯɯ^{5} **lææw^{4}** (epistemic)
Dang must read book PERF
'Dang must have read the book'

(83) dæŋ^{1} tɔɔŋ^{3} **kam^{1}laŋ^{1}** ʔaan^{2} naŋ^{5}sɯɯ^{5} (epistemic)
Dang must PROG read book
'Dang must be reading the book'

The evidence that supports the claim that the deontic modals do not take perfective or imperfective aspects as their complements is the ungrammaticality of the sentence where a demotic modal co-occurs with aspectual marker. This can be illustrated in the examples below.

(84) *dæŋ^{1} tɔɔŋ^{3} khəəj^{1} ʔaan^{2} naŋ^{5}sɯɯ^{5} (deontic)
Dang must PERF read book

(85) *dæŋ^{1} khuuan^{1} ʔaan^{2} naŋ^{5}sɯɯ^{5} juu^{2} (deontic)
Dang should read book IMP

(86) *dæŋ^{1} kam^{1}laŋ^{1} saa^{4}maat^{3} ʔaan^{2} naŋ^{5}sɯɯ^{5}
Dang PROG can read book (deontic)

The sentences in (84), (85) and (86) are ungrammatical due to the presence of aspect markers. This evidence supports the claim that deontic modals in Thai, like English, do not take aspect or AspP as their complements.

3.3.4.1 Epistemic modals and perfective complements

Now, let us first turn to epistemic modal complements and perfective aspect. Epistemic modals may take verbal complements which have perfective aspect as illustrated in (87) and (88).

(87) dæŋ^{1} tɔɔŋ^{3} ʔaan^{2} naŋ^{5}sɯɯ^{5} **lææw^{4}** (epistemic)
Dang must read book PERF
'Dang must have read the book'

(88) dæŋ^{1} tɔɔŋ^{3} **khəəj^{1}** ʔaan^{2} naŋ^{5}sɯɯ^{5} (epistemic)
Dang must PERF read book
'(I inferred that) Dang has read the book'

Interestingly, although epistemic modals in Thai may take the perfective aspect as their complements, the perfective complements do not shift to simple past reading, unlike English. This suggests that the 'Past Time Replacement (PTR) Effect does not exist in modal complements in Thai. The evidence that supports this idea is the incompatibility of the perfective complements with temporal adverbials indicating simple past, as in (89).

(89)	*dæŋ^{1}	tɔɔŋ^{3}	khəəj^{1}	ʔaan^{2}	naŋ^{5}sɯɯ^{5}	mua:^{3}wa:n^{1}nii:^{4}
	Dang	must	PERF	read	book	yesterday

3.3.4.2 Epistemic modals and imperfective complements

The epistemic modal may also take a verbal complement which has an imperfective aspect as illustrated in (86) and (87).

(90)	dæŋ^{1}	tɔɔŋ^{3}	ʔaan^{2}	naŋ^{5}sɯɯ^{5}	**juu^{2}**	(epistemic)
	Dang	must	read	book	IMP	
	'Dang must be reading a book'					

(91)	dæŋ^{1}	tɔɔŋ^{3}	**kam^{1}laŋ^{1}**	ʔaan^{2}	naŋ^{5}sɯɯ^{5}	(epistemic)
	Dang	must	PROG	read	book	
	'Dang must be reading a book'					

It is also worth mentioning that the addition of the perfective makers does not help specify the reference time of the modal complement. The reference time is, on the other hand, still unpredictable despite the present of perfective markers such as *juu^{1}* 'imperfective' and *kam^{1}laŋ^{1}* 'progressive', as shown in (92). Unlike in English, the reference time of the modal complements in Thai is specified by the temporal adverbials as shown in (93) and (94).

(92)	dæŋ^{1}	khoŋ^{3}	ʔaan^{2}	naŋ^{5}sɯɯ^{5}	juu^{2}
	Dang	may/might	read	book	IMP
	'Dang must be reading a book (now/tomorrow/yesterday)'				

(93) dæŋ[1] khoŋ[3] ʔaan[2] naŋ[5]suuu[5] juu[2]
Dang may/might read book IMP
mua:[3]wa:n[1]nii[4]
yesterday
'Dang may/might have been reading a book yesterday'

(94) dæŋ[1] khoŋ[3] ʔaan[2] naŋ[5]suuu[5] juu[2] pruŋ[3]nii[4]
Dang may/might read book IMP tomorrow
'Dang might be reading a book tomorrow'

3.3.5 Types of Epistemic Modality in Thai

The set of epistemic preverbal modal particles in Thai is associated with different degrees of certainty or the speaker's confidence. This ranges from an inference with the speaker's most confidence to one with the speaker's least confidence as illustrated in figure 3.2.

HIGHEST CONFIDENCE ⟷ LEAST CONFIDENCE

tɔɔŋ[3]	tɕa[2]	khoŋ[1]	na[3]tɕa[2]
(must	will	might	should)

Figure 3.2 The scale of inferential preverbal modals in Thai

The epistemic modal particles are usually used to express different types of meaning as follows.

3.3.5.1 Possibility

The modal of this category is *ʔaat*[2] 'may'. It is normally used to indicate the speaker's evaluation of a low likelihood for an expressed proposition to be true. This category is also known as dubitative. See example (95) below.

(95) Jit[1] **ʔaat[2]** yuu[2] baan[3]
Jit might stay/be home
'Jit might be at home.'

3.3.5.2 Inferential

tɕaʔ[2] 'will' and *tɔɔŋ*[3] 'must' are the modals of this category. *tɕaʔ*[2] is used to indicate an inference based on what is generally known to the speaker or the speaker's experience. *tɔɔŋ*[3] is used to indicate an inference with strong confidence based on observable evidence.

(96) khaw[5] **tɕaʔ[2]** siia[5]tɕai[1] maak[3] muua[3] khon1rak[4]
He will be sad very when lover
tɕaak[2]pai[1]
be away
'He will be very sad when his lover has gone.'

(97) thəə[1] **tɔŋ[3]** pen[1] khon[1]rak[4] khɔɔŋ[5] fak[5]
She must be lover POSS Fak
'She must be Fak's lover.'

3.3.5.3 Probability/prediction

The modals included in this category are *khoŋ*[1] 'might' and *khuaan*[1] 'should'. They are usually used to indicate the speaker's evaluation of the increased likelihood for an expressed proposition to be true.

(98) thəə[1] **khoŋ[1]** pen[1] khon[1]rak[4] khɔɔŋ[5] fak[5]
She might be lover POSS Fak
'She might be Fak's lover.'

(99)	Jit[1]	**khuaan[1](tɕa?[2])**	yuu[2]	baan[3]
	Jit	should	stay/be	home
	'Jit should be at home.'			

3.3.5.4 Hypothetical/Tentative

naa[3]tɕa? 'might' is used to expresses hypothetical meaning. It indicates a speaker's lack of confidence in what (s)he is saying.

(100)	Jit[1]	**naa[3]tɕa?[2]**	yuu[2]	baan[3]
	Jit	might	stay/be	home
	'Jit might be at home.'			

3.3.6 Summary

In this section we have discussed the syntactic status of epistemic modals in Thai. Although there are multiple syntactic analyses of preverbal modals in Thai, linguists agree that preverbal modals are functional words which take a non-finite verb as their complement. This section also considered the relationship between epistemic modals and the two types of aspect e.g. situational aspect and view point aspect. We have seen that situational aspect does not affect the reference time of the modal complement. Furthermore, the addition of the view point aspect markers on the verbal complement plays no role in determining the reference time of the modal complement. Rather, they just distinguish the epistemic modals from the deontic ones, and it is the temporal adverbials that specify the reference time of the modal complement.

3.4 The differences between English and Thai epistemic modality

Based on the facts presented so far, we may be able to conclude that, syntactically, epistemic preverbal modals in Thai are quite similar to epistemic modal auxiliaries in English in two respects. First, they are functional words which take a non-finite verb as their complement. Second, epistemic modals in both English and Thai may take modal complements which have perfective or imperfective as their complements, while deontic modals do not.

Apart from these, we note some differences between English and Thai with respect to reference time and the aspectual properties of modal complements. First, the reference time of modal complements in English is sensitive to the lexical aspect or certain types of verbs, but this is not the case for preverbal modals in Thai.

Second, with respect to the view point aspect, although epistemic modals in English may take perfective verbal complements, perfective verbal complements, in fact, do not have perfective reading. Rather, they have a real past reading. This is, again, not the case for epistemic modals in Thai. The differences between English and Thai epistemic modalities can be summarized as follows:

Table 3.3: The differences between English and Thai epistemic modality

Epistemic modals in English	**Epistemic modals in Thai**
Status - take a non-finite verb as its complement - auxiliaries verb	Status - take a non-finite verb as its complement - auxiliaries verb
Structural position - precede a non-finite verb - generated higher than NegP - generated higher than deontic modals	Structural position - precede a non-finite verb - generated higher than NegP - generated higher than deontic modals
Tense/reference time - present - sensitive to lexical aspect of modal complements - determined by lexical aspect	Tense/reference time - no tense morphology - not sensitive to lexical aspect - determined by temporal adverbial or context
Aspect - take perfective and imperfective as its complement - Past Time Replacement (PTR) effect can be observed	Aspect - take perfective and imperfective as its complement - no PTR effect

3.5 Summary

This chapter outlined the syntactic status of epistemic modal expressions, particularly preverbal auxiliaries, in English and Thai. It also presented general facts about the relationship between preverbal auxiliaries and other elements e.g. tense and aspect in the clause. First, we see that epistemic modal auxiliaries in English and epistemic preverbal modals in Thai are quite similar in that they are functional words which always precede a non-finite verb, and take non-finite verbs as their complements. Second, we notice that with respect to reference time of modal complements, modal complements in English are sensitive to situational aspect, but this is not the case for preverbal modals in Thai. In addition, with respect to the view point aspect, epistemic modals in English may take perfective complements, but perfective complements, in fact, do not have perfective reading. Rather, they have real past reading. This is, again, not the case for epistemic modals in Thai. Temporal adverbials and contexts seem to play a crucial role in specifying reference time of modal complements. The differences between the two languages discussed in this chapter constitute the basis for the experiment in the current study. In the next chapter, I present a review of the acquisition of modality in English in order to establish the background and implications for the current study.

Chapter 4

The acquisition of modality in English

4.0 Introduction

This chapter reviews previous research concerning the acquisition of modality in English. As there are very few studies on the L2 acquisition of modality in English by non-native speakers, I shall review the L1 acquisition of epistemic modality in English in order to establish relevant background for the later experiment. In addition, I will look for implications for the L2 acquisition of epistemic modality in English by Thai learners of English. Moreover, the acquisition of deontic and dynamic modality will also be referred to at relevant points as most research on the acquisition of modality is also concerned with these types of modality. In this review of the acquisition literature we will see that there is to date no published research on the acquisition of L2 epistemic modals in English.

The chapter begins with a review of L1 acquisition of modality in English. Then it is followed by a review of the L1 acquisition of epistemic modality in English in section 4.2. Section 4.3 deals with the L2 acquisition modality in English by non-native speakers. Section 4.4 provides a conclusion and offers implications for the L2 acquisition of epistemic modality by Thai learners of English.

4.1 The L1 acquisition of modality in English

The acquisition of modality in English by native speakers has been studied widely in past decades. Previous research on the acquisition of modality always investigated not only the development of the epistemic but also of the deontic and dynamic modality in children's language. Dating back to 1970s, the early work on the development of modality in English is Shields' (1974). Her work was followed by several studies in the same area. These include those of Wells (1979; 1985), Hirst & Weil (1982), Perkins (1983), Byrnes & Duff (1989), Stephany (1993), Noveck (2001), Noveck, Ho, & Sera (1996), Papafragou (1998a, 1998c), Papafragou and Ozturk (2007), Wärnsby (2004). The rest of this section reviews those studies which are most relevant to the current study.

Shields (1974)

Shields (1974) explored the development of the modal auxiliary system in the verb phrase in children's spontaneous speech. The data was collected from 107 English-speaking children aged between 2.6 and 4.11 at intervals over months i.e. 2.6-2.11, 3.6-3.11, 4.6-4.11. The data collection took place at nurseries and playgrounds. There were 5,232 verb phrases in the data, which were later classified into 10 categories regarding the verb forms and functions. For example, (1) *Verb Form* unmarked verb, unexpected subject, imperative mood (V + Complement); (2) *Verb Form* unmarked verb preceded by modal or quasi-modal auxiliary etc. Shields found that there were three areas in which the use of particular forms increased with age i.e. the use of stative verbs, the use of the non-finite constructions, and the use of modal auxiliaries such as '*can, will, shall, would, should, could, must, ought*'. Modal auxiliaries were found to be the biggest growth area in the study. That is, the proportion of modals to the total verb phrases of children 2.6-2.11 was 8.8%, for children 3.6-3.11 it was 15%, and for children 4.6-4.11 it was 19.3%. The percentage of total verb forms with modal and quasi modal auxiliary constructions of each age group are shown in Table 4.1.

Table 4.1: Percentage of total verb forms with modal and quasi modal auxiliary constructions

	Modal auxiliaries	**Ages**		
		2.6-2.11	**3.6-3.11**	**4.6-4.11**
1	*will, shall, won't*	2.4	4.8	6.5
2	*can, can't*	3.2	5.4	4.9
3	*must, should*	0	0.9	0.8
4	*would, could*	0	0.7	2.0
5	*going to*	2.4	2.7	3.1
6	*have to, got to*	0.8	0.3	0.4
7	*had better*	8.8	15.5	19.3

(Shields 1974: 186)

Among these modal auxiliaries, Shields found that '*will, shall, won't*' are predominantly used in children's spontaneous speech. The proportion of these three

modals to the total verb forms with modal and quasi modal auxiliary constructions of children 2.6-2.11 was 2.4%, for children 3.6-3.11 it was 4.8%, and for children 4.6-4.11 it was 6.5%. In addition to the very high proportion of verb forms with modal and quasi modal auxiliary constructions, she also categorized the use of the modal auxiliaries. For example, she found that 76% of the total instances of *will* were used to express voluntary actions and intention, whereas 24% of the use of modal *will* was associated with prediction, probability, induction, and future action. These results suggest that the deontic use of *will* is established before its epistemic use. Moreover, she also found that the use of *will* was sporadic until the age of 3.6, but increased rapidly around the age of 4.6.

Interestingly, the verb forms with modal and quasi modal auxiliary constructions, which are shown in Table 4.1, were mostly found to be used in deontic and dynamic functions. The modals *must* and *should* were only used in a deontic function. The modal auxiliaries like *may*, *might* were not found in the data. However, Shields observed the use of *can* to indicate possibility, in 13% of respondents. This suggested that the means to express possibility emerged, but its use was sporadic.

The results from Shields' studies reveal some developmental stages in the acquisition of modality. That is, deontic modalities and dynamic modalities were well established, while epistemic modality was still at a very early stage of development. Hence, the children appear to acquire deontic modality and dynamic modality before the epistemic modality. Shields reasonably explained the development of modality by relating it to cognitive development. She argued that young children's use of modal auxiliaries in an epistemic function or a hypothetical function results from a fully functional system of probabilistic reasoning, which has been slowly acquired because a child's thinking has been tied to what is being or has been observed. At this stage, a child's thinking has not been systemized into a new wider applicable network of logic which enables him/her to hypothesize a state or an action the future (Shields 1974: 197).

Wells (1979)

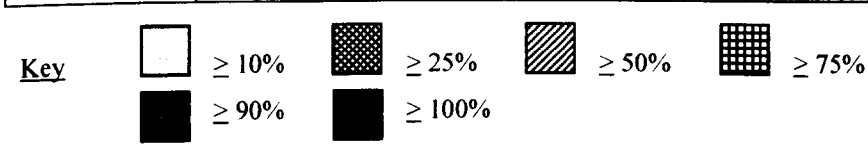
Wells (1979) conducted a longitudinal study investigating language development of 60 English-speaking preschool children in Bristol, UK. The data was collected from children aged 15 to 60 months every three months. The main aim of the study was to

look for common sequences and variation in the development of language. However, he also reported on the development of modal expressions by children.

Wells reported that *can* was the first modal to emerge in the children's data. At the age of 30 months more than 50% of the children appeared to use *can* to convey both ability and permission. It was then closely followed by the emergence of *will*, which was used to convey intention. After a few months, at about 33 months, the children used *must, have got to* and *should* to convey obligation or necessity. By the age of 39 months all categories of root modality were in place, and the children appeared to use *may* and *might* to express possibility.

Table 4.2: Age of emergence of modal expressions

Modality	**Age in months**															
	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60
Ability																
Permission																
Willingness																
Try/Attempt																
Obligation																
Necessity																
Possibility																
Certainty																
Inference																



(Wells (1979: 253)

With respect to the emergence of epistemic modality, Wells (1979) pointed out in his study that the epistemic modals emerged much later and took several months to develop and reach particular levels. The modals of possibility *may* and *might* were the first two epistemic modals which emerged before other modal categories, and are well established by the age of 60 months as shown in Table 4.2. Wells (1979) argued that the late emergence of the epistemic modality in the children's data suggested that the

development of these linguistic categories did not depend simply on the syntactic criteria, but also cognitive development.

Wells (1985) reports on a second sample of children followed from age 3.3 to 5.0. He found that by the age of 5, about 25% of the children appeared to use modals to convey certainty. However, epistemic inferential use appeared later than the expressions of certainty.

The results from Wells' study suggest a developmental stage similar to what we found in Shields (1974). That is, for the children in the two studies, root modality appeared long before epistemic modality. With respect to the emergence of the epistemic modality, we remark that while Shields (1974) reported that the probability *will* appeared to be used more than the possibility '*can*', Wells (1979) reported the emergence of the possibility *may* and *might*, and they were well established long before the modals of certainty and of inference.

Hirst and Weil (1982)

After Wells' study in 1979, research on the acquisition of modality in English often employed experimental methods, and went beyond the exploration of the emergence of modality expression. Separate tasks have been designed for tapping the developmental paths of epistemic modality and root modality. Hirst and Weil (1982), for example, conducted an experimental study investigating the acquisition of the relative strength of the plain assertions, deontic modal statements and of the epistemic modal statements by 54 children aged between 3.0 and 6.6. The subjects were divided into 7 groups according to their age e.g. 3.0-3.6, 3.6-4.0, 4.0-4.6, 4.6-5.0, 5.0-5.6, 5.6-6.0, 6.0-6.6. The rationale of the experiment was based on the idea that statements with stronger modals should be interpreted as indicating a higher degree of speaker confidence and should be preferred over statements with weaker modals, and that the plain assertions should be treated as stronger than the modal ones.

The subjects had to perform both an epistemic and a deontic task. In the epistemic task, the subjects were shown a table with a plastic cup and a box on it. Then, the researcher told them that he was going to hide a peanut under the cup or the box, and they had to find the peanut by pointing at the container which they thought the peanut was

underneath. Before choosing the container, the two puppets offered a stronger modal statement (e.g. *The peanut must be under the box.*) and a weaker modal statement to the subject (e.g. *The peanut may be under the cup.*). The subjects then had to choose the most probable statement from the two modal statements.

In the deontic task, the subjects were presented with two model rooms: green and red. There was a doll named Andy, and the two puppets Andy's teachers. The researcher told the subjects that the teachers allowed Andy to play in either the red or the green room. One teacher offered a stronger modal statement (e.g. *You must go to the green room.*), while the other offered a weaker modal statement (e.g. *You may go to the green room.*). Then, the subjects had to point to the room which they thought Andy would enter.

The general findings were that subjects appeared to distinguish the modal statement from the plain assertion, before realizing the relative strength between the modals. The results from the experiments also show that the subjects treated possibility modals *may* and *should* as weaker than plain assertions (i.e. statements with *is*) before they discovered that necessity modals, e.g. *must*, also communicate a weaker degree of commitment than plain assertions.

Hirst and Weil (1982) concluded that the greater the difference in the strength of the two types of the modal statements, the earlier this difference will be realized. They also pointed out the children's comprehension of the deontic modals seems to lag behind the comprehension of the epistemic modals. This may contrast to the developmental paths we have seen in the previous studies. However, Hirst and Weil argued that, as their study was testing the children's comprehension, it was risky to compare the findings from their experiment with the findings from the research which explored the children's production. Furthermore, they argued that the contrast may result from a non-linguistic cause. That is, there were complicated social dynamics involved in the two contradictory figures to confuse the children in the deontic, while this complexity was not present in the epistemic task (Hirst and Weil 1982: 666).

Byrnes and Duff (1989)

Another study which investigated English-speaking children's comprehension of modal expressions during the same decade is that of Byrnes and Duff (1989). The aims of their study were (1) to clarify the age trends regarding when the children appear to comprehend significant meaning of the modals; (2) to explicitly consider the hypothesis that children first acquire partial aspects of the meanings of the modals and later acquire a more complete understanding.

The subjects in their study were 20 three-year old children, 15 four-year old children, and 19 five-year old children. The subjects were asked to perform two tasks i.e. an epistemic task and a deontic task. In the epistemic task, the subjects were asked to search for a penny which was placed under one of two cups (a red cup and a blue cup) by a whisper hint of puppets. In the deontic task, the subjects were presented four stories. After each story there was a character, a child, expressing his desire to perform an action. Then there were two characters, parents, appearing and expressing a modal statement to bring about the act. The subjects were asked to predict the action immediately after the two characters made the modal statement.

Byrnes and Duff (1989) had modified Hirst and Weil's (1982) procedure. First, they decided to exclude the formal modals like *must*, *may*, and *should* from the task, but included the informal *has to/have to*, *can*, and *could* instead. They noted that the children in the previous research appeared to use the informal modals more than the formal modals. In addition, some children were not familiar with the formal modals as their parents have never expressed these to them. Therefore, to use the formal modals in the task may have underestimated the children's comprehension.

Second, since one of the aims of their study was to consider the hypothesis that children first acquire partial aspects of the meanings of modals, they decided to present a single test sentence to the children. Therefore, the children did not have to contrast the degree of strength, but only had to use the modals to prompt their search of an object.

Third, Byrnes and Duff (1989) also included referential synonymous pairs of the modals *has to* VS *can't* and *might* VS *might not* in the task in order to assess the integrity of the children's modal system. Byrnes and Duff argued that the modals of the first pair were

at extreme opposites of the continuum, while the two modals of the second pair were placed between the midpoint and the extreme opposite of the continuum.

Finally, they also compared the children's performance across the two tasks in order to see whether the children have an easier time comprehending the epistemic modals over the deontic modals, or vise versa.

The results from the epistemic task showed that the children at every age knew that *can't* and *might not* share a meaning component. That is, for example, '*It can't be under the red cup*' and '*It might not be under the red cup*' both indicate that the penny was not under the blue cup. Byrnes and Duff (1989) also found that the five-year old and the four-year old children appeared to appreciate the relative strength of the contrast pairs. This process initially occurs between the ages 3 and 4 years (Byrnes and Duff 1989: 381). Finally, the results showed that the children performed significantly better with *has to* versus *can't* than *might* versus *might not*. This corroborates the findings in Hirst and Weil (1982) that the greater the difference in the strength of the two types of the modal statements, the earlier this difference will be realized.

As for the deontic task, the results show that the five-year old children were more likely to correctly predict the character's action after hearing the deontic statement stated by the character. However, the younger children did not perform differently. Byrnes and Duff (1989) explained that the since comprehension of the deontic modal expressions requires knowledge of social relations involved in acts of giving permission or restrictive behaviour, it is not surprising to see the older children perform significantly better than the younger children.

All in all, Byrnes and Duff (1989) concluded that the children appear to acquire partial aspects of meaning first, and later appreciate the meanings of the modals within the continuum, and that the significant development of the epistemic modal system occurs between the ages of three and four, and was complete by the age of five. They also pointed out that the children in their study appear to correctly use the modal expressions to prompt their search rather than to help them predict the actions of the character. This finding, however, contradicts what has been shown in previous studies. That is, children acquire deontic modals before epistemic modals.

Although Byrnes and Duff's study (1989) revealed results which counter the findings with respect to the emergence order of deontic modals and epistemic modals in the previous longitudinal research, we see that it corroborates the findings from an experimental study by Hirst and Weil (1982). These findings strengthen Hirst and Weil's (1982) statement that it was risky to compare the findings from the research that test children's comprehension with the findings from the research which explored the children's production because the production process often lags behind the comprehension process.

In spite of such a contradiction, Byrnes and Duff's study has revealed the process and the developmental paths of the epistemic modals, which obviously have implications for my current research. In the analysis we must bear in mind that epistemic modals are harder to acquire than deontic modals.

Noveck, Ho, & Sera (1996)

Noveck, Ho, & Sera (1996) replicated and modified Hirst & Weil's hidden-object task examining children's comprehension of epistemic modals. Specifically, they investigated the extent to which a representation of relative force can account for children's understanding of the epistemic modals. The focus of their study was the epistemic modals and deontic modals not examined.

There were two experiments in their study, one which replicated Hirst & Weil's hidden-object task, and another which modified Hirst & Weil's hidden-object task. In the first experiment, the subjects were asked to search for a peanut under one of the two containers after hearing the modal statements. There were 32 five-year old children participating in the first experiment.

The results from the experiment showed that the subjects successfully searched for the peanut by relying on the puppet's statement. In other words, the subjects usually searched for the peanut under the container associated with the modals indicating a higher degree of certainty. This suggested the children realize the relative strength of the epistemic modals. Specifically, the children appear to understand the contrast between '*is/has to*', '*is/might*', '*has to/might*'. However, Noveck, Ho, & Sera (1996) noted that

the children's preference for *is* over *has to* was not significantly different due to the pragmatic peculiarity of *is* in the presented context.

In the second experiment, the subjects were first presented with two open boxes and one closed box. The participants were also told that the closed box had the same contents as one of the two open boxes. After that, the subjects were presented with two modal statements by the two puppets, one with a true proposition and another with a false proposition according to the scenario. Then, the subjects had to decide which statement was correct. In other words, the subjects had to determine which statement correctly described the scenario. The purpose of the task was to test whether the relative force hypothesis which was shown in experiment 1 can be extended to judgments concerning the logical meaning of the epistemic modals. The rationale was that if the children were to rely on the relative force of the modals, they were expected to agree with the more certain-sounding puppet.

There were six contrasting pairs of the modal statement about the content of the closed box e.g. (i) *There has to be a parrot in the box / There cannot be a parrot*, (2) *There might be a bear / There has to be a bear*. There were 32 five-year olds, 20 seven-year olds, 16 nine-year-olds, and 20 adults participating in the second experiment.

The results of the experiment 2 show that the subjects appear to endorse the logically correct fact of the background information rather than the stronger false statements. That is, the five-year olds preferred the weaker true statements over the false modal statements, the seven-year olds consistently agree with the puppet who offered the true statements, and so did the nine-year-olds and the adults. Nevertheless, Noveck, Ho, & Sera (1996) noted that the five-year olds showed signs of having a primitive understanding of the meaning of the modals, while the seven-year olds showed that they had a relatively mature understanding of it. Specifically, the children from these two groups were able to determine that the modal statements were correct according to the scenario, but they were inclined to give correct logical evaluations (Noveck, Ho, & Sera 1996: 640). Accordingly, Noveck, Ho, & Sera (1996) argued that the signs of an adult-like understanding of the logical meaning of the epistemic modals may not appear until the children are at least seven years old, and this suggests that the logical inference is a

primary component of the modal meanings, and is indispensible for modal semantic development (Noveck, Ho, & Sera 1996: 642).

Papafragou and Ozturk (2007)

Papafragou and Ozturk (2007) were inspired by the prior findings from the studies on the acquisition of epistemic modality by children. They examined children's comprehension of epistemic modals and their pragmatic interpretation. There were two experiments in their study: Experiment 1, which aimed at testing whether the 5 year-old children could choose the stronger/more informative modals in situations where the use of the modals was warranted by the evidence; and Experiment 2 which aimed at testing whether the children could detect the differences in informativeness between two modal statements if the statements have strong positive or negative consequences. The logic of the experiments was based on the idea that if the children succeeded in choosing the modals, the children will demonstrate sensitivity to the differences between weak and strong modal statements.

In Experiment 1, the subjects who participated in their study included 21 English-speaking children aged between 4.6 to 6.0 years old, and 20 adults. The subjects were presented with twelve short stories on a computer screen. In each story, the subjects saw an animal standing by two boxes on a stage, then the animal went to hide in one of the boxes while the curtains on the stage were lowered. The researcher told the subjects that the animal was hiding in one of the two boxes. Afterward, the curtains were lifted and one of the boxes was open. In some stories, there was an animal in the box, in other stories the animal was not found. Next, two cartoon characters: Minnie and Donald offered one statement each about the hiding place of the animal and the participant was asked to choose which character gave a better answer. The two statements were identical except for their modal strength. That is, they contained either a strong or a weak modal. The characters' statements illustrated three types of modal contrasts: (i) *may* vs. plain assertion (ii) *have to* vs. plain assertion, and (iii) *may* vs. *have to*.

The results of the experiment 1 showed that children's performance on the *may/is* contrast (M = 80.95%) was significantly different from their performance on the *have to/is* contrast (M = 63.1%), and the *may/have to* contrast (M = 64.29%). In addition, the children's performance for the *may/is* contrast and the *may/have to* contrast is above

chance, while the children's performance for the *have to/is* is not significantly different from chance. Adults' performance, on the other hand, showed no significant difference between their performances on the *may/is*, the *have to/is* and *may/have to* contrasts. These results suggest that although the five-year old children appear to be sensitive to the relative strength of modals, they, unlike adults, have difficulty in determining that plain assertions generally convey a higher degree of speaker's certainty than statements with epistemic modal necessity, since their performance for the *have to/is* is at chance level.

In Experiment 2, the participants were 15 English-speaking children aged between 4.1 to 5.7 and 15 English-speaking adults. The procedures in the experiment were quite similar to experiment 1. During the task, the subjects were presented with two types of stories, both positive and negative. In the stories, the subjects were asked to tell the researcher what they like or would like to get. After that, twin siblings appeared on the computer screen. Each of them offered a statement with different modals, telling the subjects that they will receive what has just been said. For example, if the children said they want an ice-cream, one of the twins will say '*I will give you an ice-cream*', and the other twin will say '*I may give you an ice-cream*'. The subjects then had to choose one of the twin siblings over the other one depending on what they said.

The results of experiment 2 reveal that adults performed better than children in this task. While the adults performed perfectly on both negative and positive stories, children performed significantly above chance level on negative stories. Based on these results, Papafragou and Ozturk (2007) concluded that 5-year-olds partially understand the pragmatic meaning of the epistemic modals, more specifically the connection between the epistemic modality and the speaker's certainty (Papafragou and Ozturk 2007: 326).

Summary

The literature reviewed in this section provides a picture of the acquisition of modality by English-speaking children as well as their developmental paths. Early work in this area traced the developmental path of modal expressions longitudinally indicating deontic and epistemic meanings in children's spontaneous speech. The findings from these studies corroboratively reveal that deontic modal expressions have been observed in children's data long before the emergence of epistemic modal expressions (Shields

1974, Wells 1979). These studies also reported the acquisition order of modal expressions. Shields (1974) reported that the use of the deontic *can* was observed before the use of other modals from the same category. However, she did not clearly report the emergence order of epistemic modals. Shields only observed that the probability *will* appeared to be used more than the possibility *can*. Wells (1979), on the other hand, found that the possibility *may* and *might* were established long before the modals of certainty and of inference. These contradictory findings, in my view, may have resulted from the variances in situations and places where the data was collected. Shields (1974) collected data from nurseries and playgrounds while the children subjects interacted with their friends and caretakers, while Wells (1979) collected data from the children's homes during interaction with parents. Nevertheless, this is just speculation and the issue is still open for further research. Even Wells (1979) himself noted differences in the use of modal expressions of children from different social backgrounds.

Apart from the early longitudinal studies, experimental research (Hirst & Weil 1982; Perkins 1983; Byrnes & Duff 1989; Noveck, Ho, & Sera 1996; Papafragou and Ozturk 2007) has been conducted to investigate how children acquire modal expressions. A truth value judgment methodology was used in the experiments. The children were presented with short stories or scenarios, and they were asked either to judge the modal statements or to choose one modal statement over the other. The common purpose of these experiments was to test whether children could detect the relative strength of modal expressions. Hirst and Weil (1982) and Byrnes and Duff (1989) found that the greater the difference in the strength of the two types of modal statements, the earlier this difference will be realized. They also noticed that children's comprehension of deontic modals seems to lag behind the comprehension of epistemic modals. This contrasts with the developmental paths we have seen in the previous studies. Noveck, Ho, & Sera (1996) and Papafragou and Ozturk (2007) investigated the acquisition of epistemic modal expressions by children across several age groups, pointing out that children from different age groups appear to be sensitive to differences between weak and strong modal statements, and that the signs of an adult-like understanding of the logical meaning of epistemic modals did not appear until the children were seven years old.

Both the methodology and the findings of the research reviewed in this section so far are taken as background and provide the platform for the experiments which will be presented in chapters 5 and 8.

4.2 The L2 acquisition of modality in English

There is a limited amount of research on the L2 acquisition of modality in English, particularly related to epistemic modality. This section therefore discusses three studies which were available at the time when the current research was being conducted: Gibbs (1990), Mason (1994), and Bardovi-Harlig (2005). However, these studies did not deal with epistemic modality directly.

Gibbs (1990)

Gibbs (1990) studied the acquisition of English modal auxiliaries: *can, could, may,* and *might* by seventy-five Punjabi-speaking students. The aims of the study were (1) to investigate the effect of age of initial exposure to English on second-language acquisition of English modal auxiliaries; (2) to discover the importance of function and context of use for that acquisition; (3) to test the hypothesis that second language acquisition of English modals broadly follows the same order as English as a first language learner.

Gibbs selected 45 primary school students and 30 secondary school students learning English as a second language in the Metropolitan Borough of Sandwell in the West Midlands of England. Although the subjects live in England, all of them acquired Punjabi as their first language, and English as a second language. Punjabi was the primary language used for communication with family members in the home. The subjects from primary school and secondary school were divided into three sub-groups according to their years of exposure to English (i.e. 2, 4, and 6).

In order to provide a baseline for the acquisition of modality in English, and to compare the acquisition patterns of Punjabi-speaking students with English-speaking students, Gibbs also collected the data from 18 English-speaking students from the same primary school as the Punjabi-speaking students, and divided them into three sub-groups according to their length of years at school (2, 4 and 6 years).

A restricted response elicitation instrument (black and white line drawings), was used in collecting oral expressions of modality. The responses were elicited for four Root Modality[5] functions—Ability, Permission, Possibility, and Hypothetical Possibility—plus the Epistemic Possibility function, and in Declarative, Negative and Interrogative environments. The subjects had to look at the complementary pictures, and orally reply to the questions with modality such as '*What could the boy do if he had some money*?'. The subjects were expected to give an answer which was conditionality or modally signaled. For example, the acceptable answers to the above question are '*He could buy some chips/He might buy some chips*'. On the other hand, if the subjects answered '*He buys chips*', it was marked as an error because it is not modally signaled. Afterward, an error analysis was conducted, and the mean score of each group was compared.

The results of the study showed that the subjects from the primary school performed better than those from the secondary school, especially in expressing hypothetical and epistemic possibility. Furthermore, the acquisition of modals in the declarative and negative environments by the primary school students preceded that of the secondary school children by about two years. The mean error scores are shown in Table 4.3.

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[5] Gibbs' adopted the terms 'root modality' from Coates (1983). That is, dynamic modality and deontic modality are sometimes classified and included in the same category i.e. root modality. This is because both deontic and dynamic modality are agent-oriented, whereas epistemic modality is speaker-oriented (Coates 1983: 20-1).

Table 4.3: Mean error scores for speakers of Punjabi and L1 English

Group	*Modal meanings* *Mean errors*					*Mean total errors*	*Context* *Mean errors*			*Mean*
	RA	RPe	RPo	HYPO	EPIS		DEC	NEG	INT	SECTS
Primary Punjabis G N Y										
A 15 2	1.5	0.5	1.7	5.7	5.8	15.1	8.8	1.7	4.7	3.0
B 15 4	0.4	0	0.3	3.1	3.5	7.3	5.1	0.7	1.6	3.9
C 15 6	0.1	0.2	0.1	1.8	1.5	3.7	1.7	0.7	1.3	4.6
Secondary Punjabis G N Y										
D 10 2	2.4	0.5	1.9	7.0	5.7	17.5	11.2	3.3	3.0	3.0
E 10 4	0.5	0	0.4	4.4	4.4	9.7	6.6	2.0	1.1	3.5
F 10 6	0.1	0	0.2	3.4	3.0	6.7	4.2	1.7	0.8	4.3
Primary English G N Y										
G 6 2	0	0.2	0.5	3.8	5.0	9.5	7.2	1.0	1.3	3.6
H 6 4	0.3	0	0	1.5	1.0	2.8	1.5	0.3	1.0	4.6
J 6 6	0	0	0	0.3	0.5	0.7	0.5	0.2	0.2	0.5

Key: G = Group; N = Number of subjects; Y = Years of exposure; RA = Root Ability; RPe = Root Permission; RPo = Root Possibility; HYPO = Hypothetical Possibility; EPIS = Epistemic Possibility; DEC = Declarative; NEG = Negative; INT = Interrogative; SECTS = Sections Passed.

(Gibbs 1990: 304)

When considering the errors made by the subjects, the secondary school students made comparatively more errors than the primary school students did. Interestingly, the mean scores of errors of root permission, root ability, and root possibility made by Punjabi-speaking children are very low. This suggests that the root modality meanings are well established in the L2 children's language before the epistemic modality meanings.

As for the more complex semantic domain, such as hypothetical possibility and epistemic possibility, Punjabi-speaking children also showed patterns of errors which

are similar to those of English-speaking children. That is, the children whose length of exposure to English was longer made fewer errors than the children whose length of exposure was relatively shorter. In addition, when considering the modal environments, Gibbs discovered that the subjects appeared to acquire modal auxiliaries in a negative environment before acquiring them in a declarative and interrogative context. However, in this situation, the secondary school students performed better than the primary school students.

In summary, Gibbs concluded that the patterns of acquisition of English modal verbs by L2 learners of English conformed to those of L1 learners. Root ability, permission and possibility were acquired before hypothetical and epistemic possibility. Nevertheless, since Gibbs did not show whether the two groups (primary and secondary) were equivalent in terms of their level of L2 proficiency, the comparison of the younger learners with the older learners based on the length of exposure may not reveal the actual developmental path. It could be that the older learners with high proficiency, but relatively short length of exposure, will produce relatively fewer errors than the younger learners with low proficiency, but a longer length of exposure. Therefore, the length of exposure may not be a crucial indicator of language development. This calls for the need to better measure proficiency, in order to make a comparison between younger learners and older learners more reliable.

Mason (1994)

Mason (1994) studied the development of narrative skills by focusing on the evaluative use of modal verbs (e.g. modals, futures, and quasi-modals), in the narratives of young, non-native speakers of English. Although Mason (1994) did not investigate the development of modality, she employed the use of modal verbs in the non-native speakers' narratives as an indicator for the development of narrative skills. She argues that modal expressions are evaluative in that they describe situations as on-going states representing the perceptions of an eyewitness or the direct experience of a character in the narratives (Mason 1994: 92).

There were 8 Punjabi-speaking children from a school in Reading in the study. The children were divided into 4 levels of L2 ability: very good, good, fair, and poor, according to their progress in reading and writing English, as judged by the class

teachers. The children were asked to retell six model stories along with two less demanding activities i.e. drawing activities and free conversation manipulating six knitted dolls which represented the characters in the stories.

With respect to the evaluative use of the modals verbs, Mason (1994) found that the modal expressions such as *can*, *must*, *may*, *might*, *will*, and *should* etc. were used more than the future expressions e.g. *will*, *shall*, and *going to*, and the quasi-modals e.g. *have/has to* and *want to* etc. She reported that the L2 learners were not equally competent as narrators, and that the evaluative use of the modals increased with age and language experience.

In addition, Mason (1994) reported that her subjects passed through the same developmental path as the L1 children in their acquisition of modal expressions. That is, they appear to acquire deontic modality before epistemic modality. However, they do not follow the developmental path which Gibbs (1990) identified in her L2 research. Mason (1994) found that the L2 subjects appeared to acquire interrogative modals first and followed by the negative and the declarative environments, while Gibbs (1990) found that the subjects appeared to acquire modal auxiliaries in a negative environment before acquiring them in a declarative and interrogative context.

Bardovi-Harlig (2005)

Bardovi-Harlig (2005) did not directly deal with modal expressions. In fact, she investigated the use of lexical futures relative to other future expressions. However, the future reference and modality are closely related. That is, future reference also encompasses modality or vice versa (Bardovi-Harlig 2005: 1). In other words, future reference may include modality readings of possibility, probability, intention, and desire or volition (Bybee 1985 cited in Bardovi-Harlig 2005). For these reasons, Bardovi-Harlig's study (2005) will have an implication for the current study.

There were 16 L2 learners of English who enrolled in the intensive English Programme at Indiana University. These included 5 native speakers of Arabic, 6 native speakers of Japanese, 2 native speakers of Korean, and 3 native speakers of Spanish. Data was collected from different sources such as journals, compositions, personal oral and written narratives, elicited narratives based on retellings of films, and oral interviews.

The length of their enrollment in the programme ranged from 6 months to 18 months. There were over 3,700 tokens of future expressions found in the data.

The results from the study show that *will* was predominantly used by the L2 learners in both written and oral data. The future *going to* was found to be the second most frequent marker of the future in the written data, and was followed by the present-based verb with an adverb (*e.g. I leave tomorrow*). However, in the oral data the use of *going to* was slightly lower than the present-based verb with an adverb. The present progressive was hardly used as a future marker. The lexical futures found in her study are, for example, *want to, hope to, have to supposed to, like* and *be able to*. The results of the use for all categories are shown in Table 4.4.

Table 4.4: Expressions of futurity: Group totals for oral and written samples

	Will	*Going to*	Base/Pres	Prog	Lexical future	Other	Total
Written	1406	241	139	40	554	1862	566
(%)	(55)	(9)	(5)	(2)	(22)	(7)	(100)
Oral	735	79	98	13	179	65	1169
(%)	(63)	(7)	(8)	(1)	(15)	(6)	(100)

(Bardovi-Harlig 2005: 6)

In terms of the emergence of the future expressions, Bardovi-Harlig (2005) also found that *will* and the lexical futures emerge similarly early in the data, while the morphological future emerges later. She argues that in the first stage of the development, *will* and the lexical futures are periphrastic modals. That is, the L2 learners use these linguistics devices to express future desires and intention, which is one of the key modal readings of the future (Bardovi-Harlig 2005: 11).

In summary, Bardovi-Harlig's study (2005) showed that the emergence of the lexical futures and the emergence of modality are linked. The early use of *will* and the lexical

futures was for modal function. Afterward, the L2 learners moved to true infinitival forms which implicate future reference time.

4.3 Conclusion

The previous studies on the L1 acquisition of modality reviewed in this chapter reveal that children acquire root modality before epistemic modality. The early work in this area reported the emergence of the root before epistemic modal expressions in longitudinal data. The epistemic modals emerge by the age of 5, and the early use of epistemic modal expressions was to indicate certainty, while the epistemic inferential use appeared later (Wells 1985).

The studies that focus on the acquisition of epistemic modality have also been presented. These studies employed a truth value judgment task in testing the children's comprehension of epistemic modals. They usually tested whether or not the children were able to detect the relative strength of individual modals. The children were normally asked to choose one modal statement over another. The results from these studies, as outlined, show that the children appear to know the relative strength of individual modals from the very beginning of the acquisition.

This chapter also presented the limited amount of research that exists on the L2 acquisition of modality by non-native speakers of English. These studies showed that the L2 children followed similar developmental paths which are observed in the L1 child's acquisition. We note that the L2 research reviewed in this chapter did not tell us more about the L2 acquisition of epistemic modality, and did not demonstrate how L2 learners of English acquire epistemic modality. Moreover, they did not demonstrate whether epistemic modals can be acquired. The lack of research directly concerned with the acquisition of epistemic modality by non-native speakers of English highlights the need for greater investigation in this area. Other questions which beg further investigation include, for example, *do the l2 children follow the same developmental paths as L1 children?*; *do L2 learners transfer their L1 properties into the L2 acquisition of epistemic modality*?

As there is no L2 research known to this author dealing with the acquisition of epistemic modality by Thai speakers, and there is no known L2 research dealing with the issues mentioned above, I will therefore investigate the L2 acquisition of epistemic modality by Thai-speaking children and adults hoping to shed light on the L2 acquisition of epistemic modality and attempt to fill the academic void in this subject area. Furthermore, we have already seen in chapter 3 that the epistemic modality is always associated with tense and aspect. Therefore, the current research may reveal implications for L2 acquisition of tense and aspect in English.

Chapter 5

The Pilot Study

5.0 Introduction

With reference to the similarities and the differences between English and Thai epistemic modal auxiliaries presented in chapter 3, it is necessary to explore more specifically the syntactic and semantic aspects of epistemic modal auxiliaries in English which are likely to present difficulties for Thai L2 learners of English. As there has been no previous research on the L2 acquisition of epistemic modality, it was decided that an exploration was warranted in order to identify the specific aspects requiring in-depth investigation in the current research. In addition, it was hoped that a pilot study would shed light on potential theoretical and practical problems which may occur in the investigation. This would enable the researcher to prepare solutions for, and to avoid future problems. This chapter presents the pilot study: An experimental study of the acquisition of English epistemic modal auxiliaries by Thai L2 learners of English. It was conducted to explore what aspects of English epistemic modal auxiliaries were likely to pose difficulties for Thai L2 learners of English.

5.1 Rationale for the experiment

This pilot experiment focused on the acquisition of the semantic properties of epistemic modal auxiliaries in English by Thai L2 learners of English. Only four epistemic modal auxiliaries were investigated *must, will, may,* and *might* because the epistemic meaning of these modals are quite clear. I did not include *should*, *would*, and *could* in this study because the semantic properties of them are very complicated. Additionally, epistemic interpretation of these modals are not distinct deontic ones, and the use of these modals involves conditionals.

The semantic properties under examination in the pilot study include the basic meanings of the four epistemic modals i.e. inference, probability, possibility, and relative degree of confidence. These semantic properties are also instantiated in Thai. They are expressed by preverbal modals, the linguistic forms which are assumed to be of relevant

forms of the epistemic modal auxiliaries in English. For convenience and clarity, the semantic properties of the four epistemic modals are provided again in this section.

Must is used to indicate the speaker's confidence in the truth of what he/she is saying based on a logical process of deduction from the facts known to him/her, which may or may not specified (Coates 1983: 41).

Will is also used to indicate an inference based on facts generally known to the speaker, or on repeated experience or common sense of the speaker (Coates 1983: 177). However, *must* draws a stronger conclusion than *will* (Palmer 2001: 35).

May and *might*[6] indicate the speaker's speculation without confidence. In other words, the speaker does not commit to the truth of what being said.

The semantic features of *must*, *will*, *may*, and *might* can be summarized as follows:

Table 5.1: The semantic features of epistemic *must*, *will*, *may*, and *might*

Auxiliaries	**Semantic features**			
	Inference	**Possibility**	**Strong confidence**	**Weak confidence**
must	Yes	No	Yes	No
will	Yes	No	No	Yes
may/might	No	Yes	No	Yes

Apart from the basic meanings shown in Table 5.1, the pilot study also explored the syntactic aspect of the four modals which are not instantiated in Thai, namely the syntactic patterns for making a judgment about an event in the past.

[6] Perkins (1983) and Coates (1983) argue that *may* and *might* indicate the same meaning and can be used interchangeably without changes in the meaning of the sentence. For this reason, *may* and *might* will be used interchangeably in the test stories.

As discussed in Chapter 3, in English epistemic modal auxiliaries can be used to make a judgment on an event or state in the past by adding HAVE + -EN. Hence, the judgment on an event or state in the past can be achieved by changing verb forms. However, in Thai, verb forms do not indicate whether the event in focus has taken place or not. Therefore, temporal adverbials are required in making a judgment on an event or state in the past. They are used to specify the time reference of the event.

Regarding this difference, Thai L2 learners of English may have difficulties in making a judgment on events in the past. Moreover, the L1 properties e.g. modal statements with temporal adverbials may be observed in the linguistic structures that the L2 learner used in making a judgment on the events in the past.

The contrast between *must*, *will*, and *may/might* and the ways in which the native speaker makes a judgment on events in the past assisted in framing the questions for the experiment as follows:

(1) Can Thai L2 learners of English acquire the inferential function of *must*, and realize the relative strength between *must*, *may* and *might*?

(2) Can Thai L2 learners of English acquire the inferential function of *will*, and realize the relative strength between *will* and *must*?

(3) Do Thai L2 learners of English rely on temporal adverbials rather than verb forms in making a judgment on events in the past?

5.2 Designing the experiment

To test whether Thai L2 learners realized the contrast between the four modal auxiliaries, a truth value judgment task was designed. The task consisted of two parts. The first part was concerned with the semantic aspect, whereas the second part was concerned with the syntactic aspect of the four modals.

The first part included 4 conditions, with each condition consisting of 4 stories which were appropriate to the particular use of a modal auxiliary.

Condition A: Inferential MUST condition

This condition was designed to test whether the subjects realized the inferential or deductive function of *must* or not. There were 4 short stories which were felicitous to the use of an inferential *must*. The statements that followed these stories contained either *must* or *may/might*. The subjects were expected to choose the sentences with *must* over the sentences with *may/might* if they understood the inferential function of *must* since the latter two modals did not have an inferential function. An example of the test items in Condition A:

A1 Tom is watching his favourite comedy on TV. He is laughing out loud.

A. It must be funny.

B. It may be funny.

Condition B: Inferential WILL condition

This condition was designed to test whether the subjects realized the inferential or deductive function of *will* or not. There were 4 short stories felicitous to the use of an inferential *will*. The statements that followed these stories contained either *will* or *may/might*. The subjects were expected to choose the sentences with *will* over the sentences with *may/might* if they understood the inferential function of *will*.

An example of the test items in Condition B:

B1 My sister has been learning two songs at school. She sings them every day in class.

A. She may know them well by now.

B. She will know them well by now.

Condition C: Relative strength of MAY/MIGHT condition

This condition was designed to test whether the subjects realized the relative strength of *may/might* or not. There were 4 short stories felicitous to the use of an epistemic *may/might*. The statements that followed these stories contained either *must* or *may/might*. The subjects were expected to choose the sentences with *may/might* over the sentences with *must* realized if they recognised the relative strength of *may/might*.

An example of the test items in Condition C:

C1 Nancy is fishing by the pond. She suddenly sees a tiny animal jumping into the pond. She is not sure what it is.

A. It must be a frog.

B. It might be a frog.

Condition D: Relative strength of MUST condition

This condition was designed to test whether the subjects realized the contrast between *must* and *will* or not. There were 4 short stories felicitous to the relative strength of *must*. The statements that followed these stories contained either *must* or *will*. The subjects were expected to choose the sentences with *must* over the sentences with *will* if they understood the inferential function with strong confidence of *must*, since the former indicates more confidence than the latter.

An example of the test items in Condition D:

D1 Winnie has crumpled up her sheet of paper and put it in the bin.

A. She must have made a mistake.

B. She will have made a mistake.

The second part included 4 stories. These stories required the use of HAVE + -EN for making a judgment on an action, a state or an event in the past. The statements that followed the stories contained either a temporal adverbial or HAVE + -EN form. It was hypothesized that the Thai L2 learners of English, who do not know the temporal meaning of the structures in question, would rely on the temporal adverbial rather than the verb forms in making a judgment about the events in the past. On the other hand, the L2 learners who know the meaning of the structures were expected to choose the statements with HAVE + -EN form over the statements with a temporal adverbial. Note that the statements with a temporal adverbial were ungrammatical, while the statements with HAVE + -EN form are grammatical.

An example of the test items in Condition E:

E1 Jerry's mum found out that Jerry lied to her. So, she cried last night.

a. She must be sad last night.

b. She must have been sad.

All stories and statements were first checked with three native speakers of English. The native speakers were asked for comments on the stories and the statements. If they felt that the stories did not make any sense or sounded a bit ambiguous, they were asked to help revise the stories. After consulting with the three native speakers, the stories and statements were revised, and tested with 35 English-speaking undergraduate students. At this time, the percentage of the chosen answers was calculated. If more than 80% of the students chose the expected statement after reading an individual story, the story and the chosen statements were considered to be sensible. Nevertheless, the statements which were not chosen were reviewed in order to ensure that the students chose the one statement as a result of the other sounding ambiguous. In addition, if the percentage of the students who chose the expected statements was lower than 80%, the story and statement were revised.

After the final revision, all short stories were read aloud by two female native speakers of English, whereas the statements were read aloud by a male native speaker of English. The stories and statements were recorded as audio files with the Audacity computer programme. Microsoft Office PowerPoint was also used to present the pictures along with the story audio.

5.3 The participants

5.3.1 The L2 children

This group consisted of 7 Thai L2 children who arrived in the UK after the age of 4, and have resided in the UK from 1 – 4 years. In fact, some of the children moved to the UK with their mothers who married British men. Some of them moved to the UK with their Thai parents because their parents came to study or work in the UK. The children had attended school for a few months after arriving in the UK. The age of the children at the time of testing ranged from 5 – 9 years. An attempt was made to select children who were in the same age bracket as the L1 children in order to make sure that the cognitive maturity would not affect the responses of the children in both groups.

Table 5.2: L2 children's biodata

Subjects	Age at the time of testing (year)	Age at first exposure (year)	Length of exposure (year)
L2CHI01	6.8	5.11	0.9
L2CHI02	8.11	6.4	2.7
L2CHI03	8.3	5.5	2.10
L2CHI04	6.2	4.3	1.11
L2CHI05	7.9	5.1	2.8
L2CHI06	9.0	7.1	1.11
L2CHI07	8.5	6.3	2.2

5.3.2 The L2 adults

The L2 adult group consisted of 10 Thai L2 adults who arrived in the UK after the age of 13, and who have resided in the UK from 1 – 8 years. The age of the subjects in this group ranged from 22 – 40. Some of them were housewives who had married British men. Some of them used English as a medium language at home and at work. All of the subjects in this group started learning English formally at school in Thailand after the age of 9 but rarely used it outside of class. They started using English more often after they arrived in the UK.

Table 5.3: L2 adults' biodata

Subjects	Age at the time of testing (year)	Age at first exposure (year)	Length of exposure (year)
L2ADU01	18.2	13.7	4.5
L2ADU02	37.6	34	3.6
L2ADU03	35.1	28	7.1
L2ADU04	35. 4	29	6.4
L2ADU05	36.8	36	6.8
L2ADU06	35.5	33	2.5
L2ADU07	32	28	4
L2ADU08	26.4	21	5.4
L2ADU09	26.5	23	3.5
L2ADU10	42	38	6

5.3.3 The L1 children

This group consisted of 8 English speaking children aged between 5 – 9 years living in Leeds and Manchester. Four of them studied Thai as a second language at a Thai Buddhist Temple in Manchester every Sunday.[7]

5.3.4 The L1 adults (Control group)

This group consisted of 10 adult native speakers of English aged between 18 and 45. The occupations of the subjects in this group varied. Some of them were undergraduate students from The University of Leeds, and some of them were the parents of the L1 children.

5.4 Recruiting the participants for the pilot study

The search for Thai L2 children was initiated before other groups since it was assumed they would be the subjects most difficult to find. As most expatriate Thai communities congregate around temples and restaurants abroad, these locations were identified as prime recruitment settings. The first subject was identified at a local Thai restaurant, often frequented by the parents. Following this, some employees of the restaurant were also identified as potential subjects.

In addition, a Thai festival in Manchester in November 2008 was recognized as a valuable potential recruiting opportunity. The festival was organized by the local Thai Buddhist Temple and many Thai people were in attendance. Because the research protocols were still in their infancy, I attended to make the acquaintance of the children and parents and to cultivate them as possible research subjects. The project was discussed with many individuals and their permission sought for their possible future participation in the study. Two individuals, Mrs. Suwipha Ungphaiboon and Phra Mahapakanonda, were instrumental in assisting in the identification of potential participants. Mrs. Suwipha was a doctoral research student at the University of

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7 The results of the children who studied Thai were singled out in order to observe whether it seems to have any effect on their responses. The results suggested some effect of Thai on the children's acquisition of their native language.

Manchester, and taught Thai to English speaking children every Sunday at Srirattanram Temple. Phra Mahapakanonda was the Abbot of Srirattanram Temple. Both were familiar with many L1 and L2 children and their parents in the community, who were introduced to this author. The Buddhist temple was a prime location due to its social and cultural importance to the Thai community. At the temple, English speaking children, Thai L2 children, Thai L2 adults, and adult native speakers of English were plentiful. Phra Mahapakanonda graciously allowed me to run the experiment at the temple, and most of the data from L1 and L2 children was collected there.

In recruiting the adult native speakers of English, a first-year linguistics student at the University of Leeds provided contacts for several native English speakers, who were later contacted. Most of the native English speakers' data was collected at the University of Leeds.

5.5 The procedures

The subjects were asked to watch to 20 short stories narrated along with pictures related to the short stories on the laptop. After each story, a picture of a clown and a wizard appeared one after the other on the screen of the computer, then on the same screen. The order and the position of the clown and the wizard on the screen were randomized. Sometimes the clown appeared first and was followed by the wizard or vice versa. It was decided that the order and the position of the characters on the screen be randomized so as not to create a bias among the subjects e.g. the left-hand one, or for the clown. The stories for different conditions were also randomized. This was to prevent the subjects' bias on the order and the codes of the stories. As for Condition E which tested the knowledge about the syntactic structures that indicate past reference time, the order of the stories was not changed.

The researcher told the subjects that the clown and the wizard would say something about the stories. The clown and the wizard offered a statement about the story. The two statements were identical except for the modal auxiliary. The subjects were asked to choose which character gave the better answer.

In order to indicate their choice of character, the subjects were given a rubber stamp after each story. They had to put a stamp into the box which belonged to the clown if they thought the statement the clown offered was better, or into the box which belonged to the wizard if they thought the statement the wizard offered was better.

The experiment started with the instructions and a warm-up session to familiarise the subjects with the task. The subjects were presented with three simple stories. The subjects could ask the researcher to repeat the stories and the statements as many times as they wanted whenever they felt that the sound was not clear to them. The experiments took place in several locations such as the University of Leeds, the Thai Temple (Wat Srirattanaram) in Manchester, Thai Edge Restaurant Leeds, and the subjects' private homes. Each experiment lasted about 20 – 30 minutes.

5.6 Scoring

As soon as the subjects listened to all stories, the numbers of the stamps in the two boxes were counted, and the answers were marked on the answer sheet. The whole group of subjects was considered to provide a correct response if more than a half or 60%[8] of the members chose the statement which was felicitous to an individual story. For example, Item **RefM1** '*Tom is watching his favourite comedy on TV. He is laughing out loud*'. The statement which was felicitous to the story is '*It must be funny*'. If 6 out of 10 subjects in the adult L2 group chose the clown, who offered the statement which was felicitous to the story, the whole group was considered to have provided a correct response. Then, the number of the correct responses in each condition was calculated as a percentage.

[8] This mean of scoring is adopted from Tommerdahl and Moran's study of the development of linguistic reasoning in English children (2011).

5.7 The results of the experiment

5.7.1 L1 acquisition: Group results

Table 5.4: The L1 adults' and L1 children's correct responses

Group	N*	Conditions									
		(A) Inferential MUST		(B) Inferential WILL		(C) Relative strength MAY/ MIGHT		(D) Relative strength MUST		(E) PAST FORM	
		%	n**	%	n	%	n	%	n	%	N
L1 adults	10	100	4/4	75	3/4	75	3/4	100	4/4	100	4/4
L1 children	8	100	4/4	75	3/4	**25**	**1/4**	100	4/4	**50**	**2/4**

* N = The number of subjects
** n = The number of stories in each condition

Table 5.4 shows the percentage of the correct responses of the L1 adults and the L1 children in all conditions. Let us first consider the L1 adults. They all provided correct responses in condition (A), (D), and (E) at 100%, and in condition (B) and (C) at 75%. The percentage of the correct responses provided the L1 adults suggested that the L1 adults realized inferential function and the relative strength of *must*. In condition (E) where the use of HAVE + -EN was required, the results show that the L1 adults always chose grammatical statements when making a judgment about past events or actions. However, it is possible that the incorrect responses provided by the adult subjects in condition (B), which tested the relative strength between *will* and *may/might*, and in condition (C), which tested the relative strength of *must* and *may/might* did not result from not knowing either the inferential function or the relative strength of the modals. Rather, the contexts of the stories were not constrained enough to force the subjects to choose the correct responses. In other words, they were open for the subjects to make a judgment based on their own experience. Most of the L1 children, the L2 children and the L1 adults also provided incorrect responses for the stories in condition (B) and condition (C). While this is speculation, the important point is that the adults, taken as a whole, performed as expected. The following are test items for which the L1 adults provided incorrect responses below.

B1 My sister has been learning two songs at school. She sings them every day in class.

A. She may know them well by now.

B. She will know them well by now.

C3 Mike is still in bed. He likes school very much, but he will not go today.

A. He must be sick.

B. He might be sick.

The correct response for the test item B1 is 'B. She will know them well by now.' However, a half of the adults chose A and the other half chose B. As for the test item C3, the correct response is 'B. He might be sick'. 7 out of the 10 adults chose A.

As for the L1 child group, the patterns of their responses are quite similar to that of L1 adults in some conditions e.g. (A), (B) and (D). However, in condition (C), the percentage of the correct responses is low; 25%. In condition (E) only half of the subjects chose the grammatical statements when the stories require the use of HAVE + -EN form. For example, for the test item **E2** '*Goofy missed the school bus this morning. So his dad gave him a lift.*' 5 out of the 8 children chose the ungrammatical statement with temporal adverbial 'A. *He might get up late this morning.*'

The percentage of the correct responses in condition (A), (B), and (D) suggests that L1 children, like L1 adults, know the inferential function and the relative strength of *must* and *will*. Interestingly, the very low percentage of the correct responses in condition (C) points to the question of whether or not L1 children in fact realize the relative strength of *may/might*. In addition, the low percentage of the correct responses in condition (E) may point to the assumption that L1 children's knowledge concerning with the syntactic patterns indicating the past reference time of the modal complement is not fully developed.

5.7.2 L1 acquisition: Individual results

The L1 child group results in the previous section reveal interesting points about the development of the L1 children's knowledge about the epistemic modal meanings. Nevertheless, the group results may not yield the actual development of a child's knowledge. Therefore, the individual results were also considered.

A look at the L1 child individual results reveals that the L1 child individual results correspond with the L1 child group's results. That is, in condition A, B, and D more than half of the subjects provided a very high percentage of the correct responses; 100% and 75% respectively. In condition C, only 1 out of the 8 subjects provided a very high percentage of correct responses on 100%, and 2 out of the 8 children provided the correct responses at 75%. Finally, in condition E only 3 out of the 8 subjects provided a very high percentage of the correct responses at 100%. These results suggest that most L1 children appear to know the inferential function of *must* and *will* and the relative strength of *must*. However, most of them do not recognise the relative strength of *may/might*, and the meaning of HAVE + -EN. Interestingly, when taking into account the age of the children, we can see that the older children tend to provide the correct responses more than the younger children in all conditions. This suggests that the target-like responses increase with age.

Table 5.5: L1 child individual results: Percentage of correct responses in each condition

Subjects	**Age**	**Conditions**									
		(A) Inferential MUST		**(B) Inferential WILL**		**(C) Relative strength MAY/ MIGHT**		**(D) Relative strength MUST**		**(E) PAST FORM**	
		%	n	%	n	%	n	%	n	%	n
L1CHI01	9	100	4/4	50	2/4	100	4/4	75	3/4	25	1/4
L1CHI03	9	100	4/4	100	4/4	75	3/4	100	4/4	100	4/4
L1CHI07	8	100	4/4	100	4/4	50	2/4	100	4/4	100	4/4
L1CHI04	7	100	4/4	75	3/4	25	1/4	100	4/4	50	2/4
L1CHI02	6	50	2/4	75	3/4	75	3/4	50	2/4	100	4/4
L1CHI05	6	100	4/4	75	3/4	0	0	50	2/4	25	1/4
L1CHI06	6	75	3/4	75	3/4	25	1/4	100	4/4	0	0
L1CHI08	6	75	3/4	75	3/4	50	2/4	50	2/4	50	2/4

Table 5.6: L1 children's mean score and SD score of correct responses in each condition.

Group	Conditions									
	(A) Inferential MUST		(B) Inferential WILL		(C) Relative strength MAY/ MIGHT		(D) Relative strength MUST		(E) PAST FORM	
	M	SD	M	SD	M	SD	M	SD	M	SD
L1 CHILD	3.5	.755	3.12	.640	2	1.309	3.13	.991	2.25	1.581

5.7.3 L2 acquisition: Group results

We found that L2 adults provided correct responses in condition A and B at 100% and in condition D at 75%. The high percentage of correct responses in condition A and B suggests that L2 adults realize the inferential function *must*. Interestingly, as for condition E, L1 adults provided a very low percentage of correct responses at 25%. This indicates that L2 adults may rely more on temporal adverbials, which is the property of their L1 grammar, in making a judgment about an event or an action in the past.

Table 5.7: L2 children's and L2 adults' responses: a percentage of the correct responses

Group	N	Conditions									
		(A) Inferential MUST		(B) Inferential WILL		(C) Relative strength MAY/ MIGHT		(D) Relative strength MUST		(E) PAST FORM	
		%	n	%	n	%	n	%	n	%	n
L2 ADULT	10	100	4/4	100	4/4	50	2/4	75	3/4	25	1/4
L2 CHILD	7	100	4/4	100	4/4	0	0/4	75	3/4	0	0/4

The results of the L2 child group are similar to the results of the L2 adult group. L2 children, like L2 adults, provided the correct responses in condition A and B at 100% and in condition D at 75%. Interestingly, the children did not provide correct responses in condition C and E. The results from condition C points to the question of whether the

L2 children realize the relative strength of *may/might* or not, while the results from condition E leads us to surmise that the L2 children have not acquired the grammatical means for making a judgment about an event in the past.

5.7.4 L2 acquisition: Individual results

When considering the individual results of the L2 children in each condition, we can see that the individual scores and the percentage of correct responses provided by individual L2 children correspond with the group results, which has already been presented in section 5.7.3. Let us first consider the condition for which the subjects provided a very high percentage of correct responses. In condition A, B and D more than a half of the L2 children provided the correct responses at over 75%, whereas in condition C only 4 out of the 7 children provided the correct responses at 25%, and the rest provided no correct responses. Finally, in condition E only 3 of the 7 provided the correct responses at 75%, whereas the rest provided the correct responses at 50% and lower.

When considering the individual results of the L2 children in each condition with the length of exposure, we note that there seems to be a correlation between the length of exposure and percentage of the correct responses. That is, the children with relatively longer exposure provided the correct responses more frequently than those with relatively shorter exposure. This suggests a causal effect of the length of exposure in the L2 children's knowledge about the epistemic modals in English.

Table 5.8: L2 child individual results: Percentage of correct responses in each condition

Subjects	Age	Age of first exposure	Length of exposure	Conditions									
				(A) Inferential MUST		(B) Inferential WILL		(C) Relative strength MAY/ MIGHT		(D) Relative strength MUST		(E) PAST FORM	
				%	n	%	n	%	n	%	n	%	n
L2CHI03	8.3	5.5	2.10	100	4/4	100	4/4	25	1/4	100	4/4	75	3/4
L2CHI05	7.9	5.1	2.8	100	4/4	75	3/4	0	0/4	50	2/4	25	1/4
L2CHI02	8.11	6.4	2.7	100	4/4	75	3/4	0	0/4	50	2/4	75	3/4
L2CHI07	8.5	6.3	2.2	50	2/4	50	2/4	0	0/4	75	3/4	50	2/4
L2CHI06	9.0	7.1	1.11	100	4/4	75	3/4	25	1/4	75	3/4	25	1/4
L2CHI04	6.2	4.3	1.11	75	3/4	100	4/4	25	1/4	75	3/4	75	3/4
L2CHI01	6.8	5.11	0.9	50	2/4	50	2/4	25	1/4	50	2/4	0	0/4

Table 5.9: L2 children's mean score and SD score of correct responses in each condition

Group	Conditions									
	(A) Inferential MUST		(B) Inferential WILL		(C) Relative strength MAY/ MIGHT		(D) Relative strength MUST		(E) PAST FORM	
	M	SD	M	SD	M	SD	M	SD	M	SD
L2 CHILD	3.28	.951	3	.816	0.57	.534	2.71	.755	1.85	1.214

As for the adult individual results, we can see that while the individual scores and percentage in condition A, B, C, and E correspond with the group scores and percentages, only the scores and the percentage of the individual correct responses in condition D, on the other hand, do not. This is likely due to a very high deviation of the scores of the correct responses provided by the subjects in this condition. This finding suggests two possible theories. Firstly, L2 adults, like L2 children, do not realize the relative strength of *may/might*. Second, the L2 adults' acquisition of the relative strength of *may/might* is in progress.

Table 5.10: L2 adult individual results: Percentage of correct responses in each condition

Subjects	Age	Age of first exposure	Length of exposure	Conditions									
				(A) Inferential MUST		(B) Inferential WILL		(C) Relative strength MAY/ MIGHT		(D) Relative strength MUST		(E) PAST FORM	
				%	n	%	n	%	n	%	n	%	n
L2ADU03	35.1	28	7.1	75	3/4	75	3/4	50	2/4	0	0/4	100	4/4
L2ADU05	36.8	36	6.8	100	4/4	100	4/4	25	1/4	100	4/4	50	2/4
L2ADU04	35.4	29	6.4	75	3/4	100	4/4	25	1/4	50	2/4	0	0/4
L2ADU10	42	38	6	50	2/4	75	3/4	100	4/4	0	0/4	0	0/4
L2ADU08	26.4	21	5.4	100	4/4	50	2/4	100	4/4	75	3/4	100	4/4
L2ADU01	18.2	13;7	4.5	100	4/4	50	2/4	0	0/4	50	2/4	50	2/4
L2ADU07	32	28	4	75	3/4	75	3/4	0	0/4	50	2/4	75	3/4
L2ADU02	37.6	34	3.6	75	3/4	100	4/4	75	3/4	75	3/4	0	0/4
L2ADU09	26.5	23	3.5	100	4/4	75	3/4	100	4/4	100	4/4	75	3/4
L2ADU06	35.5	33	2.5	75	3/4	50	2/4	75	3/4	100	4/4	25	1/4

When considering the individual results of the L2 adults in each condition with the length of exposure, we note that, unlike L2 children, there seems to be no correlation between the length of exposure and the percentage of correct responses. This suggests that the length of exposure does not have an effect on the adult L2 acquisition of the epistemic modals.

Table 5.11: L2 adults' mean score and SD score of correct responses in each condition

Group	Conditions									
	(A) Inferential MUST		(B) Inferential WILL		(C) Relative strength MAY/ MIGHT		(D) Relative strength MUST		(E) PAST FORM	
	M	SD	M	SD	M	SD	M	SD	M	SD
L2 ADULT	3.3	.674	3	.816	2.2	1.619	2.4	1.505	1.9	1.595

5.7.5 Child L1 acquisition and child L2 acquisition

When considering the results from the child L1 group and the L2 child group, we can notice a very high percentage of correct responses in condition A, B and D in both L1 and L2 child groups. As for condition C, the percentage of the correct responses is rather low. The L1 children provided correct responses at 25%, whereas L2 children provided no correct responses. In condition E, which tests the grammatical knowledge of the subjects, the L1 children show better results than L2 children, with scores of 75% and 50% respectively.

Table 5.12: L1 and L2 children's responses: Percentage of the correct responses

Group	N	Conditions									
		(A) Inferential MUST		(B) Inferential WILL		(C) Relative strength MAY/ MIGHT		(D) Relative strength MUST		(E) PAST FORM	
		%	n	%	n	%	n	%	n	%	N
L1 CHILD	8	100	4/4	75	3/4	25	1/4	100	4/4	75	3/4
L2 CHILD	7	100	4/4	100	4/4	0	0/4	75	3/4	50	2/4

Table 5.13: L1 and L2 children's responses: mean score and SD score of the correct responses

Group	Conditions									
	(A) Inferential MUST		(B) Inferential WILL		(C) Relative strength MAY/ MIGHT		(D) Relative strength MUST		(E) PAST FORM	
	M	SD	M	SD	M	SD	M	SD	M	SD
L1 CHILD	3.5	.755	3.12	.640	2	1.309	3.13	.991	2.25	1.581
L2 CHILD	3.28	.951	3	.816	0.57	.534	2.71	.755	1.85	1.214

5.7.6 Discussion of the results

This section explores the possible explanations for the findings from the experiment. There are five key points to be made based on these findings. Firstly, the high percentage of correct responses provided by the L1 children, the L2 children and the L2 adults in condition A and B indicates that all three of the subject groups realize the inferential function of *must* and *will*. Thus, it appears that the inferential function of *must* and *will* is an aspect of epistemic meaning which learners of English acquire early, both in native and second language acquisition.

Second, when considering the low percentage of correct responses provided by the L1 children and L2 children in condition C, we offer two possible assumptions. The first assumption is that the subjects from these two groups do not realize the relative strength of may/*might*. This, however, goes against the findings from the previous studies that the children appear to know this feature from the very beginning of the acquisition of modality (Wells 1979; Hirst and Weil 1982; Perkins 1983; Coates 1983, 1988; Aksu-Koç 1988; Shepherd 1981; 1993; Sweetser, 1990; Shatz and Wilcox 1991; Smoczyńska 1993; Stephany 1993; Noveck, Ho and Sera 1996; Papafragou 1998).

Another assumption is that at this stage the subjects from these two groups realize the relative strength of *may*/might. However, they have probably not acquired the ability to understand uncertainty or the possibility (e.g. probabilistic reasoning) of the proposition expressed. This is, to some extent, in accordance with the findings of Tommerdahl and Moran (2011) in their study of the development of linguistic reasoning in English children. That is, deductive reasoning emerges earlier than other kinds of reasoning, such as probabilistic. It is possible that the children in the present study are still in the early stages of linguistic reasoning development, and the probabilistic reasoning has either not yet emerged or has yet to be consolidated. Consequently, the children choose *must* over *may/might* because it contains the modal whose semantic properties match the concepts the children have already acquired i.e. inferential/deduction. *may/might* does not have this function. This assumption seems to more be plausible than that where the subjects from these two groups do not realize the relative strength of *may/might*.

Third, based on the percentage of correct responses provided by the L1 and the L2 children in condition D, which tests the contrast between *must* and *will* in terms of

relative strength, we can assume that both L1 and L2 children realize the relative strength of *must* and *will*. That is, *must* indicates a stronger inference than *will*.

Fourth, the results from condition E indicate that L2 adults rely on the temporal adverbials indicating past rather than the verb forms when making a judgment on events or actions in the past. This suggests that the L1 properties can be observed in adult L2 grammar. Furthermore, based on these results, it appears that the length of exposure may not have as strong influence as the age of first exposure. In other words, although most of the L2 adults in the present study have resided in the UK longer than the L2 children, their scores in condition E are still lower than those of L2 children, who were first exposed to English at an earlier age than the adults.

Finally, when the correct responses provided by the L1 children who studied Thai were separated from those of the L1 children who did not study Thai, an observed difference in the percentage of the correct responses between the two categories in condition E, which tests the subjects' syntactic knowledge, was discovered. That is, the percentage of the correct responses provided by the L1 children who studied Thai was comparatively lower than the percentage of the correct responses provided by the L1 children who did not study Thai. These results point to the question of whether or not learning Thai as a second language might be having some effect on the children's acquisition of their native language.

Interestingly, when we consider the percentage of the correct responses provided by L1 children who study Thai in condition E, which is comparatively lower than that of L1 children who do not, we see evidence that the properties of Thai grammar might be affecting L1 children's English grammar. In many cases, these children are raised by one or more parents who speak to them in Thai in the home. Although the children do not speak Thai, they understand it fairly well. Because this finding takes us beyond the scope of this study, I will not pursue it further, other than to note that I will carefully select only L1 children who were monolingual for my PhD project in order to avoid this effect.

Table 5.14: Responses of L1 children who studied Thai

Subjects	Age	Conditions									
		(A) Inferential MUST		(B) Inferential WILL		(C) Relative strength MAY/ MIGHT		(D) Relative strength MUST		(E) PAST FORM	
		n	%	n	%	n	%	n	%	n	%
L1CHI01	9	4	100	2	50	4	100	3	75	1	25
L1CHI04	7	4	100	3	75	1	25	4	100	2	50
L1CHI05	6	4	100	3	75	0	0	2	50	1	25
L1CHI06	6	3	75	3	75	1	25	4	100	0	0
Mean Scores		3.75	94	2.75	69	1.5	38	3.25	81	1	25

Table 5.15: Responses of L1 children who did not study Thai

Subjects	Age	Conditions									
		(A) Inferential MUST		(B) Inferential WILL		(C) Relative strength MAY/ MIGHT		(D) Relative strength MUST		(E) PAST FORM	
CHI L1:02	6	2	50	3	75	3	75	2	50	4	100
CHI L1:03	9	4	100	4	100	3	75	4	100	4	100
CHI L1:07	8	4	100	4	100	2	50	4	100	4	100
CHI L1:08	6	3	75	3	75	2	50	2	50	2	50
Mean Scores		3.25	81%	3.5	88%	2.5	63%	3	75	3.5	88

5.8 Conclusion

This initial pilot study explored the syntax and the semantics of English modal auxiliaries which are likely to create difficulties for Thai learners of English. Based on the results of the experiment, we were able to conclude that the basic meanings of the epistemic modal auxiliaries, as shown in Table 5.1, are probably not the aspect which creates difficulties for Thai L2 learners of English. The L2 adults and the L2 children realize those meanings.

Nevertheless, it seems that the syntactic aspect of the epistemic modal auxiliaries do cause difficulties for L2 learners. That is, L2 learners tend to have difficulties in making a judgment on an event in the past. Accordingly, a promising area for future experimentation and research is on the syntactic and semantic properties of epistemic modal auxiliaries in relation to tense vs. temporal aspects.

Before conducting further experiments on the acquisition of epistemic modality in relation to tense vs. temporal aspect, this author had done a survey of the use of the epistemic preverbal modals in Thai spontaneous speech. The aim of the survey was to see whether the epistemic preverbal modals, the assumed equivalent forms of English modals, are typical means for making a judgment on an event or expressing the speaker's confidence. If the results of the survey reveal that epistemic preverbal modals are not a typical means for making a judgment on an event or expressing the speaker's confidence, the typical means for expressing epistemic modality in Thai will therefore be different from English. Accordingly, Thai L2 learners may have difficulties in learning epistemic modal auxiliaries in English since they have to learn the linguistic devices which are not typically used in their native tongue. The next chapter thus presents a survey of the use of epistemic preverbal modals in Thai spontaneous speech.

Chapter 6

A survey of the use of epistemic modal expressions in Thai

6.1 Rationale for the survey

The results from the experiment in the previous chapter suggest that the syntactic aspect of epistemic modality is the area of primary difficulty for Thai L2 learners of English in acquiring English epistemic modal auxiliaries. Nevertheless, another aspect of epistemic modality, apart from the syntactic and the semantic aspect, which should be explored in order to see whether it is also likely to be problematic for Thai L2 learners, is the use of epistemic modal expressions themselves. If we find that epistemic modality in two languages is expressed by different linguistic devices, we might then surmise that learning the means for expressing epistemic modality in English may create challenges for Thai L2 learners of English. Hence, there would be a more fundamental reason why the use of epistemic modal expressions in English is problematic for Thai L2 learners.

This chapter presents a survey of the use of epistemic modal expressions in Thai. The aim of the survey is to ascertain whether the preverbal auxiliaries, the relevant forms equivalent to the modal auxiliaries in English, are typically used to express epistemic meanings. If it turns out that the preverbal auxiliaries are frequently used more than other kinds of linguistic devices such as preverbal auxiliaries, sentential-initial particles, adverbs and sentential-final particles, and adverbs, we may be able to assume that the preverbal auxiliaries are a typical means for expressing epistemic modality in Thai. Consequently, Thai L2 learners of English will not have to learn different means for expressing epistemic modality as it is expressed by the same linguistic devices such as auxiliaries. However, if a survey reveals that the preverbal auxiliaries are not a typical means for expressing epistemic modality in their native language, we would then expect L2 learners might have considerable difficulties in learning the modal auxiliaries in English. In addition, we would be able to predict that Thai L2 learners of English may start off with typical lexical categories in their native language, for example post verbal modals or initial modals, in learning modal auxiliaries in English.

6.2 The scope of the survey

The survey explores the frequency of epistemic modal expressions, e.g. preverbal auxiliaries, sentential-initial particles, sentential-final particles, and adverbs in Thai spontaneous speech. The modals expressions which are the focus of the survey are shown in table 6.1.

Table 6.1: The modals expressions included in the survey

Types of modals expressions	**Modals expressions**
preverbal modals	*tɔŋ*^{3} 'must', *tɕaʔ*^{2} 'will', *khoŋ*^{1} 'might', *ʔaat*^{2} 'may'
sentential-initial particle	*baaŋ*^{1}*thii*^{1} 'perhaps'
sentential-final particle	*maŋ*^{3} 'possibly'
Adverbs	*nɛɛ*^{3}*nɛɛ*^{3}, *nɛɛ*^{3}*nɔɔn*^{1}, (these all mean 'certainly') and *kɔɔ*^{3}*daay*^{3} 'possibly

6.3 The data

The data used in the survey was selected from Thai Concordance Online Corpus provided by the Department of Linguistics, Chulalongkorn University, Bangkok, Thailand (http://www.arts.chula.ac.th/~ling/ThaiConc/). The Corpus consists of transcriptions collected from various sources and media. The genre of the text and the total number of words for each genre are shown in Table 6.2.

Table 6.2: Genre of the text and the total number of words

	Genre	Sources	Total number of words
1	Specific data	Prof. Amara Prasithrathasin's research*	
2	Thai dialects	Prof. Amara Prasithrathasin's research	
3	News	The Thai News Agency Jun 1993 - May 1995	5,353,000 words
4	Newspapers: Krungthep Dhurakij	Online newspapers Nov 1999 - Nov 2000	29,503,000 words
5	Newspapers: Krungthep Dhurakij 2	Online newspapers Jan 2002 – Dec 2002	23,455,000 words
6	Newspapers: Thairath	Online newspapers Jul 2000 - Jun 2001	6,179,000 words
7	Articles	Online newspaper articles Jul - Sep 1999	607,000 words
8	Magazine documentary	Online magazine documentary Jan 1999 – Nov 2002	1,292,000 words
9	Old languages	Old manuscripts in Ayutthaya Period, King Rama 3 period and King Rama 5 period	99,750 words
10	Short stories and fictions	web Siam Story 14 May 2002	797,900 words
11	Academic articles	Web Mahavithayalai Thiangkhuen 5 Jun 2004	3,476,000 words
12	Laws	Various kinds of laws at www.krisdika.go.th	5,204,000 words
13	Prime Minister Thaksin Shinawatra's speeches	2001 – Aug 2004 www.thaigov.go.th	880,300 words
14	Prime Minister Chuan Leekpai's speeches	1998 - 2000 www.thaigov.go.th	109,600 words
15	Conversation	Transcribed tape scripts from 'Jor Sor Roi' radio programme 'The King and Thai language'	82,900 words

*The corpus does identify the word counts of category 1 and 2

This Corpus can be used for finding words in different contexts, and meanings. In finding a word, the user can simply type the word into the search box. Then he/she may

limit the number of characters surrounding the word up to 1000 characters. The minimum number of surrounding characters is 200. The user may also choose 5 -1,000 samples from the Corpus. He/she can also exclude certain words that often precede, follow or co-occur with the word in question. . The window of the programme is illustrated below.

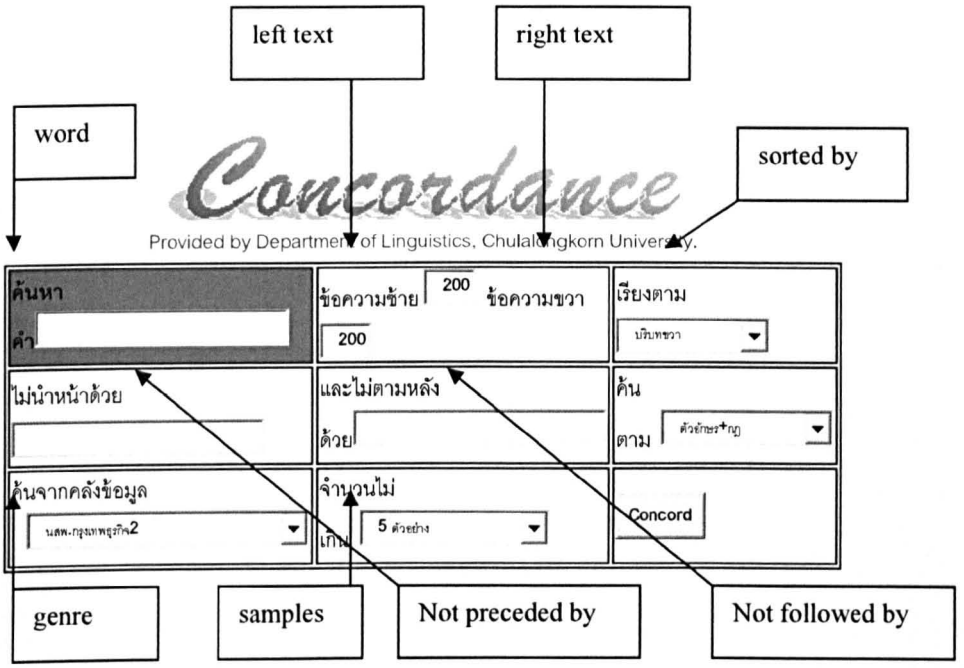

Figure 6.1 The main window of the Thai Concordance Online Corpus

Since the Corpus of transcriptions was collected from various genres, it was important for the researcher to decide what particular genres would be investigated. As the survey aimed at exploring the use of epistemic modal expressions in spontaneous speech, only the conversation transcriptions in category 15 e.g.'Jor Sor Roi' and 'The King and Thai language' radio programmes were therefore used. The data from this genre was a kind of spontaneous speech. 'Jor Sor Roi' is a live radio programme in which audience could phone in to the programme and converse with the host about traffic, accidents or events on the road in Bangkok. 'The King and Thai language' is a live radio programme which invited guests and the host talked about The King and Thai language.

6.4 Results

6.4.1 The frequency of modal expressions

At first, all modal expressions were searched to find the total frequency of occurrence in the Corpus. However, the frequency of the preverbal modals obtained at this step includes the occurrences in both epistemic and deontic senses because as some them such as *tɔ.ŋ*^{3} and *tɕaʔ*^{2} can be used to express epistemic and root meanings. The frequency of the modal expressions is shown in Table 6.3.

Table 6.3: Frequency of modal expressions in conversation transcriptions

Modal expression	Type of modal expression	rank of the word in the Corpus 82,993 words	occurrence in the Corpus of 82,993 words	Percentage of occurrences	Occurrence per million words
tɔŋ^{3}	preverbal	34	471	0.567	5675
tɕaʔ^{2}	preverbal	4	1819	2.191	21917
khoŋ^{1}	preverbal	67	188	0.226	2265
ʔaat^{2}	preverbal	87	137	0.165	1650
nɛɛ^{3}nɔɔn^{1}	adverb	366	28	0.033	337
nɛɛ^{3}	adverb	494	21	0.025	253
kɔɔ^{3}daay^{3}	adverb	180	63	0.075	759
baaŋ^{1}thii^{1}	initial particle	272	39	0.046	469

Table 6.3 shows rank and the number of occurrences of modal expressions in the Corpus of 82,993 words. It also shows the frequency of modal expressions per million words. At first, we can see that the preverbal modals occur more than other kinds of modal expressions. The only initial particle found in the corpus is '*baaŋ*^{1}*thii*^{1}'. The final particle *maŋ*^{3} is not found in the Corpus.

If we look at the frequency of each modal expression, we might be quick to assume that the preverbal modals are a typical means for expressing modality in Thai. However, such assumptions would be premature without an investigation into the frequency of the

linguistic forms which indicate only epistemic meaning. As mentioned earlier that the frequency of some modal expressions obtained at this step includes the occurrences in both epistemic and deontic senses, the higher frequency of the preverbal modals is consequently affected by the occurrences in deontic sense. Comparing only the linguistic forms which indicate the only the epistemic meaning may provide the answer to the question of whether the preverbal auxiliaries are typical linguistic devices for expressing epistemic modality in Thai spontaneous speech. For these reasons, the frequency of the preverbal auxiliaries *khoŋ*^{1}, *ʔaat*^{2}, the adverb *nɛɛ*^{3}*nɔɔn*^{1}, *nɛɛ*^{3} and the sentential initial particle *baaŋ*^{1}*thii*^{1} were compared because these four expressions are only used to express epistemic meaning.

Table 6.4: Frequency of modal expressions indicating possibility

Modal expression	**Type of modal expressions**	**Occurrence in the Corpus of 82,993 words**	**Percentage of occurrences**
khoŋ^{1}	preverbal	188	0.226
ʔaat^{2}	preverbal	137	0.165
nɛɛ^{3}nɔɔn^{1}	adverb	28	0.033
nɛɛ^{3}	adverb	21	0.025

Table 6.4 shows the frequency of modal expressions indicating epistemic possibility. Given that the search was limited to only four modal expressions, they are only a subset of the total possible modal particles. In spite of the low frequency of the epistemic modal expressions shown in this table, we note that the frequency of preverbal auxiliaries is higher than other kinds of modal expressions, demonstrating that the preverbal auxiliaries are used more than other kinds of modal expressions. This suggests that they are a typical means for expressing epistemic modality in Thai.

To summarize, this section first explored the frequency of modal expressions. We found that preverbal modal auxiliaries are more prevalent than other kinds of modal expressions. From this we could assume that preverbal auxiliaries are a typical means

used to express modality in Thai. In addition, when comparing the frequency of the modal expressions which can only be used in epistemic sense, the comparison shows that the preverbal auxiliaries are used more than the adverbs and the sentence-initial particles. Based on these results, we are therefore able to deduce that preverbal auxiliaries are a typical means for expressing epistemic modality in Thai.

Given that preverbal auxiliaries are a typical means for expressing epistemic modality in Thai, it follows that Thai L2 learners of English may not have to learn completely different means for expressing epistemic modality as it may be expressed by the same linguistic devices e.g. auxiliaries. If this is not the case, the aspect that is likely to be problematic for Thai L2 learners in acquiring epistemic modal auxiliaries in English should be the syntactic aspect.

We have already seen in the pilot study that L2 learners, especially L2 adults, appeared to treat the modal statements with a non-finite verbal complement and a temporal adverbial e.g. '*He may be in a hurry yesterday*' grammatical under the past condition. In other words, they tend to interpret the statement with a temporal adverbial as if it grammatically indicates past reference time of the modal complements. This structure is, however, ungrammatical in English.

So, an implication of these results is that the syntactic properties which indicate reference time of the modal may be problematic for Thai L2 learners of English. Accordingly, it is worth exploring the use of epistemic modals in Thai in relation to temporal aspect. In the next section I explore how the epistemic preverbal modals are used with respect to reference time, using the same Corpus.

6.4.2 Use of epistemic preverbal modals with respect to reference time

At first 200 sentences containing the epistemic *tɔŋ*^{3}, *tɕa*^{2}, *khoŋ*^{1} and *ʔaat*^{2} were identified. A sample of 50 sentences for each modal was collected. Then, the reference time of each of those sentences was identified. Interestingly, the four epistemic preverbal auxiliaries were rarely used with temporal adverbials. In other words, the

reference time of the modal statements which contain *tɔŋ*^{3}, *tɕa*^{2}, *khoŋ*^{1} and *ʔaat*^{2} is mostly determined by the context or discourse.

tɔŋ^{3}, *khoŋ*^{1} and *ʔaat*^{2} may be used for making a judgment about an event or state in the past, future, and present. Some examples are shown as follows. The sentences in [ ] are the sentences that precede the modal statements. They are included because they help determine the reference time of the modal statements.

***tɔŋ*^{3}**

(3) [ใครก็ตามที่จะแปลหนังสือหรือเขียนหนังสือขึ้นมาสักเล่มหนึ่งนี่นะครับ]

มันจะ**ต้อง**มีอะไรเป็นแรงบันดาลใจอยู่แน่ ๆ

man^{1}	**tɔŋ**^{3}	mii^{1}	ʔa^{1}raj^{1}	pen^{1}	rɛŋ^{1}ban^{1}daan^{1}tɕaj^{1}
it	must	have	what	be	inspiration
juu^{2}	nɛɛ^{3}nɛɛ^{3}				
IMP	certainly				

'There must certainly be an inspiration'

(4) [ความยากจนที่นักวิชาการพยายามอธิบายว่า] มัน**ต้อง**จนต่อไป

man^{1}	**tɔŋ**^{3}	tɕon^{1}	tɔɔ^{2}paj^{1}	
it	must	be	poor	continue

'The poverty must continue'

(5) [แล้วพอไปธันวา ก็จะเย็นอีกเหรอคะ] ที**นี้ต้อง**เรียกว่าหนาวเลย

thii^{1}	nii^{4}	**tɔŋ**^{3}	riiak^{3}	waa^{3}	naaw^{5}	lɔɔj^{1}
time	this	must	call	CP	cold	FP

'It is said to be cold now'

khoŋ[1]

(6) [เพราะว่ากรุงเทพฯเรามันกว้างนะครับ] ตำรวจก็**คง**จับได้ไม่ทั่วถึง

tam[1]ruuat[2]kɔɔ[3]	**khoŋ**[1]	tɕap[2]	daaj[3]		maj[3]
police PART	might	arrest	be able to		NEG
thuua[3]thuŋ[5]					
all					

'The police might not be able to arrest all'

(7) [ด้านนายแพทย์ ณรงศักดิ์ เทียนประยูร จากโรงพยาบาลหัวเฉียวนะคะ]

เดี๋ยว**คง**จะคุยกับคุณหมอต่อภาค 2 ทีหลัง

diiaw[5]	**khoŋ**[1]	tɕa[2]	khuj[1]	kap[2]	khun[1]mɔɔ[5]
in a moment	might	will	talk	with	doctor
tɔɔ[2]	phaak[3]		sɔɔŋ[5]	thii[1]laŋ[5]	
continue	episode		two	afterward	

'In a moment we might talk to the doctor in the second half afterward'

(8) [ตำรวจก็ไปพิทักษ์รักษาความยุติธรรมให้กับชุมชนให้กับสังคมได้ยากนะฮะ]

ในประเด็นที่เขาเสียชีวิตนี่ **คง**จะไม่ใช่จากการขาดออกซิเจนโดยตรง

naj[1]	pra[1]den[1]	thii[3]	khaw[5]	siia[5]tɕhii[1]wit[4]		nii[4]
in	case	REL	he	die		this
khoŋ[1]	tɕa[2]	maj[3]	tɕhaj[3]	tɕaak[1]	kaan[1]khaat[2]	ʔɔk[4]si[4]tɕeen[1]
might	will	not	be	from	lack	oxygen
dooj[1]troŋ[1]						
directly						

'In the case of his death, he might not have lacked oxygen directly'

ʔaat²

(9) [จะมีบันไดเลื่อนให้อย่างสบายใจหรือ เปลี่ยนสถานีทีนึงนะฮะ]

แต่ละสถานี**อาจ**จะคนเป็นหมื่นคน

tɜɜ²la⁴	sa¹thaa⁵nii¹	**ʔaat²**	tɕa²	khon¹	pen¹	muuun²
each	station	may	will	people	be	ten thousand
khon¹						
CLAS						

'Each station may have about ten thousand people'

(10) [คิดว่าทั้งผู้ชายกับผู้หญิงคงจะต่อสู้กันน่าดูทั้งสองฝ่าย]

พรุ่งนี้ดิฉัน**อาจ**จะโดนบรรดาพวกผู้ชายโทรมาต่อว่า

phruŋ³nii⁴	di¹tɕhan⁵	**ʔaat²**	tɕa²	doon¹	ban¹daa¹
tomorrow	I (female)	may	will	PASS	group
phuuak³	phuu³tɕhaaj¹	thoo¹	maa¹	tɔɔ²waa³	
group	man	telephone		complain	

'Tomorrow I might be called to complain by groups of men'

(11) [อันนี้ผมไม่อยากจะโทษใครนะฮะ คือ] ผมว่าสุขภาพท่าน**อาจ**จะไม่ค่อยแข็งแรง

phom⁴	waa³	suk²kha¹phaap³	than³	**ʔaat²**	tɕa²
I(male)	CP	health	him	may	will
maj³	khɔj³	khæŋ⁵rɜɜŋ¹			
not	quite	strong			

'I think his health might not have been good'

As for *tɕa²*, however, it can be used to make a judgment about an event in the present or future. In other words, when it is used to indicate an inference, it has present time reference, and when it is used to indicate a prediction, it has future time reference.

tɕa²

(12) [ในส่วนของการตรวจเลือดตำรวจจาจร]
โดยส่วนใหญ่แล้ว**จะ**มีสารตะกั่วอยู่ในร่างกายแทบจะทั้งนั้นเลย

dooj¹suuan²jaj¹		læw⁴	**tɕa²**	mii¹	saan⁴ta¹kuua²	juu²
mostly		PART	will	have	lead	be
naj¹	raaŋ³kaaj¹	thɜɜp³tɕa²		thaŋ⁴nan⁴	ləəj¹	
in	body	most		all	PART	

'Mostly, there will be lead in the bodies'

(13) [ไม่ต้องเป็นห่วง เขาเปลี่ยนสถานีกันง่าย] เอาไว้คอยดูขนส่งสาธารณะที่เรา**จะ**ได้ใช้อะไรกัน

ʔaw¹waj⁴	khɔɔj¹	duu¹	khon⁵soŋ²		saa⁵thaa¹ra¹na⁴	
keep	wait	look	transport		public	
thii³	raw¹	**tɕa²**	daj³	tɕhaj⁴	ʔa¹raj¹	kan¹
CL	we	will	receive	use	what	together

'Let's wait and see which public transport we will be able to use'

The contexts where the epistemic preverbal auxiliaries may occur in the corpus can be summarized in Table 6.5.

Table 6.5: The temporal contexts for the epistemic preverbal auxiliaries

The preverbal auxiliaries	**The temporal context**		
	PAST	**PRESENT**	**FUTURE**
tɔɔŋ³	√	√	√
tɕa²	√	√	√
khoŋ¹	√	√	√
ʔaat²	√	√	√

We can see so far that the epistemic preverbal auxiliaries can be used to make a judgment about an event in the present, future, and past. Nevertheless, the reference time of the modal complement is usually determined by the preceding sentences in the discourse. This may suggest that the temporal adverbials are not as important as the contexts in determining the reference time of the modal statements in spontaneous speech, particularly when the reference time of the event being judged can be detected from the preceding sentences in the discourse.

6.5 Conclusion

This survey explored the use of the modal expressions in spontaneous speech. The conversation transcriptions from the *Thai Concordance Online Corpus* were used for the survey. It was found that although the epistemic modality in Thai can be expressed by various linguistic devices, preverbal auxiliaries occur most frequently, at least in the spoken corpus investigated here. This suggests that preverbal auxiliaries are a typical means for expressing epistemic modality in Thai.

Additionally, when exploring the use of the epistemic preverbal auxiliaries with respect to the reference time, we found that the reference of the modal complement is mostly determined by the preceding sentences in the discourse rather than the temporal adverbials. Given that the linguistic mechanisms used for indicating reference time of the epistemic modal complement in Thai are quite different from English, the reference time of the epistemic modal complement in English is indicated by the verb forms or syntactic patterns. Thai L2 learners may have difficulties in acquiring the epistemic modal auxiliaries in English with respect to the temporal aspect.

With reference to the results from the pilot study and the results from the survey, the remaining parts of this thesis will be dedicated to a study of the acquisition of the syntactic patterns that indicate reference time of the epistemic modal complement in English.

Chapter 7

L2 proficiency measurement

7.0 Introduction

As this study compares the acquisition of the epistemic modality of L2 children with that of L2 adults and L1 children, L2 proficiency is required as an independent mean in order to make cross-group comparison possible. This chapter presents the L2 proficiency measurement developed for use in this project. The chapter is organized as follows. Section 7.1 provides general information concerning the participants involved in the current research. Section 7.2 discusses the procedures and the results of the L2 proficiency measurement and section 7.3 is the conclusion.

7.1 The participants

In the pilot study I encountered some difficulties in recruiting the L2 participants, particularly the L2 children who lived in the UK. There were also a number of constraints in running the experiment. For example, the L2 children lived in a variety of different towns, and their availability depended largely on the availability of their parents. I therefore decided not to recruit the L2 children and L2 adults from those who live in the UK. Instead, I decided that recruiting children from a primary school and the adults from a university in Thailand was more convenient because they could be approached more often and the task could be run simultaneously with a number of children.

7.1.1 The L2 children

The L2 children group consisted of 30 Thai-speaking children from Thai monolingual families. They were year 3 and year 4 students who were studying in an English programme at a primary school in Thailand, where English was used as a medium language. They started learning English as a second language at the age of 4. I included students from two different levels because I expected them to have different levels of L2 proficiency, as the length of exposure to English had been different. There were 14 female and 16 male children. The children's age at the time of testing ranged from 8 to

10. The age at first exposure was between 5 and 6. The length of their exposure to the target language was between 2 and 5 years.

7.1.2 The L2 adults

There were 7 male and 23 female participants. The age of the L2 adults at the time of testing ranged from 20 to 24 years old. Interestingly, 18 out of the 30 L2 adults had their first experience of English when they were young i.e. between the age of five and seven, while the other 12 adults were 8+. However, those who have first exposure to English at the age of 5 to 7 year olds had studied English as a foreign language for only 3 – 4 hours per week, like those first exposed to English after 8, and Thai was the medium language in their English classroom. Therefore, the L2 adults did not receive much L2 input. In other words, they were not fully exposed to English until they started their undergraduate degree at a university where English was used a medium language. The age at the commencement of the university programme ranges from 18 to 19, and the length of exposure to English varies between 2 and 4 years.

Although the length of exposure to the target language of the L2 children and of the L2 adults in the current study is different, the comparison of proficiency between L2 children and adults is not be made on the basis of length of exposure. Instead, an independent measure of proficiency i.e. a picture description task is used to make a more reliable comparison between the two populations. Nevertheless, the fact that some of the L2 adults in the current study first exposed to the target language when they were around 5 years old could lead to the question of whether the early age of first exposure has an effect on their L2 proficiency and performance. This possibility will be considered in the calculation of the L2 proficiency and in the performance analysis.

7.2 L2 proficiency measurement

Unsworth (2005) argues along with Thomas (1994) that L2 proficiency measurement is necessary for L2 research in that it makes a comparison between L2 children and L2 adults possible. In addition, given that L2 learners with different proficiency levels represent the different stages of the development, measuring L2 proficiency also enables us to derive developmental paths from the data of L2 learners with different L2 proficiency levels.

Following Whong-Barr and Schwartz (2002) and Unsworth (2005), a picture description task was used as a tool for eliciting L2 data for proficiency measurement. A picture description task is considered to be the most suitable tool as it is not test-like. The task allows the L2 participants to produce a wide variety of vocabulary as well as linguistic structures that reflect their morphological and syntactic knowledge of the target language. These are language aspects which the research takes into consideration. In addition, the picture description task takes only 15 – 20 minutes to complete and many participants can perform the task at the same time, particularly when it is written.

7.2.1 Materials and procedures

The materials used in the task consist of five sets of related pictures. There are five pictures in each set, which depict a series of events. For example, a boy and a girl are playing in the living room, where there are a lots of toys scattered on the floor. Their mum then walks into the room and tells them to put all the toys away and tidy the room. After that the boy and the girl start tidying the room until everything is in order. The examples of the sets of pictures are given in Appendix B. The participants had to describe only three sets of pictures.

7.2.1.1 Eliciting L2 child data

Due to time constraints as a result of their class schedule, the researcher made an appropriate adjustment to take this into consideration. The L2 children performed the task in groups and they were asked to write[9] a description for each set of pictures instead of performing oral descriptions individually. The advantage of writing is that it is easy for the researcher to spot any errors the L2 children produced.

The picture description task was performed in classrooms one afternoon at the end of the school term. At the beginning of the task, the researcher explained the task to the children, and they were given an answer sheet. The children were then given only three sets of pictures. I decided to use only three sets as it would be quicker for the younger children. In addition, using only three sets was sufficient to obtain enough relevant data for the proficiency measurement. Then the L2 children were asked to write a description

[9] Note that this is different from Whong-Bar & Schwartz (2002), and Unsworth (2005), who did this orally.

for each set of pictures. The children were encouraged to write as much as possible and the researcher also provided prompts and asked questions for eliciting more data, when necessary. The allotted time for describing each set of pictures was 15 minutes.

7.2.1.2 Eliciting L2 adult data

The procedure of eliciting L2 adult data was slightly different from the one which was run with the L2 children in two respects. Firstly, the L2 adult data was collected by a research assistant, an undergraduate student who had been trained by the researcher. Secondly, the L2 adults did the task individually.

Similarly, the research assistant explained the task to the L2 adult participants at the beginning of the task. After that, only three sets of pictures were presented to the participants, and they were then asked to write a description for each set of pictures. The participants were encouraged to write as much as possible, and the research assistant provided prompts, and asked questions for eliciting more data, when necessary. The time for describing each set of pictures was 10 minutes.

7.2.2 Proficiency measures

7.2.2.1 What to measure?

The three measures used in the current study were adopted from Unsworth (2005). They were: verbal density, lexical diversity, and rate of error-free T-units. I employed the rate of error-free clause instead of the rate of error free T-units because the L2 data in the current study is in written form.

'Verbal density' is used for measuring the grammatical complexity by calculating the average number of finite and non-finite verbs per sentence. For example, if a participant produces a total of 50 verbs across 45 sentences, the verbal density score will be 1.1.

'Lexical diversity' was determined by using a variant of Type/Token Ratio known as 'Guiraud's index', which is calculated by counting the number of different lexical types a participant produced (V) and divided by the square root of the total number of tokens produced by the participant (N) i.e. $V / \sqrt{N}$. For example, if a participant produces 200

tokens and 50 different types, he/she will be assigned a lexical diversity of 3.54 (50 / √200).

'Rate of error-free clause' was used for measuring the accuracy. It is calculated by dividing the number of error free clauses by the total number of clauses. The error free clauses must not contain morphological, lexical or syntactic errors. However, spelling mistakes are not counted. Since the descriptions were in written from, it was quite easy to determine what are and are not correct according to English grammar.

Following Unsworth (2005) the scores from the three measures were combined into a single overall proficiency score using 'principal component analysis (PCA)' in SPSS.

7.2.2.2 Identifying clause boundary

The data from the pictures description task was transcribed by the researcher in CHAT format using the CLAN programme from CHILDES (MacWhinney 2000). At first, a clause boundary was identified and coded [CL]. A clause in the current study refers to a string of words which typically consist of at least a subject and a verb. The number of the clauses produced by each participant was counted by the CLAN command "freq sample.cha @". The frequency of the clauses produced by L2 children and L2 adults are shown in Table 7.1 and Table 7.2 respectively.

Table 7.1: The total number of clauses produced by L2 children

The participants	Total number of clauses	Z score
L2CHI01	16	-0.89
L2CHI02	14	-1.07
L2CHI03	17	-0.80
L2CHI04	30	0.34
L2CHI05	19	-0.63
L2CHI06	37	0.95
L2CHI07	22	-0.37
L2CHI08	22	-0.37
L2CHI09	31	0.42
L2CHI10	34	0.69
L2CHI11	19	-0.63
L2CHI12	15	-0.98
L2CHI13	13	-1.15
L2CHI14	13	-1.15
L2CHI15	24	-0.19
L2CHI16	35	0.77
L2CHI17	41	1.30
L2CHI18	38	1.04
L2CHI19	64	3.31
L2CHI20	30	0.34
L2CHI21	27	0.07
L2CHI22	19	-0.63
L2CHI23	24	-0.19
L2CHI24	23	-0.28
L2CHI25	23	-0.28
L2CHI26	28	0.16
L2CHI27	23	-0.28
L2CHI28	27	0.07
L2CHI29	48	1.91
L2CHI30	9	-1.50

In Table 7.1, we can see that the highest total number of clauses produced by the L2 children is 64, and the lowest score is 9. The average number of the clause is 26.17.

When looking at the Z scores[10], it can be seen that there are only 13 L2 children whose total number of clauses is greater than the average score of the group.

Table 7.2: The total number of clauses produced by L2 adults

The participants	Total number of clauses	Z score
L2ADU01	34	0.35
L2ADU02	42	1.09
L2ADU03	34	0.35
L2ADU04	19	-1.04
L2ADU05	33	0.26
L2ADU06	17	-1.22
L2ADU07	20	-0.94
L2ADU08	37	0.63
L2ADU09	23	-0.67
L2ADU10	43	1.18
L2ADU11	34	0.35
L2ADU12	32	0.17
L2ADU13	18	-1.13
L2ADU14	65	3.22
L2ADU15	26	-0.39
L2ADU16	24	-0.57
L2ADU17	23	-0.67
L2ADU18	24	-0.57
L2ADU19	34	0.35
L2ADU20	47	1.55
L2ADU21	32	0.17
L2ADU22	21	-0.85
L2ADU23	36	0.54
L2ADU24	20	-0.94
L2ADU25	16	-1.31
L2ADU26	23	-0.67
L2ADU27	44	1.28
L2ADU28	18	-1.13
L2ADU29.	35	0.44
L2ADU30	32	0.17

[10] Z scores is the standard score which is calculated to show how many standard deviations the subject's score is above or below the mean of the group.

In Table 7.2, we can see that the highest total number of clauses produced by the L2 adults is 65, and the lowest score is 16. The average number or means score of the clause is 30.2. When looking at the Z scores, we can see that there are 16 adults whose total number of clauses is greater than the average score of the group.

7.2.2.3 Verbal density

After identifying the clause boundary and calculating the number of clauses in the transcriptions, all verbs were coded in order to calculate the verbal density. Verbs that were coded include auxiliaries, finite verbs, non-finite verbs, present participles, past participles. The main reason for counting all the verbs is that their use in any form is indicative of a certain level of grammatical sophistication in English of the L2 learners (Unsworth 2005: 186). Verbs BE, DO, HAVE, and modal verbs are also coded 'finite verbs [+FV]' because these verbs have to inflect for tense and agree with the subject of the clause. Verbs after 'to' and gerunds were coded 'non-finite [+NFV].

The main verbs with the -ING form after the auxiliary BE and the main verbs with -ED after the auxiliary HAVE were coded 'inflected verbs [+IV] because they are inflected for expressing aspect. The main verbs after modal auxiliaries together with the auxiliaries DO in negative clauses and questions are coded 'uninflected [+UIV]'.

In the calculation of the verbal density both correct and incorrect verb forms are included and then divided by the number of clauses. At this stage it can be seen that the number of incorrect forms produced by an L2er may be higher than the correct forms and consequently this has an affect on the verbal density score of the L2er, and, as a result, his/her score in verbal density may be higher than that of L2ers who produce a lower rate of verbal density, but produce more correct forms. In other words, most of the forms they produce are correct but the total number of verbs they produce is lower then the L2ers who have a higher rate of verbal density. So, is this the case? The answer is 'no' because the verbal density score will be computed with the lexical complexity score and the accuracy score into a single score. Therefore, the rate of the verbal density will be counter balanced by the accuracy score. The rate of verbal density of L2 children and adults are shown in Table 7.3 and Table 7.4 respectively.

Table 7.3: L2 children's verbal density scores

The participants	No. of verbs	No. of clauses	Average No. of verb per clause	Z score
L2CHI01	23	16	1.44	0.11
L2CHI02	22	14	1.57	0.62
L2CHI03	22	17	1.29	-0.45
L2CHI04	41	30	1.37	-0.17
L2CHI05	31	19	1.63	0.85
L2CHI06	45	37	1.22	-0.75
L2CHI07	33	22	1.50	0.35
L2CHI08	33	22	1.50	0.35
L2CHI09	38	31	1.23	-0.71
L2CHI10	42	34	1.24	-0.67
L2CHI11	28	19	1.47	0.24
L2CHI12	20	15	1.33	-0.29
L2CHI13	20	13	1.54	0.49
L2CHI14	26	13	2.00	2.27
L2CHI15	28	24	1.17	-0.94
L2CHI16	39	35	1.11	-1.14
L2CHI17	20	41	0.49	-3.55
L2CHI18	53	38	1.39	-0.06
L2CHI19	85	64	1.33	-0.31
L2CHI20	41	30	1.37	-0.17
L2CHI21	41	27	1.52	0.42
L2CHI22	24	19	1.26	-0.56
L2CHI23	32	24	1.33	-0.29
L2CHI24	43	23	1.87	1.77
L2CHI25	36	23	1.57	0.60
L2CHI26	42	28	1.50	0.35
L2CHI27	40	23	1.74	1.27
L2CHI28	35	27	1.30	-0.44
L2CHI29	68	48	1.42	0.03
L2CHI30	14	9	1.56	0.56

Column 4 shows the average number of verbs produced by each L2 child. The minimum score is 0.49, and the maximum score is 2.00. The average score of the whole group is 1.41, and the standard deviation score of the whole group is 0.26. The

number of children whose score is greater and lower than the average score of the group is the same. The Z score in the last column shows the distribution of the L2 children verbal density scores which is also illustrated in Figure 7.1.

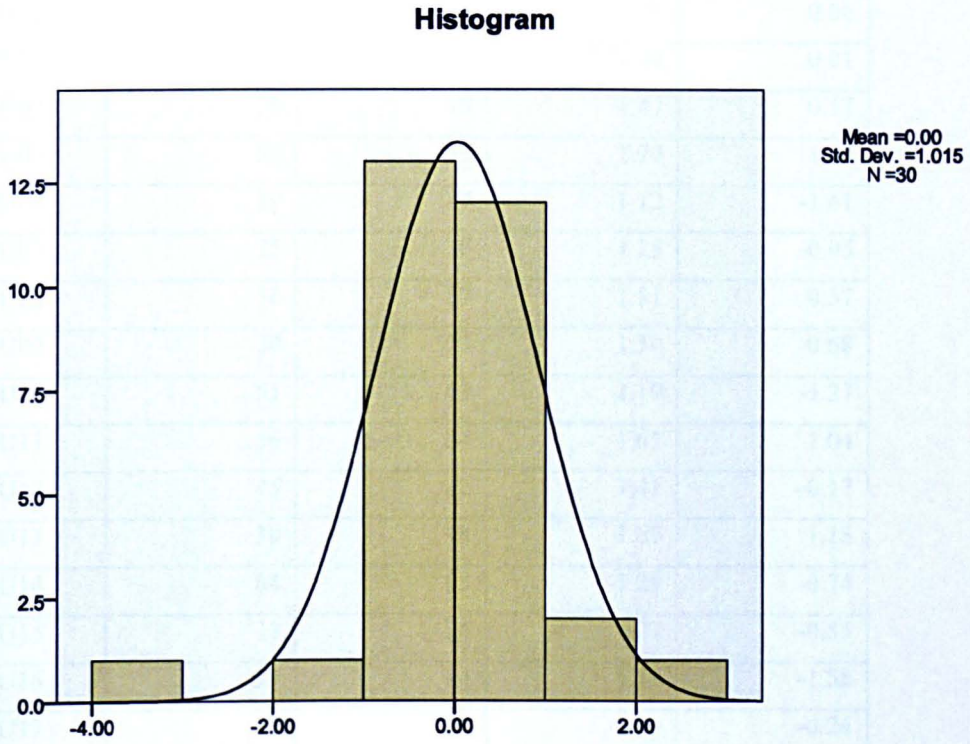

Figure 7.1 The Z score of the L2 children's verbal density scores

Figure 7.1 shows that most of the L2 children's verbal density scores fit the normal curve because they are close to the mean of the group. There are a few L2 children whose scores fall outside the curve.

Table 7.4: L2 adults' verbal density scores

The participants	No. of verb	No. of clause	Average No. of verb per clause	Z score
L2ADU01	48	34	1.41	-0.14
L2ADU02	61	42	1.45	0.06
L2ADU03	49	34	1.44	0.01
L2ADU04	28	19	1.47	0.17
L2ADU05	56	33	1.70	1.28
L2ADU06	19	17	1.12	-1.61
L2ADU07	25	20	1.25	-0.95
L2ADU08	56	37	1.51	0.37
L2ADU09	30	23	1.30	-0.68
L2ADU10	51	43	1.19	-1.27
L2ADU11	56	34	1.65	1.04
L2ADU12	45	32	1.41	-0.17
L2ADU13	30	18	1.67	1.13
L2ADU14	84	65	1.29	-0.74
L2ADU15	33	26	1.27	-0.85
L2ADU16	27	24	1.13	-1.58
L2ADU17	32	23	1.39	-0.24
L2ADU18	28	24	1.17	-1.37
L2ADU19	46	34	1.35	-0.44
L2ADU20	65	47	1.38	-0.29
L2ADU21	52	32	1.63	0.93
L2ADU22	32	21	1.52	0.42
L2ADU23	47	36	1.31	-0.67
L2ADU24	30	20	1.50	0.30
L2ADU25	26	16	1.63	0.93
L2ADU26	44	23	1.91	2.37
L2ADU27	66	44	1.50	0.30
L2ADU28	33	18	1.83	1.97
L2ADU29.	53	35	1.51	0.37
L2ADU30	43	32	1.34	-0.48

Table 7.4 shows the rate of the verbal density of each L2 adult. The minimum score is 0.12, and the maximum score is 1.91. The average score of the whole group is 1.44, and the standard deviation score of the whole group is 0.2. There are 15 adults whose

verbal density rate is greater than the average score of the group. The Z score in the last column shows the distribution of the L2 adults' verbal density scores which is also illustrated in Figure 7.2.

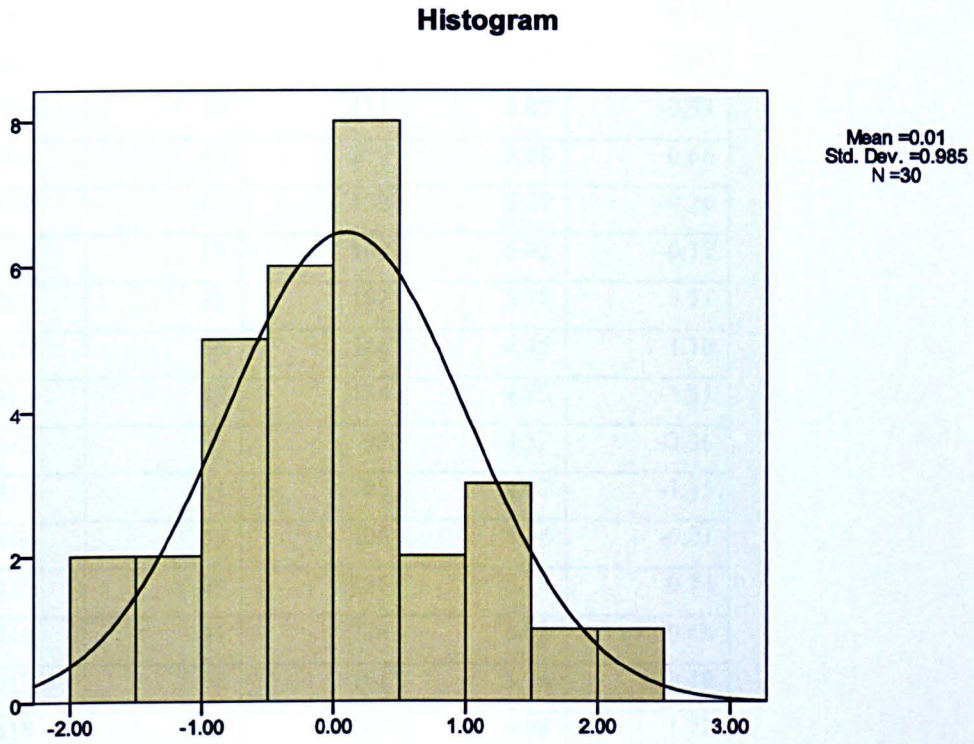

Figure 7.2 The Z score of the L2 adults' verbal density scores

Interestingly, Figure 7.2 shows that most of the L2 adults' verbal density scores fall into the left normal curve. This suggests a skewed distribution in the L2 adults' verbal density scores.

7.2.2.4 Lexical diversity

After coding the verbs in the transcriptions, the number of types and tokens of the lexical items produced by each participant were counted using the CLAN command "freq sample.cha @". The lexical diversity scores of the L2 children and L2 adults are shown in Table 7.5 and Table 7.6 respectively.

Table 7.5: L2 children's lexical diversity scores

The participants	Verb types	tokens	(V/ √ N)	Z score
L2CHI01	57	104	5.59	0.08
L2CHI02	49	95	5.03	-0.58
L2CHI03	59	118	5.43	-0.10
L2CHI04	85	196	6.07	0.65
L2CHI05	58	131	5.07	-0.53
L2CHI06	90	219	6.08	0.66
L2CHI07	65	152	5.27	-0.29
L2CHI08	69	162	5.42	-0.12
L2CHI09	78	182	5.78	0.31
L2CHI10	88	186	6.45	1.10
L2CHI11	49	134	4.23	-1.51
L2CHI12	35	99	3.52	-2.36
L2CHI13	41	88	4.37	-1.35
L2CHI14	55	106	5.34	-0.21
L2CHI15	69	126	6.15	0.74
L2CHI16	91	224	6.08	0.66
L2CHI17	68	161	5.36	-0.19
L2CHI18	113	262	6.98	1.72
L2CHI19	159	424	7.72	2.59
L2CHI20	93	218	6.30	0.92
L2CHI21	68	172	5.18	-0.39
L2CHI22	62	115	5.78	0.31
L2CHI23	63	149	5.16	-0.42
L2CHI24	72	176	5.43	-0.11
L2CHI25	60	141	5.05	-0.55
L2CHI26	80	188	5.83	0.37
L2CHI27	75	179	5.61	0.10
L2CHI28	55	152	4.46	-1.25
L2CHI29	112	294	6.53	1.19
L2CHI30	35	69	4.21	-1.54

The 'Guiraud's index, i.e. V / √N shows that the average lexical diversity score of the group is 5.52, and the standard deviation of the group is 0.85. There are 14 children whose Type/Token Ratio is greater than the average score of the group.

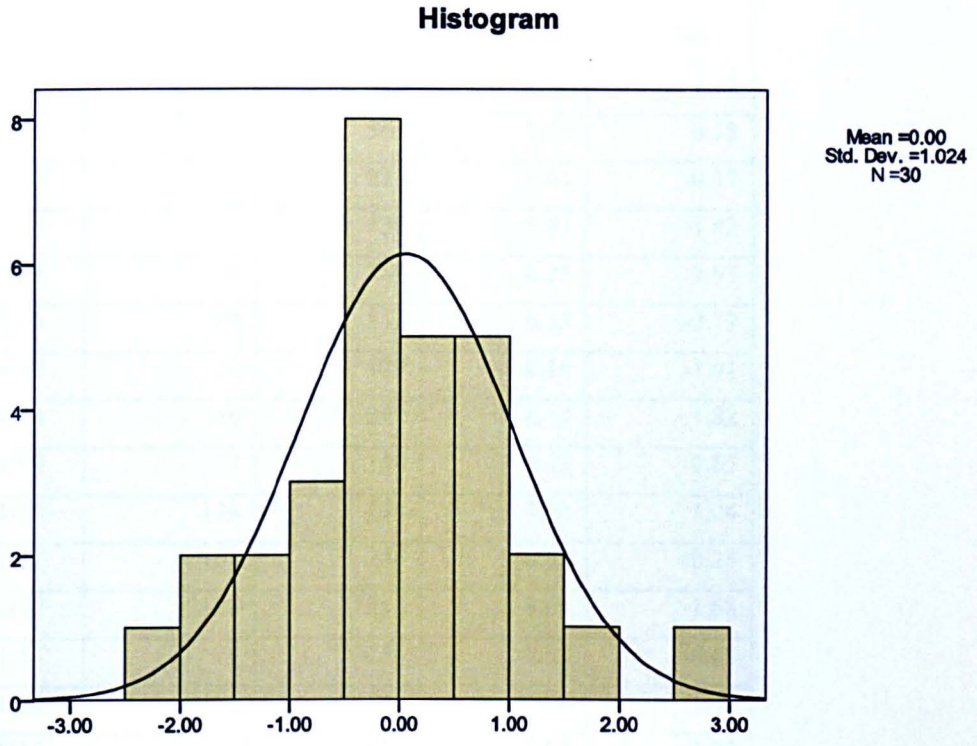

Figure 7.3 The Z score of the L2 children's lexical diversity scores

When looking at the standard deviation score of each participant, we can see that most of the L2 children's lexical diversity scores fall within the normal curve. There is only one L2 child whose score falls outside the curve because of his very high score.

Table 7.6: L2 adults' lexical diversity scores

The participants	Verb types	tokens	(V/ √ N)	Z score
L2ADU01	131	288	7.72	1.21
L2ADU02	139	365	7.28	0.58
L2ADU03	96	211	6.61	-0.37
L2ADU04	69	138	5.87	-1.42
L2ADU05	140	288	8.25	1.97
L2ADU06	67	112	6.33	-0.77
L2ADU07	70	129	6.16	-1.01
L2ADU08	136	279	8.14	1.82
L2ADU09	77	144	6.42	-0.65
L2ADU10	126	275	7.60	1.04
L2ADU11	105	246	6.69	-0.25
L2ADU12	128	253	8.05	1.68
L2ADU13	74	134	6.39	-0.68
L2ADU14	166	441	7.90	1.48
L2ADU15	80	176	6.03	-1.20
L2ADU16	76	146	6.29	-0.83
L2ADU17	86	192	6.21	-0.95
L2ADU18	93	193	6.69	-0.25
L2ADU19	104	216	7.08	0.29
L2ADU20	134	425	6.50	-0.53
L2ADU21	120	253	7.54	0.96
L2ADU22	97	187	7.09	0.32
L2ADU23	109	263	6.72	-0.21
L2ADU24	78	159	6.19	-0.98
L2ADU25	75	139	6.36	-0.73
L2ADU26	99	233	6.49	-0.55
L2ADU27	151	360	7.96	1.55
L2ADU28	78	154	6.29	-0.84
L2ADU29.	105	282	6.25	-0.88
L2ADU30	111	242	7.14	0.38

The maximum score for the L2 adults is 8.25, and the minimum score is 5.87. The mean score of the group is 6.87, and the standard deviation of the group is 0.7. There are 12 adults whose Type/Token Ratio is greater than the men of the group.

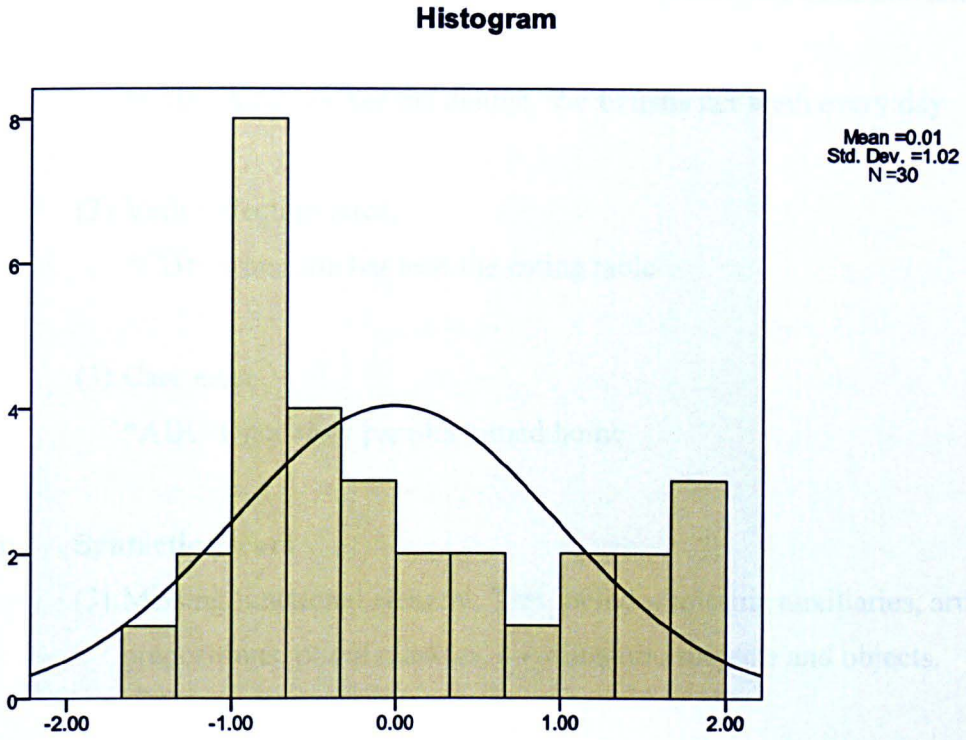

Figure 7.4 The Z score of the L2 adults' lexical diversity scores

Figure 7.4 shows the distribution of the L2 adults' lexical diversity scores. As with the verbal density measure, we can see that most of the L2 adults' scores fall within the left of the normal curve. This suggests that most of the L2 adults' scores are lower than the average score of the group.

7.2.2.5 Error-free clauses

As for the error-free clauses, three native speakers of English were asked to mark errors they found in the transcriptions. Types of errors included in the current study are morphological errors, syntactic errors, and lexical errors. Examples of these errors are shown below.

(i) Morphological errors

(1) Verb agreement error. This includes morphological omission and incorrect marking.

*CHI: After she **see** the dentist, she **brushs** her teeth every day

(2) Verb inflection error.

*CHI: when she has **saw** the eating table

(3) Case error

*ADU: Once **they** parents turned home

(ii) Syntactic errors

(3) Missing functional element. This includes missing auxiliaries, articles, prepositions, plural markers, coordinators, subjects and objects.

*CHI: so nanny toke she to (article missing) dentist. [CL]

*CHI: one sister (auxiliary missing) talking (preposition missing) each Other

(4) Non-target like word order

*CHI: She hurts her teeth very much.

(Target order: her teeth hurt very much)

(iii) Lexical errors

(5) Non-target like preposition

*CHI: Nunid said **in** a happy face.

(6) Non-target like coordinator

*ADU: Mick is an older brother **where** Mimi is a younger sister.

(7) Non-target like collocation

*CHI: The dentist saw **viruses** in her mouth.

(Target words: cavity, plaque, etc.)

Notice that some errors are fuzzy and difficult to categorize. However this is not a problem as long as the errors were spotted by the native speakers. The native speakers were also told to ignore spelling mistakes because this kind of mistake was not included in the calculation of L2 proficiency. The number of errors within a clause was taken into consideration.

The tense errors were counted only once as most L2 participants use incorrect tenses at the beginning of descriptions, for example, they start with 'Once upon a time there is.....', and they consistently use the present simple tense throughout the whole description. Consequently, the error-free clauses will hardly be seen if we marked the present tense as errors in a whole transcription. This would affect the rate of error free clauses produced by an individual participant. Nevertheless, tense errors or mismatches between tenses within a complex or compound sentence were counted.

(8) Mismatch between tenses in a complex sentence

*CHI: Once upon a time **there is** one girl who **ate** a lollypop.

Table 7.7: L2 children's rate of error free clause scores

The participants	No. of Clause	No. of error free clause	%	Z-score
L2CHI01	16	7	44%	0.32
L2CHI02	14	3	21%	-0.75
L2CHI03	17	3	18%	-0.89
L2CHI04	30	14	47%	0.46
L2CHI05	19	4	21%	-0.75
L2CHI06	37	28	76%	1.81
L2CHI07	22	18	82%	2.09
L2CHI08	22	4	18%	-0.89
L2CHI09	31	9	29%	-0.37
L2CHI10	34	13	38%	0.05
L2CHI11	19	1	5%	-1.49
L2CHI12	15	0	0%	-1.72
L2CHI13	13	1	8%	-1.35
L2CHI14	13	3	23%	-0.65
L2CHI15	24	12	50%	0.60
L2CHI16	35	20	57%	0.93
L2CHI17	41	10	24%	-0.61
L2CHI18	38	18	47%	0.46
L2CHI19	64	34	53%	0.74
L2CHI20	30	18	60%	1.07
L2CHI21	27	6	22%	-0.70
L2CHI22	19	10	53%	0.74
L2CHI23	24	2	8%	-1.35
L2CHI24	23	12	52%	0.70
L2CHI25	23	7	30%	-0.33
L2CHI26	28	3	11%	-1.21
L2CHI27	23	16	70%	1.53
L2CHI28	27	12	44%	0.32
L2CHI29	48	27	56%	0.88
L2CHI30	9	4	44%	0.32

The highest score of the group is 82%, and the lowest score is 0. This resulted in a large deviation within the group. The average score of the group is 37.03%, and the standard deviation of the group is 21.50. There were 17 participants whose scores were greater than the average score of the group.

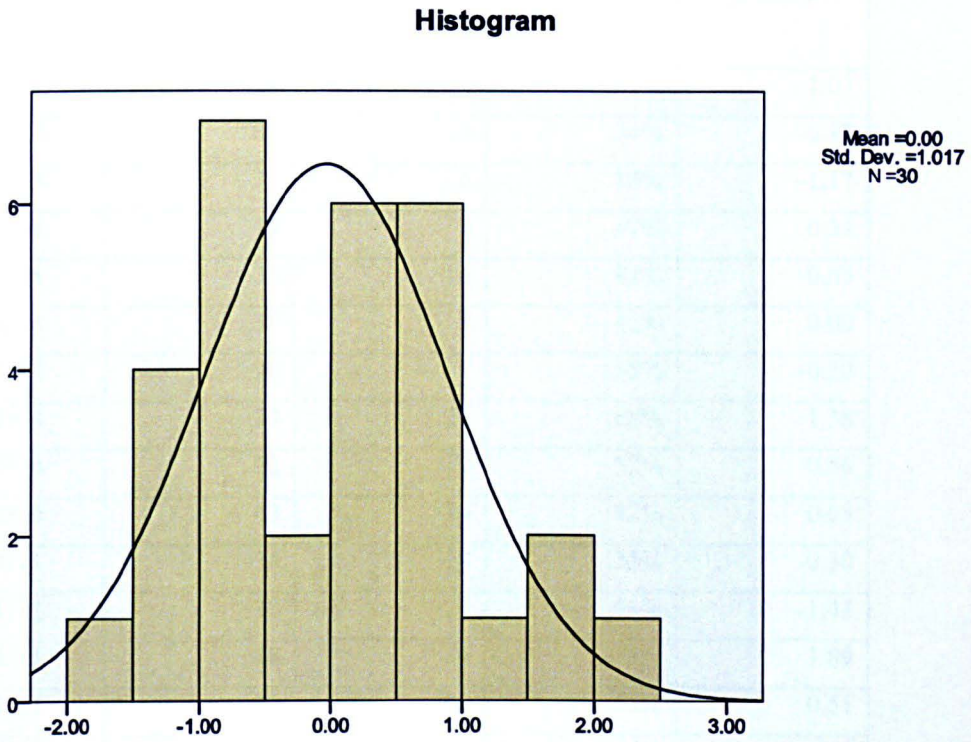

Figure 7.5 The Z score of the L2 children's error-free clause scores

Figure 7.5 shows that the L2 children's error-free clause scores were quite randomly distributed, although the scores of all L2 children fall within the normal curve.

Table 7.8: L2 adults' rate of error free clause scores

The participants	No. of Clause	No. of error-free clause	%	Z-score
L2ADU01	34	21	62%	1.07
L2ADU02	42	10	24%	-0.87
L2ADU03	34	6	18%	-1.17
L2ADU04	19	9	47%	0.31
L2ADU05	33	14	42%	0.05
L2ADU06	17	7	41%	0.00
L2ADU07	20	7	35%	-0.30
L2ADU08	37	25	68%	1.38
L2ADU09	23	12	52%	0.56
L2ADU10	43	18	42%	0.05
L2ADU11	34	12	35%	-0.30
L2ADU12	32	4	13%	-1.43
L2ADU13	18	14	78%	1.89
L2ADU14	65	33	51%	0.51
L2ADU15	26	1	4%	-1.89
L2ADU16	24	2	8%	-1.68
L2ADU17	23	6	26%	-0.76
L2ADU18	24	5	21%	-1.02
L2ADU19	34	19	56%	0.77
L2ADU20	47	37	79%	1.94
L2ADU21	32	12	38%	-0.15
L2ADU22	21	8	38%	-0.15
L2ADU23	36	24	67%	1.33
L2ADU24	20	5	25%	-0.81
L2ADU25	16	8	50%	0.46
L2ADU26	23	5	22%	-0.97
L2ADU27	44	23	52%	0.56
L2ADU28	18	12	67%	1.33
L2ADU29.	35	13	37%	-0.20
L2ADU30	32	10	31%	-0.51

Table 7.8 shows the error-free clause scores of the L2 adults. It shows that the highest score is 79%, whereas the lowest score is 4%. The average score of the group is 41%, and the standard deviation of the group is 19.6. The number of L2 adults whose score is

greater and lower than the average score of the group is the same. When we look at the distribution of the error-free clause scores we can see that the scores of all L2 adults fall within the normal curve. This is illustrated in Figure 7.6.

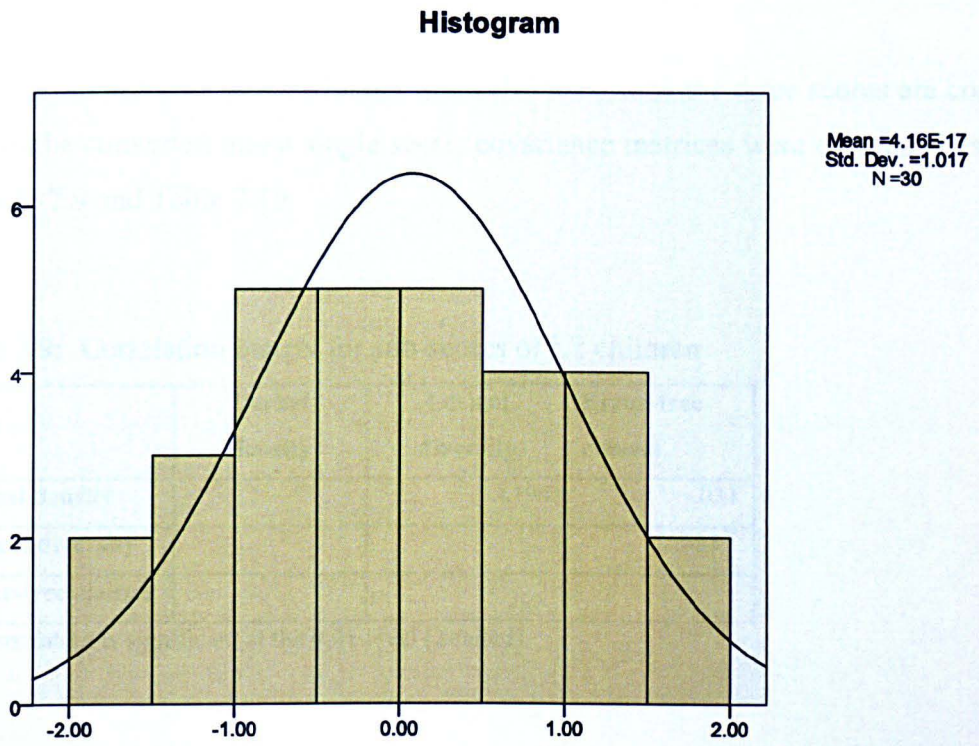

Figure 7.6 L2 adults' error-free clause score

7.2.2.6 Computing L2 proficiency

As mentioned in Section 7.2.2.1 the three measures were combined into a single overall proficiency score by the 'Principal Component Analysis' using the SPSS programme, Z score of the verbal density score, the lexical diversity score, and the error-free clause score were taken into the L2 proficiency computation.

The 'Principal Component Analysis (PCA)' is a kind of statistical means which is typically used to transform or reduce a larger number of variables into a smaller number. The variables in this case were assumed to have correlation to one another, with some redundancy among the variables which could be reduced as they are measuring the same construct (Field 2005: 630).

As the verbal density, the lexical diversity, and the rate of error-free clause are variables that measure the same construct, L2 proficiency, these three variables should therefore be reduced into a single variable i.e. a proficiency score by means of 'Principal Component Analysis'. The 'Principal Component Analysis (PCA)' is considered to be the most suitable statistical means in this case.

However, in order to check whether it is valid to assume the three scores are correlated and can be converted into a single score, covariance matrices were calculated as shown in Table 7.9 and Table 7.10.

Table 7.9: Correlation matrix for sub-scores of L2 children

	Verbal density	**Lexical diversity**	**Error-free clauses**
Verbal density		-.194	-.031
Lexical diversity			.533**
Error-free clauses			

**. Correlation is significant at the 0.01 level (2-tailed).

Table 7.10: Correlation matrix for sub-scores of L2 adults

	Verbal density	**Lexical diversity**	**Error-free clauses**
Verbal density	1	.063	.228
Lexical diversity	.063	1	.153
Error-free clauses	.228	.153	1

We can see that in Table 7.9 only two sub-scores, lexical diversity and the rate of error free clause are correlated. As for the L2 adults' scores, it is clear that the three sub-scores are not correlated at all, as shown in Table 7.10. Given that the variables or the scores taken into the 'Principal Component Analysis' are expected to be correlated, this appears problematic as one of the sub-scores is not correlated with the other two.

Field (2009) suggests that the solution to this is to exclude the scores which are not correlated from the computation. Accordingly, the verbal density score was excluded

from the computation by the PCA. However, before excluding the variables, the individual scores were re-examined in order to make sure that the variable being excluded was not correlated with the other two variables.

As a result of this I found that there were only a few children whose three sub-scores were correlated, and there were only 22 adults whose lexical diversity scores and rate of error free clause were also correlated. Based on these findings, the verbal density scores was not taken into the calculation of the L2 proficiency. The correlation between the lexical diversity scores and the rate of error free clause of the L2 adults is shown in Table 7.11.

Table 7.11: The correlation between the lexical diversity scores and the rate of error-free clauses in L2 adult group

	Lexical diversity	**Error-free clauses**
Lexical diversity	1	.630**
Error-free clause	.630**	1

**. Correlation is significant at the 0.01 level (2-tailed).

Table 7.12: The correlation between the lexical diversity scores and the rate of error-free clauses in L2 child group

	Lexical diversity	**Error-free clause**
Lexical	1	.532**
Error-free clause	.532**	1

**. Correlation is significant at the 0.01 level (2-tailed).

After excluding the verbal density scores from the calculation of the L2 proficiency, the lexical diversity scores and the rate of error-free scores were combined and converted into a single score by means of the 'Principle Component Analysis'. The proficiency scores of the L2 children together with those of the L2 adults are presented in Table 7.13 and Table 7.14 respectively. The participants were then put into three different groups according to their L2 proficiency. The high proficiency group had a score above

0.50, the participants belonging to the mid proficiency group had a score -0.49 – 0.49, and the participants belong to the low proficiency group had a score below -.50. This scale was adopted from Unsworth (2005).

Based on this categorization, there were 12 children in the high proficiency group, 7 in the mid proficiency group, and 11 in the low proficiency group. As for the L2 adults, there are 7 adults in the high proficiency group, 6 adults in the mid proficiency group, and 8 adults in the low proficiency group.

Table 7.13: L2 children's proficiency

The participants	Lexical diversity	Error- free clause	Proficiency score	Proficiency level
	Z score	%	FAC1_1	
L2CHI19	2.59	0.74	1.86	H
L2CHI06	0.66	1.81	1.39	H
L2CHI18	1.72	0.46	1.22	H
L2CHI29	1.19	0.88	1.16	H
L2CHI20	0.92	1.07	1.12	H
L2CHI07	-0.29	2.09	1.02	H
L2CHI27	0.1	1.53	0.92	H
L2CHI16	0.66	0.93	0.89	H
L2CHI15	0.74	0.60	0.75	H
L2CHI10	1.1	0.05	0.64	H
L2CHI04	0.65	0.46	0.62	H
L2CHI22	0.31	0.74	0.59	H
L2CHI24	-0.11	0.70	0.33	M
L2CHI01	0.08	0.32	0.23	M
L2CHI09	0.31	-0.37	-0.03	M
L2CHI17	-0.19	-0.61	-0.45	M
L2CHI26	0.37	-1.21	-0.47	M
L2CHI14	-0.21	-0.65	-0.48	M
L2CHI25	-0.55	-0.33	-0.49	M
L2CHI28	-1.25	0.32	-0.52	L
L2CHI03	-0.1	-0.89	-0.55	L
L2CHI08	-0.12	-0.89	-0.56	L
L2CHI21	-0.39	-0.70	-0.61	L
L2CHI30	-1.54	0.32	-0.68	L
L2CHI05	-1.51	-1.49	-1.68	L
L2CHI02	-0.53	-0.75	-0.71	L
L2CHI23	-0.58	-0.75	-0.74	L
L2CHI13	-0.42	-1.35	-0.99	L
L2CHI11	-1.35	-1.35	-1.51	L
L2CHI12	-2.36	-1.72	-2.28	L

Table 7.14: L2 adults' proficiency

The participants	Lexical diversity	Error-free clause	L2 Proficiency score	Proficiency level
	Z score	%	FAC1_1	
L2ADU08	1.82	1.38	1.96	H
L2ADU01	1.21	1.07	1.44	H
L2ADU27	1.55	0.56	1.29	H
L2ADU14	1.48	0.51	1.22	H
L2ADU05	1.97	0.05	1.17	H
L2ADU10	1.04	0.05	0.69	H
L2ADU21	0.96	-0.15	0.52	H
L2ADU22	0.32	-0.15	0.19	M
L2ADU12	1.68	-1.43	0.05	M
L2ADU30	0.38	-0.51	-0.01	M
L2ADU02	0.58	-0.87	-0.14	M
L2ADU11	-0.25	-0.30	-0.20	M
L2ADU29	-0.88	-0.2	-0.45	M
L2ADU07	-1.01	-0.3	-0.58	L
L2ADU18	-0.25	-1.02	-0.67	L
L2ADU26	-0.55	-0.97	-0.79	L
L2ADU03	-0.37	-1.17	-0.82	L
L2ADU17	-0.95	-0.76	-0.85	L
L2ADU24	-0.98	-0.81	-0.90	L
L2ADU16	-0.83	-1.68	-1.39	L
L2ADU15	-1.2	-1.89	-1.72	L

7.2.2.7 An alternative mean for deriving the L2 proficiency

The problem of the uncorrelated scores seems to have been resolved. However, the question of why the verbal density, lexical diversity, and the rate of error free clause did not correlate, and the question of whether the 'Principal Component Analysis' is the only means for deriving the L2 proficiency warrant further exploration. Following Unsworth (2005), I assumed that the verbal density, lexical diversity, and the rate of error-free clause were appropriate measures for L2 proficiency assessment, and the 'Principal Component Analysis' may be flawed because of some methodological shortcoming in my research. I therefore decided to maintain the original intuition behind

the three types of measures, and calculated an alternative score by mean which I will call a 'simple alternative'.

I calculated the L2 proficiency by just simply added the average number of finite and non-finite per clauses, the lexical diversity score, and the rate of error-free clause scores together. By this version of the measurement, we arrive at proficiency scores for the L2 children and L2 adults as shown in Table 7.15, and Table 7.16 respectively. The red colour represents the participants belonging to the high proficiency group by PAC means, blue represents the participants belonging to the mid proficiency group, while green represents those belonging to the mid proficiency group

Table 7.15: L2 children's proficiency score

The participants	Verbal density score	Lexical diversity score	Rate of error-free clause	L2 proficiency score	Proficiency level
L2CHI07	1.5	5.27	82	88.77	H
L2CHI06	1.22	6.08	76	83.3	H
L2CHI27	1.74	5.61	70	77.34	H
L2CHI20	1.37	6.3	60	67.67	H
L2CHI16	1.11	6.08	57	64.19	H
L2CHI29	1.42	6.53	56	63.95	H
L2CHI19	1.33	7.72	53	62.05	H
L2CHI22	1.26	5.78	53	60.04	H
L2CHI24	1.87	5.43	52	59.3	M
L2CHI15	1.17	6.15	50	57.31	M
L2CHI18	1.39	6.98	47	55.38	M
L2CHI04	1.37	6.07	47	54.44	M
L2CHI01	1.44	5.59	44	51.03	M
L2CHI30	1.56	4.21	44	49.77	M
L2CHI28	1.3	4.46	44	49.76	M
L2CHI10	1.24	6.45	38	45.69	M
L2CHI25	1.57	5.05	30	36.62	L
L2CHI09	1.23	5.78	29	36.01	L
L2CHI14	2	5.34	23	30.34	L
L2CHI17	0.49	5.36	24	29.85	L
L2CHI21	1.52	5.18	22	28.7	L
L2CHI05	1.63	5.07	21	27.7	L
L2CHI02	1.57	5.03	21	27.6	L
L2CHI08	1.5	5.42	18	24.92	L
L2CHI03	1.29	5.43	18	24.73	L
L2CHI26	1.5	5.83	11	18.33	
L2CHI23	1.33	5.16	8	14.49	
L2CHI13	1.54	4.37	8	13.91	
L2CHI07	1.47	4.23	5	10.71	
L2CHI06	1.33	3.52	0	4.85	

If we consider those participants with a score of 60% or above as high, then there are 8 children with high proficiency scores, 8 children in the mid proficiency range with a score between 45% - 59%, and 9 children in the low proficiency category with a score

below 45%. The participants who had a score below 20% were not assigned a proficiency level.

Table 7.16: L2 adults' proficiency score

The participants	Verbal density score	Lexical diversity score	Rate of error free clause	L2 proficiency score	Proficiency level
L2ADU20	1.38	6.5	79	86.88	H
L2ADU13	1.67	6.39	78	86.06	H
L2ADU08	1.51	8.14	68	77.66	H
L2ADU28	1.83	6.29	67	75.12	H
L2ADU23	1.31	6.72	67	75.03	H
L2ADU01	1.41	7.72	62	71.13	H
L2ADU19	1.35	7.08	56	64.43	H
L2ADU27	1.5	7.96	52	61.46	H
L2ADU14	1.29	7.9	51	60.2	H
L2ADU09	1.3	6.42	52	59.72	M
L2ADU25	1.63	6.36	50	57.99	M
L2ADU04	1.47	5.87	47	54.35	M
L2ADU05	1.7	8.25	42	51.95	M
L2ADU10	1.19	7.6	42	50.78	M
L2ADU06	1.12	6.33	41	48.45	M
L2ADU21	1.63	7.54	38	47.17	M
L2ADU22	1.52	7.09	38	46.62	M
L2ADU29.	1.51	6.25	37	44.77	L
L2ADU11	1.65	6.69	35	43.34	L
L2ADU07	1.25	6.16	35	42.41	L
L2ADU30	1.34	7.14	31	39.48	L
L2ADU17	1.39	6.21	26	33.6	L
L2ADU02	1.45	7.28	24	32.73	L
L2ADU24	1.5	6.19	25	32.69	L
L2ADU26	1.91	6.49	22	30.4	L
L2ADU18	1.17	6.69	21	28.86	L
L2ADU03	1.44	6.61	18	26.05	L
L2ADU12	1.41	8.05	13	22.45	L
L2ADU16	1.13	6.29	8	15.41	
L2ADU15	1.27	6.03	4	11.3	

* The L2 adults in black are those who were excluded from the 'PCA' as their sub-scores were not correlated.

In Table 7.16 there are 8 children in the high proficiency group, 8 in the mid proficiency group, and 9 in the low proficiency group. As indicated by the different colours in the tables, it is also evident that 8 out of the 12 L2 children with a high proficiency score from the 'Principal Component Analysis' are still in the high proficiency group when calculations were made using the 'simple alternative' method, whereas 4 of the 12 children are in the mid proficiency group. 2 out of the 7 L2 children with a mid proficiency score from the 'PCA' are still in the mid proficiency group by the simple alternative, whereas 5 out of the 7 children are in the low proficiency group. 7 out of the 11 L2 children with a low proficiency score from the 'PCA' are still in the low proficiency group, whereas two out of the 11 children now belong to the mid proficiency group. Based on these results, we can see that most of the L2 children with a high proficiency score from the 'PCA' were not affected when the 'simple alternative' method was applied, as opposed to those in the other two categories who were alternated. Therefore, to summarise, the proficiency score and level of the L2 children from the mid proficiency group and from the low proficiency group were changed by means of the 'simple alternative'.

As for the L2 adults, when applying the 'simple alternative', there were 9 adults in the high proficiency group, 8 adults in the mid proficiency group, and 11 adults in the high proficiency group.

4 out of the 7 adults with a high proficiency score from the 'PCA' remained in the high proficiency group under the 'simple alternative', whereas 3 of the 7 adults were in the mid proficiency group. Only one out of the 6 adults with a mid proficiency score from the 'PCA' were still in the mid proficiency group by the 'simple alternative' method, whereas 5 out of the 6 adults were in the low proficiency group. All of the L2 adults with a low proficiency score from the 'PCA' remained in the low proficiency group, Now, we can see that, as with the L2 children, most of the L2 adults with a high proficiency score from the 'PCA' were not affected by the simple alternative, but the L2 adults with a mid proficiency score and a low proficiency score were alternated. Therefore, the proficiency score and level of the L2 adults from the mid proficiency group and from the low proficiency group were changed by means of the 'simple alternative'.

In summary, we now have two types of the L2 proficiency score; based on calculations on the correlated two sub-scores and another which is calculated based on the three sub-scores. I shall call the first and the second type 'Proficiency 1' and 'Proficiency 2' respectively. If we assume that the scores from the three measures are appropriate for L2 proficiency assessment, the 'Principal Component Analysis' is flawed because it excluded the verbal density scores from the L2 proficiency assessment. Besides, several of the L2 adults will be excluded from the data analysis as their sub scores are not correlated if the 'Principal Component Analysis' is applied as shown in section 7.2.2.7. Therefore, in order to maintain the verbal density, the lexical diversity and the rate of error-free clause, and the number of the L2 subjects for the analysis, the L2 proficiency by means of the 'Principal Component Analysis' will be put aside. The L2 proficiency by means of the 'simple alternative'[11] will be used in the L2 subjects' data analysis, which will be presented in Chapter 8.

7.2.2.8 The comparison of the L2 children's and the L2 adults' proficiency by the 'simple alternative'

The L2 children's and the L2 adults' proficiency scores by the 'simple alternative' were first checked for normal distribution with SPSS. The results from the test, shown in Table 7.17, reveal that the L2 children's and the L2 adults' proficiency scores appeared to be normally distributed. The p value for the L2 children's and the L2 adults' data is greater than .05 (non-significant (*ns*)), $D(25) = .136$, $p = .200$, and $F(28) = .092$, $p = .200$ respectively.

Table 7.17 Test of normality

	Group	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Proficiency scores	L2 children	.136	25	.200*	.941	25	.152
	L2 adults	.092	28	.200*	.964	28	.439

a. Lilliefors Significance Correction

*. This is a lower bound of the true significance.

[11]The analysis of the experimental data in Chapter 8 did include consideration of the results in terms of the PCA analysis. However, as this did not result in any meaningful difference, I have presented results in terms of the 'Simple Analysis' scores only.

So, with the normality assumption satisfied, the L2 children's and the L2 adults' proficiency scores are compared, using a parametric test-two-way independent ANOVA. This is to check that the L2 children and the L2 adults from each proficiency level were not significantly different from each other.

The results from the test in Table 7.18 show, as expected, that (1) ignoring the level of proficiency, the L2 children are not different from the L2 adults $F(1, 47) = .995$, $p = .324$; (2) the L2 children as well as the L2 adults from the high proficiency groups are significantly different from those from mid and low proficiency group $F(2, 47) = 133.971$, $p = .000$. In addition, the Post Hoc Test results also show that the L2 children were not different from the L2 adults with the same proficiency level $F(2, 47) = .577$, $p = .566$. The profile of these results can be illustrated by the graphs in Figure 7.7. With these results, the participants from the different proficiency groups are comparable.

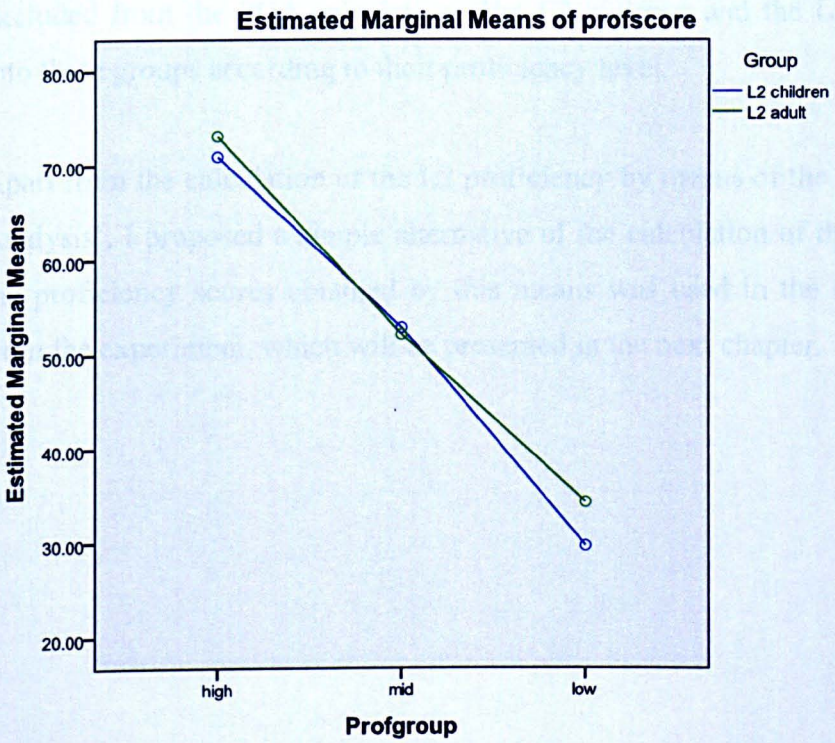

Figure 7.7 The Plot of the L2 children's and the L2 adults' proficiency scores

7.3 Conclusion

This chapter presents the results of L2 proficiency assessment. The L2 proficiency assessment is an essential part of this study as it makes a comparison between L2 children and L2 adults possible, and it also allows us to derive developmental paths from the data of L2 learners with different L2 proficiency levels. The anticipated findings will then provide evidence in support of the involvement of L1 and UG in the L2 acquisition of epistemic modality, within the *Full Transfer Full Access* model (Schwartz and Sprouse 1994, 1996), which the current research assumes.

The picture description task was adopted for eliciting L2 data. There were three measures: verbal density, lexical diversity, and the rate of error free clause. These three sub-scores were expected to be converted into a single score by means of the 'Principal Component Analysis', only if they appeared to correlate to each other. However, only lexical diversity and the rate of error free clause were correlated. They were therefore brought into the calculation of the L2 proficiency, while the verbal density score was excluded from the PCA calculation. The L2 children and the L2 adults were divided into three groups according to their proficiency level.

Apart from the calculation of the L2 proficiency by means of the 'Principal Component Analysis', I proposed a simple alternative of the calculation of the L2 proficiency, and the proficiency scores obtained by this means was used in the analysis of the results from the experiment, which will be presented in the next chapter.

Chapter 8

The L2 acquisition of the syntactic patterns that constrain the reference time of the modal complements

8.1 Rationale

The results from the pilot study show that the syntactic patterns indicating reference time of the epistemic modal complements in English seem to be problematic for Thai L2 learners of English. The current experiment, therefore, focuses on how Thai L2 learners of English acquire the syntactic patterns indicating reference time of the epistemic modal complements in English.

We have seen in chapter 3 that the reference time of the modal complements in English is instantiated differently from Thai. Accordingly, the Thai L2 learners of English will have to work out what reference time/temporal interpretation is, or is not possible, for a certain syntactic pattern when acquiring the epistemic modal auxiliaries in English. This kind of knowledge is, however, not explicitly taught in typical English language classrooms in Thailand. From my experience as an L2 learners of English, my teachers never drew my attention to the fact that, in English, a certain syntactic pattern constrains the reference time of the epistemic modal complements. They generally introduced the epistemic modals together with deontic modals. This situation is also similar in other English classrooms in the present day. Besides, although English textbooks which are commonly used in English language classrooms generally describe the meanings and the use of the modal auxiliaries, they do not specifically describe the properties of the modals with respect to reference time. For these reasons, the knowledge about the syntactic patterns which constrain the reference time of the epistemic modal complements is, therefore, assumed to be part of implicit knowledge. Native speakers of English naturally acquire these properties.

In addition, given that the task for the L2 learners is to acquire the interpretations which are not possible and impossible for certain syntactic patterns, the L2 learners are exposed to only correct examples. This leads to the questions of how the learners know that particular interpretations are not possible in English. Certainly, the data they

available to them do not contain the impossible interpretations. In this way, the L2 learners in the current study are assumed to encounter '*the poverty of the stimulus*'.

'The poverty of the stimulus' in the current study broadly refers to the situation in which the information about what interpretations are possible is relatively limited, and ,more specifically, the information about what interpretations are not possible in English are not available to the L2 learners.

Besides, as the Thai learners commence the acquisition of epistemic modals in English with the knowledge of epistemic modals in Thai, L1 properties relevant to the modality are assumed, by Full Transfer, to be present in the initial state of the acquisition of the epistemic modals in English. And the results of the pilot study have shown that the L1 properties were observed in the L2 acquisition.

Acknowledging the poverty of the stimulus, and the possibility of L1 transfer in the L2 acquisition, three fundamental research questions concerning with these two issues are addressed. An experimental study was conducted in order to search for answers to the three research questions.

8.1.1 Research questions

The fundamental research questions addressed in the current research are as follows.

(1) *Do L2 English acquisition patterns show L1 properties of Thai with regard to the reference time of modal complements?*

(2) *Can the Thai children and adults overcome the poverty of the stimulus in acquiring the syntactic patterns that constrain the reference time of modal complements in English? In other words, can the Thai L2 learners of English acquire the syntactic patterns that indicate the reference time of modal complements?*

(3) If the Thai children and adults appear to acquire those syntactic patterns, the next question is *are some patterns acquired early, and others acquired late, i.e. by the L2 children and the adults with low proficiency?*

8.1.2 Questions for the experiment

In order to find the answers to the questions above, a truth value judgment task was designed. The specific questions addressed in the experiment are as follows.

1. *Do Thai L2 learners acquire the structures that indicate the present reference time of the epistemic modal complements in English?*

   More specifically, do the L2 learners know that the following structures can indicate present reference time?

   Pattern 1 **MAY/MIGHT + A STATIVE VERB**

   e.g. may/might be, like

   Pattern 3 **MAY/MIGHT + BE AN EVENTIVE VERB - ING**

   e.g. may/might be playing, studying

   Pattern 4 **MUST + A STATIVE VERB**

   e.g. must be, like

   Pattern 5 **MUST + BE + AN EVENTIVE VERB -ING**

   e.g. must be cooking

2. *Do Thai L2 learners acquire the structures that indicate the future reference time of the epistemic modal complements in English?*

   More specifically, do the L2 learners know that the following structures can indicate future reference time?

   Pattern 1 **MAY/MIGHT + A STATIVE VERB**

   e.g. may/might be, like

   Pattern 2 **MAY/MIGHT + AN EVENTIVE VERB**

   e.g. may/might play, study

   Pattern 6 **WILL + STATIVE/EVENTIVE VERB**

   e.g. will be/miss

3. *Do Thai L2 learners acquire the structures that indicate the past reference time of the epistemic modal complements in English?*

   More specifically, do the L2 learners know that the following structure indicates past reference time?

Pattern 7 EPISTEMIC MODALS + HAVE -EN = PAST

e.g. may/might, must, will have been, cooked

8.2 Designing the task

At first, the task consisted of sixteen modal sentences with different syntactic patterns. All test sentences were presented to the participants under three conditions: Present Condition, Future Condition, and Past Condition. So, there were forty-eight test items altogether. Each condition consists of scenarios which have been designed to force certain temporal interpretations (e.g. present, future, and past) of the test sentences (see Appendix C1). The test sentences are shown in Table 8.1

Table 8.1: The test sentences and the target-like responses

Test Sentences	Condition		
	Present (A)	Future (B)	Past (C)
Ben might be at home.	OK	OK	NOT OK
Ben may like the chocolate.	OK	OK	NOT OK
Ben may play football.	NOT OK	OK	NOT OK
He might study math.	NOT OK	OK	NOT OK
The teacher must be angry.	OK	NOT OK	NOT OK
Ben must know the answer.	OK	NOT OK	NOT OK
Jerry will be late.	NOT OK	OK	NOT OK
Ben will miss the bus.	NOT OK	OK	NOT OK
Ben may be playing football.	OK	NOT OK	NOT OK
He might be studying math.	OK	NOT OK	NOT OK
He must be going to the party.	OK	NOT OK	NOT OK
Ben must be cooking the dinner.	OK	NOT OK	NOT OK
Ben might have been at home.	NOT OK	NOT OK	OK
Ben must have cooked the dinner.	NOT OK	NOT OK	OK
Ben's bedroom will have been messy.	NOT OK	NOT OK	OK
Ben will have missed the bus.	NOT OK	NOT OK	OK

The first column shows the test sentences/modal statements. The mark 'OK' represents the reference time which are possible for the sentences, and the mark 'NOT OK' represents the reference time which are not possible for the sentences. Notice that

sentence '*Ben might be at home*' and sentence '*Ben may like the chocolate*' allow both present and future interpretations. Therefore, the responses for these two sentences were counted twice i.e. one for present category and another for future category.

The participants were asked to judge whether sentences sounds OK or NOT OK based on the stories or scenarios provided. The participants who have developed a target-like grammar were expected to say the sentence is 'OK' when the sentences were presented under the right conditions, or when the reference time of the modal statements is felicitous to the reference time of the scenarios. They were also expected to accurately reject or say the sentence is 'NOT OK', if they found the sentences not temporally felicitous to the scenarios. For example, the sentence '*Ben might be at home*' was presented to the participants under Present Condition, Future Condition, and Past Condition as follows.

Present Condition

Story: Ben has a bad cold. He did not come to school today.

Prompt: Where do you think Ben is now?

Correct Interpretation: Ben might be at home.

Future Condition

Story: Ben was not feeling well after school. He will not come to school tomorrow.

Prompt: Where do you think Ben will be tomorrow?

Correct Interpretation: Ben might be at home.

PAST Condition

Story: Ben had a bad cold yesterday. He did not come to school.

Prompt: Where do you think Ben was yesterday?

Incorrect Interpretation: Ben might be at home.

Since the sentence '*Ben might be at home*' has syntactic pattern 1: **MAY/MIGHT + A STATIVE VERB,** and has present reference time and future reference time, the participants were therefore expected to say 'OK' under Present Condition and Future

Condition, but say 'NOT OK' under Past condition, if they know the reference time of the sentence.

Nevertheless, how can we know whether the present and the future interpretations are constrained by UG? In other words, is the temporal interpretation of this sentence not influenced by their L1 properties? The participants may allow the present and the future interpretations which are their L1 properties for the certain test sentences because the present, future, and past reference time are freely allowed for the modal complement out of context, as mentioned in chapter 3.

To be able to claim that it is UG, the participants not only have to allow the correct interpretation, they also need to reject or disallow the temporal interpretation which is not allowed for the sentences. For example, the sentence '*Ben might study math*' has only future reference time in English. If the participants consider the sentence to be 'OK' when it is presented under Future Condition, and consistently consider the sentence to be 'NOT OK' only under Present Condition and Past Condition, we will be able to claim that it is UG that constrains the participants' interpretation. On the other hand, if the participants consider the sentence to be 'OK' when it is presented under Future Condition, and also under Present Condition or Past Condition, we would claim that it is L1 that constrains the participants' interpretation, and there is L1 transfer.

After designing the task, the test was piloted with three native speakers of English in order to check the validity of the test. The test items which did not elicit the responses as expected were revised and rechecked with the native speakers. In the second trial, the test items were able to elicit the responses as expected.

8.3 Procedures

8.3.1 Running the test with native speakers

17 native speakers of English, aged between 18 – 30 years old were selected as the control group. There were 6 male and 11 female undergraduate and postgraduate students from the University of Leeds. The main purpose of conducting the test with the adult native speakers was to provide a benchmark of target responses for comparison.

The format of the test was like a questionnaire (see Appendix C3). The native speakers were told that they were going to read little stories, and after each little story, Dan and Tom would say something about the story. Dan always speaks well, but Tom does not. The native speakers therefore had to decide whether what Tom said OK or not OK. They had to circle or mark OK, if they thought the sentence which was said by Tom is OK, and they had to circle or mark NOT OK, if they thought the sentence which was said by Tom was not OK. The results from the test performed by the L1 native speakers are presented in Table 8.2.

Table 8.2: The adult native speakers' responses

	The test sentences	**Present**		**Future**		**Past**	
		N = 17	**%**	**N = 17**	**%**	**N = 17**	**%**
1	Ben might be at home.	16	94.12	14	82.35	16	94.12
2	Ben may like the chocolate.	11	64.71	16	94.12	15	88.24
3	Ben may play football.	15	88.24	17	100	17	100
4	He might study math.	16	94.12	17	100	16	94.12
5	The teacher must be angry.	16	94.12	16	94.12	14	82.35
6	Ben must know the answer.	10	58.82	12	70.59	13	76.47
7	Jerry will be late.	10	58.82	15	88.24	16	94.12
8	Ben will miss the bus.	7	41.18	16	94.12	16	94.12
9	Ben may be playing football.	17	100	9	52.94	16	94.12
10	He might be studying math.	17	100	13	76.47	15	88.24
11	He must be going to the party.	8	47.06	6	35.29	17	100
12	Ben must be cooking the dinner.	16	94.12	12	70.59	16	94.12
13	Ben might have been at home.	14	82.35	16	94.12	17	100
14	Ben must have cooked the dinner.	13	76.47	16	94.12	13	76.47
15	Ben's bedroom will have been messy.	15	88.24	15	88.24	13	76.47
16	Ben will have missed the bus.	13	76.47	12	70.59	13	76.47

*refer to Table 8.1 for conditions expecting correct acceptance and correct rejection

There were several test sentences which many of the native speakers accepted/rejected as the researcher expected in some conditions, and there were also several test sentences which many of the native speakers did not accept/reject (as shaded). These results suggest that the temporal interpretations of these test sentences are more variable than assumed.

We can first see that, as expected, majority of the native speakers rejected the past modal statements when they were presented in Present and Future conditions, and accepted the modal statements to be OK when they were presented in Past condition. They gave the anticipated responses for all test sentences in this category more than 70%.

As for the present modal statements, it is quite surprising to see that the native speakers did not provide the anticipated responses for sentence '*Ben must know the answer*', '*Ben may be playing football*' and '*He must be going to the party*' as the researcher expected.

Only 10 out of the 17 adult native speakers accepted sentence '*Ben must know the answer*' when it was presented in Present condition. And Only 9 out of the 17 adult native speakers provided the expected responses for sentence '*Ben may be playing football*' as expected in Future condition. As for the sentence '*He must be going to the party*', only 8 out of the 17 adult native speakers provided the expected responses when it was presented in Present condition, and only 6 out of the 17 adult native speakers rejected this sentence when it was presented in Future condition. These results suggest that the test sentences do not have the reference time as the researcher assumed.

It is also surprising to see that some of the adult native speakers accepted the test sentences with WILL to be OK when they were presented in Present condition. We can see that only 10 out of the 17 adult native speakers rejected sentence '*Jerry will be late*', and only 7 out of the 17 adult native speakers considered sentence '*Ben will miss the bus*' to be not OK in Present condition.

As for the sentences for which present and future interpretations are possible, the native speakers tended to provide the responses for the sentence '*Ben might be at home*' as expected in all three conditions. However, as for the sentence '*Ben may like the*

chocolate', only 11 out of the 17 adult native speakers provided the anticipated responses as expected in Present condition.

Since the results of the test performed by the adult native speakers show that the temporal interpretation of some test sentences are more variable than assumed, I decided to put aside the test items and the conditions in which the adult native speakers did not provide the expected responses, and considered the responses for these sentences provided by the L2 children, L2 adults and L1 children separately. These items are shown in Table 8.3.

Table 8.3: The test sentences for which the adult native speakers did not provide the responses as expected

The test sentences	**Conditions**
Ben must know the answer.	Present
Ben may be playing football.	Future
He must be going to the party.	Present, Future
Jerry will be late.	Present
Ben will miss the bus.	Present
Ben may like the chocolate.	Present

8.3.2 Running the test with L1 children

Since child L2 acquisition will also be compared with child L1 acquisition in the current research, 22 English-speaking children aged 8 - 9 years old were asked to perform the task. There were 13 boys and 9 girls. The L1 children were studying in year 4 at a local primary school in Leeds, UK. Some of the L1 children were bilingual. There were 6 British-born Pakistanis, 3 British-born Iranians, 3 British-born Indians, and 2 British-born Bangladeshis. Although these children came from non-native speaker's families, they started learning English when they were under 4 because they all went to nurseries where English was spoken. So, they were considered to be native speakers of English.

Because of the possibility that being bilingual might have some effect on the results of these children, the bilingual children's responses were initially separated from the monolingual children's responses in order to explore if there was any difference in the results. However, after the exploration, no meaningful difference was observed. The results of the test performed by the bilingual and the monolingual children were then reported together.

The L1 children were asked to perform the truth value judgment task in groups of 6. By doing this, the researcher was able to monitor the task and help individual children when they did not understand the task, or when they needed help. The experiment took place in classrooms of a primary school in Leeds. The two class teachers were also in the classroom to assist the researcher in conducting the experiment. The format of the test was like a questionnaire similar to the one which was run with the L1 adults. At first the children were given the test, and the researcher explained the task to the children. The children were told that they were going to read little stories, and after each little story, Dan and Tom would say something about the story. Dan always speaks well, but Tom does not. The children, therefore, had to decide whether what Tom said was OK or NOT OK. The children had to circle or mark OK on the answer sheet, if they thought the sentence which was said by Tom was OK, and they had to circle or mark NOT OK, if they thought the sentence which was said by Tom was not OK. After the researcher explained the task to the children, one of the class teachers repeated and simplified what the researcher had just said to the children to make it easier for the children to understand.

The experiment also began with a warm-up session. It was run by the class teacher. She asked some students to read the story, Dan's comments and Tom's statements aloud to the class. This was like a role play. At the end of the first story, the teacher stopped for 30 seconds to repeat what was going on in the story, and asked the children to choose the answers. Then, she told the class the appropriate answers. The warm-up session went like this. After the warm-up session ended, the children were asked to do the test by themselves. However, the class teachers and the researcher were sitting with the children to assist and to explain vocabulary just in case they did not understand. It took 45 minutes for the children to complete the task. At the end of the task, the tests were collected.

As mentioned in the previous section, the responses for the test sentences for which the adult native speakers did not provide the expected responses were separated. Thus, I first considered the L1 children's target-like responses for the sentences in which the temporal interpretations are not variable among the adult native speakers. These are presented in Table 8.4.

Table 8.4: The L1 children's target-like responses

The test sentences	**Conditions**					
	Present		**Future**		**Past**	
	N = 22	**%**	**N = 22**	**%**	**N = 22**	**%**
Ben might be at home.	**20**	**90.91**	14	63.64	11	50.00
Ben may like the chocolate.	14	63.64	11	50.00	19	**86.36**
Ben may play football.	11	50.00	17	77.27	**20**	**90.91**
He might study math.	**18**	**81.82**	**19**	**86.36**	**18**	**81.82**
The teacher must be angry.	13	59.09	14	63.64	17	77.27
Ben must know the answer.	12	54.55	10	45.45	12	54.55
Jerry will be late.	**19**	**86.36**	14	63.64	16	72.73
Ben will miss the bus.	16	72.73	16	72.73	**21**	**95.45**
Ben may be playing football.	**19**	**86.36**	**19**	**86.36**	14	63.64
He might be studying math.	**18**	**81.82**	11	50.00	15	68.18
He must be going to the party.	11	50.00	10	45.45	**21**	**95.45**
Ben must be cooking the dinner.	17	77.27	5	22.73	14	63.64
Ben might have been at home.	13	59.09	20	**90.91**	13	59.09
Ben must have cooked the dinner.	**18**	**81.82**	17	77.27	14	63.64
Ben's bedroom will have been messy.	16	72.73	19	**86.36**	15	68.18
Ben will have missed the bus.	**19**	**86.36**	14	63.64	11	50.00
Mean		**75.00**		**79.55**		**60.23**

There were many test items (as bolded) for which the L1 children provided the target-like responses above 80% as expected in some conditions. And there were some test sentences (e.g. '*The teacher must be angry*' and '*Ben must be cooking the dinner*') for which the L1 children did not provide the expected responses in all three conditions at consistently high rates. In addition, there was only one test sentence for which the L1

children provided the target-like responses above 80% in all three conditions. That is, *'He might study math'*.

Another point which should be noted is that the L1 children tended to accurately reject the test sentences when they were presented in infelicitous conditions. This suggests that the L1 children appear to know what temporal interpretation is not possible for the certain modal statements before they know what interpretation is possible for the modal statements.

Now let us consider the conditions for which the adult native speakers did not provide the expected responses (see Table 8.3). It is interesting to note that first, unlike the adult native speakers, 19 out of the 22 L1 children rejected sentence *'Ben may be playing football'* when it was presented in Future condition. Secondly, 19 out of the 22 L1 children provided the target-like responses i.e. rejection for sentence *'Jerry will be late'* in Present condition. These results suggest that the L1 children's interpretation does not correspond with that of the adult native speakers.

When considering the percentage of the target responses for the modal statements indicating different reference time given by the L1 child group, as shown in Table 8.5, I found that the percentage of the target responses for the modal statements indicating the future reference time is higher than that of the modal statements indicating the present and the past reference time. In addition, when looking at the percentage of the non-target responses for the modal statements, we can see that the percentage of the non-target responses for the modal statements indicating the future reference time is lower than that of the modal statements indicating the present and the past reference time.

Table 8.5: The L1 children's total of target-like and non-target responses for the modal statements indicating different reference time

The modal statements	Target response		Non-target response	
	n	%	n	%
Present	160/240	66.66	80/240	33.33
Future	142/180	78.88	38/180	21.11
Past	135/180	75	45/180	25

In Table 8.5, we also notice that the percentage of the target responses for the modal statements indicating present reference time is lower the than that of the modal statements indicating the future and the past reference time, and the percentage of the non-target responses for these modal statements is higher than that of the modal statements indicating the future and the past reference time.

Two Non-parametric Tests[12]: Friedman's ANOVA and Wilcox Signed Ranks Test were applied to check whether or not the percentage of the L1 children's responses for the modal statements in each condition is significantly different. First, the results from the Friedman's ANOVA show that the percentage of the L1 children's responses for the modal statements in each condition is significantly different, ($\chi^2(2) = 114.095$, $p = .000$). Followed up with Wilcox Signed Ranks Test, significant differences between conditions e.g. Present, Future, and Past were observed. With respect to the target-like responses, the L1 children's scores of the accurate rejection for the present and the future modal statements were significantly different ($z = -2.065$, $p = .039$, $r = -0.44$)[13]. The L1 children's scores of the accurate rejection for the present and the past modal statements were also significantly different ($z = 2.15$, $p = .032$, $r = -0.46$), while the L1 children's scores of the accurate rejection for the future and the past modal statements were not significantly different. Regarding the non-target responses, the L1 children's inaccurate acceptance scores for the present and the future modal statements were significantly different ($z = -2.065$, $p = .039$, $r = -0.44$). The L1 children's scores of the

[12] Non-parametric Tests were applied to the statistic analyses of all participants' responses because the data obtained is not normally distributed.

[13] After running Wilcox Signed Ranks Test, the effect size for each condition was calculated.

inaccurate acceptance for the present and the past modal statements were also significantly different (z = 2.15, p = .032, r = -0.46), while the L1 children's scores of the inaccurate acceptance for the future and the past modal statements were not significantly different.

Although the L1 child group results show that the L1 children performed as expected in several conditions, we cannot make claims about the acquisition of the syntactic patterns without considering the L1 child individual results. The very high percentage of the group results may result from the results of individual children. That is, some children may have provided very high percentage of the correct responses, while the other children may have provided very high percentage of the incorrect responses. For these reasons, the L1 child individual results are presented.

To determine whether an individual L1 realized, or did not realize, the reference time of the modal statements, a child had to accurately accept the sentences when they were presented in felicitous conditions, and accurately reject the sentences when they were presented in infelicitous conditions. The L1 child individual results are presented in Table 8.6. Only the test sentences for which the adult native speakers' interpretations were not variable were considered.

Table 8.6: The L1 child individual results: the successfully acquired modal statements

The participants	Types of modals statements			
	Present	Future	Past	Total
	n = 4	n = 3	n = 4	n = 11
L1CHI01	3	2	3	8
L1CHI03	2	2	4	8
L1CHI02	2	2	2	6
L1CHI04	2	2	2	6
L1CHI06	3	2	1	6
L1CHI05	1	2	2	5
L1CHI07	1	2	2	5
L1CHI08	2	1	2	5
L1CHI19	1	2	2	5
L1CHI11	0	1	3	4
L1CHI15	2	2	0	4
L1CHI12	0	1	2	3
L1CHI09	0	2	1	3
L1CHI10	0	1	2	3
L1CHI13	1	1	1	3
L1CHI18	0	2	1	3
L1CHI21	2	1	0	3
L1CHI16	0	1	1	2
L1CHI20	1	1	0	2
L1CHI14	0	1	0	1
L1CHI17	0	0	1	1
L1CHI22	0	1	0	1
Total	**23/88**	**32/66**	**32/88**	
%	**26.14**	**48.48**	**36.36**	

In Table 8.6, we first notice that the number of the modal statements which the individual L1 children have successfully acquired is rather low. Only two children performed crucially better than the rest of the group. These results suggest that most of the L1 children have not fully acquired the syntactic patterns which indicate the reference of the modal complements.

Nevertheless, an interesting developmental trend can be observed. That is, at the individual level, L1 children tended to more accurately accept and reject the future

modal statements than the other modal statements. These results suggest that the syntactic patterns which indicate the future reference time are acquired earlier than the other two patterns.

Table 8.7: The syntactic patterns acquired by the L1 children

The syntactic patterns	L1 children	
	n	%
Present		
MAY/MIGHT + A STATIVE VERB	3/22	13.63
MAY/MIGHT + BE AN EVENTIVE VERB - ING	8/22	36.36
MUST + A STATIVE VERB	7/22	31.81
MUST + BE + AN EVENTIVE VERB -ING	5/22	22.72
Future		
MAY/MIGHT + A STATIVE VERB	3//22	13.62
MAY/MIGHT + AN EVENTIVE VERB	29/44	65.90
WILL + STATIVE/EVENTIVE VERB*	0	0
Past		
EPISTEMIC MODALS + HAVE -EN = PAST	32/88	36.36

*The pattern 'WILL + STATIVE/EVENTIVE VERB' is excluded from the analysis because the temporal interpretation of this pattern was more variable among the adult native speakers than expected, as showed in section 8.3.1.

Moreover, when closely looking at individual syntactic patterns, I found that the percentage of the L1 children who appear to have acquired the syntactic pattern 'MAY/MIGHT + AN EVENTIVE VERB' is relatively higher the other pattern in the same category.

In summary, the L1 child results presented in this section were a bit surprising because a few children appear to have acquired some of the syntactic patterns which indicate the reference of the modal complements. Since the L1 children have not acquired these properties of the epistemic modals, we will need to keep this in mind when we consider the child L2 results.

8.4 The child L2 acquisition

8.4.1 Running the test with L2 children

The L2 children were asked to perform the truth value judgment task in groups of 10. The experiment took place in a classroom. Before the task started, the room was set for the experiment. The researcher's laptop was connected to the LCD projector and the amplifier. Two class teachers were also present in the classroom to assist the researcher. The test was demonstrated to the teachers, and the amplifier system and the sound volume were also checked to ensure they were OK for the children. When the experiment took place, the children were sitting at their own desks, and each of them was given an answer sheet. Then, the researcher explained the task to the children. The instructions were similar to those used with the L1 children. However, the L2 children had to listen to the stories instead of reading them. The experiment began with a warm-up session to familiarize the children with the task and to check whether or not they understand the task. The warm-up session consisted of 5 short stories, which were different from the real task, but they were the same as those used with the L1 children. The researcher played the first warm-up story. At the end of the first story, the researcher stopped for 30 seconds to repeat what was going on in the story. Then the researcher played Dan's comment and Tom's comment. Afterward, the children were asked to decide, and mark the answers on the answer sheet. The children had 1 minute to choose the answer. The researcher and the teachers looked around while the children were choosing the answer. When the children finished the first item, they moved onto the next item until they finished the fifth item, and the researcher had a quick look at the children's answer sheets to make sure that the children had understood the task. After the warm-up session, the real task was performed. The children were allowed to have a 3 minute-break in the middle of the task. After the break the task was carried on. At the end of the task, the answer sheets were collected. It took about an hour for the children to finish the task.

The L2 children's and the L2 adults' responses were classified into four categories as follows.

(1) 'Accurate rejection' is the target-like L1-incompatible response. It is the target interpretation which only reflects the development of L2 target

grammar. It is the interpretation that is not allowed only in the L2. It refers to the 'NOT OK' response expected in the infelicitous conditions.

(2) 'Inaccurate acceptance' is the non-target L1-compatible response. It is the interpretation of the L1, and only reflects pure L1 transfer. In other words, it is the interpretation that is not allowed in the L2, but it is allowed in the L1. It refers to the 'OK' response expected in the infelicitous conditions.

(3) 'Accurate acceptance' is the target-like L1-compatible response. However, it can be either the target-like interpretation or the interpretation of the L1. In other words, it is the interpretation that is allowed in the L2 and the L1. It refers to the 'OK' response expected in the felicitous conditions.

(4) 'Inaccurate rejection' is the non-target L1-incompatible response. It is neither the interpretation of the L2 nor L1. In other words, it is the interpretation which is not allowed either in the L2 or the L1. It refers to the 'NOT OK' response expected in the felicitous conditions.

There were 29 test sentences that elicit the target-like L1-incompatible responses (see Appendix C1). The responses for these sentences will be evidence for the development of the ability to identify the interpretations which are not allowed for the modal statements in English. The participants were expected to reject or say the sentences were NOT OK when these sentences were presented in infelicitous contexts. If a participant constantly rejects the sentences, (s)he was considered to realize the reference time of the test sentences.

On the other hand, if the participant appears to accept these sentences, or to say the sentences were OK, they were considered not to realize the reference time of the test sentences. An acceptance or OK response in this case was considered to be the non-target L1-compatible, and it reflects L1 transfer.

There were 19 test sentences that elicit the target-like L1-compatible responses. The participants were expected to accept, or to say the sentences were OK, when these sentences were presented in felicitous contexts. However, the reference time of these test sentences is possible also possible in the Thai.

The rejection or the NOT OK response for the test sentences in this category were considered to be a non-target L1-incompatible because they were neither the L2 nor L1 interpretation.

8.4.2 The L2 child group results

To provide an overview of the L2 children's performance, the percentage of the responses for the modal statements given by the whole group of L2 children are presented. To begin with, Table 8.8 shows the percentage of the L2 children's responses for the present, the future and the past modal statements.

Table 8.8: The L2 children's responses for the modal statements indicating the present, the future, and the past reference time

The modal statements	Accurate rejection		Accurate acceptance		Inaccurate acceptance		Inaccurate rejection	
	n	%	n	%	n	%	n	%
Present	115/360	31.94	167/210	79.52	245/360	68.05	43/210	20.47
Future	64/240	26.66	161/210	76.66	176/240	73.33	49/210	23.33
Past	80/240	33.33	84/120	70.00	160/240	66.66	36/120	30.00

Table 8.8 generally illustrates that the L2 children did not do very well. The percentage of the accurate rejection responses which reflects the pure L2 knowledge, for all modal statements is relatively low, ranging from 26.66 to 33.33%. The L2 children hardly rejected the sentences when they were presented in infelicitous contexts. The percentage of the accurate rejection responses for the future modal statements is relatively lower than that of the present and the past modal statements.

On the other hand, the percentage of the accurate acceptance responses for all modal statements is relatively high. The very high percentage of this kind of responses, however, did not truly reflect the L2 children's knowledge about the reference time of the modal complements. The interpretation which the L2 children allowed for the modal statements can be attributed to either the L2 or the L1 knowledge. The L2 children may have considered the test sentences to be OK without knowing the test sentence have the same temporal interpretation as their counterpart in Thai.

With respect to the inaccurate acceptance responses, which reflect pure L1 knowledge, the percentage of this kind of response is relatively high. This suggests that the L2 children allowed the interpretations which are possible in their L1, but they are not possible for the equivalent structures in the L2. This is, therefore, evidence for L1 transfer. The very high percentage of the inaccurate acceptance responses has led us to assume that the high percentage of the accurate acceptance responses resulted from L1 knowledge. The L2 children tended to accept the test sentences as OK, even though they have not acquired the true reference time of the test sentences.

In Table 8.8 we also notice that the percentage of the inaccurate rejection responses, which reflects neither L1 nor L2 interpretation, is comparatively low.

The percentage of the L2 children's responses for the modal statements in each condition were compared, using two Non-parametric Tests: Friedman's ANOVA and Wilcox Signed Ranks Test, followed –up with effect size calculation. The results from the Friedman's ANOVA, show that the percentage of the responses for the modal statements some conditions is significantly different, ($\chi^2(2) = 120.516$, $p = .000$). And the results from the Wilcox Signed Ranks Test reveals that, with respect to the accurate rejection, the percentage of the accurate rejection responses for the present and the future modal statements is significantly different ($z = -1.959$, $p = .050$, $r = -0.358$). The percentage of the accurate rejection responses for the future and the past modal statements is significantly different ($z = -1.989$, $p = .047$, $r = -0.363$). With respect to the inaccurate acceptance, the percentage of the inaccurate acceptance responses for the present and the future modal statements is significantly different ($z = -1.959$, $p = .050$, $r = -0.358$). The percentage of the inaccurate acceptance responses for the future and the past modal statements is significantly different ($z = -1.989$, $p = .047$, $r = -0.363$).

Although the group results show some general trends concerning the L2 children's knowledge about the reference time of the modal complements, we need to consider the results in terms of proficiency before we can make any claims about development. In the next section, I thus consider the L2 child results per proficiency group.

8.4.3 The L2 child results per proficiency group

In the previous section, we have seen differences between the target-like responses and the non-target responses for the modal statements provided the L2 children regardless of the L2 proficiency. In this section, I consider the L2 children's results in regard to their proficiency in order to search for developmental patterns. The L2 children were divided into three proficiency groups – high, mid, low according to the proficiency scores by 'simple alternative' mean, which was presented in chapter 7. The responses for the modal statements in the conditions which have variable interpretations among the native speakers are not considered.

Table 8.9: The L2 child results per proficiency group: the responses for the modal statements which have different reference time

The syntactic patterns	Groups	Accurate rejection		Accurate acceptance		Inaccurate acceptance		Inaccurate rejection	
		n	%	n	%	n	%	n	%
Future	High	21/64	32.81	42/56	75.00	43/64	67.19	14/56	25
	Mid	16/64	25.00	45/56	80.36	48/64	75.00	11/56	19.64
	Low	20/72	27.78	49/63	77.78	52/72	72.22	14/63	22.22
Past	High	24/64	37.50	26/32	81.25	40/64	62.20	6/32	18/75
	Mid	15/64	23.44	18/32	56.25	49/64	76.56	14/32	43.75
	Low	27/72	37.50	26/36	72.22	45/72	62.5	10/36	27.78
Present	High	29/96	30.21	43/56	79.76	67/96	69.79	13/56	23.21
	Mid	32/96	33.33	42/56	75.00	64/96	66.67	14/56	25
	Low	36/108	33.33	54/72	85.71	72/108	66.67	9/72	14.29

Surprisingly, the L2 children from the high proficiency level did not perform consistently better than did the L2 children from the low proficiency group. They provided a higher percentage of the accurate rejection responses than did the L2 children from the low proficiency group only for the future modal statements. In addition, the L2 children from the low proficiency group provided a higher percentage of the accurate rejection responses than did the L2 children from the high proficiency group for the present modal statements. Given that this surprising data could result from unusual performance of an individual child, I decided to closely look at the individual

child's responses for the modal statements in which the L2 children did not provide the responses as expected, and I found that the L2 children with the same proficiency level did not obviously perform differently from each other. Therefore, it was possible that the L2 children's knowledge about the syntactic patterns indicating the present reference time lagged behind the L2 children from the mid and the low proficiency groups.

Besides, in regard to the inaccurate acceptance responses, the L2 children from the high proficiency group provided the inaccurate acceptance responses for the present modal statements more than did the L2 children from the low proficiency group.

As for the L2 children from the mid proficiency level, they generally did not perform better than the L2 children from the low proficiency group for the future and the past modal statements.

The percentage of the responses for the modal statements provided by the L2 children from the three proficiency groups was compared, using Kruskal Wallis Test by split file by group. The purpose of the test was to check whether or not the L2 children from the three proficiency groups behaved significantly regarding the types of the responses and the conditions. The results of the test show that the percentage of the types of responses provided by the L2 children from the three proficiency groups was not significantly different in every condition. This confirms that there was no connection between the L2 children's performance and their L2 proficiency. In other words, regardless of L2 proficiency levels, the L2 children's performance was not significantly different.

Table 8.10: Kruskal Wallis Test: the L2 children's responses-cross proficiency groups

	Pres_ ACR*	Pres_ ACA	Pres_ INA	Pres_ INR	Past_ ACR	Past_ ACA	Past_ INA	Past_ INR	Fut_ ACR	Fut_ ACA	Fut_ INA	Fut_ INR
Chi-square	.15	2.02	.15	2.02	.18	.41	.18	.41	1.51	3.23	1.51	3.23
df	2	2	2	2	2	2	2	2	2	2	2	2
Asymp. Sig.	.928	.365	.928	.365	.916	.815	.916	.815	.471	.199	.471	.199

*ACR = accurate rejection, ACA = accurate acceptance, INA = inaccurate acceptance, INR = inaccurate rejection

In summary, the results per proficiency group presented so far show that the L2 children from the three proficiency groups have not acquired the syntactic patterns that indicate the reference time of the modal complements. In other words, their knowledge about the reference time of the modal complement in English is underdeveloped. We have seen that the L2 children provided a very low rate of the accurate rejection responses, which reflects the pure L2 knowledge. In addition, they tended to highly allow their L1 interpretations of the modal statements in English.

In addition, the results per proficiency group also suggest no close correspondence between the L2 children's performance and L2 proficiency. The L2 children with higher proficiency did not consistently provide the expected responses, particularly the accurate rejection responses; indeed, they performed no higher than the L2 children with lower proficiency. This gives rise to the question of whether the proficiency measure is flawed – given that the researcher had trouble with that measure, it seems possible. However, I postpone the discussion of the L2 proficiency in relation to the L2 children's performance until Chapter 9.

8.4.4 The L2 child individual results

This section considers the individual L2 children's response patterns in order to find out which modal statements are acquired by the L2 children. To begin with, the test items which are acquired by the L2 children are shown in Table 8.11.

Table 8.11: The L2 child individual results: the successfully acquired modal statements

The participants	Proficiency levels	Types of modals statements			
		Present	Future	Past	Total
		n = 4	n = 3	n = 4	n = 11
L2CHI04	M	1	2	1	4
L2CHI06	H	1		2	3
L2CHI07	H	1		2	3
L2CHI15	M	1		1	2
L2CHI05	L	1	1		2
L2CHI13*		1	1		2
L2CHI20	H			1	1
L2CHI18	M			1	1
L2CHI25	L			1	1
L2CHI17	L		1		1
L2CHI03	L		1		1
L2CHI11*		1			1
L2CHI27	H				
L2CHI16	H				
L2CHI29	H				
L2CHI19	H				
L2CHI22	H				
L2CHI24	M				
L2CHI01	M				
L2CHI30	M				
L2CHI28	M				
L2CHI10	M				
L2CHI09	L				
L2CHI14	L				
L2CHI21	L				
L2CHI02	L				
L2CHI08	L				
L2CHI23*					
L2CHI12*					
L2CHI26*					
Total		**7/120**	**6/90**	**9/120**	
%		**5.83**	**6.66**	**7.5**	

* The L2 children whom were not assigned proficiency level because their proficiency scores were very low.

The individual L2 children's results in Table 8.11 show that majority of the L2 children have not acquired the syntactic patterns indicating the reference time of the modal complement. There was a small number of L2 children who appear to have acquired some syntactic patterns. Also, it can be noted that the L2 children who appear to have acquired some of the syntactic patterns were from different proficiency groups. These results suggest no connection between L2 proficiency and performance.

In summary, the L2 children's results presented in the sections above show the L2 children's rudimentary knowledge about syntactic patterns indicating the reference time of the modal complements in English. The majority the L2 children did not appear to have acquired relevant L2 knowledge. They were not able to accurately accept and reject the test sentence under certain conditions. This is reflected by the low percentage of the accurate rejection responses, and the number of the L2 children who appear to have acquired certain syntactic patterns. Besides, the L2 children tended to allow interpretations which are not possible in the L2, but possible in their L1, to apply to the test sentence. This is evidence of L1 knowledge transfer.

8.5 The adult L2 acquisition

8.5.1 Running the test with L2 adults

The L2 adults were asked to perform the test individually. The task was conducted by the researcher's assistant, a senior university student who was very well trained by the researcher. The experiment took place in a teacher's common room at a university. Before the task started, the participants were given the answer sheet, and the research assistant explained the task to the participants. The instructions were identical to those used with the L2 children. The L2 adults had to do a warm-up session. The process of the warm-up session and the real task are also identical to the one that was run with the L2 children. However the L2 adults were allowed to have a short break at some points when they felt tired during the task. Afterwards the task was continued. At the end of the task, the answer sheets were collected. It took about an hour for the participants to finish the task.

This section presents the L2 adults' results. Paralleling the L2 children's results, there are three sub sections. Section 8.5.1 deals with the L2 adult group results. The L2 adult

results per proficiency group are presented in section 8.5.2, and the L2 adult individual results are presented in section 8.5.3.

8.5.2 The L2 adult group results

This section presents the L2 adult group results as a whole in order to provide an overview of the L2 adults' performance. Table 8.12 shows the percentage of the L2 adults' responses for all modal statements.

Table 8.12: The L2 adults' responses for the modal statements indicating the present, the future, and the past reference time

The modal statements	Accurate rejection		Accurate acceptance		Inaccurate acceptance		Inaccurate rejection	
	n	%	n	%	n	%	n	%
Present	177/360	49.16	156/210	74.28	183/360	50.83	54/210	25.71
Future	112/240	46.66	148/210	70.47	128/240	53.33	62/210	29.52
Past	126/240	52.5	67/120	55.83	114/240	47.5	53/120	44.16

In Table 8.12 we can also notice that the percentage of the inaccurate acceptance responses or the L1 Transfer responses for the future modal statements is higher than that of the present and the past modal statements, whereas the percentage of the inaccurate acceptance responses for the past modal statements is lower than that of the present and the future modal statements. Lastly, the percentage of the incorrect rejection responses for the past modal statements is higher than that of the present and the future modal statements.

The L2 adults' responses for the modal statements were checked whether there are significant differences between conditions, using Friedman's ANOVA Test followed up with Wilcoxon Signed Ranks Test and the effect size calculation. The results from the Friedman's ANOVA, show that the percentage of the responses for the modal statements in some conditions is significantly different, ($\chi 2(2) = 91.89$, $p = .000$). The results from the Wilcox Signed Ranks Test reveals that, the percentage of the accurate acceptance responses for the present and the past modal statements is significantly

different (z = -3.78, p = .000, r = -0.69). And the percentage of the accurate acceptance responses for the future and the past modal statements is significantly different (z = -3.19, p = .001, r = -0.58).

8.5.3 The L2 adult results per proficiency group

In this section I deal with the L2 adult group results per proficiency group expecting to find evidence for the adult L2 acquisition of the syntactic patterns indicating the reference time of the modal complements. In other words, we expect a connection with higher proficiency. Like L2 children, the L2 adults were classified into three sub groups- high, mid, and low, according to their L2 proficiency by 'simple alternative' mean.

Table 8.13: The L2 adult results per proficiency group: the responses for the modal statements which have different reference time

The syntactic patterns	Groups	Accurate rejection		Accurate acceptance		Inaccurate acceptance		Inaccurate rejection	
		n	%	n	%	n	%	n	%
Future	High	42/72	58.33	46/63	73.02	30/72	41.67	17/63	26.98
	Mid	23/64	35.94	43/56	76.79	41/64	64.06	13/56	23.21
	Low	43/88	48.86	50/77	64.94	45/88	51.14	27/77	35.06
Past	High	45/72	62.50	18/36	50.00	27/72	37.50	18/36	50.00
	Mid	31/84	48.44	17/32	53.13	33/84	51.56	15/32	46.88
	Low	41/88	46.59	28/44	63.64	47/88	53.41	16/44	36.36
Present	High	67/108	62.04	50/63	79.37	41/108	37.96	13/63	20.63
	Mid	43/96	44.79	42/56	75.00	53/96	55.21	14/56	25.00
	Low	61/132	46.21	56/77	72.73	71/132	53.79	21/77	27.27

The results in Table 8.13 show that the L2 adults from the high proficiency group were likely to perform better than the L2 adults from the mid and the low proficiency groups. The L2 adults from the mid proficiency group, on the other hand, did better than the L2 adults from the low proficiency group only for the past modal statements.

We notice that the L2 adults from the high proficiency group were more accurate in rejecting the modal statements than were the L2 adults from the other two groups. This was indicated by the comparatively higher percentage of the accurate rejection responses provided by the L2 adults from the high proficiency group for all three types of the modal statements. In addition, the rate of the inaccurate acceptance responses, which reflects the L1 interpretations, provided by the L2 adults from the high proficiency group is relatively higher than those provided by the L2 adults from the mid and the low proficiency group.

In summary, despite the better performance of the L2 adults with the high proficiency level, we were not able to claim that there was connection between the percentage of the expected responses and L2 proficiency. We have seen that the L2 adults from the low proficiency group did better than the L2 adults from the mid proficiency group for the future and the present modal statements. Moreover, when applying Kruskal Wallis Test by split file by group, the results of the test show that the percentage of the types of responses provided by the L2 adults from the three proficiency groups was not significantly different in every condition. This confirms that there was no connection between the L2 adults' performance and their L2 proficiency.

Table 8.14: Kruskal Wallis Test: the L2 adults' responses-cross proficiency groups

	Pres_ ACR	Pres_ ACA	Pres_ INA	Pres_ INR	Past_ ACR	Past_ ACA	Past_ INA	Past_ INR	Fut_ ACR	Fut_ ACA	Fut_ INA	Fut_ INR
Chi-square	3.37	.81	3.37	.81	4.64	2.95	4.64	2.95	3.53	.730	3.53	.730
df	2	2	2	2	2	2	2	2	2	2	2	2
Asymp. Sig.	.185	.665	.185	.665	.098	.229	.098	.229	.171	.694	.171	.694

8.5.4 The L2 adult individual results

In the previous section, we still have not obtained crucial evidence to enable us to assume development patterns. Thus, we need to investigate the L2 adult individual results carefully.

Table 8.15: The L2 adult individual results: the successfully acquired modal statements

L2 adults	Proficiency levels	Types of modals statements			
		Present	Future	Past	Total
		n = 4	n = 3	n = 4	n = 11
L2ADU11	L	3	1	1	5
L2ADU23	H	2	1	1	4
L2ADU13	H	2	1	1	4
L2ADU09	M	2	1	1	4
L2ADU25	M	2	1	1	4
L2ADU27	H	2		1	3
L2ADU14	H	2		1	3
L2ADU20	H	1	1	1	3
L2ADU26	L	1	1	1	3
L2ADU01	H	1		1	2
L2ADU05	M		1	2	2
L2ADU10	M			2	2
L2ADU17	L		1	1	2
L2ADU07	L		1	1	2
L2ADU02	L			2	2
L2ADU28	H	1	1		2
L2ADU19	H	1	1		2
L2ADU22	M	1	1		2
L2ADU30	L	1	1		2
L2ADU08	H			1	1
L2ADU21	M			1	1
L2ADU06	M			1	1
L2ADU29	L			1	1
L2ADU04	M				
L2ADU18	L				
L2ADU24	L				
L2ADU12	L				
L2ADU03	L				
L2ADU16*					
L2ADU15*					
Total		**22/120**	**14/90**	**21/120**	
		18.33	**15.55**	**17.50**	

* L2 adults who were not assigned proficiency level because their proficiency scores were very low.

The L2 adult individual results show that some of the L2 adults appear to have successfully acquired some of the modal statements. As indicated by the total of the modal statements in which the L2 adults appear to have acquired, it looks as if the L2 modal statements which have present and past reference time were acquired before the modal statements which have future reference time.

When closely looking at individual test items within the present category, I found that 12 out of 30 L2 adults accurately rejected and accepted sentence No.1 '*Ben might be at home*' when it was presented in three temporal conditions. Based on these results, we may be able to conclude that the L2 adults appear to have acquired the syntactic pattern MAY/MIGHT + A STATIVE VERB before the other patterns in the same category.

As for the past modal statements, the L2 adults tended to acquire the pattern MUST + HAVE -EN and MAY/MIGHT + HAVE –EN rather than the past modal statements with *will*. Some of the L2 adults, in this case, probably overgeneralized that the modal *will* retains its future implication.

In Table 8.15, it can also be noted that, like the L2 children, the L2 adults who appear to have acquired some of the syntactic patterns were from different proficiency groups. These results suggest no connection between L2 proficiency and performance.

To summarize, the L2 adults results presented in this section generally show that some of the L2 adults appear to have acquired some of the syntactic patterns which indicate the reference time of the modal statements. However, their knowledge about the syntactic patterns in question was not fully developed. In other words, no native-like performance was observed. In addition, the L2 adults, like L2 children, widely allowed their L1 interpretation to the modal statements in English.

8.6 The group comparison

As mentioned in Chapter 1, the child L2 acquisition will be compared with the adult L2 acquisition on the one hand, and with the child L1 acquisition on the other; this section thus presents the cross-group comparison. The aims of the comparison are (1) to see whether the L2 children and the L2 adults exhibit similarities and differences in their

acquisition of the epistemic modality in English, and (2) to see whether the L2 children and the L1 children exhibit similarities and differences in their acquisition of the epistemic modality in English. First I deal with the comparison between the child L2 acquisition and adult L2 acquisition in section 8.6.1. Then the comparison between the child L2 acquisition and the child L1 acquisition is presented in section 8.6.2.

8.6.1 The child L2 acquisition vs. the adult L2 acquisition

To begin the comparison of the child L2 acquisition with the adult L2 acquisition, let us refer to the L2 child group results and the L2 adult group results by representing them in the same table.

Table 8.16: The L2 child group results and the L2 adult group results

	Accurate rejection		Accurate acceptance		Inaccurate acceptance		Inaccurate rejection	
	n	%	n	%	n	%	n	%
Present								
L2 child group	115/360	31.94	167/210	79.52	245/360	68.05	43/210	20.47
L2 adult group	177/360	49.16	156/210	74.28	183/360	50.83	54/210	25.71
Future								
L2 child group	64/240	26.66	161/210	76.66	176/240	73.33	49/210	23.33
L2 adult group	112/240	46.66	148/210	70.47	128/240	53.33	62/210	29.52
Past								
L2 child group	80/240	33.33	84/120	70.00	160/240	66.66	36/120	30.00
L2 adult group	126/240	52.5	67/120	55.83	114/240	47.5	53/120	44.16

The L2 child group results were compared with the L2 adult group results using Kruskal-Wallis Test, followed up with Mann-Whitney Test in order to check whether there were significant differences between the groups with respect to the types of the responses and the conditions. The results from Kruskal-Wallis Test reveal some significant differences between the L2 children and the L2 adults. The results from Mann-Whitney Test, which was employed to identify the differences between the two groups, shows that the L2 children were different from the L2 adults regarding the percentage of the accurate rejection and the percentage of the inaccurate acceptance in

every condition. In present condition, the percentage of the L2 adults' accurate rejection responses and the inaccurate acceptance were significantly higher than that of the L2 children (U=256, p = .004, r = -.527). In future condition, the L2 adults' percentage of the accurate rejection responses and the inaccurate acceptance are significantly higher than that of the L2 children (U=243, p = .002, r = -.565). In past condition, the L2 adults' percentage of the accurate rejection responses and the inaccurate acceptance are significantly higher than that of the L2 children (U=243, p = .002, r = -.565). Notice that the effect size in each condition is greater than 0.50. This suggests that the L2 children's performance is largely different from the L2 adults' performance.

Table 8.17: Mann-Whitney Test: the L2 children and the L2 adults' responses

	Pres_ACR	Pres_INA	Fut_ACR	Fut_INA	Past_ACR	Past_INA
Mann-Whitney U	256.000	256.000	243.500	243.500	245.000	245.000
Z	-2.887	-2.887	-3.094	-3.094	-3.083	-3.083
Effect size (r)	-.527	-.527	-.565	.565	-563	-.563
Asymp. Sig. (2-tailed)	.004	.004	.002	.002	.002	.002

Table 8.18: The syntactic patterns acquired by the L2 children and the L2 adults

The syntactic patterns	L2 children		L2 adults	
	n	%	n	%
Present				
MAY/MIGHT + A STATIVE VERB	3/30	10	12/30	40
MAY/MIGHT + BE AN EVENTIVE VERB - ING	3/30	10	3/30	10
MUST + A STATIVE VERB	1/30	3.33	2/30	6.66
MUST + BE + AN EVENTIVE VERB -ING	1/30	3.33	6/30	20
Future				
MAY/MIGHT + A STATIVE VERB	3/30	10	12/30	40
MAY/MIGHT + AN EVENTIVE VERB	2/30	6.66	3/30	10
WILL + STATIVE/EVENTIVE VERB[14]	0		0	
Past				
EPISTEMIC MODALS + HAVE -EN = PAST	9/60	15	22/120	18.33

It seems that the L2 children's results in Table 8.18 can not tell us which syntactic patterns the L2 children acquire earlier or later. The percentage of the L2 children who appear to have acquired each syntactic pattern is very low. Nevertheless, we can noticed that the percentage of the L2 children who appear to have acquired the syntactic pattern 'EPISTEMIC MODALS + HAVE -EN = PAST' is slightly higher than the other patterns.

The L2 adults' results, on the other hand, show that the percentage of the L2 adults who appear to have acquired the pattern 'MAY/MIGHT + A STATIVE VERB', which indicate the present reference time and the future reference time is comparatively higher than the other patterns. These results suggest that the L2 adults acquired the syntactic pattern 'MAY/MIGHT + A STATIVE VERB' earlier than the other patterns.

[14] The pattern 'WILL + STATIVE/EVENTIVE VERB' is excluded from the analysis because the temporal interpretation of this pattern was more variable among the adult native speakers, as showed in section 8.3.1. The test sentences in which there was no L2 participants appear to have acquired were excluded from the comparison.

8.6.2 The child L2 acquisition VS the child L1 acquisition

In this section I compare the L2 child group results with the L1 child group results. As generally accepted, one of the fundamental differences between the L2 children and the L1 children is that the L2 children come to the task of the L2 acquisition with their L1 knowledge. It is not reasonable to compare the L2 children and the L1 children in the same way as the comparison between the L2 children and the L2 adults. Therefore, the comparison between the L2 children and the L1 children is based on only the accurate acceptance and the accurate rejection.

Table 8.19: The L2 child group results and the L1 child group results

	Accurate rejection		Accurate acceptance		Inaccurate acceptance		Inaccurate rejection	
	n	%	n	%	n	%	n	%
Present								
L2 child group	115/360	31.94	167/210	79.52	245/360	68.05	43/210	20.47
L1 child group	170/264	64.39	112/154	72.72	94/264	35.6	42/154	27.27
Future								
L2 child group	64/240	26.66	161/210	76.66	176/240	73.33	49/210	23.33
L1 child group	138/184	75	111/162	68.51	46/184	25	51/162	31.48
Past								
L2 child group	80/240	33.33	84/120	70.00	160/240	66.66	36/120	30.00
L1 child group	102/132	77.27	40/66	60.61	30/132	22.73	26/66	39.39

The comparison of the L2 children's responses with the L1 children's responses in Table 8.19 clearly shows that the L1 children's knowledge about the syntactic patterns which indicate the reference time of the modal complements is far more advanced than that of the L2 children, as expected. Regarding the accurate rejection, the L2 children were not be able to reject the modal statements when they were presented in infelicitous conditions. They did not know what reference time are not possible for certain modal statements. The L1 children, on the other hand, were more accurate in rejecting the modal statements when they were presented in infelicitous conditions. However, their knowledge about this aspect of the modal complement has not fully developed like adult native speakers. Consequently, they appear to have acquired only some of the syntactic patterns, as shown in section 8.4.3.

In Table 8.19, it is interesting to see that the percentage of the L2 children's accurate acceptance is higher than that of the L1 children in every condition. Nevertheless, this does not mean that the L2 children's knowledge about what reference time is possible for the certain modal statements is more advanced than the L1 children. The first assumption for this case is that the higher percentage of the L2 children's accurate acceptance did not result from their L2 knowledge, but it was their L1 interpretation. Recall that the reference time of a modal statement in Thai is vague, and a modal statement can have present, future, or past reference time by means of contextualization and temporal adverbials. On the other hand, the reference time of a modal statement in English is constrained by certain syntactic patterns. It can not be derived from context or morphological markers. Therefore, the L2 children, who have not acquired this L2 knowledge, tentatively accepted the test sentences to be OK by allowing the L1 interpretations to the test sentences in which the surface structures were similar to their counterparts in their L1. Nonetheless, they did not know that those interpretations were not possible in the L2.

This explanation even sounds plausible when we look at the percentage of the inaccurate acceptance provided by the L2 children. The L2 children's inaccurate acceptance in this case reflects the L1 knowledge. It can be noted that the percentage of the inaccurate acceptances provided by the L2 children is relatively higher than that provided by the L1 children in every condition. In addition, correlation between the L2 children's accurate acceptance and the inaccurate acceptance was observed. The correlation between the L2 children's accurate acceptance and the inaccurate acceptance is significant, $p = .000$. But this is not the case for the L1 children. All in all, the very high percentage of the L2 children's accurate acceptance resulted from their L1 interpretation rather than the L2 knowledge.

Table 8.20: Correlation between the L2 children's accurate acceptance and the inaccurate acceptance

	Accurate acceptance	**Inaccurate acceptance**
Accurate acceptance		.000**
In accurate acceptance		

** Correlation is significant at the 0.01 level (2-tailed)

The L2 child group results were compared with the L1 child group results using Kruskal-Wallis Test, followed up with Mann-Whitney Test. The results from Kruskal-Wallis Test show that there were some differences between the L2 children and the L1 children. The results from Mann-Whitney Test specifically show the L2 children and the L1 children are difference regarding the accurate rejection and the inaccurate acceptance in every condition. In present condition, the L1 children's percentage of the accurate rejection responses and the inaccurate acceptance are significantly higher than that of the L2 children (U = 91, p = .000, r = -.814). In future condition, the L1 children's percentage of the accurate rejection responses and the inaccurate acceptance are significantly higher than that of the L2 children (U = 52, p = .000, r = -.949). In past condition, the L1 children's percentage of the accurate rejection responses and the inaccurate acceptance are significantly higher than that of the L2 children (U = 70, p = .000, r = -.888).

Table 8.21: Mann-Whitney Test: the L2 children's and the L1 children's responses

	Pres_ACR	Pres_INA	Fut_ACR	Fut_INA	Past_ACR	Past_INA
Mann-Whitney U	91.000	91.000	52.000	52.000	70.000	70.000
Z	-4.456	-4.456	-5.195	-5.195	-4.860	-4.860
Effect size (r)	-.814	-.814	-.949	-.949	-.888	-.888
Asymp. Sig. (2-tailed)	.000	.000	.000	.000	.000	.000

In Table 8.21, we can notice that the effect size (r) for every condition is greater than -.70. This suggests that the L2 children's performance and the L1 children's performance are largely different. In other words, the L1 children's knowledge about the syntactic patterns is far more advanced than that of the L2 children.

8.7 Discussion

So far in this chapter, we have considered the L2 results of the study in terms of group and individual results. We have also compared the L2 children's results with the L2 adults' results, and with the L1 children's results. Now we turn to our original research questions, which are presented in section 8.1.1. The first question is concerned with the issue of the L1 transfer, while the second question is related to the issue of the poverty of the stimulus. The third question addresses the acquisition order.

8.7.1 Do L2 English acquisition patterns show L1 properties with regard to reference time of modal complements?

The answer to this question is 'YES'. The L1 interpretation has been observed in the L2 participants' interpretation of the modal statements in English. The evidence that supports this claim is the percentage of the target-like L1-compatible responses and percentage of the non-target L1-compatible or L1-transfer responses given by the L2 children and the L2 adults in all three conditions. Given that L1 interpretations which are possible both for the modal statements in English and their counterparts in Thai entail the accurate acceptance when the English modal statement were presented in felicitous conditions, the inaccurate acceptance for the modal statements in the infelicitous conditions, on the other hand, was evidence for L1 knowledge involvement.

In addition to L1 transfer in conditions that are licit in English, both L2 children and L2 adults allowed interpretations which are not possible for the modal statements in English, but are possible for whose counterparts in Thai. For example, they accepted the sentence '*He might study math*' to be OK even when it was presented in Present and Past conditions. Therefore, we are able to conclude that there was L1 transfer in both child L2 acquisition and the adult L2 acquisition.

8.7.2 Can the Thai children and adults overcome the poverty of the stimulus in acquiring the syntactic patterns that constrain the reference time of modal complements in English?

According to the L2 child individual results, which are shown in Table 8.9, it seems that the L2 children have not acquired the syntactic patterns that constrain the reference time of the modal complements in English. On the other hand, the L2 children's knowledge about the syntactic patterns and the reference time are rudimentarily developing. Although the L2 child group and individual results show that the L2 children provided the target-like L1-compatible responses for the modal statements in the right conditions, this does not show that the L2 children know the reference time of the modal statements. They just accepted the test sentences to be OK without knowing that those test sentences have the same temporal interpretation as their counterpart in Thai.

In addition, we have seen that the L2 children's percentage of the target-like L1-incompatible responses e.g. the correct rejection, which reflect pure L2 knowledge about the reference time of the modal complements, is very low. The L2 children were not able to reject the modal statements when the modal statements were presented in infelicitous conditions. In other words, they did not know what interpretations are not possible for the certain syntactic patterns.

Recall that '*the poverty of the stimulus*' in the current study broadly refers to the situation in which the information about what interpretations are possible is relatively limited, and the information about what interpretations are not possible in English are not available to the L2 children. Based on the results from the experiment, I therefore conclude that the L2 children have not overcome the poverty of the stimulus in acquiring the syntactic patterns that constrain the reference time of the modal complements in English.

As for the L2 adults, according to the results presented in Table 8.14, it seems that some of them appear to have acquired the syntactic patterns which constrain the present and the future reference time, and the syntactic patterns which constrain the past reference time of the modal complements. These results show that, although some of the L2 adults are overcoming the poverty of the stimulus, some conditions may be more readily acquired than others.

The results from the experiment show that the L2 adults performed better than the L2 children in rejecting the test sentences in infelicitous conditions. *Why did the L2 adults perform better than the L2 children?* A possible explanation is that the L2 adults' better performance may have resulted from the relatively longer length of exposure to the target language of the L2 adults. We have seen that most of the L2 adults have longer length of exposure to English than the L2 children. Even though the L2 adults were not intensively exposed to English until they started their undergraduate degree at a university, the input they received may have contained positive evidence necessary for the acquisition of the syntactic patterns which indicate the reference time of the modal complement. Given that the language that adults use is different from the language that young children use, it is possible that the language young children used did not contain knowledge about the syntactic patterns.

Another promising explanation is to do with the cognitive factors or real world experience of the L2 adults. It is possible that the adults' cognitive ability and real world experience play a part in the acquisition of the epistemic modality. Recall that results from the previous research on L1 acquisition of the epistemic modality, which were reviewed in Chapter 4, reveal that the epistemic modality is acquired late. Even for a child native speaker of English, the signs of an adult-like understanding of the logical meaning of the epistemic modals may not appear until the children are seven years old (cf. Shields 1974; Byrnes and Duff 1989; Noveck, Ho, & Sera 1996). For these reasons, it might not be very surprising to see that the L1 children (aged between 8 and 9) in the current study appear to have acquired only a few of the syntactic patterns because their relevant knowledge is not fully developed. Rather, it is in the early stages.

The task of the acquisition for Thai children must be even more difficult. The Thai children have to acquire the knowledge about the epistemic modality in Thai and English at the same time. We have seen that the means for expressing the reference time of the epistemic modal complements in Thai is different from English. The acquired L1 knowledge in this case cannot entirely accommodate the acquisition of the L2 knowledge. The L2 children's knowledge about the syntactic patterns indicating the reference of the modal complement therefore lagged behind the L1 children.

Note, however, that if the assumption about cognitive ability is true, our arguments on the L1 transfer in the child L2 acquisition which was discussed in section 8.7.1, have to be flawed. That is, the higher percentage of the target-like L1-compatible responses and non-target with L1 provided by the L2 children may have not resulted from the L1 knowledge. But it could have been something else. It could be a 'yes' bias'[15]. The L2 children may have said 'OK' just to favour the researchers when they were asked to judge the grammaticality or meanings of sentences. They did not know that the certain modal statements in English have the same reference time as their counterparts in Thai on the one hand, and have not acquired the reference time of the modal complements in Thai.

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[15] A 'Yes' bias is a common phenomenon in child language development. It is often seen when the children tend to give the same inappropriate responses such as 'yes' to 'Yes-No' questions (Okanda & Itakura 2010: 568).

In the current study, we have no evidence to show that the L2 children have not acquired the relevant knowledge in their L1. The cognitive factor assumption, thus, cannot rule out our arguments on the L1 transfer in the child L2 acquisition. This calls for the need to investigate the L1 acquisition of the epistemic modality in Thai.

8.7.3 Which patterns are acquired early or which patterns are acquired late?

This question is closely linked with second question, and it is concerned with the acquisition order or developmental paths of the syntactic patterns. The L2 child results per proficiency group have shown that the L2 children's knowledge about the syntactic patterns which indicate the reference time of the modal complement is rather rudimentary. In addition, the L2 child results per proficiency groups show no clear evidence in support the early or late acquisition of a certain syntactic pattern. Nonetheless, in terms of syntactic patterns, the L2 child individual results showed an interesting trend. That is, L2 children were likely to have acquired the past modal statements e.g. '*Ben might have been at home*' and '*Ben must have cooked the dinner*' prior to the other patterns.

My speculation about this L2 children's acquisition order is that the modal statements '*Ben might have been at home*' and '*Ben must have cooked the dinner*' have the syntactic pattern which consists of morphological markers i.e. HAVE –EN. It might be easier for the children to acquire the temporal meaning which is morphologically marked. The L2 children may look for explicit markers for signaling the temporal meaning.

On the other hand, the future modal statements (e.g. '*Ben may play football*', and '*Ben might study math*'), which have the syntactic pattern MAY/MIGHT AN EVENTIVE VERB, do not contain any morphological markers. In other words, the temporal meaning is implicitly marked. This syntactic pattern is therefore more difficult for the L2 children to acquire.

As for the L2 adults, the results suggest that some L2 adults appear to have acquired the modal statements which have the present and the future reference time MAY/MIGHT A

STATIVE VERB prior to the other modal statements, and the statements which have the future reference e.g. MAY/MIGHT AN EVENTIVE VERB

Recall that the equivalent forms in Thai *'khoŋ/ʔaat* + A STATIVE/AN ACTION VERB, in which the present, the future, and the past references times are all possible. For these reasons, learning the patterns which their L1 knowledge is able to facilitate might be easier for the L2 adults, who have fully acquired this kind of knowledge in their L1. In this case they can employ their L1 interpretation or the meanings in their L1 to this syntactic pattern in English, and the meanings seem to be compatible with the meanings of equivalent forms in the their L2.

8.8 Conclusion

This chapter presented the results of the experiment performed by the L2 children and the L2 adults. I started the chapter with the rationale for the experiment and then the procedures of the experiment. The native speakers of English were also selected to perform the task in order to check the validity of the test sentences. After running the test with the native speakers, I found that the native speakers' responses for some test sentences in some conditions are different from my predictions. In other words, the native speakers allowed reference time which was different from what I predicted. Consequently, the target responses or the expected responses for the test sentences for which the temporal interpretation was more variable than assumed were put aside, as shown in section 8.3.1.

The L2 child results showed no evidence to support that L2 children have overcome the poverty of the stimulus. In addition, the L2 children's results show evidence for L1 transfer. The L2 children tentatively allowed their L1 interpretations of the modal statements in English. The L2 adults' results, on the other hand, showed that some of the L2 adults are overcoming the poverty of the stimulus. Some of them appear to have acquired some of the syntactic patterns that constrain the reference time of the modal complements in English. This is quite surprising, and gives rise to the assumption of cognitive development and the L2 adults' real world experience in the acquisition of the syntactic patterns, as discussed in 8.7.2.

Chapter 9

Conclusions and Implications for future research

9.1 Summary of the results

This study investigated the L2 acquisition of the epistemic modality in English by Thai-speaking children and adults. It focused on the syntactic patterns that constrain the reference time of the modal complements. The child L2 acquisition was compared with the adult L2 acquisition and alternatively with the child L1 acquisition. Thirty Thai-speaking children aged between 6 and 9 from a primary school in Thailand, and thirty Thai-speaking undergraduate students aged between 18 and 25 from a university in Thailand were selected to perform a truth value judgment task, which was designed to test the L2 acquirers' temporal interpretation of the modal statements. Twenty-two English-speaking children aged between 8 and 9 from a primary school in Leeds, UK, and 17 English-speaking university students were also selected to perform the same task.

The L2 children and the L2 adults were divided into three subgroups according to their L2 proficiency levels: high, mid, and low. A picture description task adopted from Whong-Barr and Schwartz (2002) and Unsworth (2005) was used to elicit the L2 data. At first the L2 proficiency score was calculated based on the verbal density score, the lexical diversity score, and the rate of error-free clause by means of the Principle Component Analysis (PCA). However, as the participants' verbal density score was not correlated to the other two sub scores, only the lexical diversity and the rate of error-free clause were therefore taken into the L2 proficiency computation. The L2 adults whose sub scores were not correlated were excluded from the computation. As a result, the scores of only 21 out of 30 L2 adults were taken into the calculation.

Assuming that the verbal density, lexical diversity, and the rate of error free clause are appropriate measures for L2 proficiency assessment, and the 'Principal Component Analysis' was seen as flawed in this case, I therefore decided to maintain the original intuition behind the three types of measures, and calculate an alternative score which I

called a 'simple alternative'. The three sub scores were simply combined into a new score. The use of this method resulted in no participants being excluded from the calculation, in addition the participants with a high proficiency score from the 'PCA' were not affected by the 'simple alternative'.

The truth value judgment task consisted of 16 epistemic modal statements which were presented in three temporal conditions: Present, Future, and Past. The participants were asked to judge whether the modal statements were appropriate or not according to the situations, which were felicitous and infelicitous for the modal statements.

The results of the task performed by the L1 adult native speakers, a control group, revealed that the temporal interpretations of the modal statements were more variable than assumed. Therefore, 7 test items in which the temporal interpretations were more variable in a certain condition than assumed were put aside. There were 41 test items selected for the analysis.

The L1 child results showed that even the native speaker children had not completely acquired the knowledge by the age of 9. Nevertheless, a developmental trend was observed. The majority of the L1 children appeared to have acquired the future modal statements with the pattern MAY/MIGHT + AN EVENTIVE VERB. The syntactic pattern MAY/MIGHT + A STATIVE VERB which constrain the present and the future reference time were barely acquired by the L1 children. Additionally, it seems that the ability to accept and to reject the modal statements when they were presented in the felicitous and infelicitous contexts progressively developed.

The L2 child results demonstrated that the L2 children have not acquired the syntactic patterns which constrain the reference time of the modal complements. This suggests that the L2 children in the current study have not overcome the poverty of the stimulus. On the other hand, the L2 children tended to allow the temporal interpretations which were not possible for the test sentences in the task, but they were possible for the equivalent patterns in their L1. This suggests the involvement of the L1 properties, hence, L1 transfer, in the child L2 acquisition. Besides, the L2 child results per proficiency group show that the L2 children with different proficiency levels did not behave differently according to the ONE WAY ANOVA TEST.

The results of the task performed by the L2 adults showed that some of the L2 adults appeared to have acquired some of the syntactic patterns which constrain the reference time of the modal complements. This therefore suggests that some of the L2 adults are overcoming the poverty of the stimulus. Although some of the L2 adults appear to do this, no native adult-like patterns were observed. Besides, the L2 adults, like the L2 children, allowed the temporal interpretations which were not possible for the test sentences in the task, but they were possible for the equivalent patterns in their L1. The L2 adults with a lower proficiency tended to allow those interpretations more than the L2 adults with a higher proficiency.

The comparison of the child L2 acquisition with the adult L2 acquisition showed that the L2 children's knowledge about the reference time of the modal complements in English is rudimentary, while the L2 adults' knowledge is comparatively more advanced. The L2 adults were more accurate in rejecting the test sentences when they were presented in infelicitous conditions. This was indicated by the higher percentage of the target-like L1-incompatible responses, which reflected pure L2 knowledge. The L2 children, on the other hand, provided the target-like L1-compatible responses more than the L2 adults did. However, this did not reflect the L2 children knowledge about the syntactic patterns. The larger proportion of the target-like L1-compatible resulted from the L1 interpretations. In addition, the L2 children tended to allow L1 interpretation more than the L2 adults did. This was indicated by the higher percentage of the non-target with L1 responses, which reflected the pure L1 knowledge.

With respect to the acquisition patterns, while the L2 children tentatively acquired the syntactic patterns which indicate the past reference time, many of the L2 adults appeared to have acquired the syntactic patterns which indicate the present and the future reference. Based on these results my speculation about the child L2 acquisition is that the L2 children might be looking for explicit linguistic forms that signal temporal meanings. And the HAVE + -EN in this case indicates past reference time. The present and the future reference time of the modal complements, on the other hands, are not always indicated by explicit linguistic forms. Accordingly, they might be more difficult for the L2 children to acquire. As for the L2 adults, for the L2 adults, they might be looking for linguistic forms that are equivalent to the counterparts in their L1, and they employ their relevant L1 knowledge to accommodate the acquisition of temporal

meanings. We have already seen that the L2 adults appear to acquire the syntactic patterns MAY/MIGHT + A STATIVE VERB first. The syntactic patterns MAY/MIGHT + A STATIVE VERB is not restricted to only a certain interpretation. It is, on the other hand, open of the present and the future interpretation, it is therefore quite similar to the equivalent forms in Thai '*khoŋ/ʔaat* + A STATIVE/AN ACTION VERB, in which the present, the future, and the past references times are all possible. For these reasons, learning the pattern in which their L1 knowledge is able to facilitate might be easier for the L2 adults who have fully acquired this kind of knowledge in their L1. In this case they can employ their L1 interpretation or the meanings in their L1 to this syntactic pattern in English, and the meanings seem to be compatible with the meanings of equivalent forms in the their L2.

The comparison of the child L2 acquisition with the child L1 acquisition showed that the L1 children's knowledge about the syntactic patterns that constrain the reference time of the modal complements is far more advanced than the L2 children. However, it is not fully developed, and no native adult-like performance was observed. This gives rise to the general cognitive development necessary for both L1 and child L2 acquisition of epistemic modality, particularly the reference time.

9.2 Evidence for Full Transfer Full Access Hypothesis

This section thus discusses the findings in the light of the Full Transfer Full Access position. This position, as mentioned in Chapter 2, assumes the entirety of L1 knowledge as well as the role of UG in L2 acquisition.

The L2 results obtained from the experiment show that L1 properties (e.g. L1 interpretations) were observed in both child L2 acquisition and adult L2 acquisition. Given that the L2 participants with different L2 proficiency levels were assumed to be representatives of L2 acquirers at different developmental stages, the L2 participants with lower proficiency were then assumed to be in the early stages, while the L2 participants with high proficiency were assumed to be in the later stages. Accordingly, the very high percentage of the target-like L1-compatible responses and the very high percentage of the non-target with L1 or L1-transfer responses provided by the L2 participants with low proficiency, suggested a full transfer of L1 properties at the early

stage of the acquisition, hence the initial state of the interlanguage. The L2 participants with mid and high proficiency, on the other hand, provided a comparatively smaller percentage of the target-like L1-compatible responses and of the non-target with L1 or L1-transfer responses. This suggested that the rate of L1 transfer tentatively decreased as the L2 proficiency accelerated.

The L2 child results show that none of these L2 children in the current study had overcome the poverty of the stimulus. That is, they had not acquired the syntactic patterns that constrain the reference time of the modal complements in English. Therefore, we are not able to argue for evidence of access to UG in child L2 acquisition in this study. Given that the reference time of the modal complement results from the combination of a certain epistemic modal and a certain type of verb, it is possible that an L2 child will not acquire the reference time of the modal complements until their knowledge about these two linguistic realms is fully developed.

It is possible that UG is not directly involved in the acquisition of the reference time of the modal complements. Rather, it constrains the acquisition of the two linguistic realms which mutually constitutes the reference time of the modal complements. This might be the way in which UG involves in the L2 acquisition of the syntactic patterns.

As we do not obtain evidence of access to UG in child L2 acquisition, it is also possible to acknowledge the role of general cognitive ability. In other words, the reference time could be a general cognitive property, but not to do with UG at all. The children's cognitive ability required for the acquisition of the reference time of modal statements may not be fully developed. Consequently, the L2 children and the L1 children have not acquired the syntactic patterns that indicate the reference time of the modal complement.

The L2 adult results also show that cognitive maturity is a basic requirement for the acquisition of the reference time. In addition, some of the L2 adults were overcoming the poverty of the stimulus, and UG is the assumed source for the L2 adult learner in acquiring the L2 knowledge about those syntactic patterns. As the L2 adults results demonstrate that UG is still available in adulthood, this is therefore counter evidence for the No Access to UG position, which argues for the unavailability of UG in adulthood.

Moreover, we have seen that the L1 interpretations were observed in the data of the L2 adults as well as the L2 children with lower proficiency levels, this is therefore counter evidence for Direct Access to UG position, which deny the role of the L1 knowledge in L2 acquisition. By and large the findings of the current research support the Full Transfer/Full Access Hypothesis.

9.3 Limitations of the current study

This section discusses the problems and limitations which the researcher encountered during the course of the study. These include L2 proficiency assessment, experimental design, and managing the experiments.

In the current study, the L2 proficiency was measured in order to derive developmental paths from the data of L2 learners with different L2 proficiency levels. As shown in Chapter 7, however, the measures and the statistical mean which had been applied in L2 proficiency measurement in the current study seemed to be problematic, and led to the questions of (1) whether the verbal density, the lexical diversity, and the rate of error free clause are appropriate measures for L2 proficiency assessment; (2) whether the 'Principal Component Analysis (PCA)' is an appropriate mean for deriving the L2 proficiency.

The problems found in the L2 proficiency assessment of the Thai L2 learners of English in this study suggest that certain measures and statistical means that currently exist may be suitable for some, but not for all research. Additionally they point to the need for commonly applicable measures for L2 proficiency assessment in SLA research.

Apart from the problem concerning the L2 proficiency assessment, the problem about the experimental design should also be considered. The task seems to be too long for both child and adult participants. The task consisted of 16 modal statements, and each of them was presented in three temporal conditions. Therefore, there were 48 scenarios and the test sentences which were presented to the participants. As the task consisted of so many test items, there was no space left for distraction items. The task did not include any distraction that was particularly designed to track a 'yes' bias. For these

reasons, it could be the task effect, the L2 children and the L1 children in the current study do not like to reject.

Finally, regarding to the limitations in running the task, both L2 children and L1 children seemed to lose their concentration easily during the time when the task was being run. The researcher and their class teachers had to keep encouraging and motivating them to do the task. Consequently, it took a longer time for the children to complete the task than the researcher expected, and the children may have lost their concentration on the task, and tended to say 'yes' just to finish the task as soon as possible. As the current researcher did not include test items which were specifically designed for controlling a 'yes' bias, this is an area open for further research. If a 'yes' bias is carefully controlled the experiment may yield different results.

9.4 Implications for future research

Firstly, the experiment carried out in this research was concerned with the L2 learners' interpretation of the modal statements. In other words, it mainly tested the L2 learner's comprehension, rather than the L2 learner's production. Therefore, studies which test the L2 learner's production of the modal statements are necessary as they can provide pictures of the L2 acquisition of the modality in English to help gain a clear understanding about the L2 acquisition of the epistemic modality in English.

Secondly, we are already aware that in English the reference time of an event is generally indicated by tenses, and the reference time of the modal statements is sometimes related to aspects such as perfective and imperfective. Therefore, the acquisition of these grammatical categories may link to the acquisition of the syntactic patterns that constrain the reference time of the modal statements. The knowledge about tense and aspect may pre-determine the knowledge about the syntactic patterns that constrain the reference time of the modal statements or vice versa. If this is the case, the L2 children may not acquire certain properties if they have not yet acquired the others. This is an open area for further research.

Thirdly, since the L2 participants in the current research were school and university students, their knowledge of English was limited to what they obtained at school and

university. The amount of L2 input and the context may be a bit more limited, and may not be sufficient for triggering L2 parameter value setting. For these reasons, running the task with L2 learners who have exposure to English in more natural settings, both at school and outside school where people in their community speak English may yield different results. In addition, as mentioned earlier that L2 knowledge about the current research the syntactic patterns that constrain the reference time of the modal statements is not explicitly taught in SLA classrooms, it would therefore be interesting to investigate to what extent explicit teaching with syntactic patterns that constrain the reference time of the modal statements have on the acquisition of modality in English. What if the teacher draws the learners' attention to these L2 properties?

Additionally, we do not know whether the L2 children have acquired the relevant properties in their L1 or not. As there is no research which investigates the L1 acquisition of epistemic modality in Thai, the answer to the question remains unresolved. If the epistemic modality is an area which a native speaker acquires at a late stage in the learning process, or the acquisition of the epistemic modality carries on until puberty, we cannot assume that the L1 properties get involved in the child L2 acquisition. For this reason, further research on L1 acquisition of epistemic modality in Thai is required.

Finally, The L2 children in the current study have been exposed to English for only a few years at school. Accordingly, this exposure may not sufficiently contain relevant properties which are inducible and facilitate them in resetting the parameters for the acquisition of modality in English. For these reasons, it would be interesting to run a similar experiment with the same groups of L2 children when they are adults and have therefore been exposed to English for quite a long time, to see whether they are able to overcome the poverty of the stimulus or not.

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Appendix A

The Pilot Study

1. The scripts of the test stories

Who said it well?
Instructions:
You are going to hear little stories. After each little story, a clown and a wizard will appear and they will say something about the story. But they do not always say things well. You will need to decide who said it well.

Trial

(i) Kate is not feeling well today. She has a headache and cough.

(a) She should stay in bed.
(b) She needs to exercise.

(ii) Lucy has been playing tennis for an hour. She is very tired and thirsty now.

(a) She will drink some water.
(b) She should not drink

(iii) Tomorrow is Christmas Day.

(a) People will be sad.
(b) People will have a party.

A1 Tom is watching his favourite comedy on TV. He is laughing out loud.

C. It must be funny.
D. It may be funny.

C1 Nancy is fishing by the pond. She suddenly sees a tiny animal jumping into the pond She is not sure what it is.

C. It must be a frog.
D. It might be a frog.

B3 Minnie has done the laundry for her boyfriend, Mickey. She usually does it very carefully

A. His shirts will be clean.
B. His shirts may be clean.

C3 Mike is still in bed. He likes school very much, but he will not go today.

C. He must be sick.
D. He might be sick.

A2 Bunny's little brother fell off the tree. He cried out very loud. His knee is bleeding.

A. He might be hurt.
B. He must be hurt.

B2 Mickey and Minnie are picnicking in the garden. Suddenly, it rains. There is no where to shelter.

A. They will get wet.
B. They might get wet.

C2 Alice likes animals. She has always had many pets.

A. She must be a vet.
B. She may be a vet.

D4 Kathy and Lucy went to the beach last weekend. They both look so tanned.

A. They must have been sunbathing.
B. They will have been sunbathing.

B1 My sister has been learning two songs at school. She sings them every day in class.

C. She may know them well by now.
D. She will know them well by now.

D1 Winnie has crumpled up her sheet of paper and put it in the bin.

C. She must have made a mistake.
D. She will have made a mistake.

A4 Spike found out that Tom stole the bone from his bowl. So, he is shouting and swearing at Tom now.

A. Spike might be angry.
B. Spike must be angry.

B4 Pluto is very lazy. He never makes his bed and tidies his bedroom.

A. His room will be messy.
B. His room might be messy

D2 We have got a lot of homework to do today. But Ben is playing in the garden.

A. He must have finished his homework.
B. He will have finished his homework.

A3 Gavin and Nancy smile because they know their son loves school.

A. They may be happy.
B. They must be happy.

D3 Cinderella is running out of the grand hall quickly. The prince calls her, but she doesn't stop.

A. She will be in a hurry.
B. She must be in a hurry.

C4 Snow White and the Dwarfs are walking in the forest. Suddenly, they see an ugly old women carrying some fruits. She is walking toward them.

A. That must be the cruel witch.
B. That might be the cruel witch.

E1 Jerry's mum found out that Jerry lied to her. So, she cried last night.

a. She must be sad last night.
b. She must have been sad.

E2 Goofy missed the school bus this morning. So his dad gave him a lift.

A. He might get up late this morning.
B. He might have got up late.

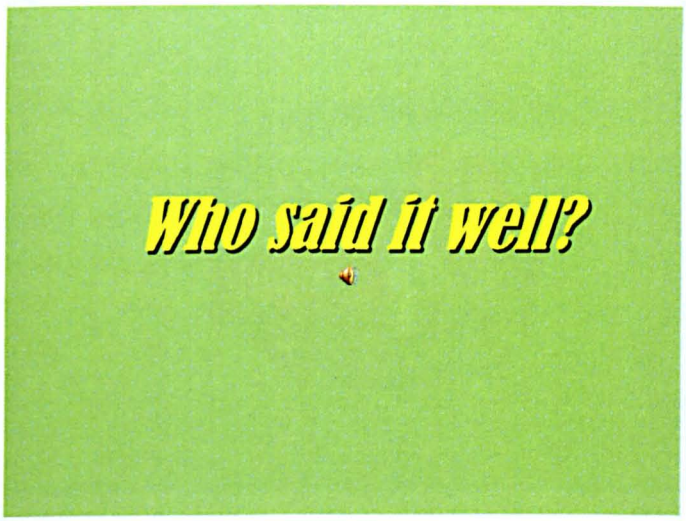
E3 Tom was walking very fast when I saw him yesterday. I called him but he didn't hear.

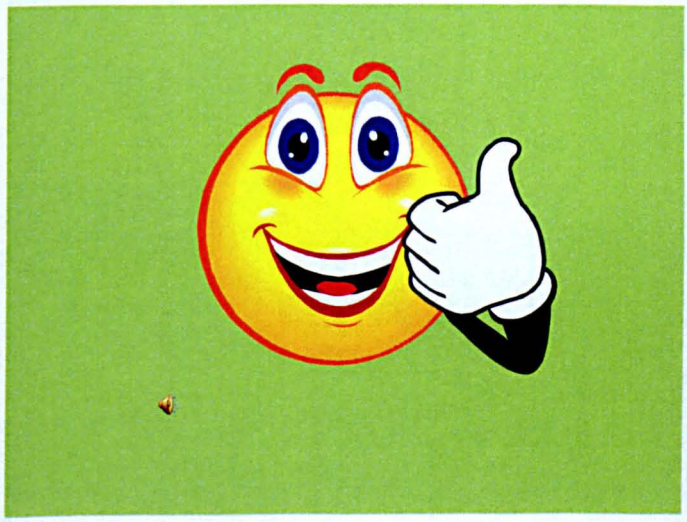
A. He may be in a hurry yesterday.
B. He may have been in a hurry.

E4 Mickey didn't come to work yesterday because he stayed in the hospital.

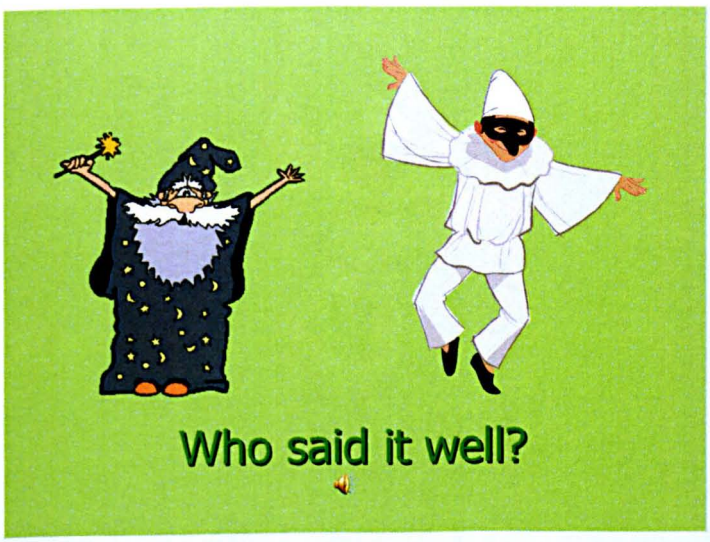
A. He must be sick the day before.
B. He must have been sick.

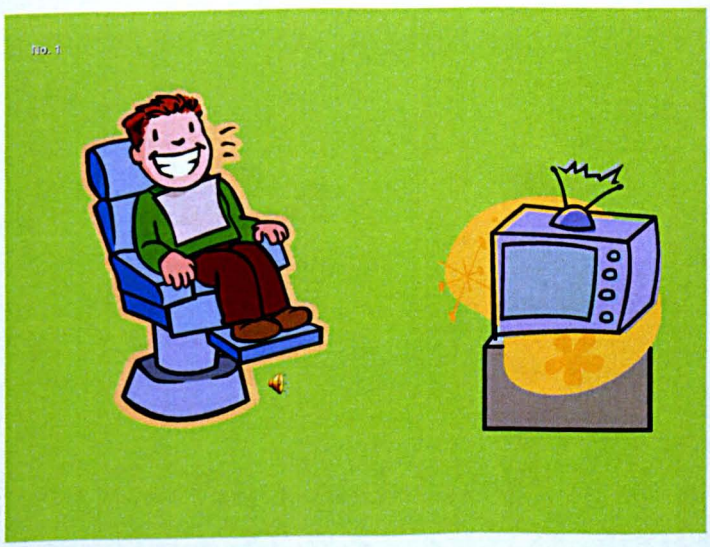
2. Examples of the powerpoint presentation

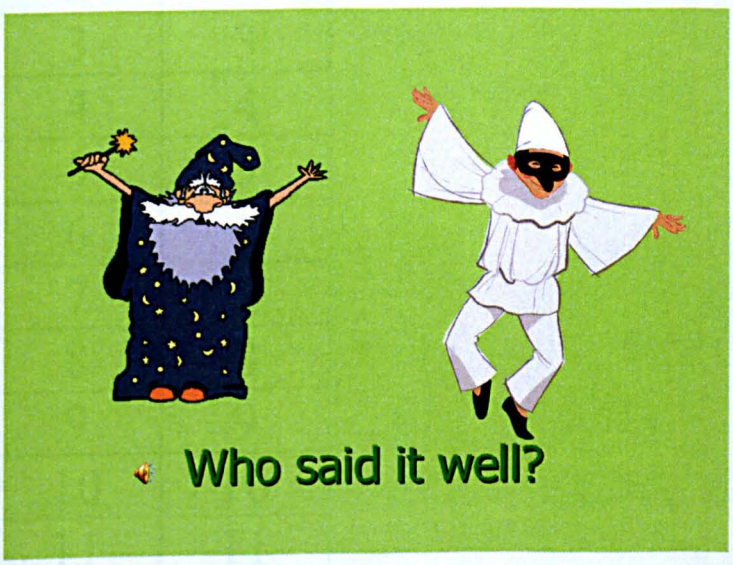





Trial 1


Who said it well?


No. 1


Who said it well?

3. The answer sheet

Name……...

Name……...
Group.....……..…..
Date……

	
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
15	15
16	16
17	17
18	18
19	19
20	20

4. Raw Scores

CODES	MEANINGS
A	the situations felicitous to the referential function of *must*
B	the situations felicitous to the referential function of *will*
C	the situations felicitous to the relative strength of *may/might*
D	the situations felicitous to the relative strength of *must*
E	the situations which require HAVE + -EN form
1, 2, 3, 4	The number of the test items in each condition
V-form	the sentences with HAVE + -EN form
Avd	the sentences with temporal adverbial

L1 ADULTS

CONDITIONS	CONTEXT	COR	SCORE	%
A1	watching TV	must	9/10	90
A2	falling off the tree	must	7/10	70
A3	love school	must	9/10	90
A4	stealing bone	must	10/10	100
B1	singing	will	5/10	50
B2	picnicking	will	8/10	80
B3	doing laundry	will	6/10	60
B4	untidy room	will	6/10	60
C1	fishing	might	10/10	100
C2	having pets	may	10/10	100
C3	not going to school	might	3/10	30
C4	Snow White	might	7/10	70
D5	crumpling papers	must	8/10	80
D6	doing homework	must	9/10	90
D7	Cinderella runs	must	10/10	100
D8	sunbathing	must	7/10	70
E1	lying to Mom	V-form	10/10	100
E2	missing the bus	V-form	10/10	100
E3	in a hurry	V-form	10/10	100
E4	staying in the hospital	V-form	10/10	100

L1 CHILD

CONDITIONS	CONTEXT	COR	SCORE	%
A1	watching TV	must	7/8	87.5
A2	falling off the tree	must	6/8	75
A3	love school	must	8/8	100
A4	stealing bone	must	7/8	87.5
B1	singing	will	4/8	50
B2	picnicking	will	7/8	87.5
B3	doing laundry	will	7/8	87.5
B4	untidy room	will	7/8	87.5
C1	fishing	might	4/8	50
C2	having pets	may	7/8	87.5
C3	not going to school	might	4/8	50
C4	Snow White	might	1/8	12.5
D1	crumpling papers	must	6/8	75
D2	doing homework	must	6/8	75
D3	Cinderella runs	must	6/8	75
D4	sunbathing	must	7/8	87.5
E1	lying to Mom	V-form	6/8	75
E2	missing the bus	V-form	3/8	37.5
E3	in a hurry	V-form	4/8	50
E4	staying in the hospital	V-form	5/8	62.5

L2 CHILD

CONDITIONS	CONTEXT	COR	SCORE	%
A1	watching TV	must	7/7	100
A2	falling off the tree	must	4/7	57.1
A3	love school	must	7/7	100
A4	stealing bone	must	5/7	71.4
B1	singing	will	5/7	71.4
B2	picnicking	will	5/7	71.4
B3	doing laundry	will	6/7	85.7
B4	untidy room	will	5/7	71.4
C1	fishing	might	0/7	0.0
C2	having pets	may	3/7	42.9
C3	not going to school	might	1/7	14.3
C4	Snow White	might	0/7	0.0
D5	crumpling papers	must	4/7	57.1
D6	doing homework	must	7/7	100
D7	Cinderella runs	must	3/7	42.9
D8	sunbathing	must	5/7	71.4
E1	lying to Mom	V-form	3/7	42.9
E2	missing the bus	V-form	2/7	28.6
E3	in a hurry	V-form	4/7	57.1
E4	staying in the hospital	V-form	4/7	57.1

L2 ADULTS

CONDITIONS	CONTEXT	COR	SCORE	%
A1	watching TV	must	7/10	70
A2	falling off the tree	must	10/10	100
A3	love school	must	7/10	70
A4	stealing bone	must	9/10	90
B1	singing	will	6/10	60
B2	picnicking	will	9/10	90
B3	doing laundry	will	8/10	80
B4	untidy room	will	7/10	70
C1	fishing	might	7/10	70
C2	having pets	may	4/10	40
C3	not going to school	might	6/10	60
C4	Snow White	might	5/10	50
D5	crumpling papers	must	6/10	60
D6	doing homework	must	5/10	50
D7	Cinderella runs	must	7/10	50
D8	sunbathing	must	6/10	60
E1	lying to Mom	V-form	4/10	40
E2	missing the bus	V-form	5/10	50
E3	in a hurry	V-form	3/10	30
E4	staying in the hospital	V-form	7/10	70

Appendix B

L2 Proficiency Measurement

1. Sets of Pictures for description task

Picture 1

Picture 2

Picture 3

Picture 4

Picture 5

2. Answer sheet

Answer sheet for The Picture Description Task

Name.....

dd/mm/yy.....

Time.....

Write stories as mush as you can based on the sets of pictures given. One story for a single set of pitures. You can choose three out of five sets of pictures, and you have ten minutes for each story

Story 1 .....

3. L2 proficiency

Table 3A: The exploration of normal distribution of the L2 children's and the L2 adults' proficiency

Tests of Normality[b]							
	Group	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
profscore	L2 children	.136	25	.200*	.941	25	.152
	L2 adult	.092	28	.200*	.964	28	.439

a. Lilliefors Significance Correction

*. This is a lower bound of the true significance.

b. There are no valid cases for profscore when Group = 3.000. Statistics cannot be computed for this level.

Table 3B: The exploration of normal distribution of the L2 children's and the L2 adults' proficiency (cross-proficiency groups)

Tests of Normality							
	Profgroup	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
profscore	high	.189	17	.107	.904	17	.080
	mid	.125	16	.200*	.947	16	.443
	low	.157	20	.200*	.941	20	.253

a. Lilliefors Significance Correction

*. This is a lower bound of the true significance.

Table 3C: Univariate Analysis of Variance: L2 children VS L2 adults

Tests of Between-Subjects Effects					
Dependent Variable:profscore					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	14811.684[a]	5	2962.337	53.943	.000
Intercept	142229.371	1	142229.371	2589.964	.000
Group	54.656	1	54.656	.995	.324
Profgroup	14714.147	2	7357.074	133.971	.000
Group * Profgroup	63.360	2	31.680	.577	.566
Error	2581.033	47	54.916		
Total	155780.714	53			
Corrected Total	17392.716	52			

a. R Squared = .852 (Adjusted R Squared = .836)

Table 3D: Post Hoc Tests L2 children VS L2 adults

Multiple Comparisons						
profscore Bonferroni						
(I) Profgroup	(J) Profgroup	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
high	mid	19.5934*	2.58119	.000	13.1851	26.0017
	low	39.9128*	2.44461	.000	33.8436	45.9820
mid	high	-19.5934*	2.58119	.000	-26.0017	-13.1851
	low	20.3194*	2.48556	.000	14.1485	26.4903
low	high	-39.9128*	2.44461	.000	-45.9820	-33.8436
	mid	-20.3194*	2.48556	.000	-26.4903	-14.1485

Based on observed means.

The error term is Mean Square(Error) = 54.916.

*. The mean difference is significant at the 0.05 level.

Appendix C

The experiment

1. The test items

There were 29 test items which elicit the target-like L1-incompatible responses. They were coded 1C, 2C, 3A, 3C, 4A, 4C, 5B, 5C, 6B, 6C, 7A, 7C, 8C, 9B, 9C, 10B, 10C, 11B, 11C, 12B, 12C, 13A, 13B, 14A, 14B, 15A, 15B, 16A, 16B.

There were 19 test items which elicit the target-like L1-compatible responses. They were coded 1A, 1B, 2B, 3B, 4B, 5A, 6A, 7B, 8B, 9A, 10A, 11A, 11B, 12A, 12B, 13C, 14C, 15C, 16C. The capital 'A' represents the present contexts, the capital 'B' represents the future contexts, and the capital 'C' represents the past contexts.

1A **Present interpretation**
Story: Ben has a bad cold. He did not come to school today.
Prompt: Where do you think Ben is now?
Correct interpretation: Ben might be at home.

1B **Future interpretation**
Story: Ben was not feeling well after school. He will not come to school tomorrow.
Prompt: Where do you think Ben will be tomorrow?
Correct interpretation: Ben might be at home.

1C **PAST interpretation**
Story: Ben had a bad cold yesterday. He did not come to school.
Prompt: Where do you think Ben was yesterday?
Incorrect interpretation: Ben might be at home.

2A **Present interpretation**
Story : The teacher is telling the exam results to the class. The teacher gave some very nice chocolate to Ben because he did very well. She bought the chocolate from Ben's favourite shop.
Prompt : What do you think Ben feels about the chocolate?
Correct interpretation : Ben may like the chocolate.

2B **Future interpretation**
Story : The teacher promises that she will give some chocolate to Ben if he does well in the exam. The teacher will buy the chocolate from Ben's favourite shop.
Prompt : What do you think Ben will feel about the chocolate?
Correct interpretation : Ben may like the chocolate.

2C PAST interpretation

Story: Yesterday the teacher gave some very nice chocolate to Ben because he did so well on the exam. Ben ate all the chocolate up just as soon as the teacher gave it to him.

Prompt: What do you think Ben felt when he tasted the chocolate yesterday?

Incorrect interpretation: Ben may like the chocolate.

3A PRESENT interpretation

Story : Ben really loves football. He often plays football with his friends when he has free time. Today, Ben doesn't have homework. He is free now.

Prompt : I'm going to look for him now?

Incorrect interpretation : Ben may play football.

3B Future interpretation

Story: Ben really loves football. He often plays football with his friends at the weekend. Tomorrow is Saturday. Ben will not go to school.

Prompt: What do you think Ben will do tomorrow?

Correct interpretation : Ben may play football.

3C PAST interpretation

Story: Ben really loves football. He often plays football with his friends at the weekend. It was Saturday. Ben did not go to school.

Prompt: What do you think Ben did yesterday?

Incorrect interpretation: Ben may play football.

4A PRESENT interpretation

Story: Ben is a good student. He always studies hard. Tomorrow, Ben has a math exam. He has been in his bedroom since he had dinner.

Prompt: Let's go to his bedroom to see him?

Incorrect interpretation: Ben might study math.

4B Future interpretation

Story: Ben is a good student. He always studies hard when he gets home from school. Tomorrow, Ben has a math exam. Ben will go home early today.

Prompt: What do you think Ben will do when he gets home?

Correct interpretation: Ben might study math.

4C PAST interpretation

Story : Ben is a good student. He always studies hard when he gets home from school. Today, Ben has a math exam. But he got up a bit late this morning.

Prompt: What do you think Ben did last night?

Incorrect interpretation : Ben might study math.

5A Present interpretation

Story: Ben told the teacher that he would finish his homework before playing football with his friends. But the teacher found out that Ben didn't do the homework as he said.

Prompt: What do you think the teacher feels now?

Correct interpretation: The teacher must be angry.

5B FUTURE interpretation

Story: Ben promised the teacher that he will finish the exercise before she came back. The teacher will be back very soon, and find out that Ben has not done the exercise yet.

Prompt: How will the teacher feel?

Incorrect interpretation: The teacher must be angry.

5C PAST interpretation

Story: Yesterday, the teacher told Ben to finish his homework before playing football. But the teacher found out that Ben played football with his friends, but didn't do his homework.

Prompt: How did the teacher feel yesterday?

Incorrect interpretation: The teacher must be angry.

6A Present interpretation

Story: Ben is studying English history in class right now. Ben has read many books about English history.

Prompt: The teacher asked Ben to name the queens of England.

Correct interpretation: Ben must know the answer.

6B FUTURE interpretation

Story: Ben really loves English history. Ben is going to read a book about Palaces in England tonight.

Prompt: Tomorrow the teacher will ask Ben when Buckingham Palace was built.

Incorrect interpretation: Ben must know the answer.

6C PAST interpretation

Story: Ben is very good at math. Yesterday the teacher gave the class a handout with math questions to answer.

Prompt: But the last one was very difficult.

Incorrect interpretation: Ben must know the answer.

7A PRESENT interpretation

Story: Jerry is going to the train station. He is on a bus now. Unfortunately, the traffic on the road is very bad.

Prompt: He arrives at the station just as the train disappears.

Incorrect interpretation: Jerry will be late.

7B Future interpretation

Story: Jerry is going to the train station to pick Ben up. Unfortunately, the traffic on the road is very bad because it is raining heavily. He is only half way to the station.

Prompt: What do you think will happen?

Correct interpretation: Jerry will be late.

7C PAST interpretation

Story: Yesterday Jerry was on a bus. He was going to the train station. The traffic on the road was very bad. His train was about to depart, but he was only half way to the station.

Prompt: What do you think happened to Jerry yesterday?

Incorrect interpretation: Jerry will be late.

8A PRESENT interpretation

Story: Ben went to bed late last night. So, he got up late this morning. He is still getting dressed. He has not had breakfast yet. But, the school bus is here.

Prompt: What do you think is happening to Ben now?

Incorrect interpretation: Ben will miss the bus.

8B Future interpretation

Story: Ben got up late this morning. He is still getting dressed. He has not had breakfast yet. The school bus will be arriving shortly.

Prompt: What do you think will happen to Ben?

Correct interpretation: Ben will miss the bus.

8C PAST interpretation

Story: Ben usually goes to school by the school bus. He got up late this morning. The school bus arrived when he was having a shower. Ben is walking to the school now.

Prompt: What do you think happened to Ben?

Incorrect interpretation: Ben will miss the bus.

9A Present interpretation

Story: Ben really loves football. He often plays football with his friends when he has free time. Today, Ben doesn't have homework. He is free now.

Prompt: What do you think Ben is doing now?

Correct interpretation: Ben may be playing football.

9B FUTURE interpretation

Story: Ben really loves football. He often plays football with his friends at the weekend. Tomorrow is Saturday. Ben will not go to school.

Prompt: What do you think Ben will do tomorrow?

Incorrect interpretation: Ben may be playing football.

9C PAST interpretation

Story: Ben really loves football. He often plays football with his friends at the weekend. It was Saturday. Ben did not go to school.

Prompt: What do you think Ben did yesterday?

Incorrect interpretation: Ben may be playing football.

10A Present interpretation

Story: Ben is a good student. He always studies hard. Tomorrow, Ben has a math exam. He has been in his bedroom since he had dinner.

Prompt: What do you think Ben is doing now?

Correct interpretation: He might be studying math.

10B FUTURE interpretation

Story: Ben is a good student. He always studies hard when he gets home from school. Tomorrow, Ben has a math exam. Ben will go home early today.

Prompt: What do you think Ben will do when he gets home?

Incorrect interpretation: He might be studying math.

10C PAST interpretation

Story: Ben is a good student. He always studies hard when he gets home from school. Today, Ben has a math exam. But he got up a bit late this morning.

Prompt: What do you think Ben did last night?

Incorrect interpretation: He might be studying math.

11A Present interpretation

Story: Jerry has invited Ben, his close friend, to his birthday party today.

Oh! The party has already started. But Ben hasn't arrived yet.

Prompt: Where do you think Ben is now?

Correct interpretation: He must be going to the party.

11B FUTURE interpretation

Story: Jerry will invite Ben, his close friend, to his birthday party tomorrow. The party is at Jerry's house. Jerry will prepare food and drinks Ben likes.

Prompt: What do think Ben will do tomorrow?

Incorrect interpretation: Ben must be going to the party.

11C PAST interpretation

Story: Yesterday was Jerry's birthday. So, he invited Ben, his close friend, to the party. Ben and Jerry are close friends. Jerry prepared food and drinks Ben likes.

Prompt: What do think Ben did yesterday?

Incorrect interpretation: Ben must be going to the party.

12A Present interpretation

Story: Ben has invited some friends to have dinner at his house this evening. He has been in the kitchen all afternoon. His friends will arrive soon.

Prompt: What do you think Ben is doing now?

Correct interpretation: Ben must be cooking the dinner.

12B FUTURE interpretation

Story: Ben has invited some friends to have dinner at his house this evening. He bought some meat, vegetables and a cookery book from the supermarket this morning.

Prompt: What do you think Ben will do?

Incorrect interpretation: Ben must be cooking the dinner.

12C PAST interpretation

Story: Ben invited some friends to have dinner at his house yesterday. He bought some meat, vegetables, and a cookery book.

Prompt: What do you think Ben did yesterday?

Incorrect interpretation: Ben must be cooking the dinner.

13A PRESENT interpretation

Story: Ben has a bad cold. He did not come to school today.

Prompt: Where do you think Ben is now?

Incorrect interpretation: Ben might have been at home.

13B FUTURE interpretation

Story: Ben was not feeling well after school. He will not come to school tomorrow.

Prompt: Where do you think Ben will be tomorrow?

Incorrect interpretation: Ben might have been at home.

13C Past interpretation

Story: Ben had a bad cold yesterday. He did not come to school.

Prompt: Where do you think Ben was yesterday?

Correct interpretation: Ben might have been at home.

14A PRESENT interpretation

Story: Ben has invited some friends to have dinner at his house this evening. He has been in the kitchen all afternoon. His friends will arrive soon.

Prompt: What do you think Ben is doing now?

Incorrect interpretation: Ben must have cooked the dinner.

14B FUTURE interpretation

Story: Ben has invited some friends to have dinner at his house this evening. He bought some meat, vegetables and a cookery book from the supermarket this morning.

Prompt: What do you think Ben will do?

Incorrect interpretation: Ben must have cooked the dinner.

14C Past interpretation

Story: Ben invited some friends to have dinner at his house yesterday. He bought some meat, vegetables, and a cookery book.

Prompt: What do you think Ben did yesterday?

Correct interpretation: Ben must have cooked the dinner.

15A PRESENT interpretation

Story: Ben is really busy at work these days. Ben has not made his bed nor tidied his room for nearly three weeks.

Prompt: What do you think Ben's bedroom looks like now?

Incorrect interpretation: Ben's bedroom will have been messy.

15B FUTURE interpretation

Story: Ben will be busy at work in the next few days. He will not have time to make his bed and tidy his room.

Prompt: What do you think Ben's bedroom will look like?

Incorrect interpretation: Ben's bedroom will have been messy.

15C Past interpretation

Story: Ben was really busy at work last month. He did not make his bed nor tidy his room until this morning.

Prompt: What do you think Ben's bedroom looked like yesterday?

Correct interpretation: Ben's bedroom will have been messy.

16A PRESENT interpretation

Story: Ben went to bed late last night. So, he got up late this morning. He is still getting dressed. He has not had breakfast yet. But, the school bus is here.

Prompt: What do you think is happening to Ben now?

Incorrect interpretation: Ben will have missed the bus.

16B FUTURE interpretation

Story: Ben got up late this morning. He is still getting dressed. He has not had breakfast yet. The school bus will be arriving shortly.

Prompt: What do you think will happen to Ben?

Incorrect interpretation: Ben will have missed the bus.

16C Past interpretation

Story: Ben usually goes to school by the school bus. He got up late this morning. The school bus arrived when he was having a shower. Ben is walking to the school now.

Prompt: What do you think happened to Ben?

Correct interpretation: Ben will have missed the bus.

2. Example of the powerpoint presentation

Instruction

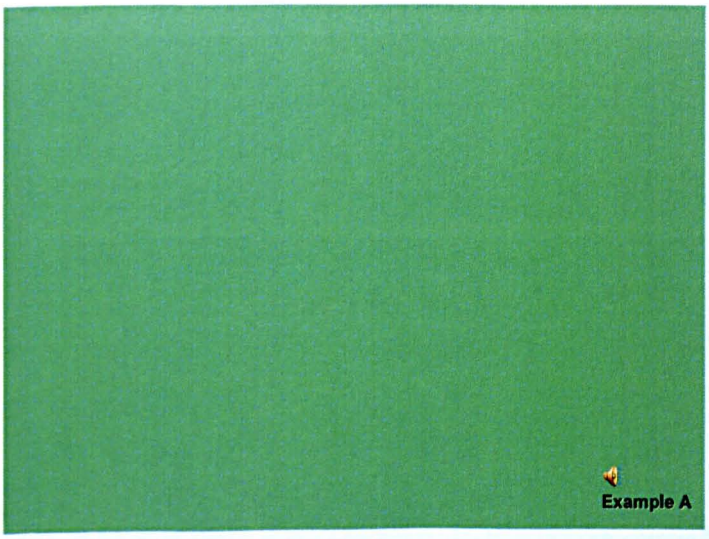
You are going to listen little stories. After each story, Dan and Tom will say something about it.

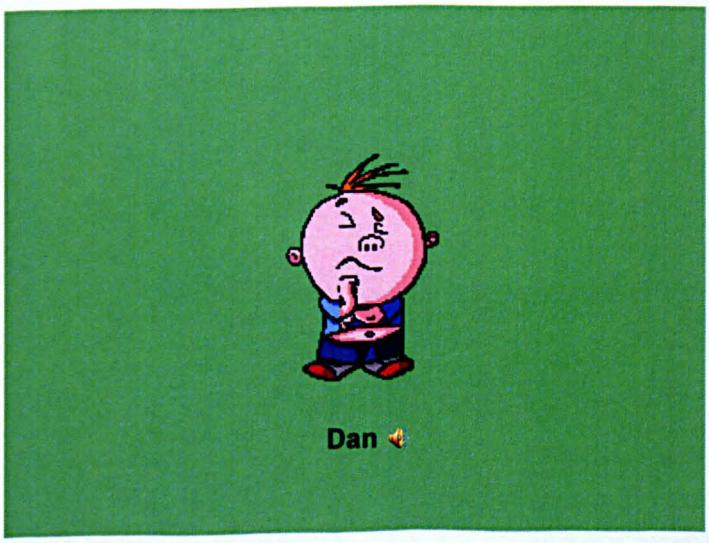
You will see, what Dan says is always ok, but Tom does not listen very well, so sometimes he will say something strange. You will have to tell me if what Tom says is ok or not."

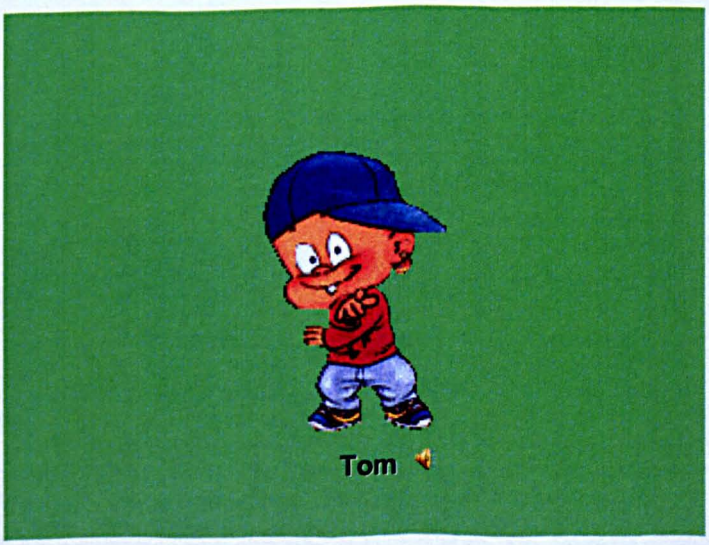
Dan

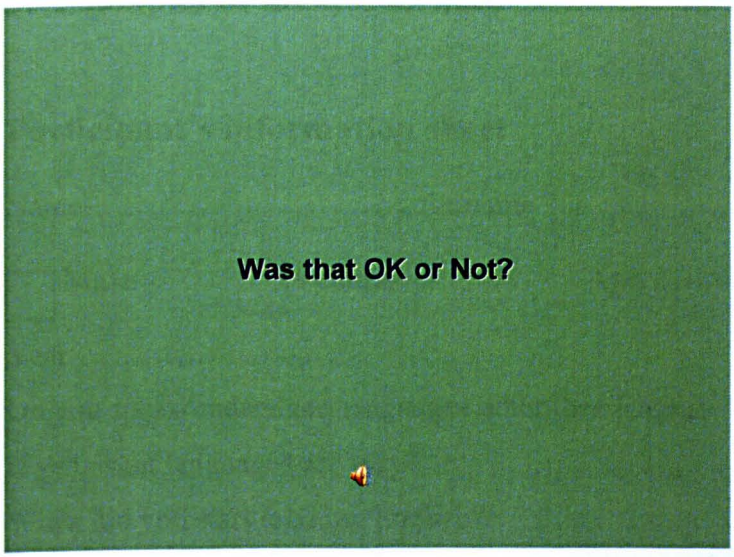
Tom

*Say '**OK**' if you think what Tom says is OK, and say '**Not OK**' if you think what Tom says is not OK.*


Example A


Dan


Tom


Was that OK or Not?

3. Examples of the test format

Participant's information sheet

Name..... Surname.....

☐ **Male** ☐ **Female** **Age.....**

Year.....

Do you speak/understand languages other than English? ☐ YES ☐ NO

If yes, what languages are they? .....

When did you start learning English?.....

Instruction

You are going to read little stories. After each story, Dan and Tom will say something about it.

You will see, what Dan says is always ok, but Tom does not listen very well, so sometimes he will say something strange. You will have to tell me if what Tom says is ok or not."

*Circle '**OK**' if you think what Tom says is OK, and circle '**Not OK**' if you think what Tom says is not OK.*

Examples

(iv) Story: Kate is not feeling well today. She has a headache and cough.
Dan: What do you think Kate will do?
Tom: She will go swimming.

Was that ok or not ok?

OK **NOT OK**

(v) Story: Kate is very clever. But she does not always study hard.
Dan: Tomorrow she will have an exam
Tom: She could fail the exam.

Was that ok or not ok?

OK **NOT OK**

(vi) Story: There was no more milk in the fridge yesterday.
Dan: So, Nancy went to the supermarket this morning.
Tom: She buys some milk.

Was that ok or not ok?

OK **NOT OK**

(vii) Story: Nancy was so hungry when she arrived at home yesterday evening.
Dan: Her mum made a pizza for her.
Tom: She ate the pizza.

Was that ok or not ok?

OK **NOT OK**

(viii) Story: There is no more milk in the fridge.
Dan: So, Nancy is going to the supermarket tomorrow morning.
Tom: She will buy some milk.

Was that ok or not ok?

OK **NOT OK**

.....

1 Story: Ben has a bad cold. He did not come to school today.
Dan: Where do you think Ben is now?
Tom: Ben might be at home.

Was that ok or not ok?

OK **NOT OK**

2 Story: Ben really loves football. He often plays football with his friends when he has free time. Today, Ben doesn't have homework. He is free now.
Dan: I wonder where he is now.
Tom: Ben may play football.

Was that ok or not ok?

OK **NOT OK**

3 Story: Ben has a bad cold. He did not come to school today.
Dan: Where do you think Ben is now?
Tom: Ben might have been at home.

Was that ok or not ok?

OK **NOT OK**

4 Story: Ben invited some friends to have dinner at his house yesterday. He bought some meat, vegetables, and a cookery book.
Dan: What do you think Ben did yesterday?
Tom: Ben must have cooked the dinner.

Was that ok or not ok?

OK **NOT OK**

5 Story: Jerry is going to the train station. Unfortunately, the traffic on the road is very bad because it is raining heavily. He is only half way to the station.
Dan: What do you think will happen?
Tom: Jerry will be late for the train.

Was that ok or not ok?

OK **NOT OK**

4. Answer sheet for L2 adults

Answer Sheet

Name.....
dd/mm/yy.....
Time.....

Participant's information

☐ Male ☐ Female Age .....

When did you start learning English?.....
How many hours do/did you study English per week? .....
Do you speak English every day? .....

Instruction

*Circle '**YES**' if you think Tom's response goes well with the context of the story, and circle '**NO**' if you think Tom's response does not go well with the context of the story.*

Example

A	(OK)	NOT OK
B	OK	(NOT OK)

Practice

i	OK	NOT OK
ii	OK	NOT OK
iii	OK	NOT OK
iv	OK	NOT OK
v	OK	NOT OK

Test

1	OK	NOT OK
2	OK	NOT OK
3	OK	NOT OK
4	OK	NOT OK
5	OK	NOT OK
6	OK	NOT OK
7	OK	NOT OK
8	OK	NOT OK
9	OK	NOT OK
10	OK	NOT OK
11	OK	NOT OK
12	OK	NOT OK
13	OK	NOT OK
14	OK	NOT OK
15	OK	NOT OK
16	OK	NOT OK
17	OK	NOT OK
18	OK	NOT OK
19	OK	NOT OK
20	OK	NOT OK
21	OK	NOT OK
22	OK	NOT OK
23	OK	NOT OK
24	OK	NOT OK

25	OK	NOT OK
26	OK	NOT OK
27	OK	NOT OK
28	OK	NOT OK
29	OK	NOT OK
30	OK	NOT OK
31	OK	NOT OK
32	OK	NOT OK
33	OK	NOT OK
34	OK	NOT OK
35	OK	NOT OK
36	OK	NOT OK
37	OK	NOT OK
38	OK	NOT OK
39	OK	NOT OK
40	OK	NOT OK
41	OK	NOT OK
42	OK	NOT OK
43	OK	NOT OK
44	OK	NOT OK
45	OK	NOT OK
46	OK	NOT OK
47	OK	NOT OK
48	OK	NOT OK

5. L2 participants' biodata

Table 5A: L2 children: biodata

The participants	Sex	Age at the time of testing	Age at first exposure	Length of exposure
L2CHI01	F	8	5	3
L2CHI02	M	8	6	2
L2CHI03	M	8	5	2
L2CHI04	F	9	6	3
L2CHI05	M	8	5	3
L2CHI06	F	9	5	4
L2CHI07	F	9	5	4
L2CHI08	F	8	5	3
L2CHI09	M	8	6	2
L2CHI10	F	9	6	3
L2CHI11	F	8	5	3
L2CHI12	M	8	5	3
L2CHI13	M	9	5	4
L2CHI14	M	9	5	4
L2CHI15	F	8	5	3
L2CHI16	F	9	6	3
L2CHI17	M	10	6	4
L2CHI18	M	10	6	4
L2CHI19	F	10	5	5
L2CHI20	F	9	6	4
L2CHI21	F	10	6	4
L2CHI22	M	10	5	5
L2CHI23	M	9	6	3
L2CHI24	M	9	5	4
L2CHI25	M	10	6	4
L2CHI26	F	9	6	3
L2CHI27	M	10	5	5
L2CHI28	M	9	5	4
L2CHI29	F	9	6	3
L2CHI30	M	10	6	4

Table 5B: L2 adults: biodata

The participants	Sex	Age at the time of testing	Age at first exposure	Age at the commencement of the university programme	Length of the commencement of the university programme
L2ADU01	M	22	5	18	4
L2ADU02	F	24	10	20	4
L2ADU03	M	21	7	19	2
L2ADU04	F	20	9	18	2
L2ADU05	F	20	6	18	2
L2ADU06	M	22	5	18	4
L2ADU07	F	22	5	18	4
L2ADU08	F	23	7	19	4
L2ADU09	F	23	5	19	4
L2ADU10	F	20	7	18	2
L2ADU11	F	21	7	18	3
L2ADU12	M	21	13	19	2
L2ADU13	F	23	5	19	4
L2ADU14	F	22	9	18	4
L2ADU15	F	22	10	18	4
L2ADU16	F	22	5	19	3
L2ADU17	F	21	5	19	2
L2ADU18	F	21	10	18	3
L2ADU19	F	20	7	18	2
L2ADU20	M	21	5	18	3
L2ADU21	F	21	5	18	3
L2ADU22	F	21	9	19	2
L2ADU23	F	22	5	18	4
L2ADU24	F	21	12	18	3
L2ADU25	F	23	13	20	3
L2ADU26	M	23	10	19	4
L2ADU27	F	22	5	18	4
L2ADU28	F	21	12	19	2
L2ADU29	M	22	15	19	3
L2ADU30	F	21	5	18	3

6 The main experiment results

6.1 Groups' results

Table 6A: The exploration of normal distribution of the participants' responses for presents modal statements

Tests of Normality							
		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Group	Statistic	df	Sig.	Statistic	df	Sig.
Pres_ACR	L2 children	.237	30	.000	.867	30	.001
	L2 adult	.124	30	.200*	.942	30	.102
	L1 children	.140	22	.200*	.937	22	.173
Pres_ACA	L2 children	.397	30	.000	.710	30	.000
	L2 adult	.173	30	.022	.902	30	.010
	L1 children	.202	22	.020	.896	22	.025
Pres_INA	L2 children	.237	30	.000	.867	30	.001
	L2 adult	.124	30	.200*	.942	30	.102
	L1 children	.140	22	.200*	.937	22	.173
Pres_INR	L2 children	.397	30	.000	.710	30	.000
	L2 adult	.173	30	.022	.902	30	.010
	L1 children	.202	22	.020	.896	22	.025

a. Lilliefors Significance Correction

*. This is a lower bound of the true significance.

Table 6B: The exploration of normal distribution of the participants' responses for the future modal statements

Tests of Normality							
Fut_ACR	L2 children	.225	30	.000	.861	30	.001
	L2 adult	.179	30	.015	.899	30	.008
	L1 children	.262	22	.000	.861	22	.005
Fut_ACA	L2 children	.161	30	.045	.905	30	.011
	L2 adult	.211	30	.002	.909	30	.014
	L1 children	.215	22	.010	.918	22	.069
Fut_INA	L2 children	.225	30	.000	.861	30	.001
	L2 adult	.179	30	.015	.899	30	.008
	L1 children	.262	22	.000	.861	22	.005
Fut_INR	L2 children	.161	30	.045	.905	30	.011
	L2 adult	.211	30	.002	.909	30	.014
	L1 children	.215	22	.010	.918	22	.069

a. Lilliefors Significance Correction

*. This is a lower bound of the true significance.

Table 6C: The exploration of normal distribution of the participants' responses for the past modal statements

Tests of Normality							
Past_ACR	L2 children	.212	30	.001	.889	30	.004
	L2 adult	.248	30	.000	.897	30	.007
	L1 children	.244	22	.001	.891	22	.019
Past _ACA	L2 children	.239	30	.000	.870	30	.002
	L2 adult	.228	30	.000	.885	30	.004
	L1 children	.258	22	.001	.869	22	.007
Past _INA	L2 children	.212	30	.001	.889	30	.004
	L2 adult	.248	30	.000	.897	30	.007
	L1 children	.244	22	.001	.891	22	.019
Past _INR	L2 children	.239	30	.000	.870	30	.002
	L2 adult	.217	30	.001	.899	30	.008
	L1 children	.258	22	.001	.869	22	.007

a. Lilliefors Significance Correction

*. This is a lower bound of the true significance.

Table 6D: Kruskal-Wallis Test

Test Statistics[a,b]												
	Pres_ ACR	Pres_ ACA	Pres_ INA	Pres _INR	Fut_ ACR	Fut_ ACA	Fut_ INA	Fut_ INR	Past_ ACR	Past_ ACA	Past_ INA	Past_ INR
Chi-square	22.15	3.49	22.15	3.49	35.23	1.91	35.23	1.91	31.13	4.60	31.13	3.75
df	2	2	2	2	2	2	2	2	2	2	2	2
Asymp. Sig.	.000	.174	.000	.174	.000	.384	.000	.384	.000	.100	.000	.153

a. Kruskal Wallis Test

b. Grouping Variable: Group

Table 6E: Mann-Whitney Test: L2 children VS L2 adults

Test Statistics[a]						
	Pres_ACR	Pres_INA	Fut_ACR	Fut_INA	Past_ACR	Past_INA
Mann-Whitney U	256.000	256.000	243.500	243.500	245.000	245.000
Wilcoxon W	721.000	721.000	708.500	708.500	710.000	710.000
Z	-2.887	-2.887	-3.094	-3.094	-3.083	-3.083
Asymp. Sig. (2-tailed)	.004	.004	.002	.002	.002	.002

a. Grouping Variable: Group

Table 6F: Mann-Whitney Test: L2 children VS L1 children

Test Statistics[a]						
	Pres_ACR	Pres_INA	Fut_ACR	Fut_INA	Past_ACR	Past_INA
Mann-Whitney U	91.000	91.000	52.000	52.000	70.000	70.000
Wilcoxon W	556.000	344.000	517.000	305.000	535.000	323.000
Z	-4.456	-4.456	-5.195	-5.195	-4.860	-4.860
Asymp. Sig. (2-tailed)	.000	.000	.000	.000	.000	.000

a. Grouping Variable: Group

Table 6G: Mann-Whitney Test: L2 adults VS L1 children

Test Statistics[a]						
	Pres_ACR	Pres_INA	Fut_ACR	Fut_INA	Past_ACR	Past_INA
Mann-Whitney U	204.500	204.500	98.000	98.000	120.500	120.500
Wilcoxon W	669.500	457.500	563.000	351.000	585.500	373.500
Z	-2.339	-2.339	-4.340	-4.340	-3.980	-3.980
Asymp. Sig. (2-tailed)	.019	.019	.000	.000	.000	.000

a. Grouping Variable: Group

Table 6H: Friedman Test: L2 children

Test Statistics[a,b]	
N	30
Chi-square	120.516
df	11
Asymp. Sig.	.000

a. Group = L2 children

b. Friedman Test

Table 6I: Friedman Test: L2 adults

Test Statistics[a,b]	
N	30
Chi-square	91.892
df	11
Asymp. Sig.	.000

a. Group = L2 adult

b. Friedman Test

Table 6J: Friedman Test: L1 children

Test Statistics[a,b]	
N	22
Chi-square	114.095
df	11
Asymp. Sig.	.000

a. Group = L1 children

b. Friedman Test

Table 6K: Wilcoxon Signed Ranks Test: L2 children

Test Statistics[c,d]						
	Fut_ACR - Pres_ACR	Past_ACR - Pres_ACR	Fut_ACR - Past_ACR	Fut_INA - Pres_INA	Past_INA - Pres_INA	Fut_INA - Past_INA
Z	-1.959[a]	-.320[b]	-1.989[b]	-1.959[b]	-.320[a]	-1.989[a]
Asymp. Sig. (2-tailed)	.050	.749	.047	.050	.749	.047

a. Based on positive ranks.

b. Based on negative ranks.

c. Group = L2 children

d. Wilcoxon Signed Ranks Test

Table 6L: Wilcoxon Signed Ranks Test: L2 adults

Test Statistics[c,d]						
	Fut_ACR - Pres_ACR	Past_ACR - Pres_ACR	Fut_ACR - Past_ACR	Fut_INA - Pres_INA	Past_INA - Pres_INA	Fut_INA - Past_INA
Z	-.115[a]	-.574[b]	-1.262[b]	-.115[b]	-.574[a]	-1.262[a]
Asymp. Sig. (2-tailed)	.909	.566	.207	.909	.566	.207

a. Based on positive ranks.

b. Based on negative ranks.

c. Group = L2 adult

d. Wilcoxon Signed Ranks Test

Table 6M: Wilcoxon Signed Ranks Test: L1 children

Test Statistics[c,d]						
	Fut_ACR - Pres_ACR	Past_ACR - Pres_ACR	Fut_ACR - Past_ACR	Fut_INA - Pres_INA	Past_INA - Pres_INA	Fut_INA - Past_INA
Z	-2.065[a]	-2.150[a]	-.232[b]	-2.065[b]	-2.150[b]	-.232[a]
Asymp. Sig. (2-tailed)	.039	.032	.817	.039	.032	.817

a. Based on negative ranks.

b. Based on positive ranks.

c. Group = L1 children

d. Wilcoxon Signed Ranks Test

6.2 Proficiency groups' results

Table 6N: Kruskal-Wallis Test: the L2 children from the three proficiency groups

Test Statistics[a,b,c]												
	Pres – ACR	Pres – ACA	Pres – INA	Pres – INR	Fut – ACR	Fut – ACA	Fut – INA	Fut – INR	Past – ACR	Past – ACA	Past – INA	Past – INR
Chi-square	.150	2.01	.150	2.01	.177	.410	.177	.410	1.50	3.23	1.50	3.23
df	2	2	2	2	2	2	2	2	2	2	2	2
Asymp. Sig.	.928	.365	.928	.365	.916	.815	.916	.815	.471	.199	.471	.199

a. Group = L2 children

b. Kruskal Wallis Test

c. Grouping Variable: Profgroup

Table 6O: Kruskal-Wallis Test: the L2 adults from the three proficiency groups

Test Statistics[a,b,c]												
	Pres – ACR	Pres – ACA	Pres – INA	Pres – INR	Fut – ACR	Fut – ACA	Fut – INA	Fut – INR	Past – ACR	Past – ACA	Past – INA	Past – INR
Chi-square	3.37	.815	3.37	.815	4.64	2.95	4.64	2.95	3.53	.730	3.53	.730
df	2	2	2	2	2	2	2	2	2	2	2	2
Asymp. Sig.	.185	.665	.185	.665	.098	.229	.098	.229	.171	.694	.171	.694

a. Group = L2 adult

b. Kruskal Wallis Test

c. Grouping Variable: Profgroup

Appendix D

Research Ethics Consideration

1. AREA Ethics reference

Research Support
3 Cavendish Road
University of Leeds
Leeds LS2 9JT

Tel: 0113 343 4873
e-mail: j.m.blaikie@adm.leeds.ac.uk

Peerapat Yangklang
Linguistics & Phonetics
University of Leeds
Leeds, LS2 9JT

AREA Faculty Research Ethics Committee
University of Leeds

12 April 2012

Dear Peerapat

Title of study **L2 acquisition of epistemic modality in English by L1 Thai-speaking children and adults**

Ethics reference **AREA 10-028**

The above project was reviewed by the AREA Faculty Research Ethics Committee at its virtual meeting on 21st October 2010.

The following documentation was considered:

Document	*Version*	*Date*
AREA10-028 application.pdf	1	17/09/2010

On the basis of the information provided, the Committee is happy to approve the project, but would like to offer the following comments and advice:

> The Committee felt that you needed to give more thought to how your data will be stored. Your answer to C20 needed to make clear what will be done to ensure the data can only be accessed by the researcher, for example, if electronic, the data should be saved on University server, and if hard copies, in locked secure filing -- anonymising may not be enough, if schools etc are identifiable.

Yours sincerely

Jennifer Blaikie
Research Ethics Administrator, Research Support
On Behalf of the AREA Faculty Research Ethics Committee

CC: Student supervisor: Melinda Whong

2. Participants Information Sheet

Information Sheet

1. Research Project Title:

L2 acquisition of epistemic modality in English by L1 Thai-speaking children and adults

This research is part of education qualification, PhD dissertation.

2. What is the project's purpose?

This project investigates how Thai children and adults learn some kinds of words like MUST, WILL, and MAY/MIGHT. These words are difficult for Thais who have just started to learn English.

This study also compares Thai children with Thai adults, English children with Thai children in learning English epistemic modal auxiliaries. The participants of the study are (1) Thai children age between 6 – 9 years old (2) English children age between 6 – 9 years old (Native speaker of English) (3) Thai adults age between 21 – 45 years old (4) English adults age between 21 – 45 years old. A judgement task is conducted, whereby the participants will be asked to choose whether the statements given are right or wrong based on the stories given.

This project will last 6 months.

3. Why have the children been chosen?

Since this research compare the acquisition of epistemic modal auxiliaries by Thai learners of English with that of English-speaking children aged 6-9 years old, 15-20 students in year-2 and 15-20 students in year-4 are chosen to take part the project.

4. Do I have to take part?

It is up to the students to decide whether or not to take part. If the students do decide to take part they will be given this information sheet to keep and they can still withdraw. They do not have to give a reason.

5. What will happen to me if the students take part?

Once the students agree to take part the project, the students will be asked to do a questionnaire. It will take about 45 minutes to complete it. This will be carried out after school or during their free activity time at schools.

6. What do students have to do?

The students will be asked to read to short stories along with related pictures on the researcher's laptop. After each story, Dan and Tom will say something about it. Dan sometimes may either make a comment or asks a question, while Tom may either make further comment or answer the question. After that the students will have to decide whether the comment or the answer of Dan is OK or not OK based on the story. The students may circle OK if they feel what Tom says is OK, and may circle Not OK if they feel what Tom says is not OK. The questionnaire starts with the instructions and a warm-up session to familiarise the subjects with the task

7. What are the possible disadvantages and risks of taking part?

There is no disadvantage of taking part

8. What are the possible benefits of taking part?

Whilst there are no immediate benefits for those people participating in the project, it is hoped that this work will. The results of the students' performance will make contribution to academic world, especially linguistic area. The results of the research will help linguists understand first and second language acquisition processes.

9. What happens if the research study stops earlier than expected?

The data will somehow be kept strictly confidential.

10. Will my taking part in this project be kept confidential?

All the information that we collect during the course of the project will be kept strictly confidential. The participants will not be identified in any reports or publications.

11. What type of information will be sought from the children and why is the collection of this information relevant for achieving the research project's objectives?

This project will test children's English language knowledge, especially epistemic modal auxiliaries. As this project focus on how young Thai children learn grammar of English as their second language, and how young English children learn English as their first language, your English will therefore be very useful for the project.

12. What will happen to the results of the research project?

The results of the task the children perform will be shown in my PhD dissertation. The participants may ask the researcher for the results of the tasks, but they will neither obtain a copy of the published results or be identified in any report or publication.

13. Who is organising and funding the research?

This project is part of my PhD qualification. My PhD study is sponsored by The Faculty of Management Science, Silpakorn University, 1 Moo 3 Sampraya, Cha-am, Petchaburi 76120 Thailand

14. Contact for further information

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ii. Thank you for taking part in the project.

3. Participant Consent Form

Participant Consent Form

Title of Study The acquisition of English epistemic modal auxiliaries by Thai L2 learners of English.

The participant should complete the whole of this sheet himself/herself

	Please confirm the statements by putting your initials in the box below
I have read and understood the participant information sheet	
I have had the opportunity to ask questions and discuss this study	
I have received satisfactory answers to all of my question	
I have received enough information about the study	
I understand that I am free to withdraw from the study:- 1 At any time 2 Without having to give a reason for withdrawing	
I understand that any information I provide, including personal details, will be confidential, stored securely and only accessed by those carrying out the study.	
(When relevant) I understand that any information I give may be included in published documents but my identity will be protected by the use of pseudonyms	
I agree to take part in this study	
Participant Signature ..... Date	
Name of Participant	
Researcher Signature ..... Date	
Name of Researcher	

Thank you for agreeing to take part in this study