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# FIRST WORDS: COMMUNICATIVE DEVELOPMENT OF 9- TO 24-MONTH-OLD THAI CHILDREN

**Mr. Sorabud Rungrojsuwan**



**A Dissertation Submitted in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy in Linguistics**

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สรบุศย์ รุ่งโรจน์สุวรรณ : คำชุดแรก: พัฒนาการการสื่อสารของเด็กไทยอายุ 9-24 เดือน. (FIRST WORDS: COMMUNICATIVE DEVELOPMENT OF 9- TO 24-MONTH-OLD THAI CHILDREN) อ. ที่ปรึกษา : ผู้ช่วยศาสตราจารย์ ดร. สุดาพร ลักษณียนาวิน จำนวนหน้า 220 หน้า ISBN 974-17-4283-5

งานวิจัยนี้มีวัตถุประสงค์เพื่อศึกษาพัฒนาการทางเสียงและพัฒนาการในการรู้คำของเด็กไทย ระหว่างช่วงอายุ 9 ถึง 24 เดือน จากการศึกษาพบว่า การรู้ภาษาแม่เป็นกระบวนการที่ซับซ้อน มีปัจจัยหลายประการที่มีความสำคัญต่อการรู้ภาษา ได้แก่ ลักษณะสากลลักษณ์ และลักษณะเฉพาะภาษา นอกจากนี้ยังพบว่าสภาพแวดล้อม ความหลากหลายและความชอบของเด็กแต่ละคน พร้อมทั้งลักษณะของภาษาป้อนเข้า ก็มีความสำคัญด้วยเช่นกัน

จากการศึกษาพัฒนาการทางเสียงพบว่า ความสามารถในการออกเสียงของเด็กมีจำกัด กล่าวคือ เด็กจะออกเสียงบางเสียงบ่อยกว่าเสียงกลุ่มอื่น เช่น ในกลุ่มเสียงพยัญชนะต้น คือ เสียงกัก > เสียงนาสิก > เสียงต่อเนื่อง > เสียงเสียดแทรก, ในกลุ่มเสียงสระเดี่ยว คือ /a/ > /i/ > /u/ > /O/ > /x/ > /o/ > /e/ > /U/ > /q/, ในกลุ่มเสียงวรรณยุกต์ คือ สามัญ > โท > เอก > ตรี > จัตวา ตามลำดับ ในระบบพยางค์หนักเบา คือ พยางค์หนักเป็นเอก > พยางค์หนักเป็นโท > พยางค์เบา เป็นต้น นอกจากนี้ยังพบว่า เด็กสามารถออกเสียงที่มีโครงสร้างทางเสียงที่มีความซับซ้อนน้อยได้ก่อนเสียงที่มีโครงสร้างทางเสียงที่ซับซ้อนมากกว่า เช่น โครงสร้างพยางค์แบบเปิด คือ CV > CVV > CCV, ในโครงสร้างพยางค์แบบปิด คือ CVC > CVVC > CCVC, เสียงพยัญชนะ คือ C > CC, เสียงสระ คือ V > VV อย่างไรก็ดี จากการศึกษาเปรียบเทียบสัดส่วนของเสียงแต่ละกลุ่มกับภาษาผู้ใหญ่ (ศศิธร หาญพานิช, 2536) พบว่า ลักษณะทางเสียงในภาษาของเด็กจะค่อยๆ พัฒนาไปสู่รูปแบบของเสียงในภาษาของผู้ใหญ่

จากการศึกษาพัฒนาการในการรู้คำพบว่า เด็กเริ่มรู้คำชุดแรกเมื่ออายุประมาณ 9-15 เดือน อัตราในการรู้คำของเด็กที่พบมี 2 ลักษณะ คือ แบบค่อยเป็นค่อยไปและแบบฉับพลัน ซึ่งระยะเวลาของอัตราในการรู้คำแบบฉับพลันนั้นส่งผลโดยตรงต่อปริมาณคำศัพท์ที่เด็กรู้เมื่อมีอายุได้ 24 เดือน จากการศึกษาประเภทของคำที่เด็กรู้พบว่าเด็กรู้คำหลักก่อนและในปริมาณที่มากกว่าคำไวยากรณ์ และรู้คำที่อ้างถึงสรรพสิ่งก่อนและในปริมาณที่มากกว่าคำที่อ้างถึงอาการ ลักษณะ และความสัมพันธ์ของสรรพสิ่ง จากการศึกษาความสัมพันธ์ระหว่างความเข้าใจกับการพูด พบว่า โดยปกติเด็กจะเข้าใจความหมายของคำก่อนที่จะพูด แต่อย่างไรก็ตาม ในช่วงระยะที่มีการรู้คำศัพท์ใหม่ๆ เป็นจำนวนมากนั้น เด็กอาจพูดเลียนแบบเสียงคำบางคำได้ก่อนที่จะเข้าใจความหมายของคำเหล่านั้น

จากการศึกษาความสัมพันธ์ระหว่างภาษาป้อนเข้ากับคำชุดแรกของเด็กไทยพบว่า มีความสัมพันธ์ในแบบที่ไม่ชัดเจนนักระหว่างประเภทของคำในภาษาป้อนเข้ากับประเภทของคำในภาษาของเด็ก จากข้อค้นพบดังกล่าวผู้วิจัยจึงอภิปรายว่าอาจจะเกิดจากปริมาณความสนใจของเด็กที่มีต่อผู้ใหญ่และสิ่งแวดล้อมรอบข้าง ซึ่งเป็นอีกปัจจัยหนึ่งที่มีผลต่อการรู้ภาษา

**ภาควิชา** ....ภาษาศาสตร์....
**สาขาวิชา** ....ภาษาศาสตร์....
**ปีการศึกษา** ....2546....

**ลายมือชื่อนิสิต** .....
**ลายมือชื่ออาจารย์ที่ปรึกษา** .....
**ลายมือชื่ออาจารย์ที่ปรึกษาร่วม** .....

# # 4280200622 : MAJOR LINGUISTICS

KEYWORD: FIRST WORDS/LANGUAGE ACQUISITION/LANGUAGE DEVELOPMENT/PHONOLOGICAL DEVELOPMENT/LEXICAL DEVELOPMENT

SORABUD RUNGROJSUWAN: FIRST WORDS: COMMUNICATIVE DEVELOPMENT OF 9- TO 24-MONTH-OLD THAI CHILDREN, THESIS ADVISOR : ASSISTANT PROFESSOR SUDAPORN LUKSANEEYANAWIN, Ph.D., 220 pp. ISBN 974-17-4283-5.

This study aims to investigate the phonological and lexical development of Thai children from 9 to 24 moths of age. First language acquisition is a complex phenomenon, which involves not only universal and language specific factors, but also other factors including individual variation, individual preference, and the characteristics of the parental input.

In relation to phonological development, it was found that children's productive ability is restricted in its phonological characteristics i.e. some sounds are produced more frequently than others; Stops > Nasals > Continuants > Fricatives in initial consonants; /a/ > /i/ > /u/ > /O/ > /x/ > /o/ > /e/ > /U/ > /q/ in monophthongs; Mid > Falling > Low > High > Rising in tones, and primary accented syllable > secondary accented syllable/s > unaccented syllable/s. Moreover, simpler combinations of sounds are produced before more complex ones such as, CV > CVV > CCV in open syllables, CVC > CVVC > CCVC in closed syllables, C > CC in consonants, and V > VV in vowels. In comparison to proportions of sounds in adults' speech it was found that children's phonological characteristics gradually develop toward those of adults (Hanpanich 1993).

In relation to lexical development, it was found that children start to acquire their first word at around 9-15 months and have two distinctive rates of lexical acquisition; gradual and rapid. The duration of "the lexical explosion period", directly determines the amount of items children acquire at 24 months of age. In terms of lexical categories, it was found that, syntactically "Content Words" are acquired earlier and in greater number than "Function Words", and semantically "Nominals" are acquired earlier than "Verbals" and "Relations". In addition, it was found that comprehension normally precedes production in first language acquisition. However, during the period of "vocabulary explosion", it is possible that children could imitate some particular items before understand their meaning.

The investigation of the relationship between parental input and children's first words revealed that there was not a strong association between input and first words produced by children. The results suggest that children's attention to the input might be another possible factor to account for first language acquisition.

| | |
|---|---|
| Department ….LINGUISTICS…. | Student's signature …… |
| Field of Study ….LINGUISTICS…. | Advisor's Signature…… |
| Academic year ….2003…. | Co-advisor's Signature…..……. |

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# List of Symbols and Abbreviations

**Thai Phonological System**[1]

The following phonological representations of syllable structures, consonants, vowels, tones, and accent used in the transcription of the data in this study are adapted from Luksaneeyanawin 1993, Zlatev and Yangklang 2001.

***1. Syllable Structure***

Thai Syllables consist of three major components. They are:

| | | | |
|---|---|---|---|
| a) | Consonant | = | C |
| b) | Vowel | = | V |
| c) | Tone | = | T |

These three components are necessary for syllables in Thai. However, it should be noted that tones (T) are normally omitted although every pattern of syllable structure in Thai requires one tonal element. Examples of syllable structures are CV, CVC, CCVC, etc.

In consonants, C and CC are used to represent monoconsonant and consonant cluster respectively. As for vowels, V represents short and long monophthongs, whereas VV represents short and long diphthongs.



[1] Phonological transcription used in this study is adapted from the LRU transcription — the transcription developed at the Linguistic Research Unit by Luksaneeyanawin (1993) — Schoknecht (2000). This transcription uses standard keyboard characters to represent the consonants, vowels, tones and accent of Thai words which are suited to computer input. When the transcription was used in corpus development which was finally contributed to the CHILDES website (CHILDES, 2001), some symbols in the LRU transcription were adjusted again in order to keep consistancy with the Thai narrative corpus (frog story) in the website developed by Zlatev and Yangklang (2001).

## *2. Consonants*

### a) Monoconsonants

| Manner of Articulation | Place of Articulation | | | | |
|---|---|---|---|---|---|
| | **Labial** | **Alveolar** | **Palatal** | **Velar** | **Glottal** |
| **Stops** | | | | | |
| a) Voiceless aspirated | p* | t* | c | k* | ?*[2] |
| b) Voiceless unaspirated | ph | th | ch | kh | |
| c) Voiced | b | d | | | |
| **Non-stops** | | | | | |
| a) Nasals | m* | n* | | N*[2] | |
| b) Fricatives | f | s | | | h |
| c) Continuants | | | | | |
| (1) Lateral | | l | | | |
| (2) Trill | | r | | | |
| (3) Approximants | w* | j* | | | |

* It should be noted that consonants with asterisks can occur in syllable initial and syllable final positions.

### b) Consonant Clusters

| | | |
|---|---|---|
| pr, pl | tr | kw, kr, kl |
| phr, phl | thr | khw, khr, khl |

## *3. Vowels*

### a) Monophthongs

| Tongue Height | Tongue Advancement | | |
|---|---|---|---|
| | **Front** | **Central** | **Back** |
| **High** | i, ii | U, UU[3] | u, uu |
| **Mid** | e, ee | q, qq[3] | o, oo |
| **Low** | x, xx[3] | a, aa | O, OO[3] |

[2] The symbols /?/ and /N/ are used in this study to replace the phonetic alphabets /?/ and /N/ of the IPA system respectively.

[3] These symbols are used to replace phonetic alphabets of the IPA system as follows:

/x, xx/ for /E, E◌̱/
/U, UU/ for /◌̀, ◌̀◌̱/
/q, qq/ for /↔, ↔◌̱/
/O, OO/ for /□, □◌̱/

**b) Diphthongs**

| | | | |
|---|---|---|---|
| Short Diphthongs:- | /ia/ | /Ua/ | /ua/ |
| Long Diphthongs:- | /iia/ | /UUa/ | /uua/ |

***4. Tones***

| | | |
|---|---|---|
| mid level | = | 0 |
| low level | = | 1 |
| falling | = | 2 |
| high level | = | 3 |
| rising | = | 4 |

***5. Accents***

| | | |
|---|---|---|
| Primary Accent | = | ´_ |
| Secondary Accent | = | `_ |

**Abbreviations**

| | | |
|---|---|---|
| Acq | = | Acquisition |
| C | = | Content Words |
| Comp | = | Comprehension |
| F | = | Function Words |
| NOM | = | Nominals |
| Prod | = | Production |
| REL | = | Relations |
| VER | = | Verbals |

**Other symbols**

> This symbol is used to represent the order of acquisition in this study. The element on the left of '>' is reported to be acquired before another element on the right. For example, Stops > Fricatives, means that stop sounds are acquired before fricative sounds; NOM > VER, means that words in the nominal category (concrete objects) are acquired before words in the verbal category (actions and states).

>>> This symbol is used to illustrate children's actual production as a simplified output of the adult's target word. For example,

| Adult's Target Words | | Children's Productions |
|---|---|---|
| /siN4 ´too0/ | >>> | [too0] |
| /`cak1 kra0 ´jaan0/ | >>> | [cak1 jaan0] |

# Chapter 1
# Introduction

In this chapter, a short background and rationale of the studies is given in terms of phonetic/phonological development, lexical development, methodological issues, assumptions, and first language acquisition in Thai, ahead of a description of the studies.

## 1.1 Research Background

Children are commonly said to begin the process of first language acquisition when they produce the first set of words (Clark 1993, Ingram 1989). Researchers of language acquisition traditionally call this set of words the child's "first words". As an indicator of the onset of first language acquisition, first words have interested linguists, psychologists, and psycholinguists. From a linguistic perspective, first words are studied at all linguistic levels, including phonetic, phonological, morphological, semantic, and pragmatic levels.

Two aspects of word acquisition can be considered, universal and language specific. By universal, it is meant that children, regardless of their mother language, follow the same process of development (Gentner 1982, Jacobson 1941268 cited in Ingram 1989). In contrast, the language specific hypothesis suggests that the specific characteristics of the language, affect children's acquisition of their "first words" (Gopnik & Choi 1995, Pye, Ingram, & List 1987, Tardif, Gelman, & Xu 1999).

### 1.1.1 Phonetic/Phonological Development

In relation to the phonetic and phonological development of "first words", it has been reported that children are normally able to produce a limited range of sounds. Lieberman, Crelin, and Klatt (1971) explained that this limitation of production is due to children's incomplete anatomical development. Infants and young children have a short vocal tract and a small oral cavity. The short vocal tract does not allow the tongue to be freely flexible. As a consequence, it limits the possible range of articulation in comparison to that of the adult. Locke (1983) claimed that linguistic environment does not affect children's production ability until after the first 50 words have been acquired. In addition to and perhaps because of these biological constraints, children commonly apply a set of phonological simplification processes, such as "final syllable deletion", "vowel shortening", "fronting", etc. to any particular word produced.

However, some findings suggest that language specific characteristics can also play an important role in children's phonological development. Pye, Ingram, and List (1987) found in a study on Quiche⇔ (a Mayan language spoken in Guatemala) phonological acquisition that Quiche⇔ children acquire the fricative /ξ/ and the affricate /τΣ/ very early. This is an important counter example against the universal assumption proposed by Locke (1983) that anatomical constraints limits the acquisition of difficult phones such as fricatives. In addition, they found a positive correlation between Quiche⇔ input and children's production ability. Regarding the acquisition of stress[4], Hockberg (1988) found from his study of Spanish acquiring children that, they have learnt the regular patterns of stress in the language and applied these patterns to new encountered

[4] Abercrombie (1976) made distinction between the terms 'accent' and 'stress' into two related linguistic concepts. The term 'accent' is used in phonological sense. It refers to the potentiality of syllable/s to be realized with stress in actual speaking situation. The term 'stress' is used in phonetic sense. It refers to the realization of accented syllable/s in actual speaking situation.

words systematically. Similar results were also reported in the case of German children (Wijnen, Krikhaar, & Os 1994).

The above studies show that both language universal and language specific factors play a role in first language acquisition. Studies of phonetic and phonological development suggest, in accord with the universal hypothesis, that children have a limited range of production and phonological processes (Ingram 1968, Lieberman *et al.* 1971, Locke 1983). Additionally, the linguistic environment is of crucial importance in guiding children's language acquisition (Hockberg 1988, Pye *et al.* 1987, Wijnen *et al.* 1994). Hence both universal and language specific factors play an important role in the language acquisition process.

### 1.1.2 Lexical Development

Regarding lexical development, Gentner (1982) claimed from his cross-linguistic study of "first words" that most words in early language development are words that refer to concrete objects. He explained that this is due to "the natural partitions hypothesis" which predicts that semantic characteristics of "nouns" are more salient than those of other categories. Referents of words in the "nouns" category are more static, and easily perceivable than those in the "verb" category. However, it was found in later studies that children acquire "verbs" before and in larger numbers than "nouns." For example, Gopnik and Choi (1995) in a comparative study of Korean versus English-speaking children found that "verbs" are acquired before and in greater numbers than "nouns" in Korean children, while the opposite is the case in English children. Furthermore, they claim that these effects on word acquisition are determined by the language specific characteristics of Korean and English. When they analyzed the infant-directed speech, they found that Korean-speaking parents tend to produce more verbs than nouns, while English-speaking parents predominantly used nouns. Similar results were found by Tardif, Gelman, and Xu (1999) in their comparative study between Chinese and English-speaking children. Chinese parents and children also produce a higher proportion of verbs as in the Korean case.

Moreover, studies of lexical development have revealed that children's language development varies greatly (Bates, Dale, & Thal 1995). This implies that studies on early lexical development might produce different results depending upon the individual variation within speakers of a particular language group. For example, while Gopnik and Choi (1995) found that Korean children whose parents are verb-dominant acquire verbs ("action" words) before and in greater numbers than nouns ("object" words), Au, Dapretto, and Song (1994) found that even though parents were verb-dominant, Korean children acquired significantly higher number of nouns than verbs. This kind of variation is possibly due to the influence of individual differences.

### 1.1.3 Methods

In addition, research methods possibly influence the results found in different studies. According to Ingram (1989), different methods are suitable for different research purposes. In a long history of first language acquisition study, there are two major approaches to the collection of linguistic data: cross-sectional and longitudinal studies.

In cross-sectional studies, different children of different ages are tested (Ingram 1989). Research following this approach commonly uses a large number of participants. The cross-sectional approach enables the study to be systematic in that researchers are more able to control factors such as number of participants, age, sex, socio-economic background, etc. Ingram (1989) suggests that the cross-sectional approach is appropriate for the establishment of normative behavioral development. Fenson *et al.* (2003), for

example, normed English lexical development from a cross-sectional study of 1,803 normally developing American children from 8-30 months of age. This method was used as a model for further development of studies in word acquisition (Bates *et al.* 1995, Berglund 1999, Hamilton *et al.* 2000, Fenson *et al.* 2003). However, the cross-sectional approach has its limitations, as children of different ages are selected, and their development is not followed continuously such that individual differences in development cannot be accurately observed. The longitudinal approach, as the name infers, involves following individual children developmentally. A longitudinal design provides actual developmental data, but the data collection procedure is time-consuming and labor-intensive, and is mostly conducted on small groups of participants. Tuaycharoen (1977), Benedict (1979), Gopnik and Choi (1995), Nelson (1973 cited in Ingram 1989), studied language development of 1, 8, 12, and 18 children, respectively. The use of small sample sizes is, however, sometimes criticized as being non-representative.

### 1.1.4 Assumptions

Psycholinguistic researchers also have different assumptions about word acquisition. Some researchers believe that word acquisition involves the study of children's underlying lexical knowledge. As a consequence, a number of studies in lexical acquisition take lexical items as a basic unit of analysis (Au *et al.* 1994, Bates *et al.* 1995, Benedict 1979, Clark 1993, Gentner 1982, Ingram 1989). Studies following this assumption have generally found that children's first words are overwhelmingly nouns. Another group of researchers believe that data from children's performance can lead to implications about word acquisition. As a consequence, researchers following this assumption take frequency of occurrence as a basic unit of analysis (Gopnik & Choi 1995, Sandhofer & Smith 2000, Tardif *et al.* 1999). Many studies concentrating on the frequency of occurrence of lexical items have found that language specific characteristics of parental input seem to play an important role in children's acquisition of words, as discussed by Gopnik and Choi (1995). Different findings from the use of different basic units of analysis—items versus frequency—suggest the separation of word acquisition into two levels: underlying representation and performance. To compromise these two levels of analysis, it is reasonable to compare these two different methods of analysis using data from the same group of participants.

### 1.1.5 First Language Acquisition in Thai

There have been only a limited number of research studies conducted on first language acquisition in Thai. Most research has been carried out on developmental aspects of phonetic, phonology, and infant-directed speech (Kitamura, Thanavisuth, Burnham, & Luksaneeyanawin 2002, Luksaneeyanawin 1976, Luksaneeyanawin, Thanavisuth, Sittigasorn, & Rukkarangsarit 1998, Rukkharangsarit 1998, Sittigasorn 1997, Thanavisuth 1997, Thanavisuth & Luksaneeyanawin 1998, Tuaycharoen 1977, Tuaycharoen 1995). In a study on lexical acquisition in Thai, Tuaycharoen (1984) studied the acquisition of classifiers in Thai, and proposed developmental strategies of using classifiers by two Thai children. Although research in this area in Thai is rare, there are other studies on Thai adult language that are also useful for research on first language acquisition (Luksaneeyanawin 1983, Luksaneeyanawin 1992, Hanpanich 1993, Sudasana na Ayudhaya 2002, Surinpiboon 1985). It should be noted that children develop their language ability to approach the goal of adult language. In the present study, discussion of research findings on Thai adult language will be used for discussion of the developmental path from child language to adult language.

## 1.2 Aims of the Study

The present study aims to investigate the phonological and the lexical aspects of word acquisition in Thai using empirical data from questionnaires and a corpus of adult-child interactions. The adult-child interaction data were collected using a longitudinal approach by following the development of the first words of 10 Thai children from 9 to 24 months of age. Findings from this study will be discussed from both universal and language specific perspectives. The ultimate goal of this study is to elucidate understanding of the contribution of both universal and language specific influences on early lexical acquisition in general, and contribute to our understanding of first language development in Thai in particular.

**Purposes**

This study aims to investigate the development of 9- to 24-month-old Thai children in the following areas:

1. Phonological acquisition,
2. Lexical acquisition,
3. Correlation between characteristics of parental input and children's first words.

**Hypotheses**

1. In the early period of development, children's first words reflect a different phonological system from that of adults. This system gradually changes and moves towards the adult phonological system.

2. Regarding the order of lexical development, semantically, words referring to objects should be acquired before words referring to actions, states, and relations; syntactically, content words should be acquired before function words (Gentner 1982).

3. The specific characteristics of infant-directed speech will determine the domain of words children acquire at every stage of development.

**Scope**

This project is divided into two major studies. In the first study, the phonological aspect of first words is investigated. It includes the examination of syllable structures, consonants, vowels, tones, and the accentual system. In the second study, the lexical aspect of first words is investigated. It includes the examination of onset, rate, lexical categories, and the correlation between parental input and children's first words.

**Contributions**

Findings from this study will contribute

1. Further understanding about first language acquisition in terms of both universal and language specific effects,
2. A useful source of knowledge for further research on other aspects of child language, and
3. Basic knowledge for developing language learning materials for Thai children.

## 1.3 Glossary of Notations and Terms

| | |
|---|---|
| Word Acquisition | Children's state of accessing knowledge about words of the adult language. In this study, word acquisition is divided into two related aspects: phonological acquisition, and lexical acquisition. |

| | |
|---|---|
| Phonological Acquisition | Children's state of accessing the phonological system of their mother language. In this study, the acquisition of phonology is composed of the investigation of syllable structures, consonants, vowels, tones, and the accentual system of children's first words. |
| Normally Developing Children | Children who have normal physical development (e.g. regular development of internal and external organs), motor development (e.g. regular development of motor skill such as, movement of eyes, hands, fingers, legs, etc.), and are not considered as mentally retarded. |
| Parental Input | Parents' —father and mother— speech address to children. In this study, data of parental input were elicited from 10 pairs of parents-child interactions from children's age of 9, 12,15,18, 21, and 24 months. Each session consists of 20-minute videotape. These data were used as instantiations of parent's speech address to children and are used to test the correlation between parental input and children's fist words (see Section 5.3.4). |
| Lexical Acquisition | Children's ability to understand the meaning and to express the phonological form of a particular lexical item consistently |
| Lexical Comprehension | Children's ability to understand partial meanings of a particular lexical item of the adult language |
| Lexical Production | Children's ability to produce the phonological form of the adult target lexical item |
| Lexical Item | A word stored in children's underlying lexicon |
| Frequency | Occurrence of a particular lexical item in normal speech |
| Lexical Categories | Groups of lexical items classified by a particular criterion |
| Lexicon | Knowledge about linguistic forms and their meanings stored in children's brain. In this study, data about children's lexicon is retrieved from parents' perception (through their interaction with children) using a word checklist questionnaire. |
| Semantic Domain | A classification of lexical items according to a semantic paradigm. In this study, the semantic domain of first words consists of three categories: nominals (bounded, concrete animate, and inanimate objects), verbals (actions, states, and properties of 'nominals'), and relations (relations within and between members of 'nominals' and 'verbals' categories). |
| Syntactic Domain | A classification of lexical items according to a syntactic paradigm. In this study, the syntactic domain of first words consists of two categories: content words and function words. |

# Chapter 2
# Literature Review

In this chapter, four main topics will be discussed. For each topic, relevant literature, research problems, and applications for this study will be reviewed. These four topics are:

1. Theories of language acquisition,
2. Milestones of child development,
3. First words: from empirical studies to the universal and the language specific hypothetical explanations,
4. First language acquisition in Thai and studies of Thai adult language

## 2.1 Mainstream Theories of Language Acquisition: A Historical Perspective

Language is said to be a distinctive characteristic discriminating human beings from other species (Aitchison 1989, Chomsky 1959, Deacon 1997, Donald 1991). It is an elaborate symbolic system that is acquired by human infants within a surprisingly short period of time. Questions about the emergence and the acquisition of language have challenged numerous researchers interested in this topic for centuries. Five major theoretical explanations for the acquisition of language have been proposed by Behaviorist, Nativist, Cognitivist, Functionalist, and Interactionist. In these theories, there are two major controversial dimensions related to the process of language acquisition as follows.

Firstly, it has been debated whether language is predominantly shaped by nature or by nurture. A strong version of the nature hypothesis is that language is a predetermined element and unique to human beings, and that children are able to acquire any language to which they are exposed. By nurture, it means that language is acquired through interaction with the environment. This interaction could involve learning processes which are inherent in children biological, cognitive, and social make-up. Input from adults and caretakers is viewed as important in language development.

Secondly, the five theoretical explanations have different points of view about the relationship between language and cognition. Evidence from both inductive and deductive studies including laboratory experiments and careful observations have been used to explain to what extent cognition is involved in language acquisition process and whether there is a causal or an interactive relationship between the two.

In the following section, the five mainstream theories of language acquisition will be reviewed in historical context. The main ideas, counter-evidence, and alternative explanations will be discussed.

### 2.1.1 Behaviorist Approach

The study of language acquisition was of interest for more than a century (Buhler 1931, Preyer 1899, Smith 1926 cited in Ingram 1989). The first major language acquisition theory was proposed by the well-known psychologist B.F. Skinner (1957). Based on laboratory experiments investigating the behaviour of rats in a box, Skinner proposed a theory of learning which involved three important concepts: stimulus, response, and reinforcement. According to this theory, children acquire language through learning exactly the same way as rats learn to get food (reinforcement) when it was hungry (stimulus) by pressing a button (response). In the acquisition of language, demand is an important factor that stimulates children to make responses, i.e. — say some words, while the adults' repetitive input functions as reinforcement.

Skinner finds no difference between human verbal behaviour and a rat's bar-pressing behavior as indicated by:

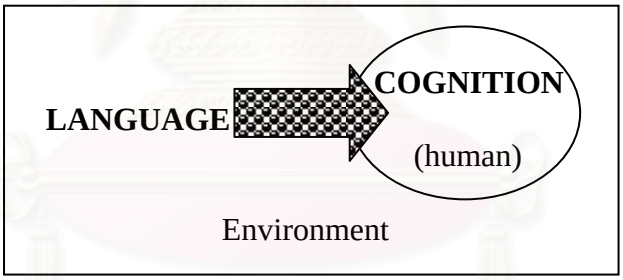
"*The basic processes and relations which give verbal behaviour its special characteristics are now fairly well understood. Much of the experimental work responsible for this advance has been carried out on other species, but the results have proved to be surprisingly free of species restrictions. Recent work has shown that the methods can be extended to human behavior without serious modification.*"

(Skinner 1957: 3)

Skinner's proposal implies that learning and teaching plays an important role in first language acquisition. However, it seems to be limited to one-to-one correspondences between language and desire — one stimulus for one response — which is predictable as in the controlled experiments. This view proposes that children acquire language by learning through imitation — the repetition of adults' production.

In relation to the nature-nurture controversy, behaviorist theory supports the nurture hypothesis of language acquisition, because the theory pays attention to learning and teaching processes. While, it was claimed that children need some basic mental capacity to support their learning, the exact type of mechanism was not identified. According to this perspective, children are viewed as passive learners to whom language is brought by adults.This behaviorist perspective implies that there is a causal relationship between language and cognition (Skinner 1957) with language being acquired via the teaching process of adults and the learning process of children, as depicted in Figure 2.1.

***Figure 2.1 Relationship between language and cognition in the behaviorist's theory***




In Figure 2.1, the rectangle represents children's surrounded '*Environment'* in which *'Language'* is claimed to be existing. The oval represents *'Human's children'* who are claimed to be born with some basic cognition. The arrow pointing to the right, that is from *'Language'* to *'Human'*, means that *'Language'* is brought about from *'Environment'* to '*Children'* as claimed by the behaviorists.

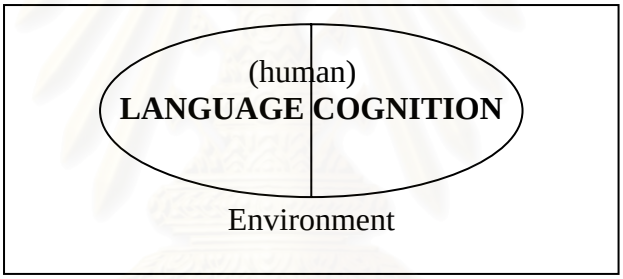
Skinner's explanation of the acquisition of language was vigorously criticized by the linguist Noam Chomsky (1959), who argued that language is too complicated to be compared with simple laboratory experiments of animals. According to Chomsky, the behaviour of the rat in the experiment is totally irrelevant to humans' verbal behavior. In actuality, children can produce many different linguistic forms in order to express the same single desire. For example, if a child is hungry, he might express the meaning in many different ways, e.g., 'eat', 'cake', 'water', 'bread', etc. The relationship between stimulus and response does not need to be one-to-one, but can in fact be a one-to-many relationship. Moreover, if children acquire their mother language from imitative learning, they would be expected to grow up using only grammatical sentences. However, it has been found that children not only produce a number of ungrammatical sentences during

the early period of language development, but also show some evidence of creativity such as, the regularization of irregular plural and past tense forming suffixes like 'fishes' instead of 'fish', and 'goed' instead of 'went' (Aitchison 1989).

### 2.1.2 Nativist Approach

Instead of learning theory, Chomsky (1959, 1965) proposed an alternative theory of language acquisition based on the nativist perspective. The theory states that language originates in humans as part of their biological endowment. Moreover, the language faculty exists independently from other general faculties within the human brain. The evidence to support this claim is that children acquire language in a remarkably short period of time (substantially between 2 and 5 years of age and certainly by 8 years), while their cognition is still not completely developed. The hypothetical innate structure guiding this development was called the "LAD" (Language Acquisition Device), an independent faculty where human's linguistic competence is located. With LAD, children are able to acquire any language they are exposed to during the early period of development. Chomsky claims that the environment is only a minor factor which triggers the linguistic knowledge stored in the LAD at an appropriate time.

***Figure 2.2 Relationship between language and cognition in the nativist's theory***




In Figure 2.2, the rectangle represents children's surrounded *'Environment'*. The oval represents *'Human's children'* who are claimed to be born with two totally separated faculties in the brain *'Language'* and *'Cognition'* as claimed by the nativists.

The nativists' perspective denies the necessity of learning, teaching, and the support function of cognitive development. Following this theoretical explanation, many researchers proposed some additional endowed mechanisms accommodating the language acquisition process. In addition to the abstract and unidentified Language Acquisition Device, biological development seems to be another remarkable piece of evidence to support the view that human beings are born with the ability to acquire language (Donald 1991, Lieberman 1975). From studies of human evolution, it is known that human beings and some species of our ancestors have some special biological features that enable them to speak. These include the speech organs that consist of teeth, lips, tongue, and larynx. These organs are constructed differently from those of other species that lack the ability to pronounce a variety of sounds and to acquire such a complicated symbolic system as language. For example, adult humans (but not young infants), have a lowered larynx, which makes possible a range of articulatory movements and the production of formants in vowels (Lieberman 1975, Lieberman *et al.* 1971)

Although it is convincing that there are some specific capacities that facilitate humans' acquisition of language, clear identification of the LAD has not been specified. In addition, a number of studies on the relationship between parental input, child language, and brain functions have found counter-evidence against some notions of the

nativists' theory. Many studies on parental input report that adults' speech addressed to children has the following specific characteristics — simpler, shorter, slower speech, and higher pitch and higher pitch modulation than normal speech addressed to other adults, and this is thought to facilitate the learning of language by children (Kitamura *et al.* 2002, Luksaneeyanawin *et al.* 1998, Rukkharangsarit 1998, Sittigasorn 1997, Snow & Ferguson 1977, Thanavisuth 1997, Thanavisuth & Luksaneeyanawin 1998). Moreover, it has also been found that the types of words used in adults' speech correlates to the types of words children acquire during early language development (Gopnik & Choi 1995, Tardif *et al.* 1997). This research implies that adults' language plays an important role in first language acquisition and that language is not completely innate.

Recent research on neurolinguistics using Neural Imaging technique — which investigates the activation of the brain in relation to human behavior — has found associations between language and other general cognitive functions in the same area of the human brain (Boysson-Bardien, 1999). According to Boysson-Bardien, the front and the posterior regions of the left hemisphere — Broca's area, and Wernicke's area — play a role in language production and comprehension respectively. They are not the only regions which are activated when language is used. Other areas in the right hemisphere which are mainly responsible for other general cognition — such as, motor movement control — are also activated when we speak. This latter evidence is important in arguing against the independent nature of language processes claimed from the nativists.

### 2.1.3 Cognitivist Approach

Cognitivist or experientialist theory was first proposed by the well-known psychologist Jean Piaget (1953). This theory gained much interest from linguists and psycholinguists after they found that language is not independent from cognition and that innateness theory could not account for language acquisition completely. The main idea of cognitivists' theory of language acquisition is that cognitive development is a necessary fundamental step for the acquisition of a first language and that the development of language is just one aspect of general cognitive growth from the point of view of this theory. Piaget accepted that learning is a prerequisite for the development of human cognition. As a consequence, without cognition, language would not be acquired.

From intensive observation of his own three children, Piaget postulated four stages of children's cognitive or intellectual development, the sensori-motor stage, pre-operational stage, concrete operations stage, and formal operations stage. Cognitive developments in the first two stages were said to be mainly responsible for the acquisition of language (Piaget 1953) .

In the sensori-motor stage — from birth to 18-24 months, children start to explore reality through their sensory and motor mechanisms, which include gazing, sucking, and touching. During this stage, two important concepts for children's cognitive development were postulated: assimilation and accommodation. Assimilation is when a new object is made the target of a particular sensori-motor perception — for example, shifting from sucking a nipple to sucking one's own thumb. The term 'accommodation' is used to describe the way a particular sensori-motor mechanism adapts to different objects. For example the lips adapt to sucking different objects such as, an adult's fingers and a nipple. From these mechanisms, children develop a number of different concepts about objects, actions, states, and relations, but still lack productive ability.

After the sensori-motor stage, children's cognition develops to the pre-operational stage — lasting from 18-24 months to 5-6 years. During this stage, concepts that have been developed during the sensori-motor stage are mapped on to symbolic forms and children can tell us more about how they conceive of the world using words.

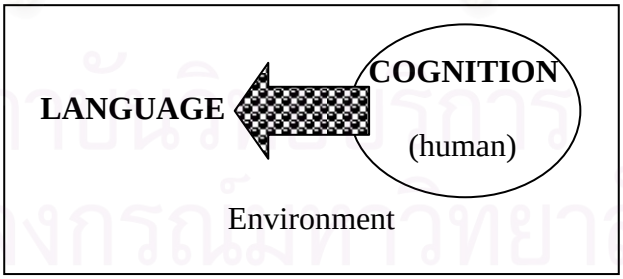
In the concrete operations stage and formal operations stage, language is much more developed to the extent that children can communicate effectively with adults. However, Piaget did not explicitly explain language development after the pre-operational stage. It might be because from his point of view, language is just an aspect of cognitive development and he mainly concentrated on cognitive growth rather than language development.

Supporting Piaget's theory, Gopnik and Meltzoff (1987) and Gopnik & Choi (1995) reported a causal relation from cognitive to language development. From an experimental study of the relationship between cognitive and language development, it was found that children acquire particular cognitive abilities prior to particular linguistic concepts. They understand the existence of objects (object permanence) before developing extensive semantic concepts of object to other object referents. Moreover, children acquire how to achieve a certain goal (means-ends achievements) by a certain means before developing semantic concepts of action. Finally, children realize the concept of categorization before developing naming ability which eventually facilitates them in acquiring a large number of new vocabulary items. These causal relationships are demonstrated in Table 2.1.

***Table 2.1 Causal relationships from cognitive to language development***
(Adapted from Gopnik & Meltzoff 1987)

| Cognitive Development | Language Development |
|---|---|
| 1. Development of object permanence (concepts about objects) | → Development of object words |
| 2. Development of means-ends achievements (concepts about actions) | → Development of action words |
| 3. Development of categorization (concepts about classification) | → Development of naming explosion |

***Figure 2.3 Relationship between language and cognition in the cognitivist's theory***




In Figure 2.3, the rectangle represents children's surrounded *'Environment'* in which *'Language'* is claimed to be existing. The oval represents *'Human's children'* who are claimed to be born with some basic *'Cognition'*. According to cognitivist's perspective, cognition is an important factor for language acquisition, as illustrated from the left-turned arrow.

Therefore, cognitive theory focuses its attention primarily on cognition which later in development extends to the acquisition of language. Cognitive theory supports the nurture hypothesis by indicating the role of learning and experience. However, it can be claimed that Piagetian theory focuses too much on the role of cognition and ignores other

external factors, especially the social interaction, that might be important for the acquisition of language. Later research on speech addressed to children (Gopnik & Choi 1995, Kitamura *et al.* 2002, Luksaneeyanawin *et al.* 1998, Rukkharangsarit 1998, Sittigasorn 1997, Snow & Ferguson 1977, Tardif *et al.* 1997, Thanavisuth 1997, Thanavisuth & Luksaneeyanawin 1998) indicates that adults' language is an important factor in children's acquisition of language as discussed in 2.1.2. Moreover, some experimental studies have revealed that in acquiring language children not only require many cognitive abilities e.g., understanging objects, other persons, and the self (Tomasello 1999) but also interaction among themselves and with other adults (Tomasello 1999, Vygotsky 1962). Language acquisition does not appear to be simple and straightforward, but rather, a complicated process. Children do not only develop their cognition and then acquire language by themselves but also figure out some properties of language through their interaction with others. Therefore, the cognitivists' theory fails to incorporate other external factors and the interaction between language and cognition.

### 2.1.4 Functionalist and Interactionist Approach

The functionalists' and the interactionists' approach have agreed upon the fact that social interaction between children and their surrounding environment is an important factor for language acquisition. However, in details, the functionalists' approach pays more attention to the function of language, the use of language in communicating one's needs, and maintaining the relationship among members in a certain community. Halliday (1975) claimed that the way children acquire their first language is the way they learn how to mean. From the study of his own son, named 'Nigel', acquiring language, Halliday found that Nigel produced some certain syllable-like sounds in order to express certain meaning consistently. According to this, he proposed six functional concepts — Instrumental, Regulatory, Interactional, Personal, Heuristic, and Imaginative — and claimed that his son has acquired these concepts orderly (see Section 2.3.2 d)).

In relation to the interactionists' approach, it should be noted that this approach is based on the assumption that the interaction process facilitates children in acquiring their mother language. The term 'interaction' is broadly used to refer to the interaction within one speaker and the interaction among many speakers including inanimate entities. Vygotsky (1962) claimed that young children around the onset of lexical development try to interact with themselves by thinking out loud. Such behavior is normally known as 'egocentric speech'. It was previously believed that children who produce 'egocentric speech' had not acquired language, as their expressions were considered meaningless (Piaget 1953). However, from his systematic experiments and intensive observation, Vygotsky concluded that 'egocentric speech' is a meaningful and important device that facilitates children solving problems. Their egocentric speech reflects what they are thinking and their attempted solutions to particular problems. When children grow up, 'egocentric speech' is internalized as thinking and synthesizing.

Tomasello and Farrar (1986) and Tomasello (1999) explicitly explain the role of interaction in language acquisition. From his experimental studies on early lexical development in 1992, Tomasello claimed that in order to acquire a particular lexical item, children must understand the relationship between the target object, the person who participates in that situation, and the existence of themselves. Moreover, they must focus their attention on certain objects and not on others. He proposed a triadic relation between three main participants in a particular setting — that directly relates to children's language acquisition — which he termed 'joint attention', as shown in Figure 2.4.

***Figure 2.4 Joint attention***
(Adapted from Tomasello 1999)

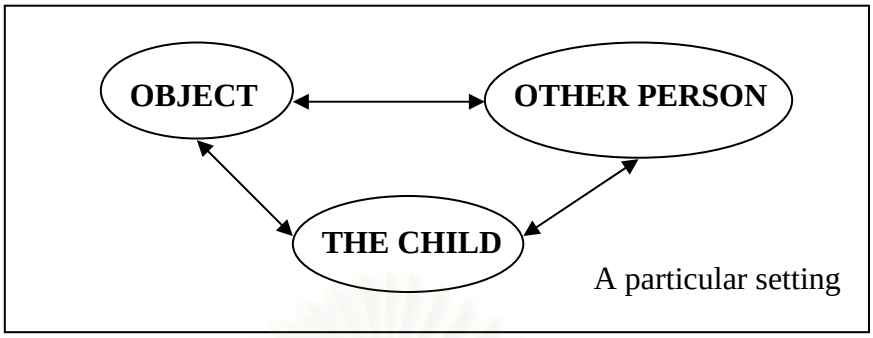
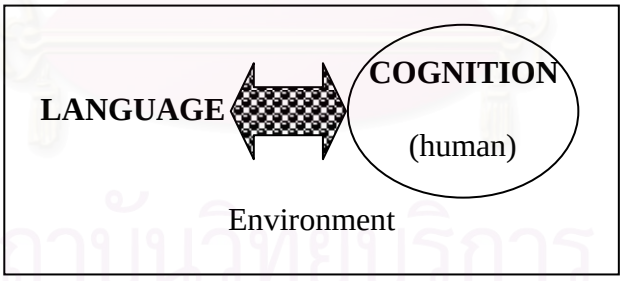



Figure 2.4 illustrates 'joint attention' as described by Tomasello (1999). The three ovals represent three important participants in joint attention: *'Object'*, *'Other person'*, and *'The child'*. These three participants are interacting (as illustrated by bi-directioned arrows) within '*A particular setting*' (as illustrated by the rectangle). Through such interaction, the child would be able to understand the existing and the relationship among the participants and consequently acquired linguistic forms used to express these concepts.

Interactionists support the nurture hypothesis. In addition to the internal and the external interactions, findings from the correlation between parental input and children's word acquisition discussed in 2.1.2 implies that the relationship between language and cognition is bi-directional, i.e., not only cognitive processes, but the language addressed to children is involved in the process of first language acquisition.

***Figure 2.5 Relationship between language and cognition in the functionalist's and the interactionist's theory***




In Figure 2.5, the rectangle represents children's surrounded 'Environment' in which 'Language' is claimed to be existing. The oval represents 'Human's children' who are claimed to be born with some basic 'Cognition'. The bi-directioned arrow represents the interactional process which plays an important role in language acquisition as claimed by the functionalists and the interactionists.

The above review of mainstream theories of language acquisition depicts the historical development of concepts, arguments, and explanations about language acquisition. It was obviously found that the process of language acquisition is complex. Different aspects of data and research topic could possibly lead to different theoretical conclusions about this phenomenon. This is an important fact reminding researchers of language acquisition to be aware of when dealing with some empirical data, experiments, observations, and a number of different methods. What has been learnt from these

controversies will be used to form the basis for the investigation of first words development of Thai children in this study.

**2.2 Milestones of Child Development**

Language does not develop independently of any relationship with other aspects of human development. Owen (1988) claimed that there are at least three other aspects of development related to language. These four are related, but separate, developmental areas: physical, cognitive, socioemotional, and communicative growth.

Physical development refers to physical growth and motor control, such as the development of body parts, hand and finger control, sitting, standing, walking, running, jumping, balancing, etc. It involves children exploring their surrounding world with their sensori-motor skills.

Cognitive development refers to intellectual growth. It includes the developing ability to comprehend, recognize, store, retrieve, and organize information received through perception. Information about the surrounding world is perceived and interpreted differently depending on children's past experiences. Owen (1988) claimed that cognitive development also relates to an increase of brain weight.

Socioemotional development refers to children's participation and maintenance of social relations with other people in a community. It includes children's preference for particular games, people, group activities, and their cooperation with others in everyday activities. Socioemotional development relates to language development in the sense that children gradually become members of a particular community and acquire some conventionalized culture-specific traditions, including the language of that community.

Communicative development includes to the development of understanding and use of any particular symbolic system in communication. It includes the consistent use of gesturing, cooing, and babbling developed by children themselves, and the use of adults' linguistic symbols. It should be noted that the level of communicative development is also dependent on the attainment of certain motor, cognitive, and social skills.

Table 2.2 shows the milestones of child development in the four developmental areas, as a function of age.

***Table 2.2 Milestones of child development*** (Adapted from Owen 1988)

| Age (Months) | Physical Development | Cognitive Development | Socioemotional Development | Communicative Development (+Language) |
|---|---|---|---|---|
| 3 | - Controls body voluntarily<br>- Swallows voluntarily<br>- Reaches and grasps | - Glances smoothly between objects<br>- Explores own body | - Has selective social smile<br>- Exhibits gregarious behavior | - Coos<br>- Turns head when hears a voice<br>- Responds vocally to speech of others<br>- Makes predominantly vowel sounds |
| 6 | - Turns head freely<br>- Sits straight when slightly supported or in chair<br>- Reaches with one arm, grasps, and brings to mouth | - Looks and reaches smoothly and quickly<br>- Inspects objects<br>- Reaches to grab dropped objects | - Differentiates social responses<br>- Prefers people games<br>- Explores face of person holding him | - Babbles resembling one-syllable utterances<br>- Varies volume, pitch, and rate<br>- Vocalizes pleasure and displeasure |
| 9 | - Stands alone briefly<br>- Sits unsupported<br>- Explores with index finger<br>- Removes and replaces bottle | - Recognizes object dimensions<br>- Uncovers object if observes act of hiding first<br>- Anticipates outcome of events and return of persons | - Explores other babies<br>- Imitates play<br>- Plays action games | - Produces distinct intonational patterns<br>- Imitates coughs, hisses, tongue clicks, etc.<br>- Uses social gestures<br>- Uses jargon |
| 12 (1 year) | - Stands alone<br>- Climbs up and down stairs<br>- Has complete thumb apposition<br>- Takes first steps with support | - Reaches while looking away<br>- Uses common objects appropriately<br>- Searches in location where an object was last seen | - Expresses people preferences<br>- Expresses many different emotions | - Recognizes own name<br>- Follows simple motor instructions<br>- Speaks one or more words<br>- Practices words he knows |

| Age (Months) | Physical Development | Cognitive Development | Socioemotional Development | Communicative Development (+Language) |
|---|---|---|---|---|
| 15 | - Walks a few steps backwards and sideways<br>- Carries objects in both hands<br>- Throws ball with elbow extension<br>- Takes off shoes and socks | - Imitates small motor acts | - Looks for adults when left alone<br>- Likes music and dancing<br>- Imitates housework<br>- Begins make-believe play | - Points to objects named<br>- Uses jargon and words in conversation<br>- Has four- to six-word vocabulary |
| 18 | - Walks up stairs with help<br>- Walks smoothly, runs stiffly<br>- Throws and catches without falling<br>- Jumps with both feet off floor | - Recognizes pictures<br>- Recognizes self in mirror<br>- Remembers places where objects are usually located<br>- Imitates adult object use | - Explores reactions of others<br>- Enjoys solitary play<br>- Pretends to feed doll | - Begins to use two-word utterances<br>- Has approximately 20-word vocabulary<br>- Identifies some body parts<br>- Refers to self by name<br>- Plays question-answer |
| 21 | - Walks up and down stairs with help of railing or hand<br>- Jumps, runs, throws, climbs<br>- Unzips<br>- Fits things together | - Knows shapes<br>- Sits alone for short periods with book<br>- Notices little objects and small sounds | - Hugs spontaneously<br>- Plays near but not with other children<br>- Likes toy telephone, doll, and truck for play | - Likes rhyming games<br>- Pulls person to show something<br>- Tries to “tell” experience<br>- Understands some personal pronouns |
| 24 (2 years) | - Walks smoothly<br>- Runs rhythmically but unable to start or stop smoothly<br>- Walks up and down stairs alone<br>- Tiptoes for a few steps<br>- Pushes tricycle<br>- Eats with fork | - Matches familiar objects<br>- Comprehends *one* and *many* | - Performs role play in limited manner<br>- Prefers action toys<br>- Cooperatives with adults in simple household tasks<br>- Communicates feelings, desires, and interests | - Has 200- to 300-word vocabulary; names most common everyday objects<br>- Uses short, incomplete sentences<br>- Uses some prepositions, pronouns, and regular inflections but not always correctly |

| Age (Months) | Physical Development | Cognitive Development | Socioemotional Development | Communicative Development (+Language) |
|---|---|---|---|---|
| 36 (3 years) | - Walks up and down stairs without assistance<br>- Balances momentarily on one foot<br>- Rides bicycle | - Creates representational art: one shape represents several things<br>- Enjoys make-believe play | - Plays in groups<br>- Shares toys for short periods<br>- Takes turns | - Has 900-1,000-word vocabulary; creates 3-4 word sentences<br>- Uses simple sentence construction (SVO)<br>- Talks about the present<br>- “Swears” |
| 60 (5 years) | - Has gross motor control<br>- Creates more recognizable drawings<br>- Prints simple words<br>- Has established hand preference | - Carries a rule through a series of activities<br>- Counts to 13<br>- Develops time concepts | - Plays simple games<br>- Shows interest in group activities<br>- Plays purposefully and constructively | - Has vocabulary of 2,100-2,200 words<br>- Discusses feeling<br>- Has 90% grammar acquisition |
| 8 years | - Has longer arms, larger hands, and better manipulative skills<br>- Has nearly mature-size brain<br>- Has more permanent teeth | - Knows left and right of others<br>- Knows differences and similarities | - Enjoy an audience<br>- Has allegiance to gang, but also strong need for adult support | - Talks a lot<br>- Verbalizes ideas and problems readily<br>- Communicates thought |
| 10 years | - Has eyes of almost mature size<br>- Has almost mature lungs and digestive and circulatory systems | - Plans future actions<br>- Solves problems with only minimal physical input | - Enjoys games, sports, hobbies<br>- Discovers that he may be the object of someone else’s perspective | - Spends a lot of time talking<br>- Has good comprehension |
| 12 years | - Begins rapid muscle growth with puberty | - Engages in abstract thought | - Has different interests than those of the opposite sex | - Has 50,000-word receptive vocabulary<br>- Constructs adultlike definitions |

## 2.3 First Words: From Empirical Studies to the Universal and the Language Specific Hypothetical Explanations

In this section, relevant studies on the acquisition of words in the early period of language development are reviewed. Findings from research on early lexical development have led to two perspectives in relation to the process of language acquisition: universal and language specific hypotheses. The universal hypothesis states that in acquiring their mother language, children follow the same steps of development regardless of linguistic environment, while the language specific hypothesis suggests that the specific characteristics of particular languages are important in determining children's acquisition of their first language.

### 2.3.1 What are "First Words"?

When children start to produce some adult-like linguistic forms to express meaningful concepts intentionally and consistently, they are normally said to have started to acquire language. The first set of words acquired by children are traditionally called "first words" (Ingram 1989, Clark 1993). Children's "first words" include the first word, and other accumulative vocabulary they acquire over development. However, the length of the "first words" period has not been exactly pinpointed. Rather, researchers have arbitrarily determined the scope of their studies according to children's age (Bates *et al.* 1995, Goldfield & Reznick 1990, Smith 1926 cited in Ingram 1989), and the number of vocabulary items in a child's lexicon (Benedict 1979, Buhler 1931 cited in Ingram 1989).

### 2.3.2 The Characteristics of "First Words"

Below, early lexical development will be discussed in terms of the following four linguistic levels: phonological, lexical, semantic, and pragmatic.

#### a) Phonological Development

Phonological development is the developmental study of phonological system in child language. It has been reported that, regardless of the mother language, children's early words are limited to some common characteristics of the adult language (Ingram 1968, Ingram 1989, Jacobson & Hale 1956 cited in Ingram 1989, Locke 1983, Luksaneeyanawin 1976, Tuaycharoen 1977). In terms of phonological structure, "first words" are normally monosyllabic or disyllabic, with simple syllabic structures, such as CV as in /ma/ 'mother', CVC as in /mam/ 'to eat', or CVCV as in /dada/ 'father'. In terms of phonological class, children's production ability is also limited to some groups of sound, such as stops and nasals.

During the period that children start to acquire their "first words", their speech organs, i.e. teeth, tongue, oral cavity, nasal cavity, and larynx are not yet fully developed in comparison to those of the adult (Lieberman 1975, Lieberman *et al.* 1971). Consequently the variety of sounds employing flexibility of speech organs cannot be correctly produced. For this reason, many researchers believe that the phonological characteristics of child language during the early period of development must be universal. As a consequence, phonological characteristics of children's early words based on the universal hypothesis have been proposed (Ingram 1989). The first universal-based theory of phonological development was proposed by the Russian linguist Roman Jacobson (1941/68, Jacobson & Halle 1956 cited in Ingram 1989). The theory states that phonemes of language can be divided into a universal set of distinctive features which are part of the child's innate linguistic capabilities. The acquisition of the phonological system involves the acquisition of these features in a predictable sequence (Ingram 1989).

Table 2.3 demonstrates some predicted order of acquisition made by Jacobson (1941/68 cited in Ingram 1989)

***Table 2.3 First stage of phonological development***
(Adapted from Jacobson 1941/68 cited in Ingram 1989)

| **Predicted Order of Early Phonological Development** |
|---|
| 1. The acquisition of vowels and consonants develops from a basic CV syllable which contains a forward articulated stop, and a wide vowel: it may appear singly, e.g. 'pa', or reduplicated, e.g. 'papa'.<br>2. The appearance of the first consonantal opposition, nasal vs. oral, e.g. 'papa', 'mama'<br>3. The appearance of the second consonantal opposition, labial vs. dental, e.g. 'papa' vs. 'tata', 'mama' vs. 'nana'<br>4. The appearance of the first vocalic opposition, narrow vs. wide vowel, e.g. 'papa' vs. 'pipi'<br>Minimal consonant system: m - n, p – t<br>Minimal vowel system: i u (or) i<br>a e<br>a |

Locke (1983) made similar predictions, but also provided more details about the different phonological classes. In addition, other groups of researchers found that children normally modify adults' words and fit them into their phonological system — the limited range of sounds they can produce (Ingram 1986). Based on the universalist perspective, such "phonological processes" were proposed and are shown in Table 2.4.

***Table 2.4 Examples of phonological processes***
(Adapted from Ingram 1986)

| Process | Adult Form | Child Form | Source |
|---|---|---|---|
| 1. Substitution | | | |
| a) Stopping | Hungarian /vira:g/ | [bija:g] | Kerek (1975) |
| b) Fronting | Polish /dzembi/ | [z´embi] | Zarebina (1965) |
| c) Gliding | English /læp/ | [jæp] | Ingram (1979) |
| 2. Assimilation | | | |
| a) Voicing | French /popo/ | [bobo] | Bloch (1913) |
| b) Consonant harmony | English /dʌk/, /sɔk/, /tʌŋ/ | [gʌk], [gʌk], [gʌn] | Ingram (1979) |
| 3. Syllable Structure | | | |
| a) Cluster reduction | Estonian /klaun/ | [kaumn] | Ingram (1979) |
| b) Final consonants deletion | English /baik/ | [bai] | Ingram (1979) |
| c) Unstressed syllables deletion | Romanian /pa´pu`ʃa/ | [puʃa] | Vogel (1975) |
| d) Reduplication | French /butʃ/ | [bubu] | Ingram (1979) |

Although many studies have concentrated on the universal aspect of phonological development, some cross-linguistic studies indicate that language specific characteristics of adults' language also influence the child's phonological system. Pye *et al.* (1987) in a comparative study of phonological development between English- and Quiche-acquiring children found that English and Quiché children acquire different sets of initial consonants. The first fricative acquired by Quiché children is /x/, whereas English children first acquire /f/ and /s/. At the same age, Quiché children already acquired /l/ and /tʃ/, while none of the English children were able to produce these sounds. In addition, it was found that the frequency of initial consonants occurring in the input of the two languages correlates with initial consonants acquired by Quiché and English children. The frequency of /l/ and /tʃ/ is high in Quiché data, but is quite low in English. This indicates the influence of the input on children's acquisition of the phonological system.

Findings from studies of stress in Spanish (Hochberg, 1988) and German (Wijnen *et al.* 1994) also indicate that children are developing their linguistic system toward that of the adult. They found that once children learn a regular pattern of stress in their particular mother language, they tend to apply that rule to other irregular words. Moreover, their production of adults' polysyllabic words is mostly monosyllabic or disyllabic. Such production also relates to stress patterns in the adult language as shown in the following examples.

| **Adults' forms** | **Glossaries** | **Child's forms** |
|---|---|---|
| /ˈsɛncjəs/ | 'coins' | [sɛ] |
| /ˈɔndər/ | 'under' | [ɔn] |
| /ˈsikəˈhʌys/ | 'hospital' | [sikhʌys] |
| /ˈfraxtˈauto/ | 'lorry' | [fraxaut] |

(Productions of German children: adapted from Wijnen *et al.* 1994)

Therefore, research in phonological development suggests that, regardless of the linguistic environment, children are born with limited capabilities in production. However, as they grow, the linguistic environment seems to shape their phonological system to be similar to, and finally the same as, the adult language system.

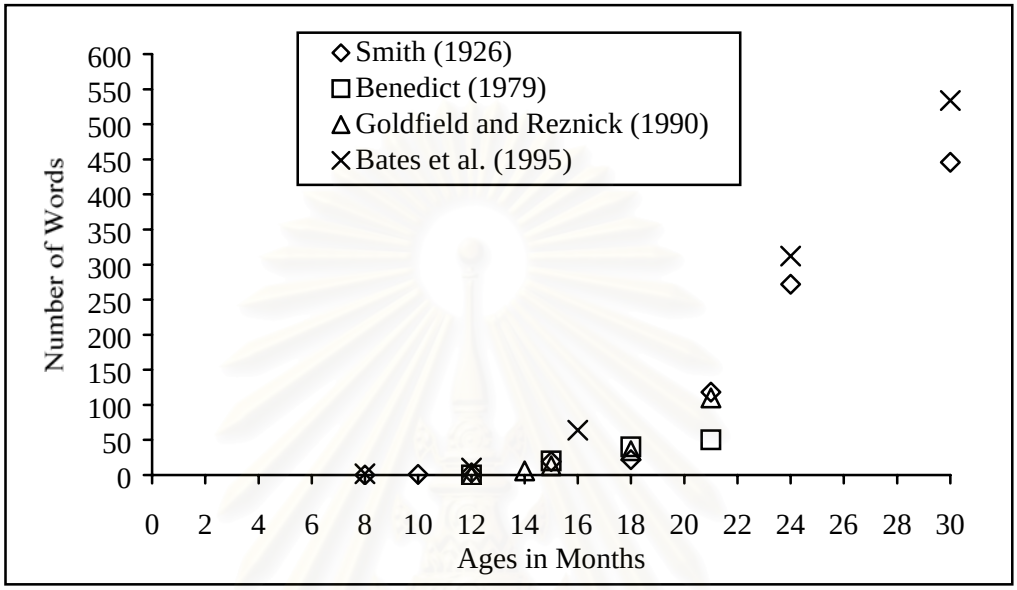
**b) Lexical Development**

The study of lexical development traditionally deals with the measurement of children's vocabulary (Benedict 1979, Dromi 1999, Fenson *et al.* 1994, Goldfield & Reznick 1990). The number of vocabulary words reported regularly represents the number of lexical items in children's underlying lexicon. Research questions normally asked by researchers of lexical development are: When do children acquire their first word? How does children's vocabulary develop? What are the semantic characteristics of "first words"? and What is the relationship between comprehension and production in lexical acquisition?

Empirical studies show that lexical development is a complicated phenomenon. One cannot pinpoint the exact characteristics of children's lexical development, because children vary so much in their development. However, from such variation, a clear description of the child's lexicon emerges. It has been reported that generally children start to acquire their first word at around 12 months. However, the onset of lexical development could range from eight (Bates *et al.* 1995) to 14 months (Goldfield &

increases. Figure 2.6 demonstrates number of words acquired by children in early lexical development as reported in Bates et al. (1995), Benedict (1979), Goldfield and Reznick (1990), and Smith (1926).

***Figure 2.6 Number of words acquired by children in early lexical development***
(Adapted from Bates *et al.* 1995, Benedict 1979,
Goldfield & Reznick 1990, Smith 1926)




From Figure 2.6, it can be seen that the number of words in children's lexicon increases over time. However, the rate of development is different. From around eight to 18 months, results from the four studies seem to agree that new words are gradually accumulated into the child lexicon. Goldfield and Reznick (1990) reported that children encounter around 1.79 new words per week until 18 months. After 18 months of age the rate increases to 8.32 new words per week. The acceleration of rate of lexical acquisition is known as the "vocabulary spurt", or "vocabulary explosion" (Clark 1993, Dromi 1999, Goldfield & Reznick 1990). However, there is no agreement upon the exact age of the "vocabulary explosion" nor whether this phenomenon occurs for all children (Dromi 1999). Moreover, some reports from longitudinal studies have found that children possibly have different paces of lexical learning (Clark 1993, Dromi 1999, Goldfield & Reznick 1990). Some children might either start to acquire their first words or enter the period of vocabulary explosion before 18 months, whereas some children gradually acquire new vocabulary and extend their "vocabulary explosion" three to nine months later.

Regarding the distribution of early words in various word classes, studies from a number of languages such as, English, German, Turkish, Japanese, Kaluli, Mandarin, Korean, Italian, etc. report that "first words" mostly consist of "nominals", or object words (Au *et al.* 1994, Benedict 1979, D'O Dorico *et al.* 2001, Dromi 1999, Gentner 1982, Goldfield & Reznick 1990, Kim *et al.* 2000). This is traditionally called the "noun-bias" phenemonon (Tardif *et al.* 1997, Tardif *et al.* 1999). As an explanation about "noun-bias", Gentner (1982) proposed the "Natural Partitions hypothesis" as follows.

*"…the Natural Partitions hypothesis, holds that: (1) the linguistic distinction between nouns and predicate terms, such as verbs and preposition, is based on a preexisting perceptual-conceptual distinction between concrete concepts such as persons or things and predicative concepts of activity, change-of-state, or causal relations; and (2) that the category corresponding to nouns is, at its core, conceptually simpler or more basic than those corresponding to verbs and other predicates…"*

(Gentner 1982: 301-2)

In short, semantic characteristics of nouns, or nominals are more concrete, static, and easily perceivable than those of other categories. As a consequence, children are able to acquire a large number of words that refer to entities, such as objects, people, animals, places, etc. during the early period of lexical development.

However, some studies have found that "nominals" do not necessarily comprise the largest proportion of the children's lexicon. Gopnik and Choi (1995) found from a comparative longitudinal study between English- and Korean-speaking children that English children learn more object words than action words, whereas Korean children learn more action words than object words. Further examination of the correlation between parental input and children's "first words" found that Korean mothers talk about actions with their children much more frequently than English mothers do. This is an important piece of evidence which suggests that not only the internal characteristics of language (Gentner 1982) but also the external characteristics of parental input — which differ from language to language — influence the types of words children acquire. Further discussion of the correlation between parental input and children "first words" was given in Section 2.3.3 (c).

With regard to the relationship between comprehension and production in lexical development, it has been reported that children can understand some partial meanings of words before being able to produce them (Bates *et al.* 1995, Benedict 1979, Fenson *et al.* 1994). From a longitudinal observation, Benedict found that children in her study already comprehended 40-150 words, when they produced their first word. Many studies based on parental reports also confirm the precedence of comprehension over production (Bates *et al.* 1995, Fenson *et al.* 1994, Hamilton *et al.* 2000).

**c) Semantic Development**

Semantic development traditionally refers to the study of acquisition of word meaning by children. It differs from the investigation of "first words" distributed among lexical categories, or word classes i.e. nominals, predicates, relations, in the sense that semantic development focuses on the scope of referents denoted by "first words". It has been reported that children use a particular word to refer to various types of referents (Berrett 1995, Dromi 1999, Ingram 1989). From a synchronic perspective, it has been found that semantic characteristics of early words can be described in terms of semantic extension.

Dromi (1999) classified semantic extensions of children's early words into four types: regular extension, underextension, overextention, and unclassified extension. "Regular extension" is the use of a particular word to refer to similar referents as that of the adult as shown in Table 2.6 (A). "Underextension" is the use of a particular word to refer to a specific referent partially related to some aspect of the adult's use as shown in Table 2.6 (B). "Overextension" is the use of a particular word to refer to some similar referents as that of the adult, and some other referents which have semantic similarity with the referent of the original word as shown in Table 2.6 (C). "Unclassified Extension"

is the use of a particular word to refer to some referents which do not have any semantic similarity with the referent of the original word as shown in Table 2.5 (D).

**Table 2.5 Examples of the four categories of extensions in early lexical development**
(Adapted from Dromi 1999)

| Words | Referents | Sources |
|---|---|---|
| **A. Regular Extension** | | |
| oto 'car' | daddy's car, noise of a car, toy cars, pictures of cars in books | Dromi 1987, 1996 |
| ball | tennis balls, large colorful balls, a beach ball | Berrett 1986, 1995 |
| open | as a request by the child for: a door, a jar, a box of cookies to be opened | Tomasello 1992 |
| **B. Underextension** | | |
| bottle | plastic baby bottles only | Anglin 1983 |
| pil 'an elephant' | a blue toy elephant only | Dromi 1987, 1996 |
| halax 'walked' | while walking in mother's shoes only | Dromi 1987, 1996 |
| **C. Overextension** | | |
| dog | dogs, lambs, cats, wolves, cows | Anglin 1983 |
| peca 'wound' | cuts, wounds, Schoth-tape, dark spots on fabrics and balloons | Dromi 1987, 1996 |
| tik 'a handbag' | folders, nylon bags, plastic sacks, boxes a hat upside down, pockets | Dromi 1987, 1996 |
| **D. Unclassified** | | |
| niyar 'a paper' | pencils, pens, pieces of paper, a sticker on a container of food, newspapers | Dromi 1987, 1996 |
| dod 'an uncle' | strangers we met in the street, any loud noises, barking of dogs, hitting of objects, visitors at the house | Dromi 1987, 1996 |
| bow-wow | sound of barking, birds chirping, car and airplane engines, sight of dogs or car | Braunwald 1978 |

In terms of development, it has been found that the order of semantic extension in children varies greatly (Berrett 1995). Underextended words developed into overextended words in some children, but in some cases, the order of development is reversed. However, as children develop and they learn more vocabulary items, semantic extension is finally developed to "regular extension" (Berrett 1995). Findings from the study of semantic development indicate that children's pathway of language development progresses toward that of adults' language.

**d) Pragmatic Development**

Pragmatic study of "first words" concentrates on the use of words in some particular communicative contexts. It has been found that children do not only use words to refer to some particular referents, but also to express some communicative functions,

such as requesting, asking, ordering, etc (Griffiths 1986). It should be noted that because the number of words in their lexicon is limited, children's use of words serves either referential, semantic, communicative, or pragmatic functions.

The most intensive study of pragmatic development is reported by Halliday (1975). He focused on linguistics and the function of language and supported the notion that children acquire language through interaction. Halliday found that his son — Nigel — created his own language to communicate with him consistently. He proposed six functional concepts developed by Nigel from nine to 18 months: instrumental, regulatory, interactional, personal, heuristic, and imaginative functions (see Table 2.6). Moreover, it is claimed that these six functional concepts are arranged in consecutive order from the easiest concept — instrumental function — to the most difficult concept — imaginative. In terms of development, Nigel also acquired these concepts in the same order.

***Table 2.6 Six functional concepts underlying early word use***
(Adapted from Halliday 1975)

| Functions | Examples of Production | Glossaries |
|---|---|---|
| 1. Instrumental function: used to satisfy the child's needs to obtain goods or services | ʔnã--- (mid)<br>yi (high level) | 'give me that'<br>'yes I want that' |
| 2. Regulatory function: used to control the behavior of others | m̃nŋ (wide; ff)<br>ã ã (mid on both) | 'do that right now!'<br>'no don't (let's) do that' |
| 3. Interactional function: used to interact with those around the child | da; dada (high level)<br>ʔɛː (long low) | 'Daddy!'<br>'yes it's me', 'yes I see' |
| 4. Personal function: used to express the child's own uniqueness | da (mid low)<br>ba (mid low) | 'a dog!'<br>'birds!', 'a bus!' |
| 5. Heuristic function: used to explore the environment | aː : da; adʸ (--)<br>(mid rise or step up + fall)<br>imitation of name (mid fall) | 'look, what's that?'<br><br>'It's a …' |
| 6. Imaginative function: used by child to create its own environment | ʤwɣi--- (narrow low)<br><br>bʷɛ--- (high sung) | 'let's pretend to go to sleep'<br>''tra la la' (song) |

### 2.3.3 Factors Determining the Characteristics of "First Words"

Findings from different aspects of "first words" provide three important insights into factors of word acquisition: biological factors, cognitive factors, and parental input.

#### a) Biological Factors

The most obvious evidence supporting the importance biological factors in word acquisition is children's early productive ability. Incomplete development of speech organs delimits children's production of their mother language to particular phonological elements (Ingram 1986, Lieberman *et al.* 1971, Locke 1983, Tuaycharoen 1977). In addition to speech organs, motor development — hands, fingers, arms, legs — is another important basic factor facilitating children's exploration of their surrounding environment. The influence of biological factors in word acquisition supports the universal hypothesis

of language acquisition. However, it should be noted that many studies indicate the role of biological factors in the acquisition of language during early period of development.

**b) Cognitive Factors**

Many studies of the relationship between cognitive and language development suggest that cognition is another important factor for children's acquisition of their "first words". Gopnik and Meltzoff (1987) found that the development of certain cognitive abilities is a necessary prerequisite for word acquisition (see Table 2.1). For example, the development of the concept of categorization has been shown to be an important factor for the acceleration of vocabulary in the child's lexicon. In addition, the acquisition of "joint attention" — understanding objects, persons, and the self (see Figure 2.4) — is an important step of cognitive development facilitating children's acquisition of their "first words" (Tomasello 1999, Tomasello & Farrar 1986).

**c) Parental Input**

As the target language, it cannot be denied that adult language is another important factor in child language acquisition. It has been reported that language addressed to children differs from that addressed to other adults (Ferguson 1978, Snow & Ferguson 1977, Thanavisuth 1997). It is simple, easily recognizable — shorter, slower, has higher pitch than adult-directed speech, and has didactic functions facilitating children's acquisition of their mother language

In addition, as the target of acquisition, children develop their language toward that of the adult. In relation to phonology, children acquire different phonological systems of the target mother language such as phonemes (Pye *et al.* 1987), and accentual patterns (Hockberg 1988, Wijnen *et al.* 1994). Moreover, language specific characteristics of words in the input — "nouns", or "verbs" — are later found to influence types of words in the child's lexicon (Camaioni & Longobardi 2001, Gopnik & Choi 1995, Kim *et al.* 2000, Sandhofer & Smith 2000, Tardif *et al.* 1997, Tardif *et al.* 1999).

Moreover, Tardif *et al.* (1999), and Sandhofer & Smith (2000) found that context of communication is another factor governing the frequency of words used with children. It was reported that in a book-reading context, parents normally produce more nouns than verbs, whereas in toy-play context, verbs tend to be used more than nouns.

## 2.4 Research on First Language Acquisition in Thai and Other Related Studies on Thai Adult Language

Research on first language acquisition in Thai is rare. Some studies have been conducted in the area of child language and infant-directed speech. In this section, these studies will be reviewed. In addition, some relevant studies of Thai adult language will also be reviewed and used for the discussion of children's acquisition of "first words" in phonological and lexical aspects.

### 2.4.1 First Language Acquisition in Thai

Research on first language acquisition in Thai can be classified into two groups: child language (Luksaneeyanawin 1976, Tuaycharoen 1977, Tuaycharoen 1984), and infant-directed speech (Sittigasorn 1997, Thanavisuth 1997).

**a) Studies on Child Language**

Tuaycharoen (1977) studied phonetic and phonological development of a Thai baby. She recorded her nephew's interaction with his mother from the age of 3 to 18 months. She found that the child's language development started with vocalizations. The

patterns of vocalization were varied in pitch and fixed in some phonological characteristics, such as being monosyllabic and disyllabic. “First words” — one word utterances — appeared at around 11 months with some basic syllable structures — CV, CVC, and tones — mid, and low. At around 12 to 15 months, a “basic phonological system” was acquired. Table 2.7 demonstrates the “basic phonological system” of Thai proposed by Tuaycharoen (1977)

***Table 2.7 Basic phonological system of Thai***
(Adapted from Tuaycharoen 1977)

| Systems | Elements |
|---|---|
| 1. Syllable structures | CV, CVC |
| 2. Consonants | Stops: /p/ /t/ /c/ /?/<br>Nasals: /m/<br>Continuants: /w/ /j |
| 3. Vowels | A contrast between<br>close and open vowels |
| 4. Tones | A contrast of three tone prosodies:<br>mid tone, low tone, rising tone |

Table 2.7 shows that the child is developing a phonological system directed towards that of the adult. It was reported that after 15 months, the child’s phonological system was becoming more similar to the Thai adult system. Productions of two- and three-word utterances appeared, and more phonological elements were acquired.

Another study related to children’s productive ability was conducted by Luksaneeyanawin (1976). The productions of twenty-eight Thai children from three to four years were collected and an error analysis was conducted. It was found that children usually substitute adult’s pronunciation with articulatorily simple elements. Diphthongs are often replaced by long monophthongs that are a component of the target diphthongs, such as [α⁻] for /αι/, and [↔⁻] for /∝α/. Moreover, it was found that Thai children are not consistent in replacing sounds. Findings from this study suggest that children apply their incomplete phonological system to adults’ related sounds, and that their vocal repertoire is not yet well developed.

Apart from children’s speech production, Tuaycharoen (1984) investigated the acquisition of classifiers of Thai children. It should be noted that classifiers are particles used to combine a numeral and a mass noun; its function is to indicate the formal or semantic class to which lexical items belong, e.g. *tua0* ‘classifier for animal’ in

*maa4 haa2 tua0*
dog five clf.
‘five dogs’

Tuaycharoen proposed six developmental strategies in the use of classifiers by two Thai children from the age of two to five years. She claimed that in the acquisition of classifiers children follow these six step of development as shown in Table 2.8.

***Table 2.8 Developmental strategies in the acquisition of classifiers in Thai***
(Adapted from Tuaycharoen 1984)

| Strategies | Characteristics |
|---|---|
| 1. The Early Attempt Strategy (2;0-2;6)[5] | Showing some hesitation, which appeared in pitch and vowel prolongation |
| 2. The 'Noun' Identification Strategy (2;0-2;6) | Using the repetitive noun form, e.g. 'bird 3 bird', 'chicken 2 chicken' |
| 3. The Identical Noun Deletion Strategy (2;6-3;0) | Deleting final identical noun when uncertain about the correctness of the certain classifier, e.g. 'bird 3', 'chicken 2' |
| 4. The Over-Extionsion Strategy (3;0-4;6) | Extending a certain classifier to other semantically related nouns:<br>a) from generic to specific, e.g.<br>- *kra0 daat1 sOON4 lem2*<br>paper two clf.(for book/s)<br>'two pieces of paper'<br>b) from major classification to its component, e.g. *khrUaN2* (clf. for vehicles with engines)<br>- *rot3 nUN1 khrUaN2*<br>car one clf.<br>'a car'<br>- *na0 ri3 kaa0 nUN1 khrUaN2*<br>watch one clf.<br>'a watch'<br>- *tuu2 jen0 nUN1 khrUaN2*<br>fridge one clf.<br>'a fridge' |
| 5. The Trial and Error Strategy (4;6-5;0) | Applying strategies 2, 3, and 4 for classifiers that they are not sure |
| 6. The Dodging Strategy (4;6-5;0) | Avoiding using classifiers that are not learnt, e.g.<br>- *rOON0 thaaw3 nUN1 khuu2*<br>shoes one clf.(pair)<br>'a pair of shoes'<br>- *khrUN2 nUN0/?an0*<br>half one/clf.(default)<br>'a piece of shoe' |

Tuaycharoen (1984) reported that these strategies are used until children reach elementary school level, and that the acquisition of classifiers is not complete even by the age of 10 years.

[5] Traditional convention of reference to children's age: year;month. For example, 0;9 (9 months old), 1;6 (one year and six months old).

**b) Studies of Infant-directed Speech**

There are two major aspects of the study of infant-directed speech (IDS) in Thai: phonetic and pragmatic (Kitamura *et al.* 2002, Luksaneeyanawin *et al.* 1998, Rukkharangsarit 1998, Sittigasorn 1997, Thanavisuth 1997, Thanavisuth & Luksaneeyanawin 1998).

Sittigasorn (1997) conducted a longitudinal study to investigate the role of interrogative sentences in Thai speech addressed to six newborn- to 12-month-old Thai children. She found that interrogative sentences comprised 27.8% of sentences addressed to children. "Interactive interrogatives" — yes-no, and confirmative interrogative sentences — were found mostly at early ages, whereas "informative interrogatives" — WH-interrogative sentences — tend to increase as children grow older. Sittigasorn (1997) claimed that the main roles of interrogatives in IDS are didactic, expressive, and drawing attention.

Following the same research method — the longitudinal approach — Thanavisuth (1997) investigated phonetic and pragmatic characteristics of IDS in Thai. In terms of phonetic characteristics, it was found that IDS differs from speech addressed to other adults (ADS). Compared to ADS, IDS uses higher fundamental frequency, greater frequency range, longer syllable duration, shorter utterance duration, and fewer syllables per utterance. In terms of pragmatic characteristics, speech act verbs indicating expressive function — maintaining and manipulating the relationship between parents and child — were used mostly at early ages — 6 months, whereas those indicating assertive and directive functions — providing information — were found most in IDS directed to 12-month-olds. Therefore, studies in Thai IDS provide some crucial evidence suggesting the important role of adults' language in facilitating and accommodating first language acquisition.

### 2.4.2 Studies of Thai Adult Language

The adult language is said to be the target of child language acquisition. In order to demonstrate the developmental path from child to adult language, research on the characteristics of adults' language should be considered. Relevant studies on phonological and lexical characteristics of Thai adult language are reviewed below.

**a) Phonology**

***(1) Statistical Distribution of Consonants, Vowels, and Tones***

Luksaneeyanawin (1992) and Hanpanich (1993) investigated the statistical distribution of consonants, vowels, and tones in adults' normal speech and Table 2.9 demonstrates some of the results of this investigation.

***Table 2.9 The order of distribution of consonants, vowels, and tones in Thai adult speech***
(Adapted from Luksaneeyanawin 1992, and Hanpanich 1993)

| Phonological Elements | Order of Distribution |
|---|---|
| 1. Initial Consonants | Stops > Continuants > Nasals > Fricatives |
| 2. Finals Consonants | Nasals > Stops > Continuants |
| 3. Monophthongs | /a/ > /O/[6] > /u/ > /o/ > /e/ > /i/ > /x/[6] > /q/[6] > /U/[6] |
| 4. Diphthongs | /ia/ > /ua/ > /Ua/ |
| 5. Tones | Low > Mid/Falling > High > Rising |

It should be noted that in the examination of children's phonological development this order of phonological distribution will be taken to be the target of phonological acquisition in Section 4.2.

***(2) The Accentual System of Thai***

From the investigation of accentual patterns of Thai polysyllabic words, Luksaneeyanawin (1983) proposes that Thai has a fixed accentual system governed by "Accent Placement Rules". Accent placement in Thai words is governed by two sets of rules depending on the types of words, monosyllabic or polysyllabic. For monosyllabic words, all content words are accented, and all grammatical words are unaccented. For monomorphemic polysyllabic words, a double accented system is favored. Accent placement is determined by the number of the component syllables in the word as well as the structure of its component syllables. The primary accented syllable is always the final syllable. Secondary accent assignment is determined by the position and the structure of the other component syllables, that is, whether it is a linker syllable (short syllable with an /a/ vowel). The linker syllable is normally unaccented (Luksaneeyanawin 1983, 1993, Surinpiboon 1985).

Accent Placement Rules in polysyllabic compounds are determined by the morphological derivation of the compounds (Luksaneeyanawin 1983). Polysyllabic repetitives, either the phonic reduplicatives or the semantic duplets, have a different set of rules based on types of these morphophonological processes (Luksaneeyanawin 1984).

These accentual patterns proposed by Luksaneeyanawin (1983) will be used in relation to the investigation of children's acquisition of the accentual system in Section 4.3.

**b) Lexical**

***Distribution of Word Classes in Thai Adult Language***

As an adjunct to her experimental studies of lexical access in bilinguals, Sudasana Na Ayudhaya (2002) examined the distribution of words in adults' language. With the cooperation of 300 first year students of the Faculty of Arts,

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[6] These symbols are used to replace phonetic alphabets of the IPA system as follows:

| | | |
|---|---|---|
| /O, OO/ | for | /ɔ, ɔː/ |
| /x, xx/ | for | /ɛ, ɛː/ |
| /q, qq/ | for | /ə, əː/ |
| /U, UU/ | for | /ɨ, ɨː/ |

Processing (CRSLP) led by Assistant Professor Dr. Sudaporn Luksaneeyanawin, Thai linguistic texts consisting of more than two million words were collected from ten different genres, and word frequency counts were conducted.

The frequency counts revealed that syntactic content words outnumber syntactic function words in terms of item types. However, considering the frequency of occurrence of each item found in the texts, it was found that most of the twenty items which received highest frequency were in the function word category. This indicates that regardless of the number of item types, function words were distributed more frequently than content words in adult language.

The result from this corpus study will be used in the discussion of the distribution of “first words” in the syntactic domain in section 5.3.2 a).

From the above literature review, it can be concluded that every aspect of language acquisition process — phonetic/phonology, lexical, semantic, and pragmatic — seems to be too complex to be explicit by the use of one theoretical framework, or by only one research method. Different aspects of language acquisition provided different evidence supporting different theorical views (see Section 1.1.1, and Section 1.1.2). The cross-sectional and the longitudinal approaches have both strong and weak points (see Section 1.1.3). Based on different basic assumptions, different findings were found (see Section 1.1.4).

In the present study, language acquisition process will be studied through the investigation of “first words” (the first set of words) acquired by 9- to 24-month-old Thai children. From the examination in two different research methods (the cross-sectional and the longitudinal approaches), and two different basic assumptions about word acquisition (lexicon and performance), three different but related aspects are considered: phonological acquisition, lexical acquisition, and the relationship between parental input and children’s first words. It is believed that findings from overview of different aspects of language acquisition (phonological and lexical) and the combination of the controversial research methods in the past would be useful keys for the explanation of first language acquisition.

# Chapter 3
# Research Methods

The data collected in this study are a part of the collaborative research project on tone development[7] between MARCS Auditory Laboratories, University of Western Sydney led by Professor Dr. Denis Burnham and the Centre for Research in Speech and Language Processing (CRSLP), Chulalongkorn University led by Assistant Professor Dr. Sudaporn Luksaneeyanawin. The author was a research assistant of the project responsible for the longitudinal data collection and corpus development.

Methodological details regarding participants, materials, and the domains of study are set below.

## 3.1 Participants

Participants in this study comprise of two groups: the longitudinal and the cross-sectional groups.

### *3.1.1 The Longitudinal Group*

The longitudinal group consists of 10 normally developing Thai children — five boys and five girls — whose parents belong to the middle socio-economic level and have a minimum level of education of high school graduation (see Appendix A). During the period of October to December 2000, mothers of the children were approached and asked for their cooperation in data collection at the Department of Obstetrics and Gynecology, Police General Hospital, Bangkok according to the recommendation of the doctor and the head nurse at the hospital. Then the mothers were asked to sign a consent form confirming their participation to the project. Their addresses, contact numbers, and maps were also recorded. The development of children in this group was followed longitudinally from 9 to 24 months at three monthly intervals. Interactions between the parent and child were videotaped, transcribed, and stored on a computer file. In addition, parents were asked to report upon their children's lexicon via questionnaires. Data from the longitudinal group of subjects were mainly used for the investigation of first words in this study.

### *3.1.2 The Cross-sectional Group*

The cross-sectional group of participants consists of 180 parents of 9- to 24-month-old Thai children. Thirty parents (15 parents of boys and 15 of girls) in each of six groups according to the child's age: 9, 12, 15, 18, 21, and 24 months were tested (by reporting their children's lexicon via questionnaires). All parents belonged to the middle socio-economic class and had high school graduation as their minimum level of education. Participants were approached at various institutes as follows:

a) Child Care Center, Bangkok College of Nursing
b) Child Care Center, Police General Hospital
c) Child Care Center, Rajawithi Hospital
d) Chula Nursery, Chulalongkorn University
e) Department of Pediatrics, Police General Hospital
f) Department of Obstetrics & Gynecology, Police General Hospital

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[7] The tone development project is a collaborative research project between MARCS and CRSLP. The author, as a research assistant, collected the data of 18 pairs of Thai parents-child interactions from 6- to 24 months — at three monthly intervals — continuously according to children's age. In the present study, data of 10 children from 9 to 24 months were used for the investigation of phonological and lexical development.

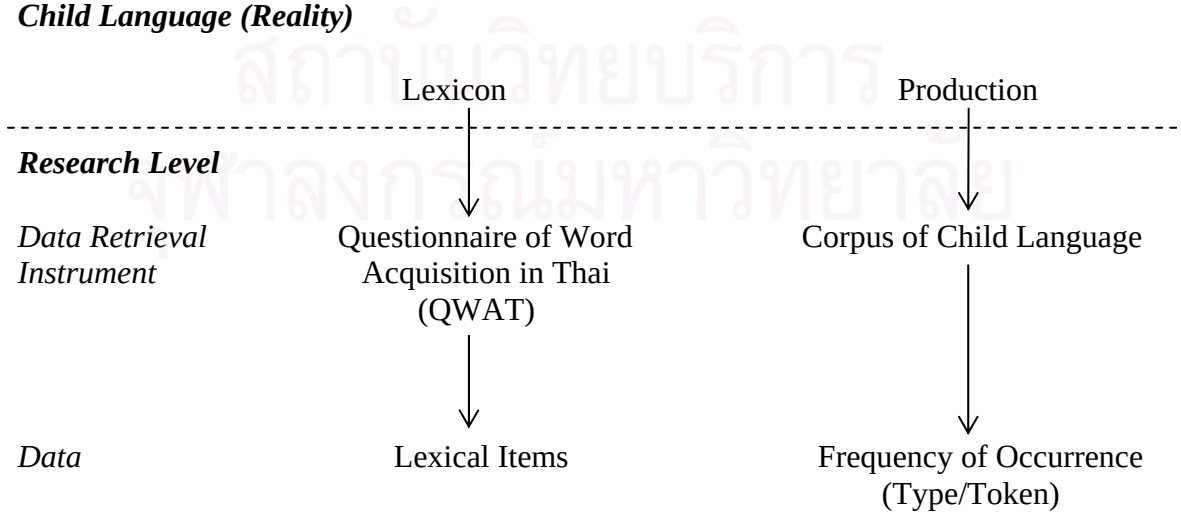
g) Faculty of Arts, Chulalongkorn University
h) Faculty of Architecture, Chulalongkorn University
i) Faculty of Fine and Applied Arts, Chulalongkorn University
j) Faculty of Education, Chulalongkorn University
k) Faculty of Economics, Chulalongkorn University
l) Faculty of Commerce and Accountancy, Chulalongkorn University
m) Faculty of Dentistry, Chulalongkorn University
n) Faculty of Veterinary Science, Chulalongkorn University
o) Language Institute, Chulalongkorn University.

Parents were asked to complete the questionnaires (see Section 3.2) concerning their child's lexicon. Data from the cross-sectional group were used to investigate the generalizability of lexical acquisition in Thai children in comparison with the longitudinal set of data.

**3.2 Materials**

In order to elicit data of first word acquisition in phonological and lexical aspects, two test instruments were developed. They are the Questionnaire of Word Acquisition in Thai (QWAT) (see Section 3.2.1 and Appendix B), and the Corpus of Child Language (see 3.2.2). Data from these different instruments represent different aspects of acquisition. On the one hand, data from QWAT — checklist questionnaires — represent children's underlying knowledge — the number of words tallied from the questionnaire represents the number of items in the child's lexicon. On the other hand, data from the Corpus of Child language — parent-child spontaneous interaction — represent instantiation of children's performance at a certain age of investigation. The number of words tallied from the corpus demonstrates frequency of occurrence of lexical items within a limited period of time. This frequency can be viewed both in terms of type and token. To make a reasonable judgement about which source of data is more appropriate for research on word acquisition might not be advisable because different aspects of research require different kinds of data. In this study, the data from two sources were used and fulfilled the investigation of phonological and lexical aspects of word acquisition.

***Figure 3.1 Two levels of data elicited***



### *3.2.1 Questionnaire of Word Acquisition in Thai (QWAT)*

The Questionnaire of Word Acquisition in Thai (QWAT) was developed in order to elicit data on word acquisition in Thai children during the early period of lexical development (see Appendix B). In developing this questionnaire, the parental report "MacArthur Communicative Development Inventories: Words and Gesture, 1989" (CDI) was used as a prototype with the permission from the CDI Advisory Board. The CDI was first developed in 1989 by a group of psychologists at San Diego State University led by Professor Larry Fenson. It was used as a communicative assessment tool for 8- to 16-month-old children. The CDI (1989) consists mainly of two parts: gestures and words. In 1993, Fenson and his colleagues developed another version of the CDI named "The MacArthur Communicative Development Inventories: Words and Sentences". The later version of the CDI concentrates on vocabulary and grammar. It was used for the study of language development of 16- to 30-month-old children. The two versions of the CDI were used as data collection instruments for 1,803 normally developing American children in 1994, and after the investigation, norms for American English lexical development were reported (Fenson *et al.* 2003) From the original American English version, a number of researchers from a number of languages have used the CDI as a tool for developing other CDI versions in a number of different languages such as British English (Hamilton *et al.* 2000), Mandarin (Tardif *et al.* 1999), Swedish (Berglund 1999), Austrian-German, American Sign Language, Basque, Catalan, Mandarin, Cantonese, Coatian, Dutch, English (British, New Zealand), Finish, French (Canadian), German, Greek, Hebrew, Icelandic, Italian, Japanese, Korean, Portuguese, Spanish, etc (Fenson *et al.* 2003). The CDI can be recommended as a valid method of assessing children's vocabulary on the basis of various studies (Berglund 1999, Hamilton *et al.* 2000).

The QWAT applies structures and tasks in the CDI to meet its purpose of study as follows:

*a) Overall Structure of the Questionnaire*

The QWAT was developed as a tool for eliciting data on lexical acquisition in Thai children from 9 to 24 months of age. It consists mainly of two parts: general information about the child and a vocabulary checklist.

*b) General Information about the Child*

In the general information about the child section, parents are asked to provide data about various aspects of their child including birth date, sex, daily activities, toys. Data from this part of the questionnaire are used as reference for discussion in the last chapter.

*c) Vocabulary Checklist*

The vocabulary checklist is the most important part of the questionnaire. Data from this part represent lexical items in the child's lexicon and are mainly used for the analysis of lexical development compared to the set of data retrieved from parent-child spontaneous interaction (see Section 3.2.2).

(i) Lexical Categories

The vocabulary checklist in QWAT consists of 23 lexical categories. Nineteen of these are from the CDI. These categories are semantically classified and have been reported in a number of studies on lexical development in a number of languages as fundamental lexical categories in early lexical development period (Fenson *et al*. 2003). These lexical categories borrowed from the CDI are as follows.

1. Animals
2. People
3. Vehicles
4. Toys
5. Food and drink
6. Clothes, accessories, and cosmetics
7. Body parts
8. Household items
9. Outdoor places and objects
10. Action words
11. Words about time
12. Words about emotion
13. Descriptive words
14. Colors
15. Directions
16. Numbers and qualifiers
17. Pronouns
18. Question words
19. Conjunctions

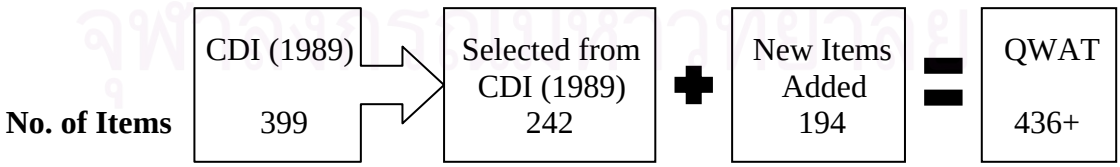
It should be noted that some lexical items in the CDI are not normally found in the Thai context. Accordingly, they were excluded from the Thai word checklist. Examples of items excluded are 'turkey', 'owl', 'cracker', 'cheese', etc. The total number of excluded items are 157. Moreover, other items such as 'ant', 'mosquito', 'policeman', 'papaya' which are more familiar to Thai culture were added. The total number of added items are 194 (as shown in Figure 3.2).

In addition to the 19 categories used from the CDI, the QWAT includes three language-specific lexical categories — from Panupong (1970). These categories consist of words that are grammatical and will be used for the investigation of lexical development in syntactic domain — which concentrates on the proportion of acquisition of content words and function words (see Section 5.2.2 a) and Section 5.3.2 a)). Moreover, the QWAT also includes another open category for words that are not in included in the listed categories as shown.

20. Preverbs
21. Postverbs
22. Final particles
23. Others

Apart from the number and types of category, the number of items in the QWAT is also different from that in the CDI. In the CDI the number of items in each category is fixed. Thus it is likely that parents are forced to select only these items that appear in the CDI. However, it cannot be denied that some children might be able to produce other items that do not appear in the CDI. Accordingly, the QWAT is designed as an open questionnaire such that parents are able to add any items that do not appear in the questionnaire. The total number of lexical items listed in QWAT is as follows.

***Figure 3.2 Adaptation of number of items in QWAT***




(ii) Tasks

There are two related tasks for parents in order to complete the QWAT. Parents are asked to decide whether their child has (a) understood and (b) produced certain items. In order to help parents make appropriate and consistent decisions, definitions of *'understand'* and *'produce'* are given in the instructions of the vocabulary checklist. The child is said to *'understand'* when he or she responds to the adult's use of a

certain item consistently. For example, the child who always points to a certain dog when he hears the word ‘dog’ would be said to *‘understand’* the word ‘dog’. In the case of *‘produce’*, parents can mark the particular item if they have heard the child produce the word regardless of understanding its meaning.

It should be noted that such clear separation between comprehension and production is not used in the CDI. Researchers adopting the CDI argue that it is difficult to determine if the child understands anything when he or she talks (Bate *et al.* 1995). However, from short interviews with parents while collecting data, it was found that parents, who probably are the most familiar persons to the child, were able to make this kind of decision, because they are exposed to numerous communicative contexts with the child every day. Moreover, it was observed that children in some age groups frequently imitate their parents’ pronunciation without showing their intention to communicate by the production. Examples of items in the QWAT are shown in Table 3.1 below.

***Table 3.1 An example of checklist section in QWAT***

| Words | Understand | Produce |
|---|---|---|
| /maa4/ ‘dog’ | | |
| /mxxw0/ ‘cat’ | | |
| /plaa0/ ‘fish’ | | |
| /ciN2 cok1/ ‘lizard’ | | |

*d) Data Collection*

Questionnaires were distributed to parents of the 10 Thai children in the longitudinal groups and 180 parents of children in the cross-sectional group. In the case of the longitudinal participants, the questionnaires were handed directly to the parents (fathers and/or mothers) when the author visited the children (at 9, 12, 15, 18, 21, and 24 months). The parents were asked to report their children’s lexicon by checking and adding lexical items and returned the questionnaires by postal mail within one week after receiving.

In the case of the cross-sectional participants, the period of keeping questionnaires is longer — that is about two weeks. This is because the number of participants is high — 180 — and the author cannot contact with the parents as often as the lingitudinal cases, so the questionniare were distributed to parents (fathers and/or mothers) about one week before the age of investigation. According to this parents, would have about one week — for the longitudinal group — and about two weeks — for the cross-sectional group — for completing the questionnaires.

e) Reliability of the QWAT

One important reason why the CDI parental report is recognizing worldwide is because it is reliable. The reliability test was not only done for the original version of CDI (American English), but also for every adapted version in a number of different languages(Fenson et al. 2003). It can be said that a reliable tool would also make elicited data reliable. In this newly adapted Thai version, the test for reliability of the QWAT was also conducted, using split half correlation of data from the cross-sectional participants. Items in each lexical category were divided into two sets, and data of 180 participants for the two sets of lexical items were used to conduct correlation tests as shown in Table 3.2.

***Table 3.2 Results of correlation of the 22 lexical categories in the QWAT***
Critical value: $r$ (178) < .3211, $p$ = .001*

| Lexical Categories | Correlation Values |
|---|---|
| **1. Animals** | 0.955* |
| **2. People** | 0.915* |
| **3. Vehicles** | 0.806* |
| **4. Toys** | 0.547* |
| **5. Food and Drink** | 0.87* |
| **6. Clothes, Accessories, and Cosmatics** | 0.856* |
| **7. Body Parts** | 0.942* |
| **8. Household Items** | 0.96* |
| **9. Outside** | 0.913* |
| **10. Action Words** | 0.971* |
| **11. Words about Time** | 0.656* |
| **12. Words about Emotion** | 0.478* |
| **13. Descriptive Words** | 0.912* |
| **14. Colors** | 0.901* |
| **15. Directions** | 0.626* |
| **16. Numbers and Qualifiers** | 0.969* |
| **17. Pronouns** | 0.635* |
| **18. Question Words** | 0.491* |
| **19. Conjunctions** | Insufficient data[8] |
| **20. Preverbs** | 0.593* |
| **21. Postverbs** | 0.955* |
| **22. Final Particles** | 0.544* |
| **Total** | 0.997* |

Results in Table 3.2 show significant correlations of 21 of 22 lexical categories in the QWAT, $r$ (178) < .3211, $p$ = .001. The total correlation of the questionnaire is very high, 0.997, which indicates the high degree of reliability of the listed items in the Thai version of word checklist (see also Appendix G).

### *3.2.2 Corpus of Child Language*

*a) Corpus Development*

The corpus of child language was developed in relation to the collaborative research project on tone development between MARCS Auditory Laboratories, Sydney, University of Western Sydney and the Centre for Research in Speech and Language Processing (CRSLP), Chulalongkorn University. The author was a research assistant who followed the development of 18 Thai children (10 boys, and 8 girls) longitudinally from 6 to 24 months of age. This corpus was contributed to the Child Language Data Exchange System (CHILDES) website (http://childes.psy.cmu.edu) in January 2004. It should be noted that data of some participants are missing at certain periods (due to a lot of background noise, turn overlapping in speech production, and in some cases data collection was not possible because the child moved from Bangkok), and in order to have

[8] The correlation test was not possible, because the data (the number of items in the 'conjunctions' category acquired) are distinctively small.

gender equivalence, data of ten 9- to 24-month-old children (five boys and five girls) from the 18 children were selected for investigation in this study. The corpus was developed via the following procedures.

(1) The author visited the longitudinal group children's homes once every three months, starting from 9 months through to 24 months of age. On each visit, twenty minutes of parent-child spontaneous interaction was videotaped using a SONY Digital Handicam DCR-TRV320E. Parents were asked to interact freely with their child as they always do in everyday situation without controlled settings.

(2) The videotaped data were computerized and converted into .mpg format by the program Ulead Video Studio 4.0 SE Basic. The twenty minutes session from digital video was divided into two 10-minute .mpg files.

(3) Using the CLAN program (CHAT mode) developed by Professor Brian MacWhinney from the Department of Psychology, Carnegie-Mellon University, U.S.A. (CHILDES: Child Language Data Exchange System 2001), the .mpg files were linked to the program, and Thai transcriptions were made in .cha format.

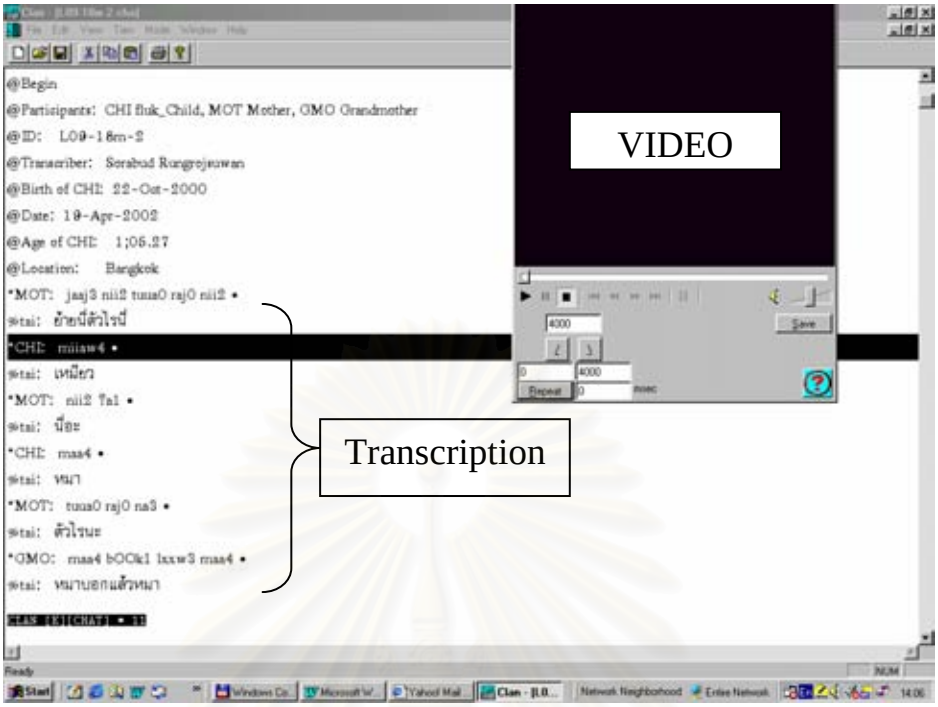
(4) Phonological representations of the Thai transcriptions were automatically added by the use of a Thai text-to-phonological representation program developed by the Centre for Research in Speech and Language Processing (CRSLP), Chulalongkorn Univestiy, by Assistant Professor Dr. Sudaporn Luksaneeyanawin and Dr. Nuttakorn Thubthong.

(5) The complete version of transcription (a .cha file) was run in the CLAN program utterance by utterance[9] along with its corresponding video of interaction (a .mpg file). An example of the corpus is shown in Figure 3.3.



[9] Parent-child's productions from the videos were segmented into utterances with the criterion of 'pause-defined unit' — a speech signal located between two pauses — and then were transcribed. In the operation of the CLAN program, each single utterance in the transcription will be marked one at a time, while the corresponding video of interaction of the certain utterance will be played on the screen.

***Figure 3.3 Corpus of child language running on the CLAN program***




*b) Data Retrieval*

Part of the data used in this study were retrieved from the corpus. Data retrieval was conducted using the following procedures.

(1) Open the CLAN program.

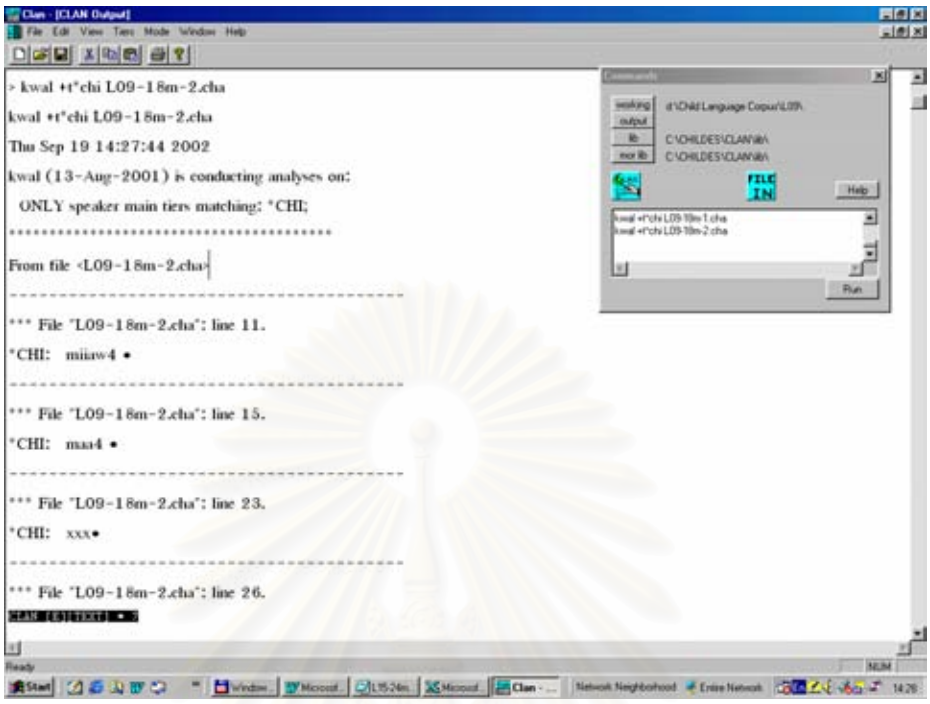
(2) Go to the command window and locate the particular parent-child interaction file in the ‘working’ directory.

(3) Key commands retrieving the transcription of the child and other participants in the transcription. The command used for data retrieval is the “kwal” command — a command used for the searching of user-specified words and outputs containing those keywords in context. Codes used for the child and other participants are ‘chi’ for the child, ‘mot’ for mother, ‘fat’ for father, ‘gmo’ for grandmother, ‘sis’ for sister, ‘bro’ for brother, ‘aun’ for aunt, ‘unc’ for uncle, and ‘vis’ for visitor. Commands used in this study were:

kwal +t*chi (filename).cha
kwal +t*mot (filename).cha
kwal +t*fat (filename).cha
kwal +t*gmo (filename).cha
kwal +t*sis (filename).cha
kwal +t*bro (filename).cha
kwal +t*aun (filename).cha
kwal +t*unc (filename).cha
kwal +t*vis (filename).cha

After running the commands on the particular ‘working’ directory, the transcription for each participant was retrieved. The example of the data retrieved by the command ‘kwal +t*chi L09-18m-2.cha’ is demonstrated in Figure 3.4.

***Figure 3.4 Outputs from the running of the command 'kwal +t*chi L09-18m-2.cha' on the CLAN program***




(4) The data retrieved were tallied and classified into phonological, syntactic, and semantic categories according to the purposes of this investigation.

For phonological and syntactic categories, data were classified by hand, and then were tallied by the program Microsoft Excel 97. For semantic categories, data were automatically counted by the "word frequency" program developed by Patavee Chanvaivit, a research assitant at the CRSLP from the Faculty of Engineering, Chulalongkorn University. The program executed the frequency count for children and adults' lexical items according to three semantic categories marked on each lexical items in the retrieved data as shown below.

(1) Two syntactic categories of lexical items were marked on the retrieved data: 'c' stands for 'content words', and 'f' stands for 'function words' (see Section 3.3.2 for more details about syntactic domain). The analysis and classification of words into the 'content words' and 'function words' categories is based on the context in which a particular word is located. It should be noted that some words in Thai could be classified as both content and function words according to context as shown in the case of /yuu1/ which could means 'to be', or 'progressive aspect'.

| nOON3 pan1 | mii0 | kxn0 taa0 luup3 | ***juu1*** | naj0 | laN4 | baan2 |
|---|---|---|---|---|---|---|
| the child's name | have | cantaloupe | ***prog.*** | in | behind | house |
| c | c | c | ***f*** | f | f | c |

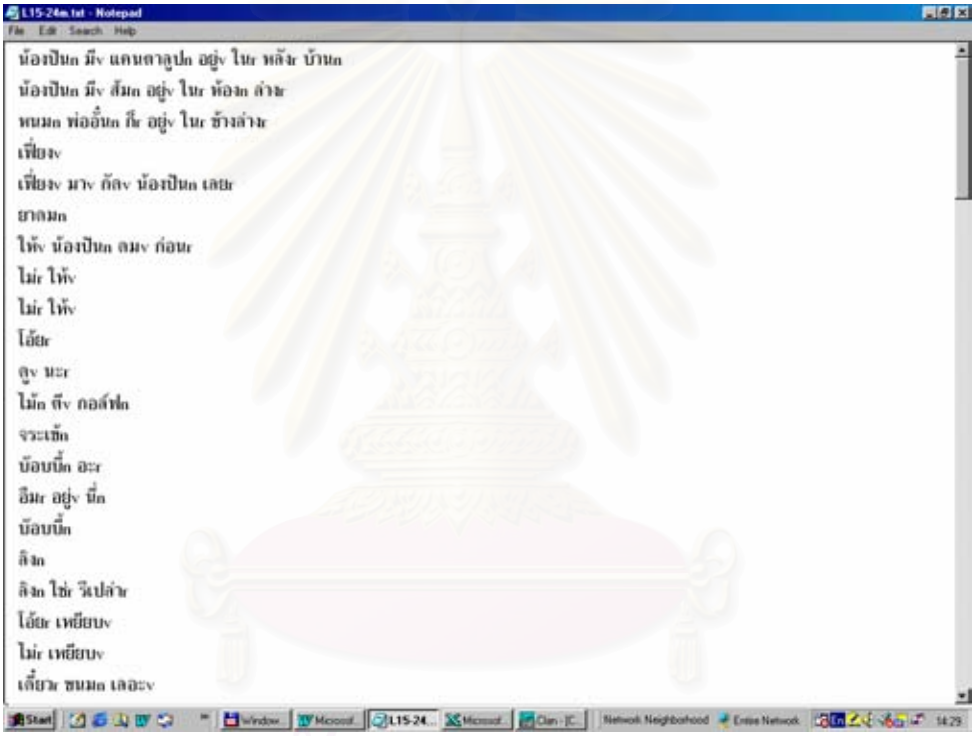
| noM4 | phOO2 ?an4 | kOO2 | ***juu1*** | naj0 | khaaN2 laaN2 |
|---|---|---|---|---|---|
| candy | father's name | too | ***to be*** | in | downstairs |
| c | c | f | ***c*** | f | c |

| fiaN2 | maa0 | kat1 | nOON3 pan0 | lqqj0 |
|---|---|---|---|---|
| throw | come | bite | the child's name | final part. |
| c | c | c | c | f |

| maj2 | haj2 |
|---|---|
| neg. | give |
| f | c |

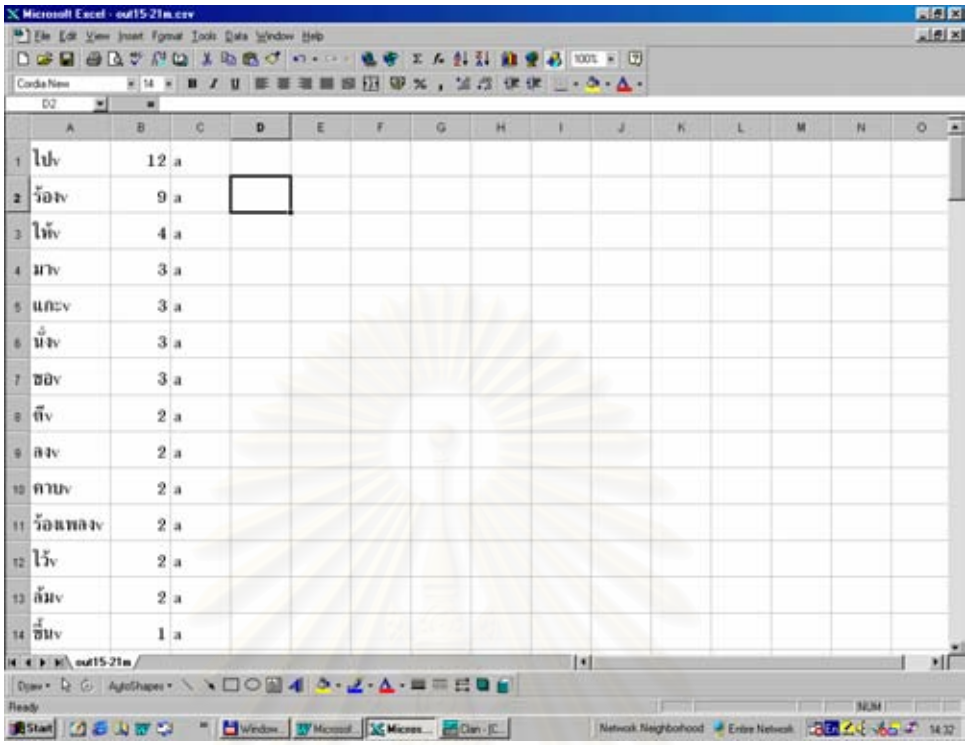
(2) Three semantic categories of lexical items were marked on the retrieved data as shown in Figure 3.5: 'n' stands for 'nominals', 'v' stands for 'verbals', and 'r' stands for 'relations' (see Section 3.3.2 for more details about semantic domain).

***Figure 3.5 Labeling three semantic categories, nominals (n), verbals (v), and relations (r), on adults' and children's lexical items***




(3) Using the "word frequency" program, frequency of lexical items was tallied as demonstrated in Figure 3.6.

***Figure 3.6 Outputs from the running of the "Word Frequency" program on semantic categories-marked items***




## 3.3 Domains of Study

There were two domains of study in this project — phonological acquisition, and lexical acquisition.

### *3.3.1 Analysis of Phonological Acquisition*

Phonological acquisition was investigated using two different sources of data: a) the acquisition of syllable structures, consonants, vowels, and tones, and b) the acquisition of the accentual system.

#### *a) The Acquisition of Syllable Structures, Consonants, Vowels, and Tones*

In the analysis of the acquisition of syllable structures, consonants, vowels, and tones, the corpus of child language was used. The method for the analysis in this section was as follows.

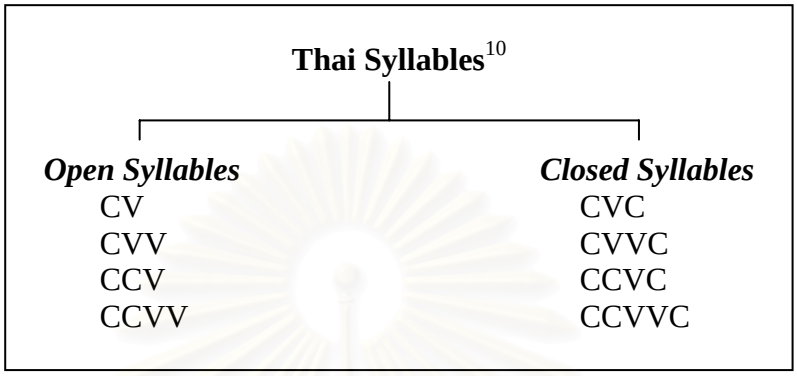
*1. Retrieval*: Productions of 10 children from 9 to 24 months were retrieved from the corpus.

*2. Transcription*: Broad phonetic transcriptions of children's production were made.

*3. Classification*: The transcriptions were classified into four phonological categories — syllable structures, consonants, vowels and tones. Phonological and phonotactic information about each of these is given below in turn.

*(i) Syllable Structures*: Thai syllable structures comprise two major types, open and closed syllables. An open syllable normally contains a long monophthong (V), or a diphthong (VV) finally, while a closed syllable contains a consonant (C) at the final position. Within each type of syllable structure, there are four possible sub-structures as shown in Figure 3.7.

***Figure 3.7 Thai syllable structures***




*(ii) Consonants*: Thai consonants can occur at the initial and final positions of syllables. There are 21 initial consonants in Thai. They can be classified into four groups according to the manner of articulation: stops, nasals, fricatives, continuants (Lateral, Trill, and Approximants), as shown in Table 3.3.

***Table 3.3 (a) Thai initial monoconsonants (b) Thai initial clusters***

| **Place of Articulation** / **Manner of Articulation** | | **Labial** | **Alveolar** | **Palatal** | **Velar** | **Glottal** |
|---|---|---|---|---|---|---|
| **(a) Monoconsonants** | | | | | | |
| **Stops** | | | | | | |
| - voiceless unaspirated | | p | t | c | k | ? |
| - voiceless aspirated | | ph | th | ch | kh | |
| - voiced | | b | d | | | |
| **Non-stops** | **Nasals** | m | n | | N | |
| | **Fricatives** | f | s | | | h |
| | **Lateral** | | l | | | |
| | **Trill** | | r | | **(Continuants)** | |
| | **Approximants** | w | j | | | |
| **(b) Clusters** | | pr, pl<br>phr, phl | tr<br>thr | | kw, kr, kl<br>khw, khr, khl | |

[10] C = monoconsonant; V = short/long monophthong
CC = consonant cluster; VV = short/long diphthong

A maximum of two consonants can occur in the initial position to form consonant cluster. Consonant cluster in Thai is composed of a stop consonant followed by a continuant consonant. There are 12 clusters in Thai as shown in Table 3.3 (b).

Nine consonants can occur in the final position. They can be broadly classified into three groups according to the manner of articulation as shown in Table 3.4.

*Table 3.4 Thai final consonants*

| Place of Articulation / Manner of Articulation | Labial | Alveolar | Palatal | Velar | Glottal |
|---|---|---|---|---|---|
| **Stops** | p | t | | k | ? |
| **Nasals** | m | n | | N | |
| **Continuants** | w | | j | | |

(iii) *Vowels*: There are two types of vowel in Thai: monophthongs and diphthongs. Monophthongs consist of nine pairs of qualitatively different phonemes, each of which has two quantitative counterparts: a short and a long vowel. These are set out in Table 3.5.

*Table 3.5 Thai monophthongs*

| Tongue Advancement / Tongue Height | Front | Central | Back |
|---|---|---|---|
| **High** | i, ii | U, UU[11] | u, uu |
| **Mid** | e, ee | q, qq[11] | o, oo |
| **Low** | x, xx[11] | a, aa | O, OO[11] |

Diphthongs consist of three qualitatively different phonemes. Each diphthong has its quantitative counterparts, long and short, as the monophthong set.

[11] These symbols are used to replace phonetic alphabets of the IPA system as follows:

| | | |
|---|---|---|
| /x, xx/ | for | /ɛ, ɛː/ |
| /U, UU/ | for | /ɨ, ɨː/ |
| /q, qq/ | for | /ə, əː/ |
| /O, OO/ | for | /ɔ, ɔː/ |

***Table 3.6 Thai diphthongs***

| **Tongue Advancement** / **Tongue Height** | **Front** | **Central** | **Back** |
|---|---|---|---|
| **High** | i, ii | U, UU | u, uu |
| **Mid** | | | |
| **Low** | | a | |

It should be noted that only the qualitative aspect of vowels was focused attention in this study.

(iv) *Tones*: Thai tones consist of three level tones — mid, low, and high, and two contour tones — falling and rising. Tones are considered significant phonemes in Thai because the use of different tones with the same consonant-vowel combination results in changes in the meaning of words.

***Table 3.7 Thai tones***

| **Tonal Characteristics** | **Symbols** |
|---|---|
| mid | 0 |
| low | 1 |
| falling | 2 |
| high | 3 |
| rising | 4 |

*4. Summation and Analyses*: Number of tokens in each phonological category was tallied, and statistical analyses were conducted.

*5. Phonemically-irrelevant sounds*: In case where children produced sounds that do not occur in Thai phonological system, these sounds were also transcribed and tallied.

***b) The Acquisition of Accentual System***

Data from the QWAT were used for the analysis of the acquisition of accentual system. Parents were asked to report their children's pronunciation of polysyllabic target words in the questionnaire. The procedures for the analysis in this section are as follows.

*1. Classification*: Polysyllabic target words were classified into four types of words:

*(i) Monomorphemic polysyllabic words*-: These are words that cannot be separated further into smaller meaningful units, such as /cOO0 ra0 khee2/ 'crocodile', /ma3 la3 kOO0/ 'papaya', etc.

*(ii) Polysyllabic compounds*-: These are words that are a combination of two or more free morphemes, such as /siN4 too0/ 'lion', /phaa2 chet3 tua0/ 'towel', etc.

*(iii) Polysyllabic complexes*-: These are words that are a combination of at least one bound morpheme, such as /phuu2 chaaj0/ ‘man’, /chaaw0 naa0/ ‘farmer’, etc.

*(iv) Polysyllabic repetitives*-: These consist of phonic reduplicatives and semantic duplets, such as /hoN1 hoN1/ ‘dog’s bark’, /tO1 tx1/ ‘to walk’, etc.

*2. Assignment*: Accentual patterns were assigned to all polysyllabic target words. For example,

| | | |
|---|---|---|
| /siN4 too0/ | >>> | /siN4 ´too0/ |
| /cak1 kra0 jaan0/ | >>> | /`cak1 kra0 ´jaan0/ |

*3. Child-Target Matching*: Children’s one-word utterances were matched with polysyllabic target words, by considering which syllable/s of the target words children pronounced. The determination of children’s one-word utterances was relied on adult’s perception as reported in the questionnaires. There are four possibilities of children’s pronunciation as follows:

(i) Primary accented syllable

| | | |
|---|---|---|
| /siN4 ´too0/ | >>> | [too0] |
| /`cak1 kra0 ´jaan0/ | >>> | [jaan0] |

(ii) Secondary accented syllable

| | | |
|---|---|---|
| /`cak1 kra0 ´jaan0/ | >>> | [cak1] |

(iii) Primary and secondary accented syllables

| | | |
|---|---|---|
| /`cak1 kra0 ´jaan0/ | >>> | [cak1 jaan0] |

(iv) Primary and other unaccented syllables

| | | |
|---|---|---|
| /`cak1 kra0 ´jaan0/ | >>> | [ka0 jaan0] |

*4. Summation and Analyses*: After identifying children’s pronunciation based on the accentual system of the adult language, the frequency of each type was tallied and a statistical analysis was conducted.

***3.3.2 Analysis of Lexical Acquisition***

Lexical acquisition was investigated in both the cross-sectional and the longitudinal study.

***a) The Cross-sectional study***

The purpose of the cross-sectional study was to investigate general properties of lexical development of 9- to 24-month-old Thai children. Using data elicited from the QWAT, lexical items in children’s lexicon were analyzed in terms of cumulative number of items, developmental distribution of items in syntactic and semantic domains, and the relationship between comprehension and production in early lexical development. The

procedures for the analysis of lexical acquisition in the cross-sectional study are as follows.

*1. Data Collection*: QWAT questionnaires were distributed to 180 parents of 9- to 24-month-old Thai children. Parents were asked to complete vocabulary checklists representing lexical items in their child's lexicon.

*2. Classification*: Lexical items were classified into syntactic and semantic domains.

(i) Syntactic Domain: Studies of lexical development are mostly focused on content words — which are further classified into semantic categories (Gentner, 1982). Accordingly, it is interesting to ask whether children at early period of development acquire function words. Lexical items were classified into two categories based on syntactic criteria as follows.

- *Content Words*: These are words which have a statable lexical meaning. They include syntactic word classes like nouns, verbs, adjectives, and adverbs, such as /maa4/ 'dog', /kin0/ 'to eat', /dxxN0/ 'red', /rew0/ 'fast', etc.

- *Function Words*: These are words which have grammatical meaning. They include syntactic word classes like prepositions, conjunctions, and particles such as /bon0/ 'on, above', /lx3/ 'and', the discourse markder for emphasis /na3/, the final partical marking politeness and femininess /kha2/, etc.

(ii) Semantic Domain: In the semantic domain lexical items were classified into two main categories according to the nature of the referents, 'nominals' and 'non-nominals' (Gentner, 1982, Gopnik and Choi 1995).

- *Nominal Category*: The 'nominal' category comprises words that refer to bounded, concrete animate and inanimate objects. It includes animals, people, things, places, and some deitic words like /?an0 nii3/ 'this one', /khaw3/ 'he/she', /thaaN0 nii3/ 'here'.

- *Non-nominal Category*: The 'non-nominal' category comprises words that are not members of the 'nominal' category. It consists of two subcategories: 'verbals', and 'relations'. The 'verbals' category consists of words that refer to actions, states and properties of 'nominals'. It includes different syntactic word classes like verbs, adjectives, and adverbs. The 'relations' category consists of words that refer to relations within and between members of 'nominals' and 'verbals' categories, such as prepositions, conjunctions, interjections, final particles, tense, aspect, modality, words about time, etc.

*3. Summation and Analyses*: After classifying words into syntactic and semantic domains, tallies were made and statistical analyses were conducted.

***b) The Longitudinal Study***

The purpose of the longitudinal study was to investigate lexical development in more detail by examining the development of children across time and comparing the data within the same group of subjects elicited by different test instruments. In addition,

correlations between first words and parental inputs were analyzed. The procedures for the analysis of lexical acquisition in the longitudinal study are as follows.

*1. Data Collection*: QWAT questionnaires were distributed to the parents of the 10 children in the longitudinal group. Parents were asked to complete the vocabulary checklists representing children's lexicon every three months from the time when their child was 9 to 24 months of age.

*2. Data Retrieval*: Data of lexical acquisition of 10 Thai children from 9 to 24 months were retrieved from the Corpus of Child Language.

*3. Tallies and Categorization*: Lexical items from QWAT questionnaires and frequency of performance from the corpus were tallied and classified into syntactic and semantic categories by the word frequency program and Microsoft Excel 97.

*4. Analyses*: Statistical analyses were conducted and the two sets of data — elicited from the distribution of the QWAT and from the Corpus of Child Language — were compared.

*5. Correlation*: For the investigation about the correlation between first words and parental input, twenty minutes of input from the parents of the 10 Thai children from 9 to 24 months were retrieved from the Corpus of Child Language (see Section 3.2.2).

*6.Tally and Categorization*: Frequency of occurrence of lexical items in parental input was tallied and classified into semantic categories by the word frequency program and Microsoft Excel 97.

*7. Analyses*: Statistical analyses of the input were conducted, and the correlation between the input and the children's first words was examined.

# Chapter 4
# Phonological Acquisition

## 4.1 Introduction

In this study, phonological development was investigated through the empirical data of first words produced by 10 Thai children. Findings from past studies suggest that there should be both universal and language specific influences in children's production ability (Hockberg 1988, Ingram 1968, Ingram 1989, Lieberman 1975, Lieberman *et al.* 1971, Locke 1983, Luksaneeyanawin 1976, Luksaneeyanawin *et al.* 1998, Tuaycharoen 1977).

From the universal point of view, young children in the early period of language development can produce a limited number of sounds (Jacobson 1941/68 cited in Ingram 1989). The incompleteness of their anatomical development has been claimed to be an important factor accounting for the difficulty in production (Lieberman *et al.* 1971, Locke 1983). According to this, children's acquisition of the phonological system can be predicted based on two aspects of difficulty. The first is difficulty in terms of quality (the system of sounds). This predicts that children should be able to produce some sounds better than others, because they have easier articulation. For example, stop sounds are easier to produce than non-stop sounds (Jacobson 1941/68 cited in Ingram 1989). The second aspect of difficulty is viewed in terms of quantity (the structure of sounds). It predicts that children should be able to produce less complicated strings of sounds prior to more complicated ones. For example, CV should be produced before CVV, C before CC, and V before VV.

From the language specific point of view, linguistic environment is claimed to be an important factor for children acquiring language (Hockberg 1988, , Pye *et al.* 1987, Tuaycharoen 1977, Wijnen *et al.* 1994). Findings from past research have been especially claimed that adult language is the target of acquisition and children gradually move toward that of the adults. Research conclusions are normally drawn from the developmental point of view based on adult language data. In addition to the investigation of children's production data, this study also took data of Thai language (Hanpanich, 1993) into account and compared with those of the children.

In this chapter Thai children's first words are investigated in terms of phonology, including syllable structure, consonants, vowels, tones, and the accentual system. The main purpose of this study is to propose a tentative order of acquisition of the Thai phonological system.

According to the universal perspective, the order of acquisition can be predicted as follows.

For syllable structures, due to quantitative difficulty, children should produce the following structures in the order given, CV > CVC, CV > CVV > CCV > CCVV for open syllables, and CVC > CVVC > CCVC > CCVVC for closed syllables.

For consonants, due to the qualitative difficulty, children should produce stop sounds early and fricative sounds relatively late. In terms of quantitative difficulty, monoconsonants (C) should be produced before clusters (CC).

For vowels, due to the qualitative difficulty, the three basic vowels /i/, /a/, /u/ should be produced before other vowels. In terms of quantitative difficulty, monophthongs (V) should be produced before diphthongs (VV).

For tones, there is no clear evidence about the order of tone acquisition from the universal point of view, because most of studies on phonological development have used data

from non-tonal languages. However, in terms of qualitative difficulty, it could be predicted that level tones should be produced before contour tones.

For accent, in terms of qualitative difficulty, the most salient stressed syllable (the primary accented syllable) should be produced before the less salient ones. The order should be as follows, primary accented syllable > secondary accented syllable > unaccented syllable.

In addition, according to the language specific perspective, the phonological system of Thai children should show some progression toward the adult language phonological system. In relation to this, it is important to take into account the distribution of consonants, vowels, and tones in Thai adult language (Hanpanich 1993, Luksaneeyanawin 1983, 1993) as the target of development.

## 4.2 Acquisition of Syllable Structures, Consonants, Vowels, and Tones

In order to examine the acquisition of syllable structures, consonants, vowels, and tones, children's spontaneous productions were retrieved from the Corpus of Child Language (see Appendix C). It should be noted that crying, laughing, babbling, rhyming, imitative production, and additional vocalizations were excluded. The distribution of syllable structures, consonants, vowels, and tones was investigated and a tentative order of acquisition was reported. Conclusions about the linear order of acquisition were obtained from the frequency of occurrence of each element in children's production of first words.

### 4.2.1 Syllable Structures

It was found that children's first words involved both open (CV, CVV, CCV) and closed (CVC, CVVC, CCVC) syllables. Examples of syllable structures of Thai children's first words are shown.

| Syllable Structures | Children's Productions | Adult's Targets | Meanings |
|---|---|---|---|
| *Open syllables* | | | |
| CV | [maa4] | /maa4/ | 'dog' |
| | [paa0] | /plaa0/ | 'fish' |
| CVV | [huua4] | /huua4/ | 'head' |
| | [mia2] | /nia2/ | 'this one' |
| CCV | [hwaa4] | /khwaa4/ | 'right (dir.)' |
| | [kwaa4] | /khwaa4/ | 'right (dir.)' |
| *Closed syllables* | | | |
| CVC | [mam1] | /mam1/ | 'to eat' |
| | [naam3] | /naam3/ | 'water' |
| CVVC | [cuuaj4] | /suuaj4/ | 'beautiful' |
| | [kiiaw4] | /khiiaw4/ | 'green' |
| CCVC | [kwan0] | /fan0/ | 'teeth' |
| | [kwaaN0] | /kwaaN0/ | 'deer' |

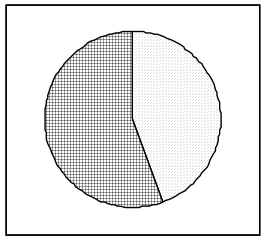
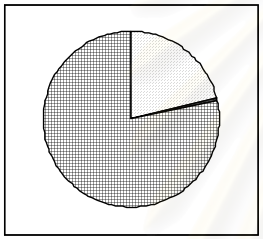
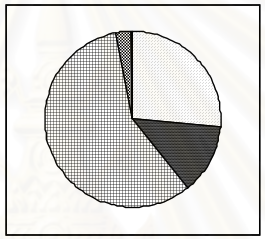
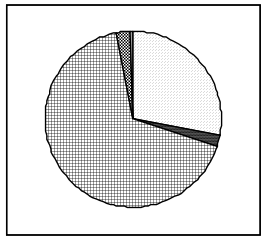
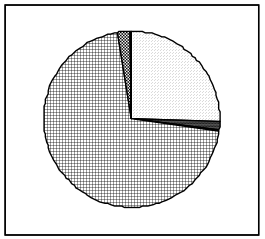
Figure 4.1 shows the syllable structure of Thai first words including the distribution of syllable structure types over age (Figure 4.1 (a)), relative distribution in each age (Figure 4.1 (b)), and relative frequency of token types over age (Figure 4.3 (a)).

**Figure 4.1 Syllable structure of Thai first words**

***(a) Distribution of syllable structures types (%)***

(i) Open Syllables: CV CVV CCV CCVV

(ii) Closed Syllables: CVC CVVC CCVC CCVVC

| 9 Months | 12 Months | 15 Months | 18 Months | 21 Months | 24 Months |
|---|---|---|---|---|---|
| No data |  |  |  |  |  |

***(b) Relative distribution***

| | *Closed* | *Open* |
|---|---|---|
| 12 Months | CVC(55.6%) | CV(44.4%) |
| 15 Months | CVC(78.4%) | CV(21.1%) CVV(0.6%) |
| 18 Months | CVC (57.7%) CVVC(2.9%) CCVC(0.2%) | CV (26.3%) CVV(12.9%) |
| 21 Months | CVC (66.9%) CVVC(2.6%) CCVC(0.5%) | CV (28.2%) CVV(1.8%) |
| 24 Months | CVC (70.2%) CVVC(2.5%) CCVC(0.2%) | CV(25.5%) CVV(1.4%) CCV(0.2%) |

***(c) Relative frequency of token types over age***

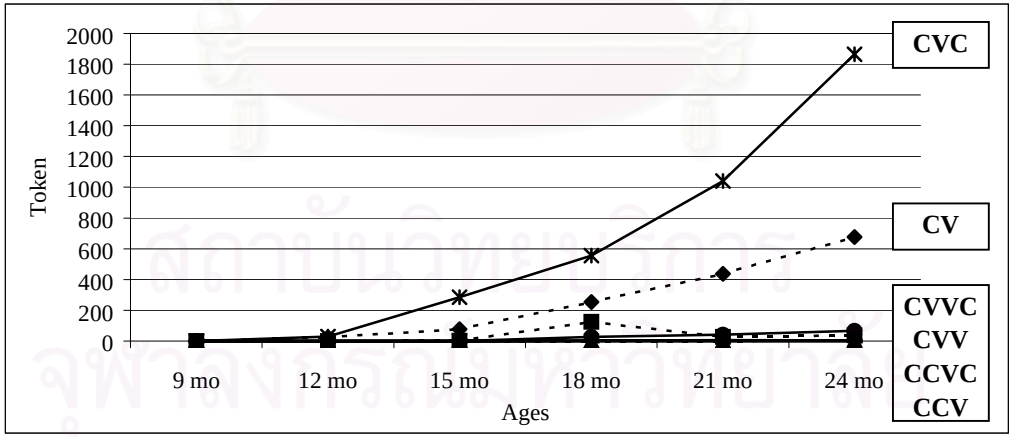


Figure 4.1 (a) shows that closed syllables emerged in a larger proportion of children's first words than open syllables throughout the period of investigation. This might be an important counterexample against Jacobson (1941/68 cited in Ingram 1989)who predicted that the open syllable 'CV' would be acquired earlier than the close syllable 'CVC'. From the data of Thai children, it was found that the word /mam1 mam1/ 'to eat' — which is an important word for children's early lives — is distributed widely in children's production from the age of 12 months. This seems to be another important factor determining the direction of phonological acquisition.

However, examination of the distribution of patterns in open and closed syllables shows that the more complicated syllable structures were found less often in children's first words. Moreover, in terms of development, syllable structure of first words tends to become more complicated over time. As demonstrated in Figure 4.1(b), the relative distribution is CV > CVV > CCV in the open syllable category, and CVC > CVVC > CCVC in the closed syllable category. The most complicated patterns in the two categories — CCVV, and CCVVC — have not yet been produced during the period of investigation. These findings support the universal hypothesis which views that children could produce limited types of sounds, because their speech organs have not yet fully developed. Moreover, these indicate that the characteristics of children's syllable structures become more adult-like over development as found in the emergence of more complicated syllable structures throughout development.

Relative frequency over age in Figure 4.1(c) shows that the development of syllable structure types is gradual throughout the period of investigation except in the case of the structure CVC that rapidly increases after the age of 18 months.

The distribution of syllable structures can lead to predictions about the order of acquisition as shown in Table 4.1 below.

***Table 4.1 The emergence of syllable structures in children's first words***

| | ***Syllable Structures*** | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **Open Syllables** | | | | ***Closed Syllables*** | | | |
| | **CV** | **CVV** | **CCV** | **CCVV** | **CVC** | **CVVC** | **CCVC** | **CCVVC** |
| 9 mo | | | | | | | | |
| 12 mo | ✓ | | | | ✓ | | | |
| 15 mo | ✓ | ✓ | | | ✓ | | | |
| 18 mo | ✓ | ✓ | | | ✓ | ✓ | ✓ | |
| 21 mo | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | |
| 24 mo | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | |

### 4.2.2 Consonants

Children's first words used both initial and final consonants, and the distribution is described in 4.2.2.1 and 4.2.2.2, respectively.

#### 4.2.2.1 Initial Consonants

A total of 5,420 tokens of initial consonants were recorded. Examples of initial consonants of Thai children's first words are shown.

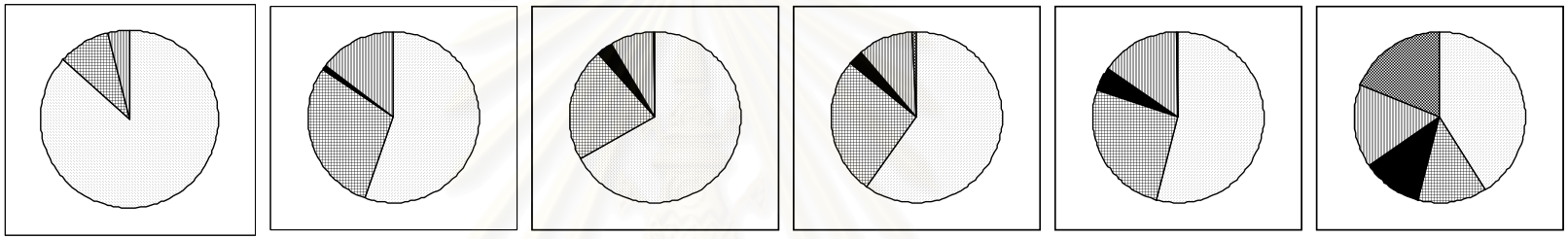
| Initial Consonants | Children's Productions | Adult's Targets | Meanings |
|---|---|---|---|
| *Monoconsonants* | | | |
| Stops | [pOO2] | /phOO2/ | 'father' |
| | [taw1] | /taw1/ | 'turtle' |
| | [kaaN0] | /niw3 klaaN0/ | 'middle finger' |
| | [?aaj0] | /jaaj0/ | 'grandmother' |
| | [cit1] | /tit1/ | 'to stuck' |
| Nasals | [mxx2] | /mxx2/ | 'mother' |
| | [nom2] | /nom0/ | 'milk' |
| | [Naj0] | /jaN0 Naj0/ | 'How' |
| Fricatives | [fa3 jaN1] | /fa3 raN1/ | 'guava' |
| | [sii4 dam0] | /sii4 dam0/ | 'black' |
| | [haj2] | /haj2/ | 'to give' |
| Continuants | [jiiaw2] | /thiiaw2/ | 'to go out' |
| | [lot3] | /rot3/ | 'car' |
| | [wii0] | /wii4/ | 'comb' |
| *Clusters* | [kwaa4] | /khwaa4/ | 'right (dir.)' |
| | [khwaaj0] | /khwaaj0/ | 'buffalo' |

The distribution, relative frequency, and relative frequency over age of these initial monoconsonants (C), and clusters (CC) are shown in Figure 4.2 (a), (b), and (c), with monoconsonants sub-divided further into manner of articulation: stops, nasals, fricatives, and continuants.

**Figure 4.2 Initial consonants of Thai first words**

***(a) Distribution of initial consonant types (%)***

(i) Monoconsonants: Stops Nasals Continuants Fricatives (ii) Clusters




***(b) Relative distribution***

| 9 Months | 12 Months | 15 Months | 18 Months | 21 Months | 24 Months | Adults (Hanpanich 1993) |
|---|---|---|---|---|---|---|
| No data | Stops (86.5%) | Stops (55.6%) | Stops (66.9%) | Stops (59.9%) | Stops (54.2%) | Stops (41.2%) |
| | Nasals (9.6%) | Nasals (28.9%) | Nasals (21.4%) | Nasals (25.8%) | Nasals (26.1%) | *Clusters (18.9%)* |
| | Continuants (3.9%) | Continuants (14.7%) | Continuants (8.5%) | Continuants (10.7%) | Continuants (14.8%) | Continuants (15.5%) |
| | | Fricatives (0.8%) | Fricatives (3%) | Fricatives (2.9%) | Fricatives (4.5%) | Nasals (12.9%) |
| | | | Clusters (0.2%) | Clusters (0.7%) | Clusters (0.4%) | Fricatives (11.5%) |

***(c) Relative frequency of token types over age***

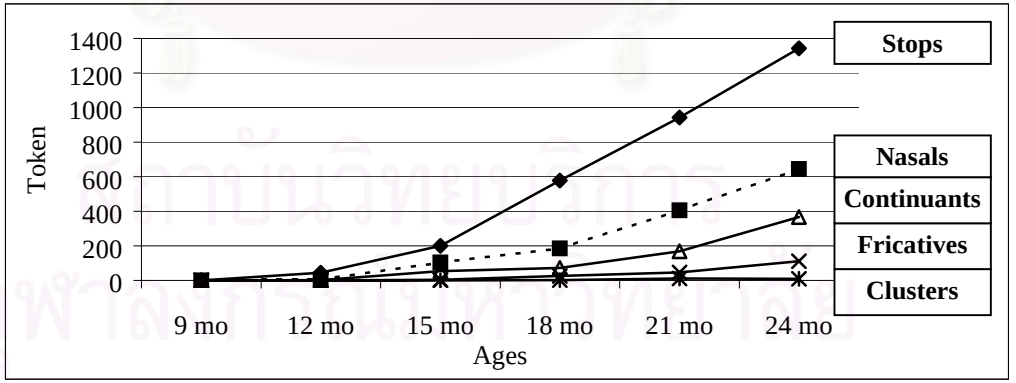


Figure 4.2 (a) shows that initial consonants of children's first words are overwhelmingly monoconsonants. This finding indicates the greater difficulty in the production of CC over C, and supports the view that children have limited capability for producing more complicated sounds as found in the case of syllable structures in 4.2.1. Figure 4.2 (b) shows details of initial clusters over age. As shown in Figure 4.2(b), clusters first appear at18 months but only with very low frequency (n=2). Thai initial clusters found in first words are /kw/ and /khw/, while non-Thai initial clusters /hw/ and /?w/ are also found. Examples and the frequency of occurrence of Thai and non-Thai initial clusters as shown

| **Clusters** | **Children's Productions** | **Adult's Targets** | **Meanings** |
|---|---|---|---|
| Thai Clusters | [kwaa4] | /khwaa4/ | 'right (dir.)' |
| | [khwaaj0] | /khwaaj0/ | 'buffalo' |
| Non-Thai Clusters | [hwaa1] | /khwaa4/ | 'right (dir.)' |
| | [?ot3 ?waj0] | /rot3 faj0/ | 'train' |

The frequency of occurrence of Thai and non-Thai initial clusters are shown in Table 4.2 below.

***Table 4.2 Developmental distribution of initial clusters of Thai first words*** (n=22)

| **Age** / **Initial Clusters** | ***9 MO*** | ***12MO*** | ***15MO*** | ***18MO*** | ***21MO*** | ***24MO*** |
|---|---|---|---|---|---|---|
| **Thai Clusters** | | | | | | |
| /kw/ | - | - | - | 2 | 9 | 6 |
| /khw/ | - | - | - | - | 2 | - |
| **Non-Thai Clusters** | | | | | | |
| /hw/ | - | - | - | - | - | 2 |
| /?w/ | - | - | - | - | - | 1 |

It should be noted that children tend to substitute the adult's target initial cluster (CC), with a monoconsonant (C). This might be the result of the incomplete development of children's speech apparatus. Examples of such substitution are:

| **Subject Code** | **Age (Months)** | **Children's Production** | **Adult's Target** | **Meanings** |
|---|---|---|---|---|
| L08 | 21 | [kaaN0] | /kwaaN0/ | 'deer' |
| L08 | 24 | [?aa4] | /khwaa4/ | 'right' |
| L09 | 24 | [wiaN2] | /khwiaN2/ | 'to throw' |

Figure 4.2 (a) shows that the most common initial consonants are stops followed by nasals, continuants, fricatives, and then clusters. This distribution is different from the order of distribution of initial consonants in the adults' spoken language reported by Hanpanich (1993). The main differences being that clusters are less frequent, and nasals are much more frequent in child than adult speech. Moreover, the relative distribution in Figure 4.2 (b) and (c) seems to be stable throughout the period of investigation. In other words, initial consonants are distributed in children's first words in the following order:

Stops > Nasals > Continuants > Fricatives > Clusters. Such distribution can be explained in terms of difficulty in production. For example, initial consonants in the 'stops' category such as /p/, and /b/ may be more easily produced than those in the 'fricatives' category such as /f/, and /s/. This data can be taken to support the universal hypothesis of language acquisition. It has been reported that stops are among the first set of initial consonants produced (Locke 1983). However, it should also be noted that fricative consonants are acquired earlier by children in some languages, such as English, and Quiche⇔ (Pye *et al.* 1987). This means that the universal explanation of the influence of biological factors in language acquisition cannot perfectly explain this phenomenon.

Although findings from Thai initial consonant acquisition seem to support the universal hypothesis, the child data should also be considered in light of distribution in the adult data as shown in Figure 4.2 (a). According to Hanpanich (1993), stops have the highest proportion in Thai adults' spoken language, while fricatives have the lowest. This is similar to children's data. However, in the case of continuants and nasals the adult distribution seems to be opposite to that of the child.

It should be noted that Hanpanich (1993) studied the distribution of the adult language not infant-directed speech. From first words data, it was found that words containing a nasal consonant in the initial position are words that refer to the child's most familiar person and activity which are frequently used in the infant-directed speech: /mxx2/, and /mam1 mam1/. These two words are among the first set of words acquired by most Thai children. The word /mxx2/ 'mother' refers to the most familiar person to the child, while the word /mam1 mam1/ is an infant-directed word means 'to eat', one of the most important activities for young children. The word /mam1 mam1/ is rarely found in the adult-directed speech, but always found in the infant-directed speech. This finding suggests that there is a role of parental input in children's acquisition of words and that despite the apparent concordance between child and adult distributions, the children's productions are also affected by the distribution of phonemes in *the speech they hear around them*.

Initial monoconsonants found in Thai children's first words consist of both Thai and non-Thai consonants as shown in Table 4.3.

***Table 4.3 Developmental distribution of initial monoconsonants of Thai first words***

| **Age**<br>**Initial Consonants** | ***9 MO*** | ***12MO*** | ***15MO*** | ***18MO*** | ***21MO*** | ***24MO*** |
|---|---|---|---|---|---|---|
| **Thai Initials**<br>(n=5,303 / 98.24%) | | | | | | |
| *Stops* | - | 45 | 200 | 577 | 943 | 1343 |
| *Nasals* | - | 5 | 104 | 185 | 406 | 645 |
| *Continuants* | - | 2 | 53 | 73 | 168 | 367 |
| *Fricatives* | - | - | 3 | 26 | 46 | 112 |
| **Non-Thai Initials**<br>(n=95 / 1.76%) | | | | | | |
| *Stops*<br>/B/[12] | - | 1 | 5 | 88 | - | - |
| *Fricatives*<br>/z/ | - | - | - | - | - | 1 |

Table 4.3 shows that non-Thai initial consonants (consonants that are not occur in Thai language) were rarely found in the data — 1.76%. Moreover, in terms of development, the two consonants do not show continuous distribution over the period of investigation. The voiced bilabial continuant /B/ was found during 12 to 18 months, while there is only one token of voiced alveolar fricative /z/ found in the data at 24 months.

In terms of realization in initial position, the two non-Thai consonants were assigned to a limited number of words. The voiced bilabial continuant /B/ is used for the production of the target word /bUUn2 bUUn2/, as [BUUn2 BUUn2] referring to ‘onomatopoeia for vehicles’, and ‘a car’, while the voiced alveolar fricative /z/ is used as free variation of the voiceless alveolar stop /t/ found in the production of the word /tot1/, as [zot1] referring to ‘to fart’. The occurrence of /B/ tends to disappear when it was substituted by the target voiced bilabial stop /b/, while the occurrence of /z/ seems to be simply an allophonic variation in production that might be the result of influence from surrounding sounds. In conclusion, the frequency of occurrence of non-Thai initial consonants found in children’s first words gradually decreases and finally disappears from children’s production. This is another evidence indicating that children are developing toward their mother language, and non-mother language characteristics are filtered out.

The above distribution can lead to an implication about the order of acquisition of initial consonants. Table 4.4 below shows the appearance of each initial consonant in Thai first words data.

[12] The phoneme /B/ represents the voiced bilabial trill of the IPA system

*Table 4.4 The emergence of initial consonants in children's first words*

| | **Initial Consonants** | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Monoconsonants** | | | | | | | | | | | | | | | | | | | | | **Clusters** | |
| | **Stops** | | | | | | | | | | | **Nalsals** | | | **Continuants** | | | | **Fricatives** | | | | |
| | **p** | **t** | **c** | **k** | **?** | **ph** | **th** | **ch** | **kh** | **b** | **d** | **m** | **n** | **N** | **l** | **r** | **w** | **j** | **f** | **s** | **h** | **kw** | **khw** |
| 9 mo | | | | | | | | | | | | | | | | | | | | | | | |
| 12 mo | ✓ | | ✓ | | ✓ | | | | | ✓ | | ✓ | | | | | | ✓ | | | | | |
| 15 mo | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | ✓ | ✓ | ✓ | ✓ | | ✓ | | ✓ | ✓ | | | ✓ | | |
| 18 mo | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| 21 mo | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 24 mo | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

**4.2.2.2 Final Consonants**

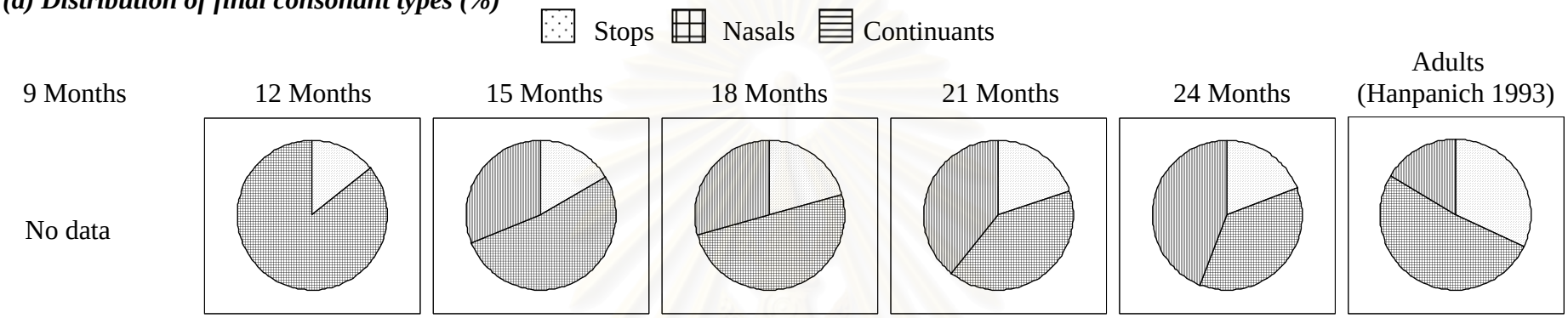
Final consonants found in children's first words correspond to the adult system. They are classified into three categories based on manner of articulation: stops, nasal, and continuants. Examples of final consonants of children's first words are shown.

| Final Consonants | Children's Productions | Adult's Targets | Meanings |
|---|---|---|---|
| Stops | [cap1] | /klap1/ | 'to return' |
| | [lot3] | /rot3/ | 'car' |
| | [jak3] | /rak3/ | 'to love' |
| | [kx?1] | /kx?1/ | 'sheep' |
| Nasals | [mam3 mam0] | /mam1 mam1/ | 'to eat' |
| | [?aan1] | /?aan1/ | 'to read' |
| | [caaN4] | /chaaN3/ | 'elephant' |
| Continuants | [?aw2] | /khaw2/ | 'to enter' |
| | [jaj0] | /?a0 raj0/ | 'What' |

The distribution and relative frequency of the three categories are shown in Figure 4.3 (a), (b), and (c).

**Figure 4.3 Final consonants of Thai first words**

***(a) Distribution of final consonant types (%)***




***(b) Relative frequency***

| 9 Months | 12 Months | 15 Months | 18 Months | 21 Months | 24 Months | Adults (Hanpanich 1993) |
|---|---|---|---|---|---|---|
| No data | Nasals (85.7%)<br>Stops (14.3%) | Nasals (52.1%)<br>Continuants (31.2%)<br>Stops (16.7%) | Nasals (50.3%)<br>Continuants (29.2%)<br>Stops (20.5%) | Nasals (41%)<br>Continuants (39.2%)<br>Stops (19.7%) | Continuants (44.1%)<br>Nasals (36.9%)<br>Stops (19.1%) | Nasals (51.7%)<br>Stops (31.9%)<br>Continuants (16.4%) |

***(c) Relative frequency of token types over age***

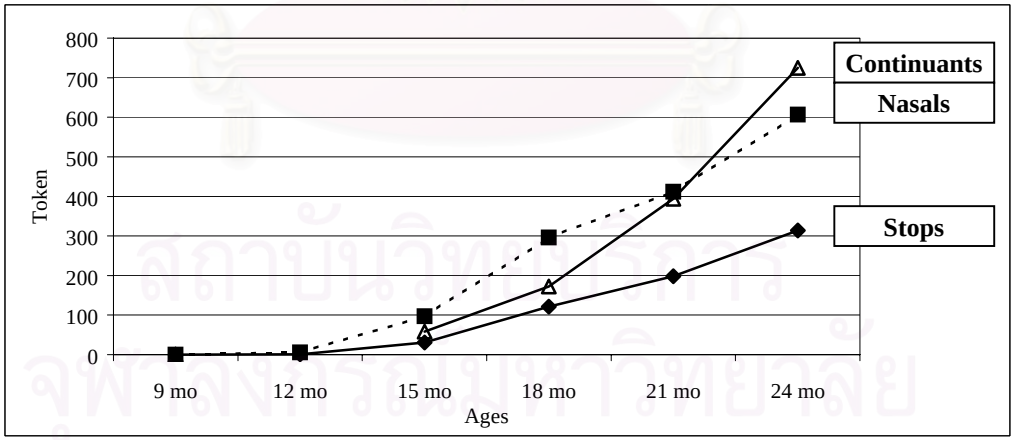


Figure 4.3 (a) and (b) show that final nasals and stops are found as early as 12 months, while final continuants are produced later, starting around 15 months. The order of distribution was stable, Nasal > Continuants > Stops, until 21 months and changed to Continuants > Nasals > Stops at 24 months. Actually the frequency of final continuants seems to increase sharply from 18 months and, finally, outnumbers final nasals as shown in Figure 4.3 (c).

In comparison to Hanpanich (1993), the proportion of final consonants is different from adults'. The period from 21 to 24 months is an interesting period. Children seem to become aware that surrounding objects have names (Gopnik & Meltzoff 1987) and can acquire a desired objects by crying or pointing, or by using its name. One of the most frequent groups of words found in children's speech in the 21 to 24 month period are the question words 'what', 'where', 'who' which are used to obtain information about the names of objects, places, or people, as shown in Table 4.5.

***Table 4.5 Frequency of the three question words (what, where, and who) found in the data in relation to the highest frequency of words found at each age***

| **Words** | **Age in Months** | | | | | |
|---|---|---|---|---|---|---|
| | **9** | **12** | **15** | **18** | **21** | **24** |
| Highest Frequency Found | - | 8 | 31 | 26 | 60 | 119 |
| What | - | - | 31 | 22 | 11 | 108 |
| Where | - | - | 2 | - | 40 | 51 |
| Who | - | - | - | - | - | 18 |

In Thai, the words are /?a0 raj0/ 'what', /thii2 naj4/ 'where', and /khraj0/ 'who' can be realized in different ways such as [?a0 laj0], [laj0], [jaj0] for /?a0 raj0/, and [naj4] for /thii2 naj4/. Even the omitted versions [laj0], [jaj0], [naj4] include the final continuant [j]. According to this, the frequency of final continuants — which consists of /w/ and /j/ — increases dramatically from the age of 21 months. This suggests that children's preference for a particular word is also a factor determining the direction of acquisition.

Another interesting finding concerns the frequency of stop sounds. In the initial position, stops emerged with very high frequency since the early period of investigation (see Section 4.2.2.1). However, in the final position, the frequency of stops seems to be the lowest among the three final consonant categories: Nasals > Continuants > Stops. According to this, it implies that from the universal point of view, the ease in production of stops clearly fails to explain findings of stops in Thai children's data. However, from the language specific point view, relative frequency of stops in child language obviously conforms to that of adults both in the case of initial and final stops. This implies the influence of language specific factor to child language acquisition.

From the distribution of final consonants, the tentative order of acquisition can be implied as shown in Table 4.6.

***Table 4.6 The emergence of final consonants in children's first words***

| | **Final Consonants** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | **Stops** | | | | **Nasals** | | | **Continuants** | |
| | **p** | **t** | **k** | **?** | **m** | **n** | **N** | **w** | **j** |
| 9 mo | | | | | | | | | |
| 12 mo | ✓ | | | ✓ | ✓ | ✓ | | | |
| 15 mo | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 18 mo | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 21 mo | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 24 mo | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

**4.2.3 Vowels**

Thai has 9 monophthongs and 3 diphthongs, and each of these have distinctive length. In this study, only the qualitative aspect of vowels, 9 monophthongs and 3 diphthongs, was investigated. Examples of vowel of Thai children's first words are shown.

| **Vowels** | **Children's Productions** | **Adult's Targets** | **Meanings** |
|---|---|---|---|
| *Monophthongs* | | | |
| Front | [nii2] | /nii2/ | 'this one' |
| | [lee0] | /tha0 lee0/ | 'sea' |
| | [dxxw0] | /dxxN0/ | 'red' |
| Central | [khUn2] | /pqqt1/ | 'to open' |
| | [pqqt3] | /khUn2/ | 'to go upward' |
| | [tam0] | /tham0/ | 'to do' |
| Back | [duu0] | /duu0/ | 'to watch' |
| | [mot3] | /mot3/ | 'ant' |
| | *[kON2]* | */klON2/* | *'camera'* |
| *Diphthongs* | [tiaw2] | /thiaw2/ | 'to go out' |
| | [mUan4] | /mUan4/ | 'same' |
| | [cuaj2] | /chuaj2/ | 'to help' |

***Table 4.7 Developmental distribution of vowels of Thai first words***

| **Age**<br>**Vowels** | ***9 MO*** | ***12MO*** | ***15MO*** | ***18MO*** | ***21MO*** | ***24MO*** | ***Total*** |
|---|---|---|---|---|---|---|---|
| Monophthongs (V) | - | 53 | 364 | 906 | 1,511 | 2,438 | 5,272 (96.11%) |
| Diphthongs (VV) | - | - | 2 | 41 | 65 | 105 | 213 (3.89%) |

Table 4.7 shows that both monophthongs (V) and diphthongs (VV) occur in children's first words, with the greater proportion (96.11%) consisting of monophthongs. In terms of development, the production of diphthongs did not occur until 15 months and even then with very low frequency (n=2), while children produced monophthongs quite extensively at 12 months. This overwhelming distribution of monophthongs over diphthongs in children's first words implies that monophthongs are more easily produced

than diphthongs. In the next section, the distribution of vowel qualities in monophthongs and diphthongs is examined.

#### 4.2.3.1 Monophthongs

Figure 4.4 (a), (b), and (c) show the distribution of each monophthong over age compared to that of the adult, relative frequency, and relative frequency over age as shown.

**Figure 4.4 Monophthongs of Thai first words**

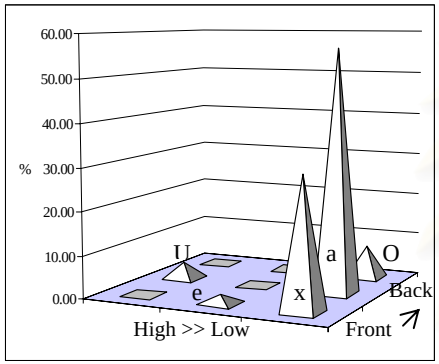
***(a) Distribution of monophthong types (%)***

X axis = Tongue Height (High-Mid-Low) Y axis = Tongue Advancement (Front-Central-Back) Z axis = %

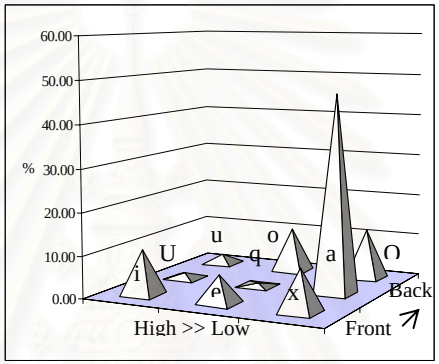
9 Months

No data

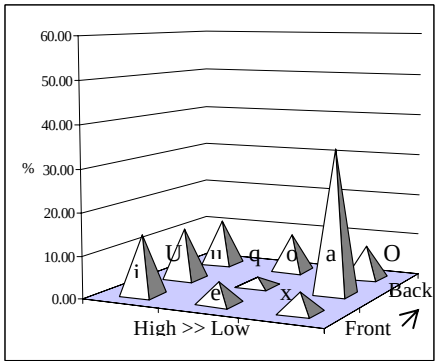
12 Months




15 Months




18 Months



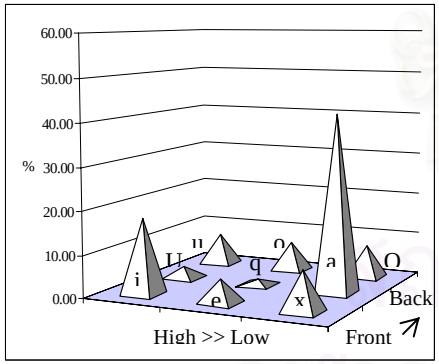

***(b) Relative frequency***

/a/ > /x/ > /O/ > /U/ > /e/

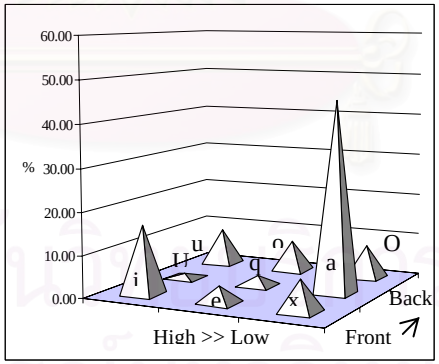
/a/ > /O/ > /i/ > /o/ > /x/ > /e/ > /u/ > /U/ > /q/

/a/ > /i/ > /U/ > /u/ > /o/ > /O/ > /e/ > /x/ > /q/

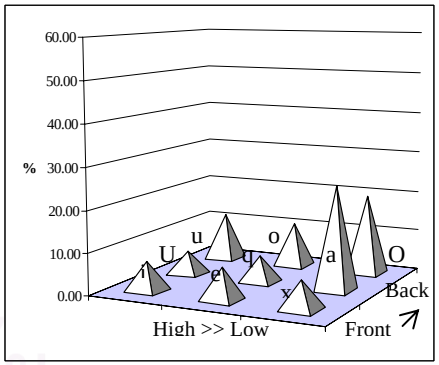
21 Months




24 Months




Adults (Hanpanich 1993)




***Relative frequency***

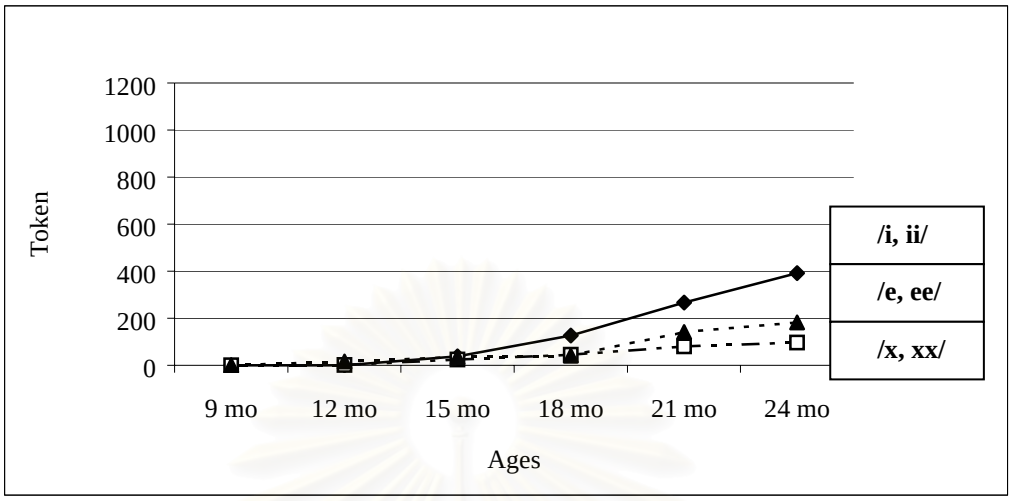
/a/ > /i/ > /x/ > /O/ > /u/ > /o/ > /e/ > /U/ > /q/

/a/ > /i/ > /u/ > /O/ > /x/ > /o/ > /e/ > /q/ > /U/

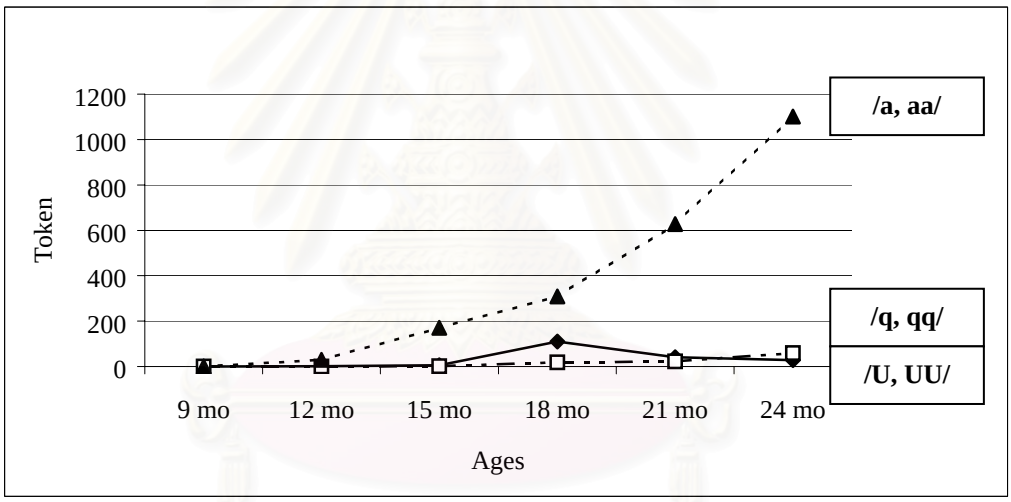
/a/ > /O/ > /u/ > /o/ > /e/ > /i/ > /x/ > /q/ > /U/

### *(c) Relative frequency of token types over age*

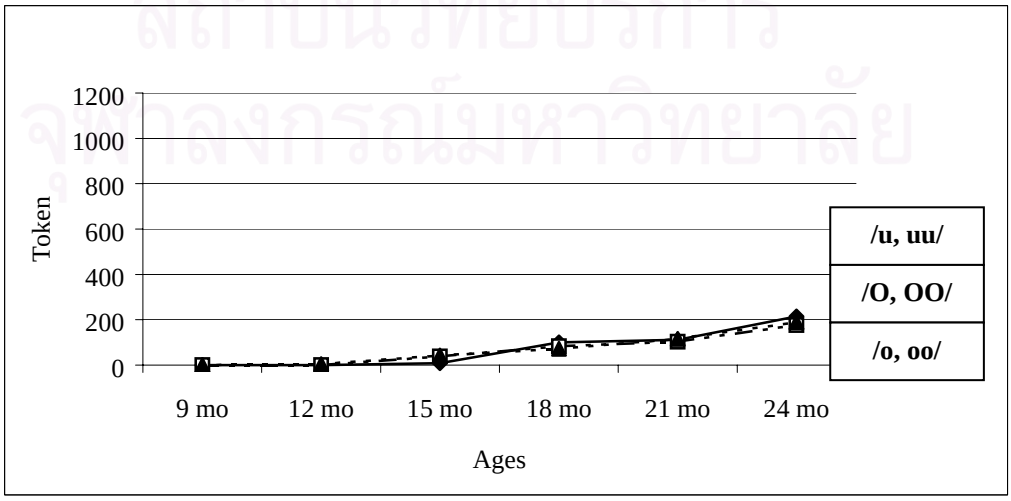
#### *(i) Front Vowels*




#### *(ii) Central Vowels*



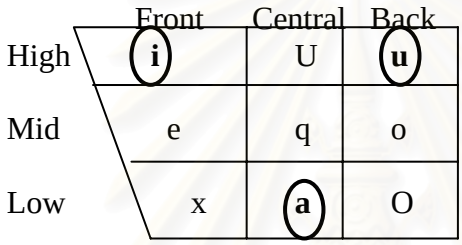

#### *(iii) Back Vowels*



From Figure 4.4 (a) and (b), it was found that five monophthongs could be produced as early as 12 months, consisting of one high vowel /U/, one mid vowel /e/, and three low vowels /x, a, O/. At 15 months children can produce all Thai vowel. Relative frequency shows that the low central vowel /a/ is the most frequently produced, while the other two central vowels /U/ and /q/ are the least frequently produced. Such distribution conforms to the adult data in Hanpanich (1993) and seems to support the view that children's vowel system is developing toward that of the adult.

Although most monophthongs continuously develop over time, the rate of development is different. From Figure 4.4 (c), the frequency of the three most distant vowels in vowel chart — /i/, /a/, /u/ — tends to increase dominantly. This might be because the position of the tongue in producing these three vowels is distinctively different as can be seen in Figure 4.5 below. Consequently, children might find them easier to produced.

***Figure 4.5 Vowel chart of Thai***




For the other monophthongs, the increasing rate and number of frequency tends to be less as shown in the following order: the low pair /O/, /x/ > the mid pair /o/, /e/ > the central pair /q/, /U/. Each pair of vowels has similar frequency of occurrence in the data.

From the distribution and relative frequency of monophthongs, the tentative order of acquisition of Thai monophthongs can be shown in Table 4.8 below.

***Table 4.8 The emergence of vowels in children's first words***

| | **Vowels** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Monophthongs** | | | | | | | | | **Diphthongs** | | |
| | **Front** | | | ***Central*** | | | **Back** | | | | | |
| | **i** | **e** | **x** | **U** | **q** | **a** | **u** | **o** | **O** | **ia** | **Ua** | **ua** |
| 9 mo | | | | | | | | | | | | |
| 12 mo | | ✓ | ✓ | ✓ | | ✓ | | | ✓ | | | |
| 15 mo | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | |
| 18 mo | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 21 mo | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 24 mo | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

**4.2.3.2 Diphthongs**

Compared to monophthongs, diphthongs are found at a later stage in the data and have much lower frequency as shown in Table 4.9.

***Table 4.9 Developmental distribution of diphthongs of Thai first words*** (n=213)

| **Age** / **Vowels** | ***9 MO*** | ***12MO*** | ***15MO*** | ***18MO*** | ***21MO*** | ***24MO*** |
|---|---|---|---|---|---|---|
| /ia/ | - | - | 2 | 28 | 20 | 51 |
| /Ua/ | - | - | - | 3 | 15 | 15 |
| /ua/ | - | - | - | 10 | 30 | 39 |

Table 4.9 demonstrates that the production of diphthongs is first found at 15 months. Although the frequency is low, the three qualitative diphthongs show continuous development until 24 months of age. The order of distribution is /ia/ > /ua/ > /Ua/ which is similar to the distribution in adults (Hanpanich, 1993).

**4.2.4 Tones**

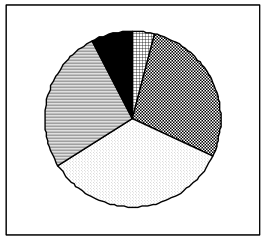
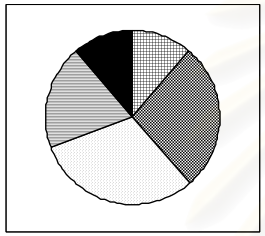
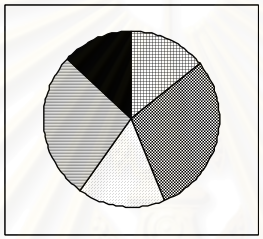
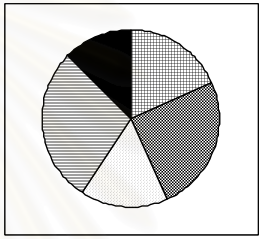
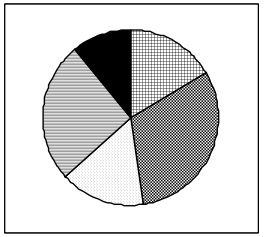
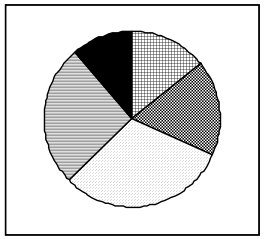
Examples of tones of Thai children's first words are shown.

| ***Tones*** | ***Children's Productions*** | ***Adult's Targets*** | ***Meanings*** |
|---|---|---|---|
| Mid (0) | [tOO0] | /fak3 thOON0/ | 'pumpkin' |
| | [jUUn0] | /jUUN0/ | 'to stand' |
| Low (1) | [kaj1] | /kaj1/ | 'chicken' |
| | [di1] | /liN0/ | 'monkey' |
| Falling (2) | [?en2] | /len2/ | 'to play' |
| | [?Ua2] | /chUa2/ | 'to believe' |
| High (3) | [paa3] | /faa3/ | 'sky' |
| | [keek3] | /kheek3/ | 'cake' |
| Rising (4) | [maa4] | /maa4/ | 'dog' |
| | [?uaj4] | /suaj4/ | 'beautiful' |

The proportions of the five Thai tones in children's early words are shown in Figure 4.6(a), (b), and (c).

**Figure 4.6 Tones of Thai first words**

***(a) Distribution of tone types (%)***


| 9 Months | 12 Months | 15 Months | 18 Months | 21 Months | 24 Months | Adults (Hanpanich 1993) |
|---|---|---|---|---|---|---|
| No data |  |  |  |  |  |  |

***(b) Relative frequency***

| 9 Months | 12 Months | 15 Months | 18 Months | 21 Months | 24 Months | Adults (Hanpanich 1993) |
|---|---|---|---|---|---|---|
| Low (34%) | Low (30.8%) | Mid (29.6%) | Falling (28.2%) | Mid (31.3%) | Low (30.9%) |
| Mid (28.3%) | Mid (27.5%) | Falling (26.8%) | Mid (24.9%) | Falling (25.8%) | Falling (26.4%) |
| Falling (26.4%) | Falling (19.4%) | Low (16.1%) | High (18.4%) | High (16.3%) | Mid (17.6%) |
| Rising (7.6%) | Rising (11.1%) | High (14.3%) | Low (16%) | Low (15.8%) | High (14.2%) |
| High (3.8%) | High (11.1%) | Rising (13.2%) | Rising (12.5%) | Rising (10.7%) | Rising (11%) |

***(c) Relative frequency of token types over age***

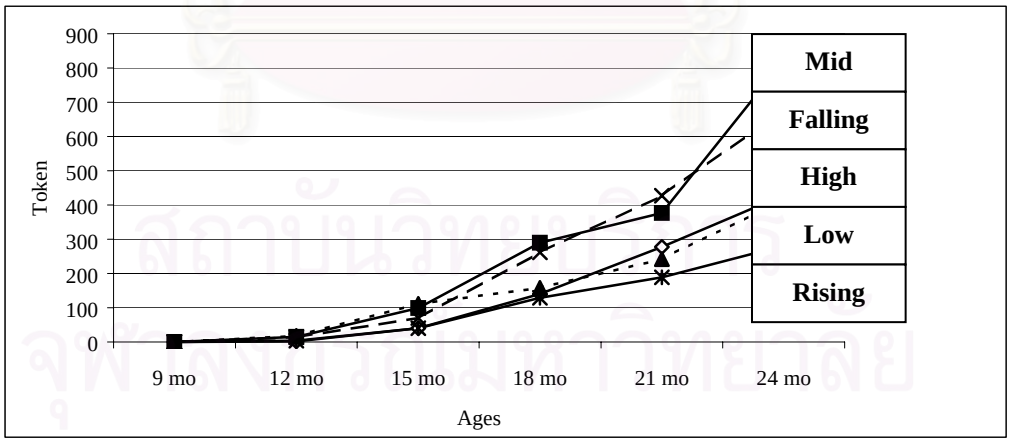


Figure 4.6 (a) and (b) show that tones develop very early in children's first words. At 12 months, all five tones are already present. However, it was found that the relative frequencies are not as stable as the case of consonants and vowels examined so far. The frequency of the five tones changes to some extent with age as can be seen in Figure 4.6 (c), with the relative proportion of mid and falling tones significantly higher than high and rising tones throughout the period of investigation, and the relative proportion of low tones in children's productions also varies with age. Around the onset of lexical development — from 9 to 15 months — the production of low tones is the highest and tends to drop radically after the age of 15 months.

Children's production of tones is different from that of consonants in the sense that the accuracy in the production of target tones is higher than that of target initial consonants as shown in Table 4.10 below.

***Table 4.10 Percentage of errors in production of consonants, vowels, and tones***

| | **Initial Consonants** | **Final Consonants** | **Vowels** | **Tones** |
|---|---|---|---|---|
| Percentage of Errors (%) | 27.27 | 4.54 | 2.59 | 3.49 |

As early as 12 months, children are mostly able to produce target tones accurately, whereas there is a large degree of substitution of target initial consonants. The decrease in the relative prominence of the low tone in children's productions over age may not indicate a decrease in their productive ability for the low tone, but rather may reflect the types of target words children acquire. From the onset of lexical development, children acquire adult target words distributed into five tones. However, some early words containing the low tone seem to be preferred over others, because they are important for children's daily life, e.g. /mam1 mam1/ 'to eat'. As children develop, they acquire more words and have more choices for expressing their needs, so the preference for production of some particular items decreases.

The proportions of tones in Figure 4.9 (a) seem to indicate a progression toward the adult target language; the older the child, the more similar the distribution of tones between children and adults. According to Hanpanich (1993), the distribution of tones in adults' spoken language is Low > Falling > Mid > High > Rising. In relation to the children's data at 24 months, a similar distribution to the adult distribution is found except low tone.

The following table (Table 4.11) gives an overview of the emergence of syllable structures, consonants, vowels, and tones found in Thai children's first words.

**Table 4.11 The emergence of syllable structures, consonants, vowels, and tones in Thai children's first words**

| Phonological Elements | | | Age in Months | | | | | | Phonological Elements | | | Age in Months | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 9 | 12 | 15 | 18 | 21 | 24 | | | | 9 | 12 | 15 | 18 | 21 | 24 |
| Syllable Structures | Open | cv | | ✓ | ✓ | ✓ | ✓ | ✓ | Final Consonants | Stops | p | | ✓ | ✓ | ✓ | ✓ | ✓ |
| | | cvv | | | ✓ | ✓ | ✓ | ✓ | | | t | | | ✓ | ✓ | ✓ | ✓ |
| | | ccv | | | | | ✓ | ✓ | | | k | | | ✓ | ✓ | ✓ | ✓ |
| | | ccvv | | | | | | | | | ? | | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Closed | cvc | | ✓ | ✓ | ✓ | ✓ | ✓ | | Nasals | m | | ✓ | ✓ | ✓ | ✓ | ✓ |
| | | cvvc | | | | ✓ | ✓ | ✓ | | | n | | ✓ | ✓ | ✓ | ✓ | ✓ |
| | | ccvc | | | | ✓ | ✓ | ✓ | | | N | | | ✓ | ✓ | ✓ | ✓ |
| | | ccvvc | | | | | | | | Cont. | w | | | ✓ | ✓ | ✓ | ✓ |
| Initial Consonants | Stops | p | | ✓ | ✓ | ✓ | ✓ | ✓ | | | j | | | ✓ | ✓ | ✓ | ✓ |
| | | t | | | ✓ | ✓ | ✓ | ✓ | Monophthongs | Front | i | | | ✓ | ✓ | ✓ | ✓ |
| | | c | | ✓ | ✓ | ✓ | ✓ | ✓ | | | e | | ✓ | ✓ | ✓ | ✓ | ✓ |
| | | k | | | ✓ | ✓ | ✓ | ✓ | | | x | | ✓ | ✓ | ✓ | ✓ | ✓ |
| | | ? | | ✓ | ✓ | ✓ | ✓ | ✓ | | Central | U | | ✓ | ✓ | ✓ | ✓ | ✓ |
| | | ph | | | ✓ | ✓ | ✓ | ✓ | | | q | | | ✓ | ✓ | ✓ | ✓ |
| | | th | | | ✓ | ✓ | ✓ | ✓ | | | a | | ✓ | ✓ | ✓ | ✓ | ✓ |
| | | ch | | | | ✓ | ✓ | ✓ | | Back | u | | | ✓ | ✓ | ✓ | ✓ |
| | | kh | | | | ✓ | ✓ | ✓ | | | o | | | ✓ | ✓ | ✓ | ✓ |
| | | b | | ✓ | ✓ | ✓ | ✓ | ✓ | | | O | | ✓ | ✓ | ✓ | ✓ | ✓ |
| | | d | | | ✓ | ✓ | ✓ | ✓ | Diph-thongs | | ia | | | ✓ | ✓ | ✓ | ✓ |
| | Nasals | m | | ✓ | ✓ | ✓ | ✓ | ✓ | | | Ua | | | | ✓ | ✓ | ✓ |
| | | n | | | ✓ | ✓ | ✓ | ✓ | | | ua | | | | | ✓ | ✓ |
| | | N | | | | ✓ | ✓ | ✓ | Tones | | mid | | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Fric. | f | | | | ✓ | ✓ | ✓ | | | low | | ✓ | ✓ | ✓ | ✓ | ✓ |
| | | s | | | | | ✓ | ✓ | | | falling | | ✓ | ✓ | ✓ | ✓ | ✓ |
| | | h | | | ✓ | ✓ | ✓ | ✓ | | | high | | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Cont. | l | | | ✓ | ✓ | ✓ | ✓ | | | rising | | ✓ | ✓ | ✓ | ✓ | ✓ |
| | | r | | | | | | | Consonant Clusters | | kw | | | | ✓ | ✓ | ✓ |
| | | w | | | ✓ | ✓ | ✓ | ✓ | | | khw | | | | | ✓ | ✓ |
| | | j | | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | | | | |

### 4.2.5 Conclusions

The acquisition of syllable structures, consonants, vowels, and tones were investigated and a tentative order of acquisition for each is proposed. The high number of distribution of a particular element implies the relative ease in acquisition. In other words, elements with a high distribution can be said to be acquired more easily and prior to elements with a low distribution.

For syllable structures, it was found that children exhibited both open and closed syllables at an early age. The order of acquisition of each type of structure is in accordance with the number of components in syllable structures: CV > CVV > CCV for open syllables, and CVC > CVVC > CCVC for closed syllables. This is in accord with the universal hypothesis of language acquisition.

For initial consonants, monoconsonants (C) are acquired before consonant clusters (CC). This is consistent with the quantitative difficulty in acquisition as found in the acquisition of syllable structures. The order of acquisition implied from the distribution of each consonant suggests that children's productions of consonants gradually move toward the adult language with age. The tentative order is Stops > Nasals > Continuants >

Fricatives. It was also found that children produce non-Thai initial consonants. These consonants gradually disappear and are substituted by Thai consonants as children get o l d e r .

Regarding final consonants, it was found that the order of acquisition is Nasals > Continuants > Stops. Although the general picture of distribution of final consonants in children might be similar to that of the adults, it was found that individual variation and preference plays an important role during the period in which requests for names abound — from 12 to 24 months of age. The distribution of final consonants shifted to Continuants > Nasals > Stops at 24 months of age.

Only the qualitative aspect of vowels was investigated. It was found that monophthongs are acquired before diphthongs. The order of distribution of vowels indicates that although the three so-called corner vowels of the vowel triangle, /i/, /a/, /u/, are not acquired earlier than others, they tend to be produced more often in the case of monophthongs, while the central high and mid vowel /U/, /q/ are acquired later. The central diphthongs /Ua/ is acquired later than the two peripheral /ia/ and /ua/.

Children acquire tones very early. The low tone shows a change in development possibly due to preferences in production of particular words. The overall distribution and proportion of tones found in the Thai children data demonstrate a gradual development toward the adult language.

In conclusion, it can be said that children's phonological system at an early period of development is different from that of the adult. During the appearance of first words, children's phonology consists of only some elements of the adult language such as, CV, CVC for syllable structures, and stops, nasals, continuants for initial consonants. As children develop, the number of elements increases. The distribution of elements of syllable structures, consonants, and vowels generally conform to that of the adults as found by Hanpanich (1993). The order of distribution of tones is different. These findings suggest that both universal and language specific influences affect the phonological acquisition. Moreover, it was found that individual preferences for particular words may also play a role in children's phonological development.

**4.3 Acquisition of Accentual System**

It has been reported that first words are normally one-word utterances (Benedict 1979, Ingram 1989, Clark 1993) consisting of either monosyllabic or disyllabic forms (Clark 1993, Ingram 1989, Wijnen *et al.* 1994). These utterances can be the result of the complete pronunciation of monosyllabic and disyllabic words, or the incomplete pronunciation of polysyllabic words.

There have been two possible explanations for this phenomenon. The first rests upon the universal hypothesis of language. Evidence of monosyllabic or disyllabic pronunciation has been explained mostly in terms of children's immature anatomical development (Clark 1993). Some universalists have tried to explain this phenomenon in terms of phonological process. Ingram (1986) states that young children simplify adults' words to limit the range of sounds and syllable structures, for example, producing only the stressed one according to the 'unstressed syllable deletion process'.

Less attention has been paid to the second possible explanation — the influence of the linguistic characteristics of the native language. In the Thai data described in the following section, some of the children's one-word utterances go beyond the explanation of the 'unstressed syllable deletion process'. This means that not only the universal hypothesis but also other factors must be considered in the course of children's choice of pronunciation at the one-word utterances stage.

Wijnen *et al.* (1994) suggested that such pronunciation does not indicate that children lack the ability to perceive the unaccented syllable of the word, but rather that they are able to realize the rhythmic pattern of strong and weak syllables in word pronunciations. However, as their production ability is not yet mature, the weak syllable is filtered. Hockberg (1988) found in her study of Spanish children that children around 3 years of age have learnt the regular patterns of stress in Spanish and tend to regularize the irregularly stressed words. This result indicates that language specific characteristics of Spanish play a very important role in children's pronunciation of words in the early period word acquisition.

From a cross-linguistic perspective, the relationship between children's pronunciation of "one-word utterances" and the accentual system of Thai, which, as proposed by Luksaneeyanawin (1983), has different patterns from those of English and Dutch, can provide insights into the role of language specific characteristics in the acquisition of the lexicon. In examining the acquisition of accentual system, children's pronunciations of Thai polysyllabic words were collected from the QWAT. The relative frequency of each type of possible pronunciation was investigated (see Appendix D).

### 4.3.1 Monosyllabic One-word Utterances

Regarding the relationship to the accentual system of Thai, children's monosyllabic and disyllabic one-word utterances were investigated. Examples of children's monosyllabic one-word utterances are given (see also Appendix E).

| ***Polysyllabic Words*** | ***Children's Productions*** | ***Adult's Targets*** | ***Meanings*** |
|---|---|---|---|
| Monomorphemic | [cok1] | /ciN2 ´cok1/ | 'lizard' |
| | [cxx0] | /kun0 ´cxx0/ | 'key' |
| Compound | [maaj3] | /baj0 ´maaj3/ | 'leaf' |
| | [som2] | /naam3 ´som2/ | 'orange juice' |
| Complex | [jiN4] | /phuu2 ´jiN4/ | 'woman' |
| | [jaj1] | /phuu2 ´jaj1/ | 'adult' |
| Repetitive | [baaj0] | /`baaj3 ´baaj0/ | 'bye bye' |

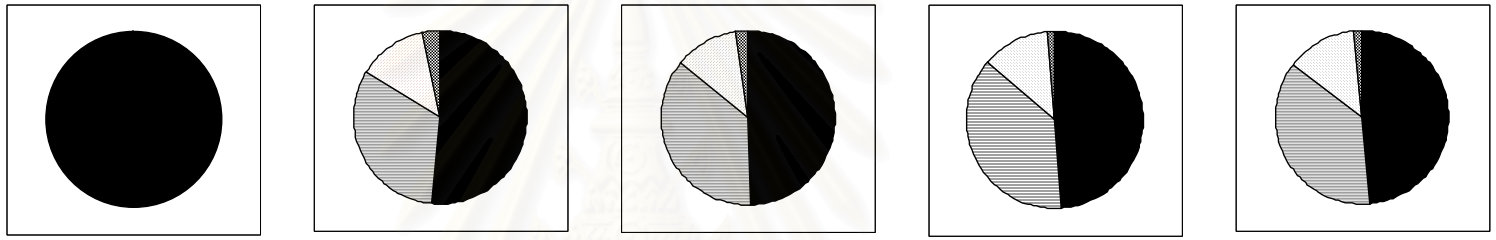
Figure 4.7 (a), (b), (c) show the distribution and relative frequency of children's monosyllabic one-word utterances.

**Figure 4.7 Monosyllabic one-word utterances**

***(a) Distribution of monosyllabic one-word utterance types (%)***

(i) Primary Accented Syllable: Monomorphemic Polysyllabic Words (Mon.) Polysyllabic Compounds (Cpd.)

Polysyllabic Complexes (Cpx.) Polysyllabic Repetitives (Rep. (ii) Secondary Accented Syllable (Sec.)




***(b) Relative frequency***

| 9 months | 12 Months | 15 Months | 18 Months | 21 Months | 24 Months |
|---|---|---|---|---|---|
| No data | Mon. (100%) | Mon. (51.6%) > Cpd. (32.3%) > Cpx. (12.9%) > Rep. (3.2%) | Mon. (49.3%) > Cpd. (36.6%) > Cpx. (11.9%) > Rep. (2.2%) | Mon. (48.8%) > Cpd. (37.2%) > Cpx. (12.5%) > Rep. (1.5%) | Mon. (48.6%) > Cpd. (36.5%) > Cpx. (13.3%) > Rep. (1.5%) |

***(c) Relative frequency of items over age***

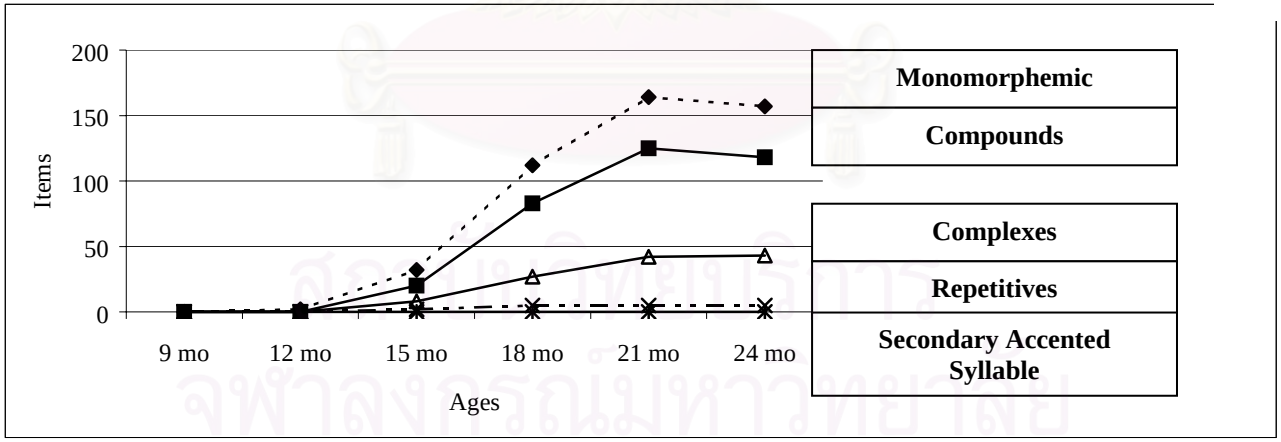


Figure 4.7 (a) and (b) show that all monosyllabic one-word utterances found in this study are the most salient primary accented syllables of the target polysyllabic words. The primary accent of polysyllabic words in Thai is always the last syllable, so children choose to pronounce only the last syllable of polysyllabic words as their monosyllabic one-word utterances.

The secondary accented syllable is not pronounced as a monosyllabic one-word utterance. This is possibly because the degree of salience of the secondary accent is less than that of the primary accent. In other words, the primary accented syllable is more likely to be stressed than the secondary one. These results for monosyllabic one-word utterances is evidence that children can distinguish between primary and secondary accented syllables. The results also imply that the most significant feature of the accentual system, that is the most salient accented syllable, has been acquired.

Examination of the relative frequency over age of monosyllabic words in Figure 4.7 (c) shows that there is a monotonic increases in development in the number of monomorphemic polysyllabic, compound, and complex words. In contrast, the number of monosyllabic repetitives does not demonstrate any developmental change at least until 24 months of age. In addition, compared with other word types, polysyllabic repetitives do not tend to be realized as monosyllabic utterances (see also Figure 4.8 (a), (b), (c) — disyllabic utterances). It can be concluded that there may be some other factor that influences children's production of repetitives. This is explained in more detail in the next section.

### 4.3.2 Disyllabic One-word Utterances

Thai children's disyllabic one-word utterances consist of two accent-related patterns. The first pattern is the two salient stressed syllables of the word primary and secondary accented syllables. The second pattern consists of the most salient stressed syllable of the word primary accented syllable and the non-salient unstressed syllable of the word unaccented syllable. These two are demonstrated below.

| ***Patterns*** | ***Target words*** | ***Meanings*** | ***Child's productions*** |
|---|---|---|---|
| 1 | /`cak1 kra0 ´jaan0/ | 'bicycle' | [cak1 jaan0] |
| 2 | /`prxxN0 sii4 ´fan0/ | 'toothbrush' | [sii4 fan0] |

Examples of children's disyllabic one-word utterances are given.

| ***Polysyllabic Words*** | ***Children's Productions*** | ***Adult's Targets*** | ***Meanings*** |
|---|---|---|---|
| Monomorphemic | [sap1 lot3] | /sap1 pa0 rot3/ | 'pineapple' |
| Compound | [thaN4 ja1] | /thaN4 kha0 ja1/ | 'bin' |
| | [kha0 ja1] | /thaN4 kha0 ja1/ | 'bin' |
| | [sii4 fan0] | /prxxN0 sii4 fan0/ | 'toothbrush' |
| Repetitive | [mam1 mam1] | /mam1 mam1/ | 'to eat' |

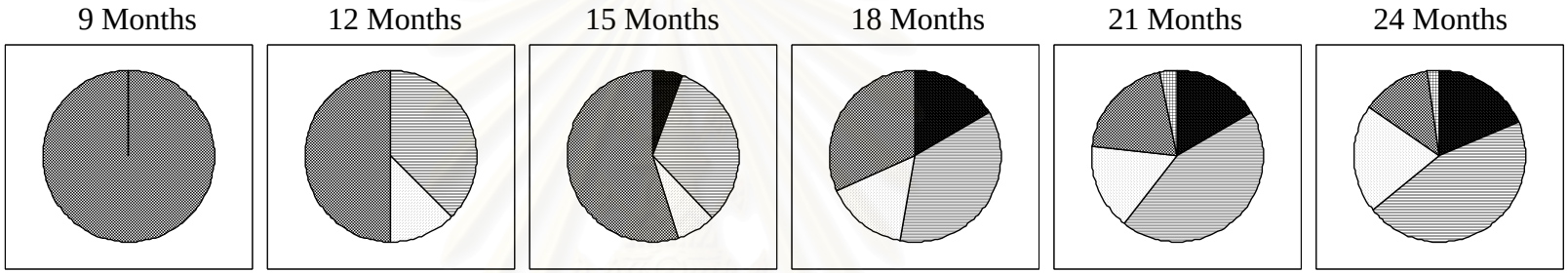
Figure 4.8 (a), (b), and (c) shows the distribution and relative frequency of disyllabic one-word utterances over age.

**Figure 4.8 Disyllabic one-word utterances**

***(a) Distribution of disyllabic one-word utterance types (%)***

(i) Primary and Secondary Accented Syllables: Monomorphemic Polysyllabic Words (Mon.) Polysyllabic Compounds (Cpd.)

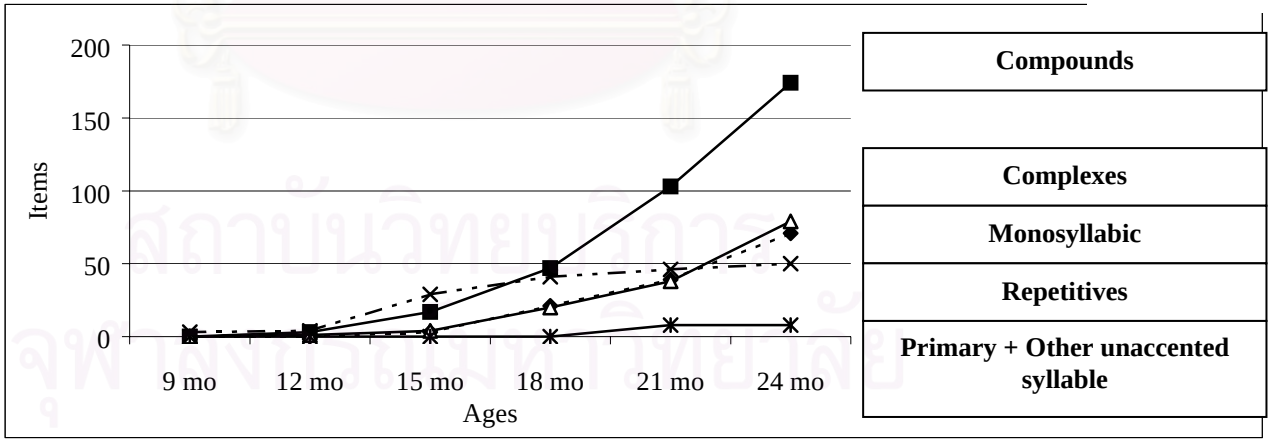
Polysyllabic Complexes (Cpx.) Polysyllabic Repetitives (Re (ii) Primary and Other Unaccented Syllables (Pou.)




***(b) Relative frequency***

| 9 Months | 12 Months | 15 Months | 18 Months | 21 Months | 24 Months |
|---|---|---|---|---|---|
| Rep. (100)%) | Rep. (50%) > Cpd. (37.5%) > Cpx. (12.5%) | Rep. (54.7%) > Cpd. (32.1%) > Cpx. (7.6%) > Mon. (5.7%) | Cpd. (36.4%) > Rep. (31.8%) > Mon. (16.3%) > Cpx. (15.5%) | Cpd. (44%) > Rep. 19.7%) > Mon. (16.7%) > Cpx. (16.2%) > Pou. (3.4%) | Cpd. (45.6%) > Cpx. (20.7%) > Mon. (18.6%) > Rep. (13.1%) > Pou. ((2.1%) |

***(c) Relative frequency of items over age***



From Figure 4.8 (a), (b), and (c), two findings are of interest. The first is focused on the special characteristics of words in the “repetitive” category. According to Luksaneeyanawin (1983), all component syllables of repetitives normally receive accent. This regular pattern of accent assignment makes “repetitives” a tightly bound category and has high potentiality for all component syllables to be realized with stress in a normal speaking situation. Moreover, the significant pattern of syllable structures of the component syllables in repetitives — totally or partially the same structure — is also more easily produced than polysyllabic words with two different structures such as monomorphemic polysyllabic words and polysyllabic compounds. As shown in Figure 4.7, the number of polysyllabic repetitives realized as monosyllabic one-word utterances is small, while in Figure 4.8, almost all disyllable repetitives — which are double accented — are completely realized as disyllabic one-word utterances. Moreover, the pronunciation of disyllabic repetitives occurs from very early in development (9 months), and seems to outnumber other categories up until the period of the vocabulary explosion (18 months).

The second interesting finding concerns the second pattern of disyllabic one-word utterances — the primary and the other unaccented syllables. From Figure 4.8, It can be seen that the only unaccented syllables that occur are in children’s pronunciation of polysyllabic compounds. There is no single case of an unaccented syllable realized in children’s monosyllabic one-word utterances. This is because of the low degree of salience of unaccented syllables to be realized with stress in a normal speaking situation. However, in the case of disyllabic one-word utterances, it seems to be the characteristic of polysyllabic compounds themselves that reflects children realization of the unaccented syllable. Consider the following data,

| ***Adult’s forms*** | | ***Children’s pronunciations*** |
|---|---|---|
| (a) /`thaN4 kha0 ´ja1/ | >>> | [kha0 ja1] |
| ‘bucket’ + ‘rubbish’ = ‘bin’ | | |
| (b) /`mii4 pxn0 ´daa2/ | >>> | [pxn0 daa2] |
| ‘bear’ + ‘panda’ = ‘panda’ | | |
| (c) /`jaa0 sa1 ´phom4/ | >>> | [sa1 phom4] |
| ‘medicine’ + ‘to wash’ + ‘hair’ = ‘shampoo’ | | |
| (d) /`prxxN0 sii4 ´fan0/ | >>> | [sii4 fan0] |
| ‘brush’ + ‘to brush’ + ‘teeth’ = ‘toothbrush’ | | |
| (e) /`phaa2 chet3 ´tua0/ ‘towel’ | >>> | [chet3 tua0] |
| ‘cloth’ + ‘to wipe’ + ‘body’ = ‘towel’ | | |

Polysyllabic compounds are combinations of two or more free morphemes. This means that all component elements of polysyllabic compounds have their own meaning and can occur separately in normal speech as monomorphemic words, as shown in examples (a)-(e). According to this characteristic of polysyllabic compounds, it can also be said that each component element of polysyllabic compounds also has its own distribution as a monomorphemic word — which is accented. Therefore, it is possible that children might be more familiar with /kha0 ja1/ as a monomorphemic word than /thaN4 kha0 ja1/, which is a polysyllabic compound, and may thus ignore the pronunciation of the latter. Moreover, it might be possible that the frequency of occurrence in infant-

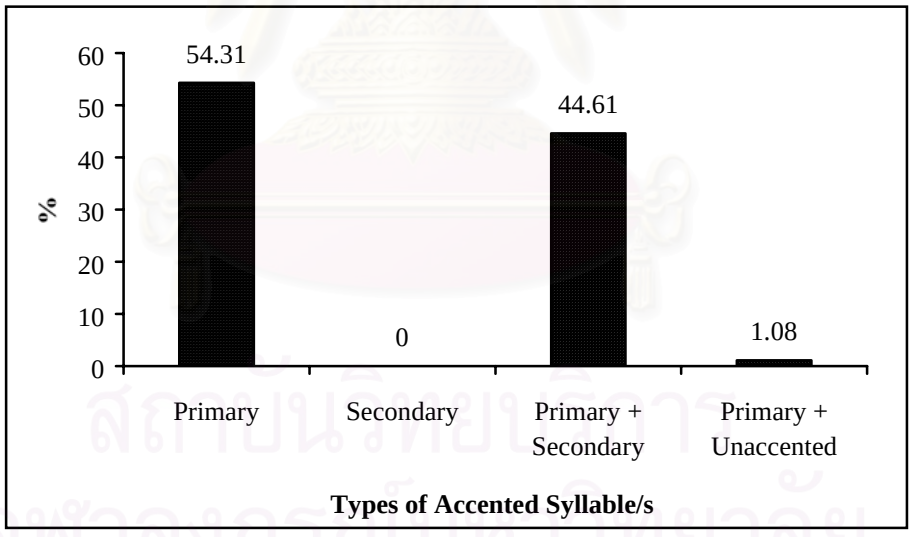
directed speech of the monomorphemic word is higher than that of the polysyllabic compound.

In examples (c), (d), and (e), the realizations of polysyllabic compounds look like a 'verb phrase' in the adult language, i.e. a type of syntactic unit which has a verb as the head. Such pronunciation indicates that component elements of polysyllabic compounds can be realized in a variety of ways in normal speech. Take /prxxN0 sii4 fan0/ 'toothbrush' for example. /prxxN0 sii4 fan0/ is a polysyllabic compound consisting of three component elements which are all free morphemes: /prxxN0/ 'a brush, to brush', /sii4/ 'to brush', and /fan0/ 'teeth'. Each of these three elements can occur in normal speech as a monosyllabic word. In addition, the two latter elements /sii4/ and /fan0/ are also able to be combined as a 'verb phrase' functioning pragmatically as a directive in infant-directed speech — 'Brush your teeth!'. Therefore, it is claimed that the possibility of distribution in normal speech of component elements of polysyllabic compounds is another crucial factor which determines the pronunciation of children's one-word utterances.

### 4.3.3 Distribution of Accented Syllable/s in Children's One-word Utterances

From the results detailed in 4.3.1 and 4.3.2, it is obvious that the primary and secondary accents assigned to polysyllabic words in Thai reflect children's pronunciation of one-word utterances. Figure 4.9 shows the distribution of each type of children's one-word utterances.

***Figure 4.9 Distribution of children's pronunciation of one-word utterances***




The use of the primary accented syllable as one-word utterances is most common, followed by primary plus secondary accented syllables, and primary plus other unaccented syllables categories respectively. However, the first two patterns far outnumber the third. This result suggests that the accentual system which is said to be language specific (Hochberg 1988, Luksaneeyanawin 1983, Wijnen *et al.* 1994), or cross-linguistically different, influences children's pronunciation of one-word utterances. The primary accent that is the most salient stressed syllable is the most influential in Thai one-word utterance data. It occurs either in monosyllabic (54.31%) or disyllabic (44.61%) words. The secondary accented syllable does not show greater dominance over the primary accented syllable, as shown in the percentage of monosyllabic one-word

utterances which derive from only the primary accented syllable and only the secondary accented syllable: 54.31%, and 0%, respectively.

**4.3.4 Thai Children's Pronunciation of One-word Utterances: Developmental Perspective**

Table 4.12 summarizes the number of words of the two major types of children's one-word utterances over time. They are (1) the monosyllabic one-word utterance which is the primary accented syllable of the adult polysyllabic word, and (2) the disyllabic one-word utterance which is the primary and secondary accented syllables of the adult's polysyllabic word.

***Table 4.12 Developmental distribution of two major types of children's one-word utterances***

| **Age**<br>**Children's One-word Utterances** | **9 MO** | **12 MO** | **15 MO** | **18 MO** | **21 MO** | **24 MO** |
|---|---|---|---|---|---|---|
| 1. **Monosyllabic**: Primary accented syllable (n=950) | 0 | 2 | 62 | 227 | 336 | 323 |
| 2. **Disyllabic**: Primary and secondary accented syllables (n=793) | 3 | 8 | 53 | 129 | 226 | 374 |
| Total (n=1,743) | 3 | 10 | 115 | 356 | 562 | 697 |

Table 4.12 shows that the total number of monosyllabic words outnumbers disyllabic words, 950 : 793. However, the distributions in each category demonstrates that at about the onset of language production, between 9 and 12 months of age, children's realizations of adult's polysyllabic words are overwhelmingly disyllabic. These disyllabic words are mostly polysyllabic repetitives. From 15 months of age, the number of monosyllabic words seems to increase sharply and outnumbers disyllabic words before it decreases again at 24 months. In terms of development, the number of disyllabic words increases consistently, while the number of monosyllabic words tends to decrease at 24 months of age.

In order to make the table clearer, Figure 4.10 was constructed to illustrate percentage of the two categories in terms of developmental proportion as shown.

***Figure 4.10 Proportions of percentage of two major types of children's one-word utterances in terms of development***

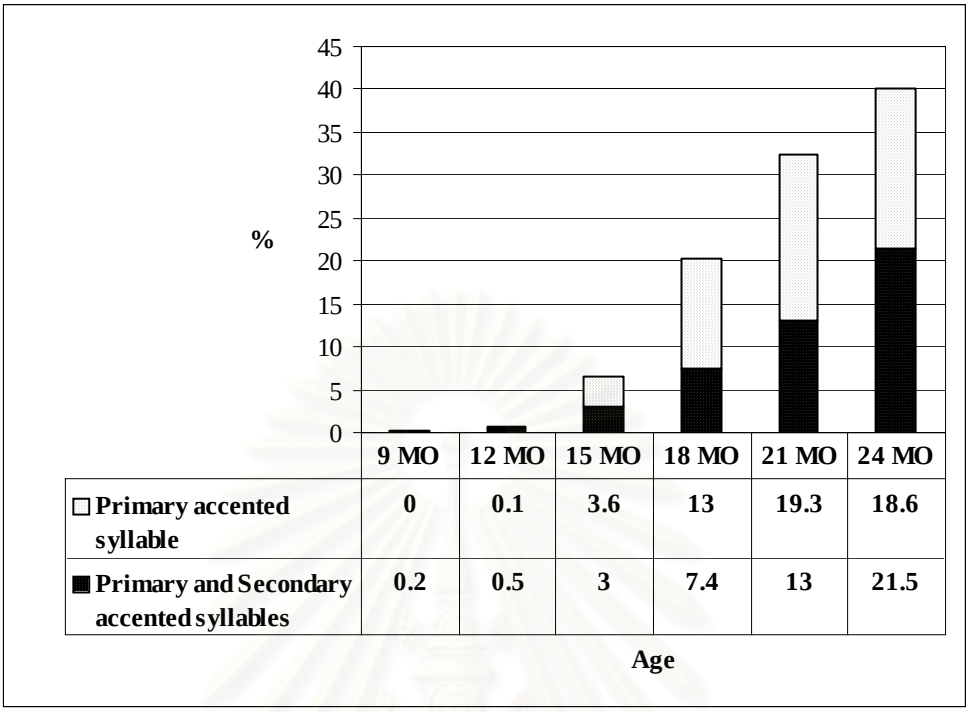



Figure 4.10 illustrates two facts about the development of one-word utterances. The relative height of the bars shows the development of one-word utterances — which is the realization of polysyllabic words. Within each age group, the proportion of monosyllabic and disyllabic one-word utterances is illustrated. It can be seen that the development of monosyllabic and disyllabic one-word utterances is different. In monosyllabic utterances, which are the realization of the primary accented syllable of polysyllabic words, development reaches its peak at 21 months of age, and tends to decrease gradually as children develop. On the other hand, children's disyllabic one-word utterances — which are the realization of the primary and secondary accented syllables of polysyllabic words — are firstly produced at a very early period of development, 9 months of age. The proportion of disyllabic one-word utterances tends to increase over time and outnumbers monosyllabic one-word utterances at 24 months of age. This indicates the fact that children have developed their production ability and are able to produce a greater number of multi-syllable utterances.

In addition, these characteristics of development are related to the characteristic of accent to be realized in stress in adult language. In other words, children pronounce polysyllabic words in two alternative ways: they are either the primary accented syllable only or the primary and secondary accented syllables, as adults do. This is the evidence to demonstrate that children's pronunciation develops toward that of the adult as shown in Table 4.13 below.

***Table 4.13 Possibilities in the production of polysyllabic words by Thai adults and children***

| ***Phonological Level*** | ***Phonetic Level*** | |
|---|---|---|
| | **Adults** | **Children** |
| /`cak1 kra0 ´jaan0/ >>> | [cak1 kra0 ´jaan0]<br>[`cak1 kra0 ´jaan0] | [jaan0]<br>[cak1 jaan0] |

**4.3.5 Conclusions**

The relationship between Thai children's pronunciation of one-word utterances and the Thai accentual system has been investigated. The results suggest that the universal hypothesis of the "unstressed syllable deletion process" is not the most appropriate predictor for children's pronunciation of polysyllabic words. Rather, it is the language specific characteristics of 1) accentual system, 2) similar patterns of the component syllables of polysyllabic words, and 3) their distribution in spoken language that govern children's pronunciation in the one-word utterance stage. This finding supports the claim made by Hockberg (1988), and Wijnen *et al.* (1994) that language specific characteristics play an important role in children's production of words in early period of word acquisition.

Children's monosyllabic one-word utterances are always the most salient stressed syllable of the word primary accented syllable. Disyllabic one-word utterances always comprise the two salient stressed syllables of the word primary and secondary accented syllables. From these findings, it can be concluded that primary and secondary accented syllables influence children's perception.

In addition to the accentual system, we find that the characteristics of each type of polysyllabic word are factors determining children's pronunciation at the one-word utterance stage. In this study, the characteristics of two types of polysyllabic words were found to play important roles in children's pronunciation: polysyllabic repetitives, and polysyllabic compounds. A polysyllabic repetitive consists of at least two component syllables which are totally or partially identical in terms of syllable structure and are all accented. Not only does the accent make the repetitive easily recognizable, but the same syllable structure makes it easier to pronounce. This is why repetitives are among the first categories of words that children acquire (Figure 4.8).

The second type of polysyllabic words is compounds. A polysyllabic compound consists of two or more component elements which are free morphemes—independent lexical items. This characteristic allows each component element of the polysyllabic compound to be widely distributed in normal speech as an independent monomorphemic word. In other words, it can be realized as either a monomorphemic word with an accentual pattern or a part of a polysyllabic compound with another accentual pattern. Moreover, the component elements of the polysyllabic compound can also occur in a syntactic unit, such as 'verb phrase' which functions as a directive in infant-directed speech. This distribution variety increases the possibility that children will pronounce the unaccented syllable of compounds.

Finally, the developmental proportions of one-word utterances, in Figure 4.10, demonstrate that children's production ability approaches the adult language over development.

## 4.4 Summary and Discussion

The phonological acquisition of children's first words was investigated in two studies (4.2 and 4.3). The order of development of each phonological component was predicted. Findings from these studies indicate that both the universal and the language specific hypothesis cannot be ignored in the description and the explanation of phonological acquisition. In addition to the two hypotheses there seem to be other factors which determine acquisition such as, individual word preferences, and the characteristics of language addressed to children.

The universal hypothesis seems to account for the difficulty in production of some types of sounds. Two types of difficulties could be postulated: quantitative and qualitative. The quantitative difficulty deals with the difficulty due to the complexity of phonological structures. This is most clearly demonstrated by the development of syllable structures, consonants, and vowels. In the early periods of development of first words, children produce a small number of components much more frequently than the larger ones. The order of development of syllable structures is CV > CVV > CCV for open syllables, and CVC > CVVC > CCVC for closed syllables. In the case of consonants and vowels, monoconsonants are acquired easier and earlier than consonant clusters (C > CC), while monophthongs are acquired more easily and earlier than diphthongs (V > VV). For the accentual system, monosyllabic pronunciation was found more often than disyllabic pronunciation.

The qualitative difficulty deals with the difficulty in articulation which is the result of phonological characteristics of each sound itself. Conclusions about qualitative difficulty can be drawn from cross-linguistics studies of children acquiring a number of different languages (e.g. Jacobson 1941/68 cited in Ingram 1989, Locke 1983). The order of acquisition of phonological classes of consonants and vowels in Thai seems to support these results. Stops, nasals, and continuants are the first group of consonants acquired, while fricatives seem to be the last. The three distinct vowels found in a number of languages—/i/, /a/, /u/—are produced much more frequently than the rest. In the case of accent, the primary accented syllable which has the highest potentiality to be realized with stress is acquired earlier then the secondary accented syllable, and the other unaccented syllable.

However, all findings cannot be explained by the universal hypothesis alone. It was also found that phonological characteristics of the Thai adult language tend to relate to children's production of first words. Phonological forms of the adult language are considered to be the target of acquisition, and the distribution of phonological elements in children's first words develops towards this target. The distribution of consonants, vowels, and tones reported by Hanpanich (1993) was confirmed by this study. In the aspect of accent, it was found that accentual patterns in the adult language play an important role in children's production of one-word utterances. Therefore, some aspects of the findings indicate that children's productions do develop towards the target language.

In addition to this view of the adult language as the target language, one should also be careful about the type of language addressed to children. It was found from the data that children's production reflects the type of speech directed to them, for example, children's production of the word /mam1 mam1/ 'to eat', which occurs only in infant-direct speech. Moreover, in the acquisition of the accentual system, the characteristics of each type of word seems to determine the choice of production, as found in the pronunciation of polysyllabic repetitives, and polysyllabic compounds.

It was also found that individual preferences play an important role in phonological acquisition. Children during the period of asking for names (from around 18

months), for example, prefer producing the word /?a0 raj0/ ‘what’ when asking for names of things in their surroundings. Consequently, this preference increases their production of the final continuant /j/. This could be a factor that causes the order of development to differ from that of the adult.

In summary, the phenomenon of phonological acquisition is complex. It cannot be explicated only by hypothetical explanation. Findings from the study of phonological acquisition of Thai children suggest that an integrated explanation between the universal and the language specific hypothesis is needed in order to explain this complex phenomenon thoroughly. Moreover, individual preference, and the characteristic of infant-directed speech should not be ignored.

# Chapter 5
# Lexical Acquisition

## 5.1 Introduction

The study of lexical acquisition traditionally deals with the developmental examination of the number of words and lexical categories acquired by children. According to Ingram (1989), the attempt to measure children's vocabulary began around the end of the nineteenth century (Preyer, 1889 cited by Ingram 1989). There are at least two questions that researchers of this field ask when dealing with language acquisition. They are: How to study?, and What to study? Regarding to the 'How' question, it should be noted that researchers employ a number of different methods in order to elicit children's knowledge about lexical words. Ingram (1989) suggests that the selection of method in studying lexical acquisition is an important factor, as each method has its strong and weak points.

There are two traditional approaches for the study of child language: the cross-sectional and the longitudinal approach. The cross-sectional approach employs a large group of subjects of different ages. The benefit of this approach is that it provides a generalized finding for the particular area of study, whereas a limitation is that the elicited data do not represent reality in terms of development.

The benefits of the longitudinal approach are that a particular group of children are followed developmentally throughout the period of investigation. Accordingly, the elicited data are rich in detail, and give more reliable data on development. However, collecting such data is time consuming and labor intensive. Data from small number of participants is generally collected (Benedict 1979 cited by Ingram 1989, Halliday 1975, Preyer 1889 cited by Ingram 1989, Tuaycharoen 1977). In this project both methods are used in order to apply and integrate the strong points of both approaches to the investigation of lexical acquisition in Thai.

In relation to the 'What' question, the answer appears to be another question of what one wants to know about children's lexical development. According to the literature on lexical acquisition, the basic research questions normally are: When do children begin to acquire their first words? What is the rate of lexical development? What kinds of words are acquired first? What is the reason for children acquiring a certain types of words before others? Is it necessary for children to understand the meaning of a particular word before producing it? As with the study of phonological acquisition (see Chapter 4), answers to the above questions indicate the necessity for both universal and language specific perspectives.

The universal perspective claims that children, regardless of linguistic environment, will follow a common path in lexical development. Benedict (1979) found from her longitudinal study of eight children that in acquiring a particular word, the children were able to understand the meaning of the word before they could produce it. This result is supported by a number of studies using a cross-sectional approach, e.g. Bates *et al.* (1995). In relation to lexical categories of first words, Gentner (1982) found from his crosslinguistic study that the first words of children from different linguistic environments are mostly nominals, words that refer to concrete objects. He claimed that this is because semantic characteristics of nominals are more salient than those of other categories. He finally proposed "the natural partitions hypothesis", which is basically a kind of universal hypothesis, which predicts that the semantic characteristics of words govern the types of first words children are going to acquire. As the semantic characteristics of nominals are most salient, words in this category should be acquired early and in a large number.

Recent research on lexical acquisition has expanded the scope of study to test the influence of the universal hypothesis on children's first words. Most of research is crosslinguistic involving the investigation of the correlation between parental input and children's first words. A crosslinguistic study by Gopnik and Choi (1995) reported that language specific characteristics of the input influence children's first words. They found that English acquiring children whose parents use more nouns than verbs tend to acquire nouns more than verbs, while Korean acquiring children whose parents use more verbs than nouns tend to acquire verbs more than nouns. A later crosslinguistic study of English and Mandarin acquiring children by Tardif *et al.* (1999) also supports this view. However, another crosslinguistic studies investigating English and Korean acquiring children did not show any correlation between input and first words (Au *et al.* 1994).

What could account for these differences? Closer investigation reveals that these three studies use different methods for measuring children's first words. In studies conducted by Gopnik and Choi (1995), and Tardif *et al.* (1999), data from adult-child interactions were used. These data represent the frequency of occurrence of lexical items produced by children during a social interaction. In contrast, the study conducted by Au *et al.* (1994) used data elicited from parental checklist questionnaires which represent the number of lexical items in the child's lexicon. Data elicited using these two methods appears to give different kinds of results hence in the present study, data of the lexical development of Thai children from both methods — questionnaire, and spontaneous speech — were used.

In this chapter, the lexical development of Thai children will be discussed. It is divided into two major studies: the cross-sectional and the longitudinal studies

## 5.2 A Cross-sectional Study of Lexical Acquisition

The cross-sectional study investigated lexical acquisition of 9- to 24-month-old Thai children via the analysis of lexical items in the children's lexicon.

Data were elicited from parents using the Questionnaire of Word Acquisition in Thai (QWAT) of 180 normally developing Thai children (see Appendix E). They were divided into six groups according to children's age: 9, 12, 15, 18, 21, and 24 months. Parents were asked to report comprehension and production aspects of lexical items of their children. Three traditional areas of study of lexical acquisition were investigated: onset and rate, lexical categories, the relationship between lexical comprehension and lexical production.

### 5.2.1 Onset and Rate

The onset and rate of lexical acquisition in this study was determined from a combination of lexical comprehension and lexical production. In other words, children were said to have acquired a particular lexical item when they were able to understand some partial meanings or match some referents to a particular item, and were able to produce its phonological representation intentionally and consistently. Lexical items reported as both comprehended and produced were taken to be items that children had acquired.

| **Items** | **Understand** | **Produce** |
|---|---|---|
| rot3 'car' | 3 | |
| sOON4 'two' | | 3 |
| maa4 'dog' | 3 | 3 |

In the example given, ‘car’ is understood by the child (and not produced), while the word ‘two’ is produced (but not understood). Here, in the analysis of the onset and rate of lexical acquisition in which there is no distinctive analysis between comprehension and production, these two words would not be considered acquired. Only the word ‘dog’, which is reported as both ‘understand’ and ‘produce’, would be counted as an acquired item.

Table 5.1 shows maximum, minimum, and mean number of lexical items acquired by Thai children from 9 to 24 months.

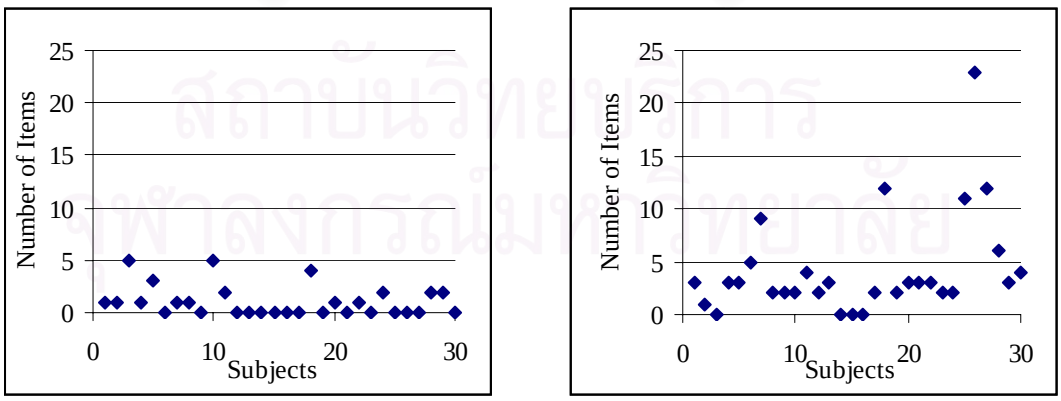
***Table 5.1 Maximum, minimum, and mean number of lexical items acquired across age***

| **Age Groups** / **Number of Lexical Items** | **9MO** | **12MO** | **15MO** | **18MO** | **21MO** | **24MO** |
|---|---|---|---|---|---|---|
| Maximum | 5 | 23 | 167 | 315 | 423 | 407 |
| Minimum | 0 | 0 | 2 | 5 | 6 | 11 |
| **Mean** | ***1.07*** | ***4.23*** | ***30.97*** | ***84.6*** | ***190.5*** | ***212.97*** |

Data from the children at different age groups shows that the average age that Thai children start acquiring their first words is 9 months with a mean of 1.07 words. This seems to be a little earlier than reported in the literature (Ingram 1989). However, considering this in more detail, it can be seen that the minimum number of lexical items in the 9 and 12 months groups is 0. This means that some children at 9 and 12 months have not yet acquired any words, while all children in the 15 months group have already acquired at least two words. This shows that the onset of acquisition cannot be determined simply on the basis of the mean number of items. To provide a more comprehensive view of the onset of acquisition, Figure 5.1 (a) and (b) demonstrate the number of items acquired by children in 9 and 12 month groups.

***Figure 5.1 Distribution of number of lexical items acquired by 9- and 12-month-old Thai children***

***(a) 9 Months*** ***(b) 12 Months***

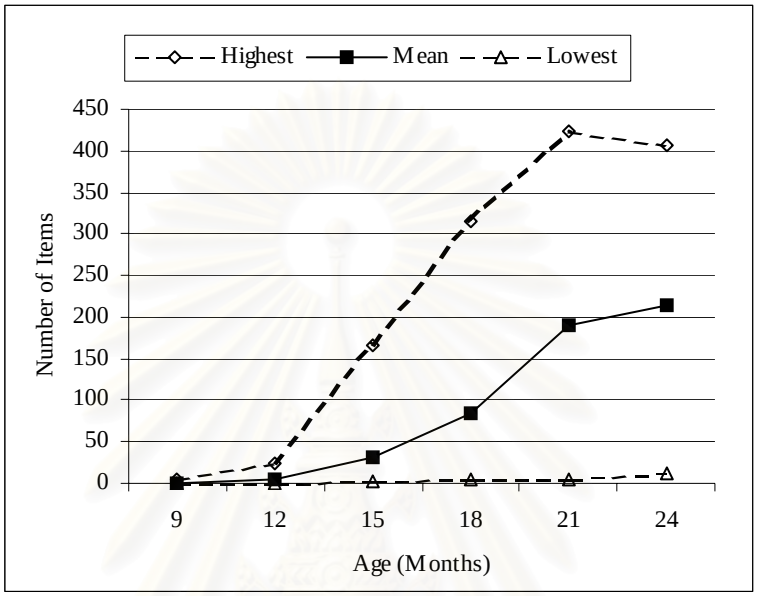



Figures 5.1 (a) for 9-month-olds, and 5.1 (b) for 12-month-olds show that half of the children in the 9 month-old group and four in the 12 month-old group have not acquired any words. This suggests that a tentative range for the onset of lexical development is from around 9 to 15 months of age. This means that some children start to acquire their first words as early as 9 months, while some of them begin as late as 15

months. Hence, there is considerably individual variation in the onset of lexical acquisition.

As children develop, the number of lexical items in their lexicon increases. Figure 5.2 demonstrates the development of lexical items of children from 9 to 24 months groups.

***Figure 5.2 Tentative development of lexical items acquired by***




***9- to 24-month-old Thai children***

It should be noted that Figure 5.2 represents cross-sectional data. We cannot claim that the developmental trends between age groups demonstrate development in absolute terms. Accordingly, Figure 5.2 is to show the *tentative* development of the number of items in children's lexicon. The highest and the lowest number of words acquired by children in each age group are depicted by the dashed line with diamonds, and the dashed line with triangles, respectively, while the mean number of words acquired in each age groups is depicted by the line with squares.

There are two points of discussion relevant to the results in Figure 5.2. The first concerns the development of the number of items. From Figure 5.2, it can be seen that the number of lexical items tends to increase as children are older. However, closer inspection shows that although the mean number of items increases over time, the rate of increase differs. From a developmental perspective, the difference in the number of items from one age group to another age group implies a tentative measure of the number of new words children have acquired (Clark 1993). Tables 5.2 shows the average difference of word numbers between age groups, derived by subtraction of the means in Figure 5.2.

***Table 5.2 Average difference of word numbers across age***

| **Age Groups** | **9MO** | **12MO** | **15MO** | **18MO** | **21MO** | **24MO** |
|---|---|---|---|---|---|---|
| Number of New Words | 1.07 | 3.16 | 26.74 | 53.83 | **105.7** | 22.47 |

Table 5.2 shows that the rate of development can be divided into two types: gradual and rapid. There are two periods of gradual development: from the onset of development to until 18 months of age, and from 21 to 24 months. Distinctively rapid

development occurs between 18 months and 21 months. These observations are consistent with reports in the literature that children at around 18 to 21 months of age tend to acquire a large number of adult lexical items (Clark 1993, Gopnik & Choi 1995). This period of rapid development is known as the 'vocabulary spurt' or 'vocabulary explosion'.

The second discussion point concerns the pace of development of the individual child. Table 5.3 shows the range[13] of the number of items in each age group.

***Table 5.3 Range of number of items acquired across age***

| Age in Months | 9MO | 12MO | 15MO | 18MO | 21MO | 24MO |
|---|---|---|---|---|---|---|
| Ranges | 5 (0-5) | 23 (0-23) | 163 (4-167) | 310 (5-315) | 417 (6-423) | 396 (11-407) |

It can be seen that as children develop, the range increases — the range of number of items is 5 in 9 months group and increases to 417 in the 21 months group. This means that the number of items children acquire tends to vary more as a product of development. While data suggest that young children do not seem to show as much variation as the older children, the increased variation at the older ages implies that children have different paces of development, and that the determination of fast and slow learners might not be possible until sometime after 18 months of age.

### 5.2.2 Lexical Categories

The analysis of lexical categories was divided into two domains: the syntactic and the semantic. Lexical items in children's lexicons collected by the questionnaires 'QWAT' were classified twice according to both syntactic and semantic criteria.

#### a) Syntactic Domain

In the syntactic domain, lexical items were classified into two categories: content words and function words. "Content words" include lexical items containing lexical meanings such as, 'dog', 'to eat', 'white', etc., and "function words" include items containing grammatical meanings such as the final particle marker 'na3' (see Appendix F).

From examination of lexical development of Thai children from 9 to 24 months in the syntactic domain, it was found that most early lexical items are content words, as shown in Figure 5.3.



[13] The range represents the difference between the highest and lowest number of words acquired by children in each age group. The higher the range, the more variation children have among a particular group. In other words, children in higher range value group have more diverse rate of development than those in lower range value group.

***Figure 5.3 Proportions of number of items acquired by Thai children across age groups according to syntactic classification*** (n=536)

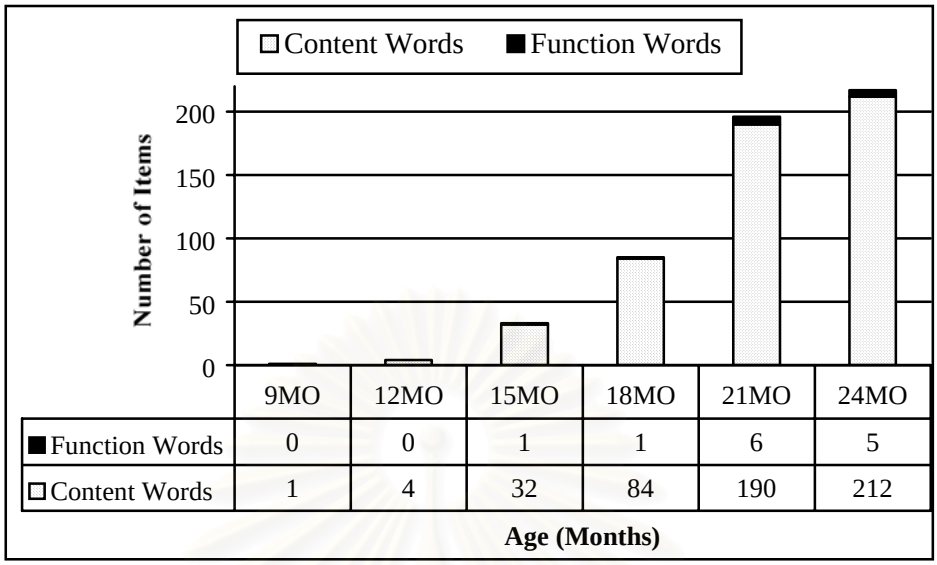


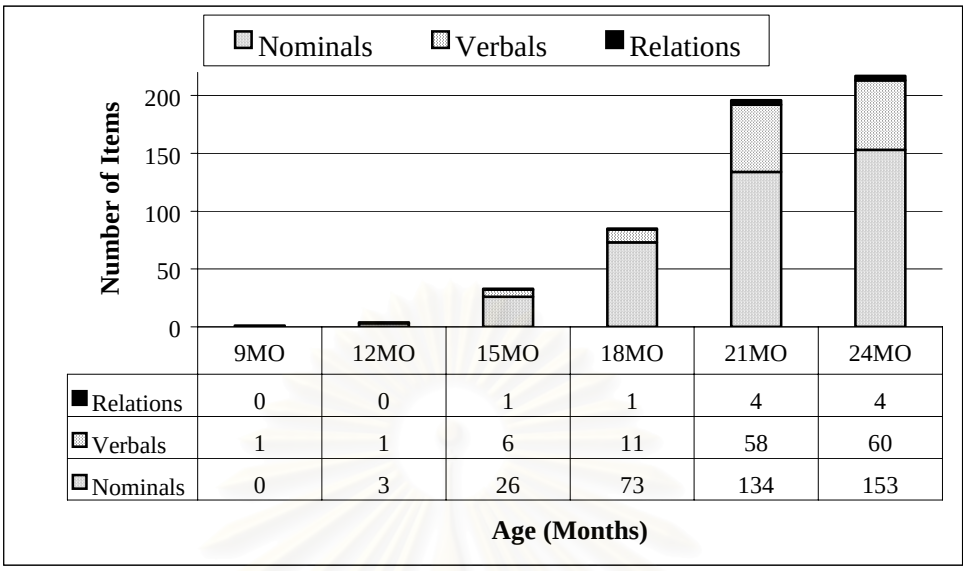

Figure 5.3 shows that the number of content words far outnumbers the number of function words at all ages. This implies that content words are acquired both earlier than and more easily than function words. This is presumably because content words are used to refer to much more concrete and easily perceivable referents existing in reality, rather than structural dependent grammatical meaning as in a function word. The dominance of acquisition of content words reflects children's early production. It has been reported that in the early period of language development, children produce one-word utterances that are mostly content words (Ingram 1989, Clark 1993). Even at the early period of word combination, it has been reported that children do not prefer to combine function words in their productions (Clark 1993).

**b) Semantic Domain**

The criterion used for the classification of items in the semantic domain is the nature of the referents. In the semantic domain there are two main categories: nominals and non-nominals. The 'nominals' category includes items referring to bounded concrete objects. The 'non-nominals' category can be divided further into 'verbals' and 'relations' categories. The 'verbals' category includes items that refer to actions, and states of nominals, while the 'relations' category includes items that refer to relations between nominals and verbals. It can be said that lexical items contain different semantic characteristics — as classified in this study into three subcategories. Some of them contain more easily perceivable features than others. Findings from the investigation of lexical development in the semantic domain would be evidence to confirm or to disconfirm the universal based proposal 'natural partitions hypothesis' which predicts that more easily perceivable items will be acquired very early and in a large number (Gentner, 1982).

Figure 5.4. shows the numbers of items in the semantic domain.

***Figure 5.4 Proportions of number of items acquired by Thai children across age groups according to semantic classification*** (n=536)




| | 9MO | 12MO | 15MO | 18MO | 21MO | 24MO |
|---|---|---|---|---|---|---|
| Relations | 0 | 0 | 1 | 1 | 4 | 4 |
| Verbals | 1 | 1 | 6 | 11 | 58 | 60 |
| Nominals | 0 | 3 | 26 | 73 | 134 | 153 |

From Figure 5.4, it can be seen that the nominals category seems to occupy the largest proportion of lexical items at every age group. From a crosslinguistic perspective, it has been reported in studies of word acquisition in other languages that more than 50% of children's early words are in the 'nominals' category (Au *et al.* 1994, Benedict 1979, Clark 1993, Gentner 1982, Ingram 1989, Nelson 1973 cited in Ingram 1989). On this basis, it has been claimed that the semantic characteristics of nominals play an important role in children's early lexical development (Au *et al.* 1994, Clark 1993, Gentner 1982). The explanation for this dominance of nominals in children's lexicon is that words in the 'nominals' or 'noun' category contain more obvious and simpler semantic characteristics than those in the 'verbals' and the 'relations' categories. Referents denoted by 'nominals' are concrete, static, and easily perceivable (Gentner 1982). Gentner called this the "natural partitions hypothesis".

Inspection of the relative number of items in the different categories in the semantic domain in Figure 5.4 clearly shows that children's early words are mostly 'nominals', followed by 'verbals', and 'relations'. This finding suggests that referents of words in the 'nominals' category are concrete and more easily perceivable than those in the 'verbals' and the 'relation' categories. Accordingly, the number of items children acquire is dominantly distributed to 'nominals'. Thus data from this study of lexical acquisition in Thai support the natural partitions hypothesis which predicts that semantic characteristics of words influence types of words children acquire.

However, closer examination reveals that some 9-month-old Thai children acquire verbals before nominals. Figure 5.4 demonstrates that children in the 9 months group acquire one word in the 'verbals' category. This is the word /mam1 mam1/ 'to eat'. Of the 30 children in the 9 months group, one third or 10 of them have acquired this word. This suggests that the natural partitions hypothesis cannot fully explain the whole phenomenon of lexical acquisition. It seems to be the case that the natural partitions hypothesis might influence lexical development strongly *after* the onset of development, while other related factors like the characteristics of parental input might play an important role *before* or at the *onset* of development. To address this issue, the correlation between lexical acquisition and characteristics of parental input is investigated in Section 5.3.4.

***Table 5.4 Lexical items acquired by Thai children at 24 months of age***
(217 words in average)

| Semantic Domains | Categories in QWAT | Number of Words | Examples |
|---|---|---|---|
| Nominals | Animals | 26 | /kaj1/ ‘chicken’, /mxxw0/ ‘cat’ |
| | People | 12 | /phOO2/ ‘dad’, /mxx2/ ‘mom’ |
| | Vehicles | 9 | /rot3/ ‘car’, /rUa0/ ‘ship’ |
| | Toys | 5 | /bOn0/ ‘ball’, /pUUn0/ ‘gun’ |
| | Food and Drinks | 18 | /naam3/ ‘water’, /plaa0/ ‘fish’ |
| | Clothes, etc. | 12 | /sUa2/ ‘shirt’, /kaaN0 keeN0/ ‘pants’ |
| | Body Parts | 25 | /paak1/ ‘mouth’, /taa0/ ‘eyes’ |
| | Household items, etc. | 33 | /kun0 cxx0/ ‘key’, /chOOn3/ ‘spoon’ |
| | Outside | 12 | /fon4/ ‘rain’, /tha0 lee0/ ‘sea’ |
| | Question Words | 3 | /khraj0/ ‘who’, /thii2 naj4/ ‘where’ |
| Verbals | Actions | 44 | /kin0/ ‘to eat’, /paj0/ ‘to go’ |
| | Words about Emotion | 5 | /cep1/ ‘pain’, /klua0/ ‘to be afraid of’ |
| | Descriptive Words | 10 | /rOOn3/ ‘hot’, /suaj4/ ‘beautiful’ |
| Relations | Words about Time | 1 | /klaaN0 khUUn0/ ‘night’ |
| | Directions | 1 | /bon0/ ‘above’ |
| | Final Particles | 1 | /ca2/ |
| | Others | 1 | /maj2/ ‘no’ |

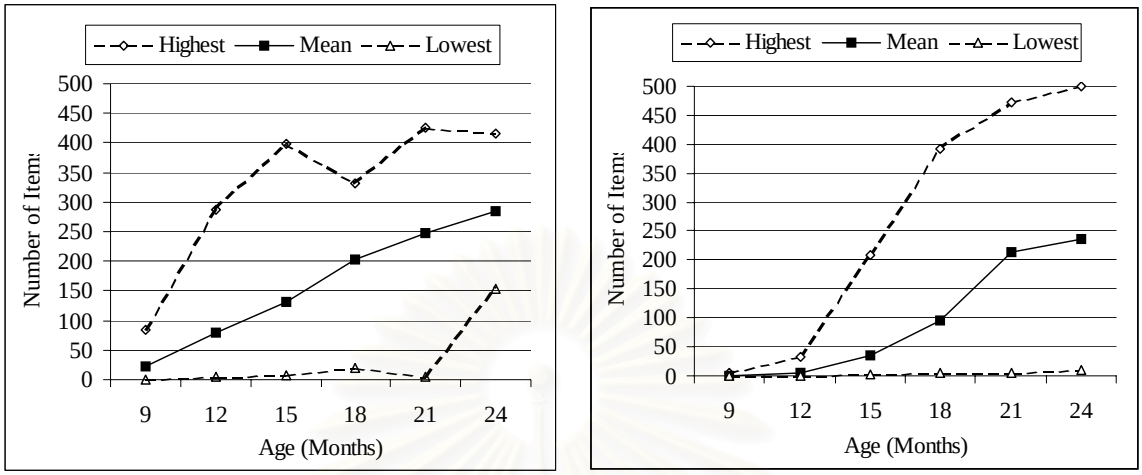
Considering the lexical categories in the QWAT, it was found that most of the words children acquire generally refer to familiar persons, objects, actions, properties, and relations. Table 5.4 demonstrates that among the lexical items acquired during the early period of lexical development, most are nominals. Among the subcategories under the ‘verbals’ category, ‘actions’ seems to be the most salient. Clark (1993) explains that words in the ‘actions’ category contain the semantic characteristic of ‘motion’ which is much more salient than ‘words about emotion’ and ‘descriptive words’. In conclusion, Thai children at 24 months, have acquired on average 217 lexical items of which approximately 71% (153) are nominals, 27% (60) are verbals, and 2% (4) are relations (see Appendix F).

**5.2.3 The Relationship between Lexical Comprehension and Production in Lexical Acquisition**

For investigation of the relationship between lexical comprehension and production, data from the questionnaire were separated into two aspects: lexical comprehension and lexical production. Figures 5.5 (a) and (b) demonstrate the rate of development of lexical items for comprehension and production respectively.

***Figure 5.5 Number of lexical items comprehended and produced by Thai children across age***

***(a) Comprehension*** ***(b) Production***




From Figure 5.5 (a) and (b), it can be seen that the distribution of the number of words in comprehension and production differs. In comprehension, the range of distribution increases dramatically right from the onset of development. At 9 months, children have acquired maximally 85 words in comprehension, while the highest number of words in production in the same period is just 5. The highest range of lexical comprehension is 419 (6-425) at 21 months which is in the period of vocabulary explosion. Although the range of lexical development does not show a linear increase, it should be noted that the mean number of lexical items comprehended demonstrates a constant increase over age throughout development.

For production, in Figure 5.5 (b), the pattern of lexical development is different. At 9 and 12 months all children seem to have a similar pace of production ability. The range of lexical production during these periods is as low as 5 (0-5), and as high as 33 (0-33). However, from 15 to 24 months , the range spurts dramatically to 208 (0-208), 387 (5-392), 466 (6-472), and 490 (11-501), respectively. Moreover, the mean number of lexical items produced clearly shows two different paces of development of lexical production: a gradual increase (between 9 and 18 months, and 21 and 24 months), and a rapid increase (at 18-21 months) as discussed in Section 5.2.1.

Combining the mean lines of comprehension and production, and plotting the agreement of the two lines, Figure 5.6 shows the mean number of words in comprehension and production.

***Figure 5.6 Number of lexical items in comprehension, production, and acquisition for Thai children across age***

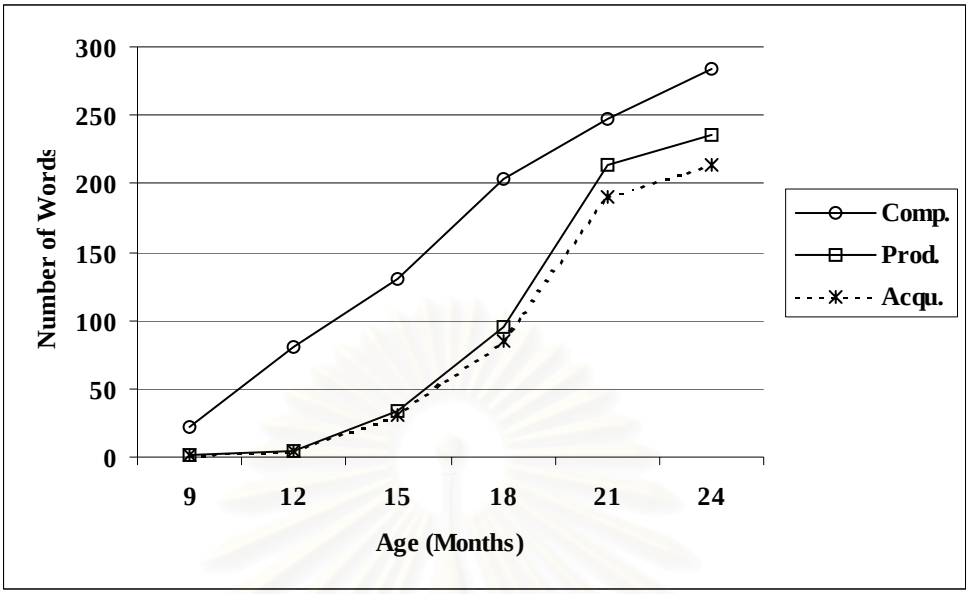



Figure 5.6 illustrates the number of items in comprehension and production of Thai children from 9 to 24 months. The figure shows that the number of items in both comprehension and production increases throughout development. Especially from 21 months, the development of the number of words in production is distinctive, and the gap between comprehension and production narrows. The acceleration in production at 21 months can be seen to reflect the postulation of a period of vocabulary spurt.

In addition, Figure 5.6 clearly shows that the number of items in comprehension exceeds the number of items in production throughout the period of development. This means that children are able to understand the meaning of words that they are not yet able to produce. However, the figure also suggests that children do not necessarily understand the meaning of every word they produce. The dotted curve with cross marks is the acquisition curve, the agreement between comprehension and production. Children are said to have acquired any particular item when they can both understand and produce that word consistently. The acquisition curve closely follows the production curve until 15 months and tends to drop away from 15 to 24 months. This indicates that until 15 months, which is said to be the period of the onset of lexical development, children's production of any particular item implies their understanding of the meaning of the particular item. However, after 15 months, the child's production does not imply his or her comprehension in every case. They may sometimes imitate adults' words without comprehending its meaning. Words that are mostly reported as being produced but not understood are among the 'relations' category such as: colors, numbers, etc.

### 5.2.4 Conclusions

The generalization of lexical acquisition of Thai children was investigated in three traditional topics: onset and rate of development, lexical categories, and the relationship between lexical comprehension and production. Using the Questionnaire of Word Acquisition in Thai (QWAT) lexical items in children's lexicon were elicited.

Findings from the analysis of the onset and rate of development indicate a large degree of individual variation in lexical development. Thai children tentatively begin to acquire their first words from around 9 to 15 months of age. When they develop, the number of items in their lexicon increases. The rates of increase are of two types: gradual

and rapid. The period of rapid increase, between 18 to 21 months, found in Thai children conforms to the period of vocabulary explosion proposed by a number of past studies in other languages (Clark 1993, Gopnik & Choi 1995). In addition to the rate of development, it was found that children have different degrees of variation in their development. Inspection of the ranges reveals that as children get older, their variation in development tends to differ more.

Apart from individual variation, there also appears to be some data consistent with the universal hypothesis. In the syntactic classification, it was found that content words, words containing lexical meanings, are acquired earlier and in greater number than function words, words containing grammatical meanings. In the semantic classification, it was found that nominals generally comprise over 50% of children's first words throughout the period of investigation. However, it is possible that this might due to the type of input used during interaction, as reported in some other studies (Gopnik & Choi 1995, Tardif *et al.* 1997, Tardif *et al.* 1999). Therefore, appropriate conclusions can not be made until the correlation between input and children's first words have been taken into account in the longitudinal study (see Section 5.3.4).

Regarding the relationship between comprehension and production, it was found that comprehension is a prerequisite to production in acquiring particular lexical items around the onset of lexical development, 9 to 15 months of age. As children get older, they also tend to produce new items, via imitation, without understanding their meaning. By 'imitation', it means that children produce a particular word only in a particular context right after the adult's production. In other words, they do not produce the particular word by themselves without adult's prior production in order to refer to a particular referent. In terms of understanding, referents referred to by children do not contain semantic similarity to each other. For example, a child produces the word /dxxN0/ 'red' after the adult's question /naj4 sii4 dxxN0/ 'which one is red?', and points to a black object and then shifts to a yellow one, a pink one, and finally stops at a red one when the adult said /chaj2/ 'that's right'. In Thai data, words that are reported produced without understanding are mostly in the 'relations' category such as, color terms, and numbers.

## 5.3 A Longitudinal Study of Lexical Acquisition

In the longitudinal study of lexical acquisition, the development of 10 Thai children was followed from 9 to 24 months of age at 3-monthly intervals. Two types of data were collected: items and frequency (see Appendix G). Data representing items in children's underlying lexicon were elicited via the distribution of the Questionnaire of Word Acquisition in Thai (QWAT) to parents of 10 children at each of six periods of investigation: 9, 12, 15, 18, 21, and 24 months. Data representing frequency of items produced by the children were elicited from the Corpus of Child Language developed in the collaborative research project in tone development between MARCS Auditory Laboratories, Sydney and the Centre for Research in Speech and Language Processing (CRSLP), Chulalongkorn University, Thailand.

Data from these two sources were analyzed in order to clarify the use of different vocabulary measurement methods, which can result in crucial controversies concerning the influence of parental input to first words. Thus, in the following sections, children' s first words are viewed in two types of analysis. Firstly, they are viewed as ***lexical items*** stored in children's lexicon. Secondly, they are viewed as frequency of occurrence during 20 minutes of parent-child interaction. Frequency of occurrence of first words is divided into ***types*** — number of items in the performance — and ***tokens*** — total frequency in the performance.

Data on three traditional areas of study — onset and rate, lexical categories, and the relationship between lexical comprehension and production — were also derived at each age in the longitudinal study in order to investigate the development of lexical acquisition of individual children. Additionally, the correlation between parental input and children's first words was also investigated.

### 5.3.1 Onset and Rate

As found in the cross-sectional study in 5.2.1, children appear to show great variation in their lexical development throughout the period of investigation. In order to investigate the data in detail, the frequency of number of items in the lexicon and tokens in performance of the 10 children at each age between 9 and 24 months are shown along with the mean number of items and tokens in Table 5.5.

***Table 5.5 The development of number of items in lexicon and frequency of occurrence of lexical items in performance of 10 Thai children***

| **Participants** | | **9MO** | **12MO** | **15MO** | **18MO** | **21MO** | **24MO** |
|---|---|---|---|---|---|---|---|
| **L01** | Items | - | 4 | 28 | 161 | 253 | 322 |
| | Tokens | - | 1 | 22 | 74 | 156 | 420 |
| **L02** | Items | 1 | 3 | 3 | 28 | 28 | 57 |
| | Tokens | - | - | - | - | - | - |
| **L03** | Items | - | 3 | 27 | 168 | 280 | 369 |
| | Tokens | - | - | 61 | 65 | 63 | 209 |
| **L04** | Items | 2 | 2 | 6 | 16 | 199 | 420 |
| | Tokens | - | - | - | 1 | 9 | 262 |
| **L05** | Items | - | 2 | 15 | 109 | 272 | 357 |
| | Tokens | - | - | 11 | 123 | 189 | 241 |
| **L06** | Items | - | 2 | 13 | 158 | 238 | 316 |
| | Tokens | - | - | 2 | 65 | 54 | 118 |
| **L07** | Items | - | 11 | 28 | 64 | 139 | 292 |
| | Tokens | - | 2 | 40 | 5 | 18 | 85 |
| **L08** | Items | 2 | 37 | 100 | 204 | 327 | 411 |
| | Tokens | - | 19 | 25 | 129 | 271 | 294 |
| **L09** | Items | 2 | 16 | 219 | 425 | 544 | 605 |
| | Tokens | - | 13 | 133 | 165 | 256 | 245 |
| **L10** | Items | - | 6 | 48 | 218 | 395 | 464 |
| | Tokens | - | 2 | 23 | 168 | 243 | 322 |
| **Mean** | Items | **0.7** | **8.6** | **48.7** | **155.1** | **267.5** | **361.3** |
| | Tokens | **-** | **3.7** | **31.7** | **79.5** | **125.9** | **219.6** |

Regarding the onset of lexical development, it was found that children start to acquire their first words at different ages. Considering the number of items in children's lexicons, L02, L04, L08, and L09 start to acquire their first words at 9 months, while L01, L03, L05, L06, L07, and L10 start to acquire their first words at 12 months. In addition, at the onset of development, children acquire different numbers of first words, from one to 11 items (see Table 5.5), a testament to the individual variation in the onset of lexical development.

The item frequency data also demonstrates that children start producing their first words at different ages. However, the onset of lexical development determined from frequency of occurrence tends to provide slightly different findings. In L03, L04, L05,

L06, L08, and L09, linguistic production occurs later in the parent-child interaction, while in L01, L07, and L10 the onset of development is the same in the two measuring methods. In addition, it was found that the child L02 did not show any linguistic production throughout the period of investigation. This might be due to the short period of data collection and psychological factors which affect children's production during each visit. These sporadic findings suggest that frequency might not be an appropriate method of investigating the onset of lexical development. Children who have acquired some first words may or may not produce those words during the period of data collection.

Regarding the rate of acquisition, it was also found that the two sources of data give different kinds of results. The number of lexical items increases continuously over time, while the number of tokens in performance does not show continuous development over the period of investigation. Figure 5.7 demonstrates the number and mean number of items in the lexicon and the frequency of occurrence in performance divided into types and tokens of the 10 Thai children from 9 to 24 months of age.

***Figure 5.7 The number and mean of items, types and tokens of Thai first words across age***

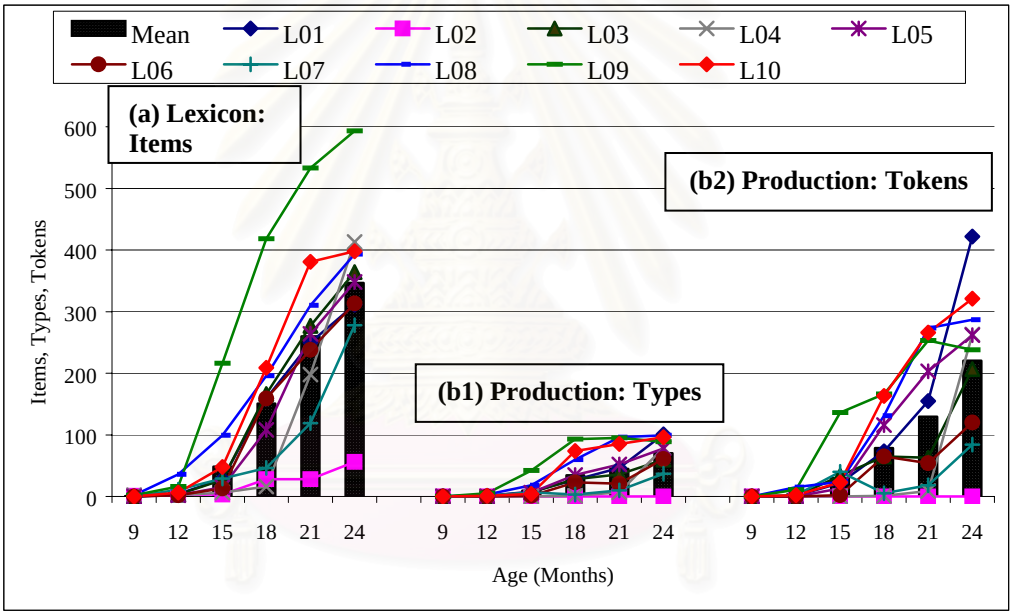



Figure 5.7 consists of three diagrams illustrating results from two different vocabulary measuring methods. In Figure 5.7 (a), the development of the number of items in children's underlying lexicon is shown. The dark histogram shows the mean number of items, while the 10 different lines show the number of items of the individual. It can be seen that both the mean and individual number of items increases over time. Additionally, individual differences were found especially as a function of age: as children get older, the range of differences in the number of items in individual children's lexicons increases — ranges are 2, 35, 216, 409, 516, and 548 at the six ages between 9 and 24 months.

In (b1) and (b2), the frequency of occurrence of items during 20 minutes of interactions performed by 10 Thai children is shown, divided into types and tokens respectively. The dark histogram shows the mean number of items, while the 10 different lines shows frequencies for individuals. Comparing to the number of items in children's lexicon in (a), the investigation of lexical development from the measurement of frequency of occurrence provides relatively few tokens and types. This is because the

frequency represents instantiations of children's performance in a certain period of time, not the entire number of items in children's lexical knowledge.

In addition, some individual development curves in (b1) and (b2) do not show continuous monotonic increase of the number of words as in the case of a). From the point of view of lexical development, it would be strange if children knew fewer words at an older age than a younger age. Therefore, the slight reversals for some children indicate that the frequency of occurrence might not be an appropriate vocabulary measuring method for the investigation of the number of words children acquire, because it cannot represent the real number of words and the developmental aspect of lexical acquisition.

Regarding the two different rates of development, gradual and rapid, reported in the cross-sectional study, it was found that most children in the longitudinal study also show both gradual and rapid rates of lexical development. Examination of the number of new words acquired suggests that the period of rapid development seems to be different from child to child. Table 5.6 shows the number of new words children acquire from 9 to 24 months of age.

***Table 5.6 Number of new words acquired by the 10 Thai children at each age from 9 to 24 months***
(period of rapid acquisition marked in bold italic font)

| **Participants** | **The Number of New Words Acquired** | | | | | |
|---|---|---|---|---|---|---|
| | **9MO** | **12MO** | **15MO** | **18MO** | **21MO** | **24MO** |
| **L01** | - | 4 | 24 | ***133*** | 92 | 69 |
| **L02** | 1 | 2 | - | 25 | - | 29 |
| **L03** | - | 3 | 24 | ***141*** | ***112*** | 89 |
| **L04** | 2 | - | 4 | 10 | ***183*** | ***221*** |
| **L05** | - | 2 | 13 | 94 | ***163*** | 85 |
| **L06** | - | 2 | 11 | ***145*** | 80 | 78 |
| **L07** | - | 11 | 17 | 36 | 75 | ***153*** |
| **L08** | 2 | 35 | 63 | ***104*** | ***123*** | 84 |
| **L09** | 2 | 14 | ***203*** | ***206*** | ***119*** | 61 |
| **L10** | - | 6 | 42 | ***170*** | ***177*** | 69 |

There are two dimensions of the vocabulary explosion evident in Table 5.6. The first concerns the onset of the vocabulary explosion. In the cross-sectional study it was concluded that children generally enter the period of vocabulary explosion around 18 months, and during the vocabulary explosion children generally acquire around 100 words per age period. Here, in the longitudinal study, it was found that children begin their vocabulary explosion at different ages, some as early as 12 months (L09), while some as late as 24 months (L07). Moreover, it was found that one participant (L02) did not demonstrate a vocabulary spurt with the period studied (9 to 24 months). Examination of environment and family background revealed that there are five members in his family, father, mother, sister, and grandmother. The child has the same normal physical and motor development as other participants. Although he did not demonstrate any linguistic production, he showed active and correct response to the particular adult's production. For example, he ran into the toilet when was directed with the phrase /paj0 laaN3 mUU0/ 'go to wash your hands', and kicked when was ordered /te1/ 'to kick'. According to this, There are two possible interpretations of this failure. Firstly, this child may show a period of vocabulary explosion later, after 24 months of age. Secondly, it is possible that this child might skip this significant period and abruptly develop to the multi-word

combination stage. This aberrant case underlines the fact that it is possible that not every child passes through the vocabulary explosion phase.

The second discussion point from Table 5.6 concerns the duration of the vocabulary explosion, marked by bolded and italicized numbers. As can be seen, the period of vocabulary explosion differs from child to child. The shortest period is about three months as in the cases of L01, L05, L06, and L07 and this is extended to six months in the cases of L03, L04, L08, and L10. The longest period of vocabulary explosion found in this study is nine months, as in the case of L09.

In addition, it can be seen that the duration of the vocabulary explosion directly affects the number of words children acquire. The longer the duration, the more words children acquire. From Table 5.6, bold and italicized numbers represent peaks of vocabulary explosion. The number of peaks imply the duration of the vocabulary explosion — one peak for three months, two peaks for six months, and three peaks for nine months. L01, L05, L06, and L07 who have one peak of vocabulary explosion (three months period of vocabulary explosion) acquired 322, 357, 316, and 292 words at 24 months respectively, while, L09 who has many peaks of vocabulary explosion (three peaks which imply nine months period of vocabulary explosion) has 605 words stored in his underlying lexicon at 24 months.

In summary, there is a large degree of individual variation in the onset and rate of lexical acquisition, such that examination of mean performance does not give an accurate description of the nature of development. Moreover, the investigation of lexical items seems to provide the closest approximation to the real development of children's first words, while the frequency of occurrence of lexical items appears to provide an imperfect measure of lexical acquisition.

### 5.3.2 Lexical Categories

#### a) Syntactic Domain

The cross-sectional examination of lexical categories in the syntactic domain reveals the fact that content words are generally acquired more easily and in greater number than function words6. From the two vocabulary measuring methods in the longitudinal study, the number of words classified by syntactic criteria conforms to the finding in the cross-sectional study as shown in detailed data of individual participants in Table 5.7.

Table 5.7 shows the number of words in syntactic domain (as classified into content words and function words). The data were elicited from two sources: the questionnaires and the corpus (videos of adult-child interaction), as represented in three major columns. The first column shows the number of items elicited from the distribution of the questionnaires. Items in this column represent the number of items in children's lexicon. The second and the third columns show the frequency of words in production elicited from the videos. The number of items found in the videos (types) is shown in the second column, while the number of tokens found in the videos is shown in the third column.

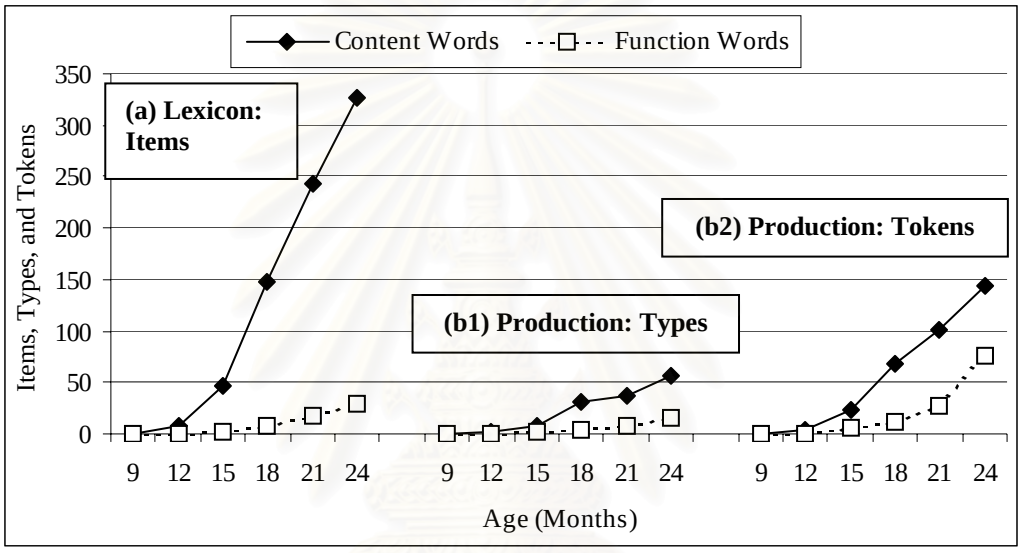
***Table 5.7 The development of number of items, types, and tokens of first words of 10 Thai children according to syntactic classification: content words (C), and function words (F)***

| | | **Items in Lexicon** | | | | | | **Frequency of Occurrence : Types** | | | | | | **Frequency of Occurrence : Tokens** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 9MO | 12MO | 15MO | 18MO | 21MO | 24MO | 9MO | 12MO | 15MO | 18MO | 21MO | 24MO | 9MO | 12MO | 15MO | 18MO | 21MO | 24MO |
| **L01** | **C** | - | 3 | 27 | 154 | 236 | 292 | - | - | 7 | 21 | 34 | 87 | - | - | 8 | 38 | 122 | 184 |
| | **F** | - | 1 | 1 | 5 | 14 | 19 | - | 1 | 1 | 6 | 12 | 14 | - | 1 | 14 | 34 | 34 | 237 |
| **L02** | **C** | 1 | 3 | 3 | 25 | 25 | 52 | - | - | - | - | - | - | - | - | - | - | - | - |
| | **F** | - | - | - | 3 | 3 | 4 | - | - | - | - | - | - | - | - | - | - | - | - |
| **L03** | **C** | - | 3 | 24 | 156 | 254 | 325 | - | - | 4 | 22 | 29 | 59 | - | - | 30 | 44 | 50 | 104 |
| | **F** | - | - | 3 | 10 | 23 | 39 | - | - | 3 | 6 | 7 | 15 | - | - | 4 | 21 | 13 | 104 |
| **L04** | **C** | 2 | 2 | 6 | 14 | 187 | 413 | - | - | - | 1 | 6 | 61 | - | - | - | 1 | 8 | 204 |
| | **F** | - | - | - | 2 | 11 | 40 | - | - | - | - | 1 | 18 | - | - | - | - | 1 | 59 |
| **L05** | **C** | - | 2 | 14 | 134 | 251 | 320 | - | - | 5 | 34 | 43 | 60 | - | - | 12 | 114 | 186 | 174 |
| | **F** | - | - | 1 | 3 | 13 | 28 | - | - | 1 | 1 | 9 | 18 | - | - | 1 | 2 | 17 | 83 |
| **L06** | **C** | - | 2 | 13 | 154 | 230 | 302 | - | - | 1 | 20 | 17 | 49 | - | - | 2 | 62 | 44 | 93 |
| | **F** | - | - | - | 5 | 8 | 11 | - | - | - | 3 | 4 | 12 | - | - | - | 3 | 10 | 25 |
| **L07** | **C** | - | 11 | 27 | 42 | 109 | 251 | - | 1 | 5 | 3 | 7 | 21 | - | 2 | 7 | 5 | 10 | 57 |
| | **F** | - | - | 2 | 4 | 10 | 27 | - | - | 2 | - | 3 | 16 | - | - | 33 | - | 8 | 27 |
| **L08** | **C** | 2 | 36 | 98 | 193 | 291 | 363 | - | 3 | 17 | 58 | 85 | 83 | - | 15 | 23 | 126 | 219 | 222 |
| | **F** | - | - | 1 | 3 | 19 | 30 | - | - | 1 | 2 | 11 | 16 | - | - | 1 | 5 | 54 | 71 |
| **L09** | **C** | 2 | 15 | 211 | 409 | 491 | 544 | - | 6 | 40 | 87 | 73 | 67 | - | 11 | 132 | 142 | 165 | 154 |
| | **F** | - | 1 | 5 | 25 | 42 | 49 | - | - | 2 | 6 | 22 | 22 | - | - | 4 | 24 | 88 | 84 |
| **L10** | **C** | - | 5 | 44 | 202 | 349 | 408 | - | 1 | 4 | 68 | 76 | 78 | - | 2 | 23 | 143 | 208 | 250 |
| | **F** | - | 1 | 4 | 15 | 31 | 39 | - | - | - | 6 | 9 | 18 | - | - | - | 20 | 54 | 69 |
| **Mean** | **C** | 0.7 | 8.2 | 46.7 | 148.3 | 242.3 | 327 | - | 1.1 | 8.3 | 31.4 | 37 | 56.5 | - | 3 | 23.7 | 67.5 | 101.2 | 144.2 |
| | **F** | - | 0.3 | 17. | 7.5 | 17.4 | 28.6 | - | 0.1 | 1 | 3 | 7.8 | 14.9 | - | 0.1 | 5.7 | 10.9 | 27.9 | 75.9 |

Table 5.7 shows that children acquire more content words than function words and the frequency of these two categories increases over time. However, children tend to produce function words as frequent as content words at older ages (see tokens of L01 and L03 at 24 months).

In Figure 5.8, mean frequencies from two sources of data are plotted. The figure in part a) shows data elicited from the questionnaires which represent the number of content and function words in children's lexicon. Data used in (b1) and (b2) were elicited from the videos which represent children's production. Figure 5.8 (b1) shows the number of items in production (types) , while Figure 5.8 (b2) shows the tokens of items retrieved from the videos.

***Figure 5.8 Mean number of items, types, and tokens of content words and function words across age***




From Figure 5.8, it can be seen that content words outnumber function words in every source of data. Part (a) in Figure 5.8 represents the relative frequency of content words and function words in children's lexicon. This conforms to the relative frequencies in the adult lexicon. The 'content words' category is normally said to be an open class, because the number of items within this category continues to accumulate over time; while the 'function words' category is normally called a closed class, due to the limited number of possible items in this category. As a consequence, the number of content words naturally dominates the number of function words, and this can also be found in normal dictionaries of spoken and written language around the world.

On the other hand, in terms of performance, the relative frequency between content words and function words occurring in children's normal interaction (see parts (b1) and (b2) in Figure 5.8) seems to indicate a different finding from that in the adult language. Basic research on the distribution of words in Thai adult language (Sudasna Na Ayudhya, 2002) reveals that although the absolute number of function words is less than that of content words, the frequency of occurrence of function words is overwhelmingly higher than that of content words. This contradiction between the adult and child results seems to suggest that function words are more difficult to acquire than content words. Meanings of function words are less salient, more abstract, and contain a higher degree of structural dependence than those of content words. Consequently, children must put more effort into understanding and using function words in appropriate contexts. However, such interpretation might not be the case. Less frequency in the production of function words does not mean that meaning of function words is difficult to acquire, because what

makes function words be effectively used — or produced — is the understanding of grammar. It should be noted that even until the age of 24 months children's production consists of content words such as, /maa4/ 'dog', 'mam1 mam1', 'to eat', or short strings of content words such as, /mxx2 mam1/ 'mom, I want to eat'. This implies that they have not yet fully acquire grammar or syntax of the mother language.

**b) Semantic Domain**

Regarding the semantic classification of first words, it was reported in the cross-sectional study that words in the 'nominals' category occupy the highest proportion of first words throughout the period of investigation. In the longitudinal study, Table 5.8 shows the number of words in semantic domain (as classified into nominals (NOM), verbals (VER), and relations (REL)). The data were elicited from two sources: the questionnaires and the corpus (videos of adult-child interaction), as represented in three major columns. The first column shows the number of items elicited from the distribution of the questionnaires. Items in this column represent the number of items in children's lexicon. The second and the third columns show the frequency of words in production elicited from the videos. The number of items found in the videos (types) is shown in the second column, while the number of tokens found in the videos is shown in the third column.

***Table 5.8 The development number of items, types, and tokens of first words of 10 Thai children according to semantic classification: nominals (NOM), verbals (VER), and relations (REL.)***

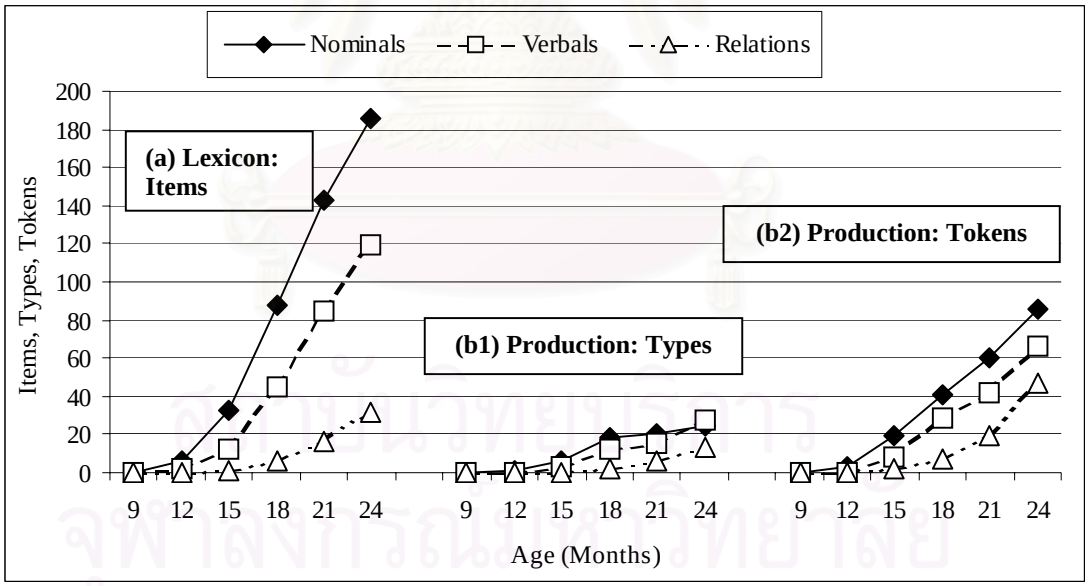
| | | **Items in Lexicon** | | | | | | **Frequency of Occurrence : Types** | | | | | | **Frequency of Occurrence : Tokens** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 9MO | 12MO | 15MO | 18MO | 21MO | 24MO | 9MO | 12MO | 15MO | 18MO | 21MO | 24MO | 9MO | 12MO | 15MO | 18MO | 21MO | 24MO |
| **L01** | **NOM** | - | 2 | 19 | 119 | 157 | 193 | - | - | ***1*** | 11 | 23 | 48 | - | - | ***1*** | ***15*** | 73 | 216 |
| | **VER** | - | 1 | 8 | 34 | 77 | 95 | - | - | ***6*** | 10 | 11 | 41 | - | - | ***7*** | ***22*** | 49 | 73 |
| | **REL** | - | 1 | 1 | 6 | 16 | 23 | - | 1 | ***1*** | 6 | 12 | 12 | - | 1 | ***14*** | ***35*** | 34 | 132 |
| **L02** | **NOM** | 1 | 2 | 2 | 13 | 13 | 40 | - | - | - | - | - | - | - | - | - | - | - | - |
| | **VER** | - | 1 | 1 | 13 | 13 | 13 | - | - | - | - | - | - | - | - | - | - | - | - |
| | **REL** | - | - | - | 2 | 2 | 3 | - | - | - | - | - | - | - | - | - | - | - | - |
| **L03** | **NOM** | - | 2 | 23 | 105 | 161 | 199 | - | - | 6 | 14 | 17 | 26 | - | - | 17 | 39 | 37 | 91 |
| | **VER** | - | 1 | 3 | 53 | 97 | 125 | - | - | 1 | 11 | 16 | 24 | - | - | 17 | 20 | 23 | 69 |
| | **REL** | - | - | 1 | 8 | 19 | 40 | - | - | - | 3 | 3 | 10 | - | - | - | 6 | 3 | 48 |
| **L04** | **NOM** | 1 | 1 | 3 | 10 | 123 | 254 | - | - | - | - | 3 | 40 | - | - | - | - | ***3*** | 154 |
| | **VER** | 1 | 1 | 3 | 4 | 63 | 155 | - | - | - | ***1*** | 3 | 28 | - | - | - | ***1*** | ***5*** | 84 |
| | **REL** | - | - | - | 2 | 12 | 44 | - | - | - | - | 1 | 11 | - | - | - | - | ***1*** | 25 |
| **L05** | **NOM** | - | 1 | 12 | 74 | 151 | 189 | - | - | 3 | 20 | ***22*** | ***27*** | - | - | ***5*** | ***53*** | 100 | ***93*** |
| | **VER** | - | 1 | 3 | 29 | 98 | 126 | - | - | 3 | 11 | ***23*** | ***35*** | - | - | ***8*** | ***57*** | 91 | ***104*** |
| | **REL** | - | - | - | 5 | 15 | 33 | - | - | - | 4 | ***7*** | ***16*** | - | - | - | ***6*** | 12 | ***60*** |
| **L06** | **NOM** | - | 1 | 9 | 112 | 158 | 191 | - | - | - | ***10*** | 9 | ***19*** | - | - | - | 41 | 24 | ***47*** |
| | **VER** | - | 1 | 4 | 43 | 73 | 108 | - | - | ***1*** | ***11*** | 9 | ***31*** | - | - | ***2*** | 22 | 21 | ***48*** |
| | **REL** | - | - | - | 4 | 7 | 14 | - | - | - | ***2*** | 3 | ***11*** | - | - | - | 2 | 9 | ***23*** |
| **L07** | **NOM** | - | 7 | 22 | 37 | 82 | 161 | - | 1 | 5 | 3 | 4 | ***7*** | - | 2 | 37 | 5 | 7 | ***14*** |
| | **VER** | - | 4 | 7 | 9 | 31 | 89 | - | - | 2 | - | 4 | ***15*** | - | - | 3 | - | 7 | ***41*** |
| | **REL** | - | - | - | - | 6 | 28 | - | - | - | - | 2 | ***15*** | - | - | - | - | 4 | ***29*** |
| **L08** | **NOM** | 1 | 34 | 88 | 140 | 206 | 237 | - | 3 | 17 | 39 | 66 | 58 | - | 15 | 23 | 71 | 180 | 180 |
| | **VER** | 1 | 2 | 11 | 54 | 88 | 115 | - | - | 1 | 20 | 23 | 24 | - | - | 1 | 58 | 61 | 58 |
| | **REL** | - | - | - | 2 | 16 | 41 | - | - | - | 1 | 7 | 17 | - | - | - | 2 | 32 | 55 |
| **L09** | **NOM** | 2 | 12 | 134 | 255 | 312 | 336 | - | 4 | 30 | 56 | ***32*** | ***31*** | - | 9 | 107 | 101 | ***73*** | ***85*** |
| | **VER** | - | 3 | 77 | 144 | 183 | 208 | - | 1 | 11 | 33 | ***43*** | ***34*** | - | 2 | 26 | 59 | ***95*** | ***89*** |
| | **REL** | - | 1 | 5 | 19 | 38 | 49 | - | - | 1 | 4 | ***20*** | ***24*** | - | - | 3 | 6 | ***85*** | ***64*** |
| **L10** | **NOM** | - | 1 | 37 | 133 | 222 | 246 | - | - | 3 | 46 | 53 | ***40*** | - | - | ***3*** | 98 | 176 | 191 |
| | **VER** | - | 4 | 8 | 64 | 127 | 162 | - | ***1*** | 1 | 25 | 25 | ***42*** | - | ***2*** | ***20*** | 51 | 71 | 99 |
| | **REL** | - | 1 | 3 | 12 | 31 | 39 | - | - | - | 3 | 7 | ***14*** | - | - | - | 14 | 16 | 29 |

Table 5.8 shows the number of first words of 9 to 24-month-old Thai children distributed in the three semantic categories. The first column shows the number of lexical items, representing the number of first words stored in children's lexicon. The order of distribution of words in the three semantic categories of the 10 children in the first column conforms to what has been reported so far — that is the number of nominals is distinctively high.

The second and the third columns show the frequency of occurrence of first words in children's normal speech divided into types and tokens respectively. These data show that children did not always produce nominals more often than verbals and relations. It is often the case that the number of nominals and verbals in children's performance is close, and sometimes equal. In addition, the bolded italicized numbers in the second and the third column of the Table 5.8 show occasions in which children produced verbals and relations more than nominals. This implies that semantic characteristics of words do not play as important a role in performance as they do in the case of competence.

Figure 5.9 shows mean numbers of first words in the three semantic categories. The figure in part (a) shows the data elicited from the questionnaires which represent the number of items in children's lexicon. Data used in (b1) and (b2) were elicited from the videos which represent children's production. Figure 5.9 (b1) shows the number of items in production (types), while Figure 5.9 (b2) shows the tokens of items retrieved from the videos.

***Figure 5.9: Mean number of items, types, and tokens of words in nominals, verbals, and relations categories across age***




From Figure 5.9, it can be seen that the number of first words found (a) items, (b1) types frequency, and (b2) tokens frequency is generally greater for nominals, verbals, than relations. In (a), the number of nominals in children's lexicon is distinctively higher than verbals and relations. This conforms to the finding reported in the cross-sectional study and supports the influence of "the natural partitions hypothesis" to children's acquisition of first words proposed by Gentner (1982). It can be said that semantic characteristics naturally

determine the degree of simplicity of acquisition of words in the three categories as found in the cross-sectional and the longitudinal examination of first words in children's underlying lexicon.

However, the frequency of occurrence of first words in (b1) and (b2) — which represents children's performance in normal situation — demonstrates that the number of types and tokens of nominals occurring in children's speech does not show distinctive differences from those of verbals, and relations as in the case of data in (a) — which represents the numbr of words stored in children's lexicon. This finding suggests that although children have acquired more nominals (as shown in Figure 5.9 (a)), it is not necessary the case that nominals are most frequently produced in normal situations (as shown in Figure 5.9 (b1) and (b2)). This implies that children who understand the three distinct semantic concepts: nominals, verbals, and relations, tend to talk about referents of these concepts freely regardless of their degree of simplicity (see also Table 5.8).

Thus, comparison of the two types of vocabulary measuring methods in the semantic domain indicates that different findings tend to results from the use of different methods — which arise from different basic assumptions about lexical acquisition. Findings from the investigation of lexical items seem to demonstrate the dominance of nominals, while findings from the investigation of frequency of occurrence suggest that children often produce verbals and relations as frequent as, or sometimes more than nominals. Gentner (1982) claimed that these kinds of differences are also found in adults' performance. These findings suggest that researchers must be very careful about methods and sources of data used in the study of child language.

Findings from this study might throw light upon an issue of contention in the past research on semantic categories of children's first words. It has been reported in many studies that children's first words are mostly nominals (Au *et al.* 1994, Benedict 1979, Clark 1993, Gentner 1982). These studies used diary recording, and vocabulary checklists to produce data that represent the number of words in children's underlying lexicon. Thus the purpose of these studies was to investigate children's knowledge about words at a more abstract level — that is competence.

However, there have also been some remarkable pieces of work claiming that children's first words need not be universally dominated by nominals (Gopnik & Choi 1995, Tardif *et al.* 1997, Tardif *et al.* 1999). Investigations of Korean (Gopnik & Choi 1995) and Chinese (Tardif *et al.* 1999) children acquiring their first words, in comparison to English acquiring children, show that children in these two linguistic environments tend to acquire higher numbers of verbals than nominals. Further investigation of the characteristics of parental input revealed that input does influence the semantic characteristics of the words children acquire. It was found that Korean and Chinese parents used more verbals than nominals during their interactive communication with their children. In contrast, English speaking parents use more nominals than verbals in interactions with their children (Gopnik & Choi 1995, Tardif *et al.* 1999).

Moreover, Gopink and Choi also claim that such difference in frequency of occurrence between nominals and verbals in English and Korean might be due to the syntactic characteristics of the two languages. Typologically, English is an SVO language,

while Korean is an SOV language[14]. In the production of normal sentence, an English speaker tends to end the sentence with a noun (nominal) functioning as object (O), while a Korean speaker tends to end the sentence with a verb (verbal). Moreover, verbs in Korean contain a lot of syntactic and pragmatic information such as, tense, aspect, and modality, so they appear very frequent in adult speech. Accordingly, it is possible for Korean parents to produce verbs more than nouns comparing to English parents. From children's point of view, in terms of limited memory, what comes at the end of adult's production tend to be more easily remembered than the previous ones. Accordingly, the verb-ending characteristic of Korean input might effect children acquisition of verbs over nouns.

However, examining the research methods more closely, it was found that Gopnik and Choi (1995), and Tardif *et al.* (1999) elicited their data from the corpus of parent-child interaction which represents children's performance, not competence. As found in the investigation of Thai children's first words, data representing performance tend to provide different findings from those representing competence. Although Gopnik and Choi (1995), and Tardiff *et al.* (1999) attempted to confirm their findings by the use of questionnaires, their bias in emphasizing verbals has been criticized (Au *et al.* 1994).

### 5.3.3 The Relationship between Comprehension and Production in Lexical Acquisition

In the cross-sectional study, it was reported that comprehension is a prerequisite of production at the onset of lexical development. Children understand the meanings of a particular word before being able to produce it. However, the cross-sectional study also suggests the possibility of production without comprehension, as discussed in Section 5.2.3 (see Figure 5.8). It was found that the agreement between comprehension and production (called 'acquisition' in this study) is less than the number of words produced.

Here, in the longitudinal study, the numbers of words in comprehension, production, and acquisition of individual participants were investigated in terms of development, as demonstrated in Table 5.9 in order to make explicit the relationships between comprehension and production in the lexical acquisition process.



[14] According to Greenberg (1966), word order can be used as one important parameter in language typology. Languages having the same pattern of word order seem to have similarity in other syntactic characteristics as well. For example, the order of noun (N) and adjective (A) tends to be NA in SVO language. and AN in SOV languages.

***Table 5.9 The development of number of items in comprehension, production, and acquisition of 10 Thai children***

| | | 9MO | 12MO | 15MO | 18MO | 21MO | 24MO |
|---|---|---|---|---|---|---|---|
| | **Comp.** | - | 6 | 130 | 216 | 300 | 357 |
| **L01** | **Prod.** | - | 4 | 29 | 163 | 265 | 335 |
| | **Acq.** | - | 4 | 28 | 161 | 253 | 322 |
| | **Comp.** | 22 | 103 | 177 | 222 | 222 | 266 |
| **L02** | **Prod.** | 1 | 3 | 3 | 28 | 28 | 57 |
| | **Acq.** | 1 | 3 | 3 | 28 | 28 | 57 |
| | **Comp.** | 11 | 43 | 94 | ***188*** | ***284*** | ***369*** |
| **L03** | **Prod.** | - | 3 | 27 | ***192*** | ***292*** | ***415*** |
| | **Acq.** | - | 3 | 27 | ***168*** | ***280*** | ***369*** |
| | **Comp.** | 4 | 54 | 155 | 193 | 284 | 426 |
| **L04** | **Prod.** | 2 | 2 | 6 | 16 | 203 | 422 |
| | **Acq.** | 2 | 2 | 6 | 16 | 199 | 420 |
| | **Comp.** | - | 30 | 114 | 220 | ***282*** | ***357*** |
| **L05** | **Prod.** | - | 2 | 15 | 136 | ***361*** | ***459*** |
| | **Acq.** | - | 2 | 15 | 109 | ***272*** | ***357*** |
| | **Comp.** | - | 33 | 57 | 164 | 238 | 316 |
| **L06** | **Prod.** | - | 2 | 14 | 162 | 238 | 316 |
| | **Acq.** | - | 2 | 13 | 158 | 238 | 316 |
| | **Comp.** | 8 | 200 | 289 | 334 | 359 | 392 |
| **L07** | **Prod.** | - | 11 | 28 | 64 | 139 | 309 |
| | **Acq.** | - | 11 | 28 | 64 | 139 | 292 |
| | **Comp.** | 24 | 65 | 146 | 243 | ***327*** | ***411*** |
| **L08** | **Prod.** | 2 | 37 | 100 | 211 | ***384*** | ***455*** |
| | **Acq.** | 2 | 37 | 100 | 204 | ***327*** | ***411*** |
| | **Comp.** | 17 | 64 | ***219*** | ***425*** | ***544*** | ***605*** |
| **L09** | **Prod.** | 2 | 17 | ***233*** | ***460*** | ***591*** | ***655*** |
| | **Acq.** | 2 | 16 | ***219*** | ***425*** | ***544*** | ***605*** |
| | **Comp.** | - | 55 | 150 | 267 | ***395*** | ***464*** |
| **L10** | **Prod.** | - | 7 | 48 | 221 | ***401*** | ***466*** |
| | **Acq.** | - | 6 | 48 | 218 | ***395*** | ***464*** |

From Table 5.9, it can be seen that there are two types of relationship between comprehension and production. The first is when comprehension is a prerequisite for production, demonstrated in the table when there are more words in comprehension than in production. This relationship occurred mainly around the onset of lexical development — from 9 to 15 months — of each participant. In addition, some children (L01, L02, L04, L06, and L07) tend to demonstrate this relationship throughout the period of investigation. It should be noted that past research on lexical development usually reported only this kind of relationship (Bates *et al.* 1995, Benedict 1979, Berglund 1999).

The second type of relationship is the opposite: when production precedes comprehension. This is demonstrated when there is a higher number of words in production than in comprehension and is shown by the bolded italicized numbers. Considering the age at which this kind of relationship occurs, it seems that production outnumbers comprehension around the period of vocabulary explosion — 18 to 24 months. This type of relationship was found in half of the children in this study — L03, L05, L08, L09, and L10. Such dominance of production over comprehension might due to the fact that children produce too many words during 18 to 24 months that parents have difficulties in determining which one their child has already comprehended its meaning. However, it is also possibly due to children's increase in imitative productions during the period of vocabulary explosion. Firstly, at around this period children's motor skills are developed, especially the movement of the tongue which directly affects the production of various sounds. Accordingly, children might possibly practice their production much more often than at the younger age. Secondly, vocabulary explosion is claimed to be a result of children's realization of that the world of things must be named (Gopnik & Meltzoff 1987), and this possibly motivates them to talk more often.

### 5.3.4 The Correlation between Parental Input and Children's First Words

In studies of lexical acquisitions, conclusions about the number of words, and lexical categories of words children acquired are usually based only on vocabulary measurements. From a linguistic perspective, Gentner (1982) claimed that children's first words are governed by the semantic characteristics of the words themselves. This consequently lead to the proposal of the 'natural partitions hypothesis'.

However, lexical acquisition studies in the past decade have tried to determine other possible explanations for the acquisition of first words in early language development. One of the most focussed topics is whether parental input, infant-directed speech (IDS), or baby talk — adults' speech addressed to children — affect the type of words children first acquire. As pointed out at the beginning of this chapter, there are two poles of studies using data representing levels of vocabulary acquisition in their analyses: 1) lexical items in children's underlying lexicon — competence, and 2) frequency of occurrence of items in normal interaction — performance.

Comparison of two comparative studies between English and Korean speaking parents and children by Au *et al.* (1994), and Gopnik and Choi (1995) clearly indicate this problem. Examination of lexical categories of inputs from the two studies reveals that Korean parents tend to use verbals more frequently than nominals, while the opposite is the case of English speaking families. Correlations between input and first words, resulted in totally different results of these two studies. Au et al., who used data collected as in 1) above, did not find any correlation between parental input and children's first words in the Korean case, while Gopnik and Choi, who collected data as in 2) above, do find significant correlations. According to this, it would be more complete and accurate to have children's data representing two linguistic levels — competence and performance — in order to examines the correlation between input and first words.

Before conducting correlation tests, semantic characteristics of Thai parental input were examined. Figure 5.10 shows the frequency of words in parental input distributed in the semantic domain (nominals, verbals, and relations). These data were elicited from the videos of adult-child interaction. Three line graphs on the left show the number of items found in 10

adults' input (types), while the line graphs on the right show the tokens of the 10 adult's input.

***Figure 5.10 Percentage of frequency of lexical items of parental input (types, and tokens) across age***

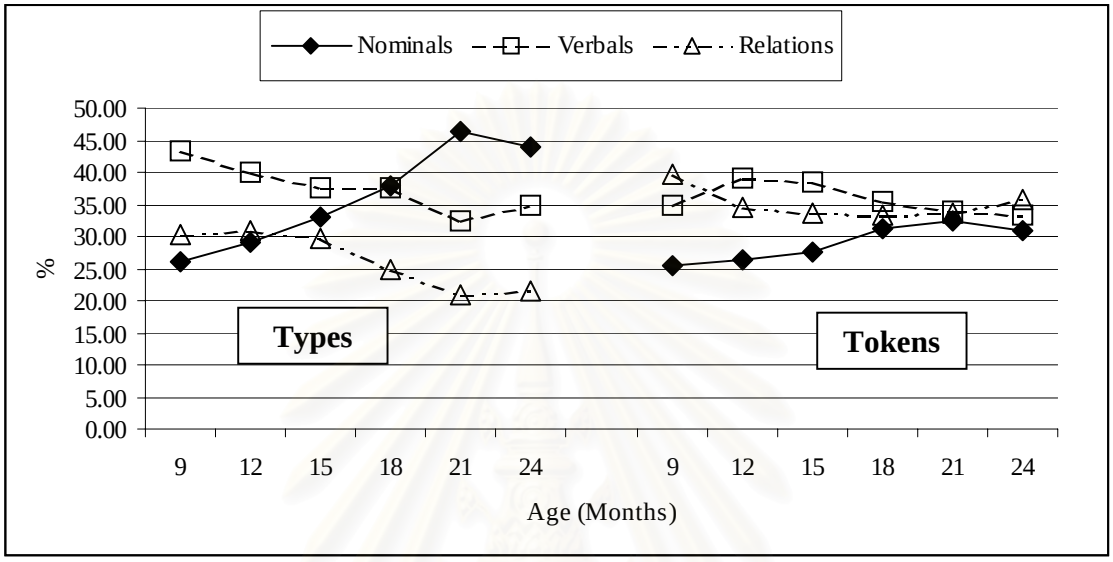



Figure 5.10 shows that the relative percentages of the three semantic categories, nominals, verbals, relations, is not consistently distributed over time. Note especially the nominals, which are said to comprise most of children's first words, are not dominant in adult's speech over the period of investigation. From the 'Types' curves, it can be seen that verbals and relations are more frequent than nominals are at 9 to 12 months. However, nominals in adults-speech gradually increase and outnumber verbals and relations at 21 months. From the 'Tokens' curves, although the number of nominals tend to increase over time, numbers of verbals and relations are quite consistent and higher than nominals over child age. This means that, parents generally tend use more object-referring items to older children, but produce these items less frequently than those referring to states, actions, relations. This indicates the possibility for older children to acquire more new nominals than verbals and relations.

***Table 5.10 Tokens of parental inputs directed to 10 Thai children according to semantic classification: nominals (NOM), verbals (VER), and relations (REL)***

| .Sub | .Sem | 9MO | 12MO | 15MO | 18MO | 21MO | 24MO |
|---|---|---|---|---|---|---|---|
| L01 | NOM | 339 | 557 | 642 | 611 | ***658*** | ***736*** |
| | VER | ***391*** | 598 | ***988*** | ***815*** | 475 | 501 |
| | REL | 363 | ***632*** | 808 | 695 | 594 | 708 |
| L02 | NOM | 319 | 294 | 320 | 512 | 257 | 202 |
| | VER | 338 | ***613*** | 708 | 647 | ***816*** | ***226*** |
| | REL | ***412*** | 399 | ***737*** | ***668*** | 389 | 202 |
| L03 | NOM | 239 | 403 | 566 | 430 | 444 | 454 |
| | VER | 315 | ***733*** | ***759*** | ***506*** | ***498*** | ***699*** |
| | REL | ***385*** | 593 | 578 | 486 | 352 | 460 |
| L04 | NOM | 350 | 365 | 528 | 498 | ***670*** | ***619*** |
| | VER | ***529*** | 492 | ***872*** | ***711*** | 621 | 502 |
| | REL | 493 | ***515*** | 431 | 434 | 441 | 516 |
| L05 | NOM | 173 | 227 | 275 | 464 | 292 | 397 |
| | VER | 392 | **540** | ***432*** | ***545*** | ***478*** | 432 |
| | REL | ***485*** | 434 | 382 | 532 | 430 | ***547*** |
| L06 | NOM | 173 | 285 | 482 | 481 | 501 | 535 |
| | VER | 249 | ***628*** | ***689*** | 480 | ***718*** | 696 |
| | REL | ***453*** | 474 | 608 | ***589*** | 653 | ***779*** |
| L07 | NOM | 326 | 112 | 208 | 367 | 331 | 293 |
| | VER | 468 | 194 | ***246*** | ***437*** | 539 | ***513*** |
| | REL | ***512*** | ***330*** | 239 | 327 | ***508*** | 497 |
| L08 | NOM | 268 | ***334*** | ***267*** | ***391*** | ***554*** | ***436*** |
| | VER | ***384*** | 213 | 164 | 387 | 288 | 237 |
| | REL | 253 | 153 | 200 | 338 | 400 | 287 |
| L09 | NOM | 48 | 174 | 297 | 379 | 177 | 355 |
| | VER | ***182*** | ***208*** | 255 | 355 | 251 | 403 |
| | REL | 130 | 134 | ***348*** | ***389*** | ***308*** | ***426*** |
| L10 | NOM | 338 | 228 | ***386*** | ***490*** | ***591*** | 347 |
| | VER | 341 | 382 | 378 | 358 | 434 | 374 |
| | REL | ***510*** | ***411*** | 368 | 469 | 589 | ***565*** |

Considering further the details of the distribution of individual adult speech in the three semantic categories in Table 5.10, it can be seen that the proportion of nominals, verbals, and relations does not show any systematic pattern in particular individuals. The bolded italicized numbers demonstrate the categories with the highest number of words at certain ages. It was found that proportions are sporadic, and generalizations of pattern of words in adults' speech cannot be drawn. This indicates that in normal speech addressed to children, the adult individually manages types of words regardless of semantic influence. Such unsystematic patterns of adults' speech might lead to insignificant correlations between input and first words. The results of correlation tests between parental input and children's first words either in both the level of competence and performance are reported in Table 5.11.

***Table 5.11 Results of correlation between parental inputs and children's first words across age***

| | 9 MO | 12 MO | 15 MO | 18 MO | 21 MO | 24 MO | Total |
|---|---|---|---|---|---|---|---|
| Input VS Lexicon | -0.22 | -0.66 | -0.5 | -0.42 | -0.51 | 0.252 | -0.49 |
| Input VS Performance | ## | -0.58 | -0.387 | -0.429 | -0.573 | -0.182 | -0.47 |

- The symbol ## marks insufficient data, very low frequency, which make the analysis of correlation not possible
- $r$ (8) = .6391, $p$ = .05*

Regardless of semantic characteristics, it can be questioned whether the frequency of input correlates with the number of items children acquire, and with the frequency in performance. In other words, do children acquire more items and/or produce more frequently when their parents talk to them more. Table 5.11 shows the correlation between input and the two types of children's data across age. It can be seen that there is no significant correlation between input and children's first words neither in children's lexicons nor performances ($r$ (8) = .6391, $p$ = .05). Based on three semantic categories, nominals, verbals, and relations, correlation between parental inputs and children first words was conducted, as shown in Table 5.12.

***Table 5.12 Results of correlation between parental inputs and children's first words in three semantic categories***

| | 9 MO | 12 MO | 15 MO | 18 MO | 21 MO | 24 MO | Total |
|---|---|---|---|---|---|---|---|
| 1. Input VS Lexicon | | | | | | | |
| 1.1 Nominals | -0.4 | -0.08 | -0.38 | -0.28 | 0.017 | 0.325 | -0.16 |
| 1.2 Verbals | 0.515 | -0.78 | -0.42 | -0.58 | -0.77 | 0.193 | -0.57 |
| 1.3 Relations | ## | -0.06 | -0.15 | -0.09 | -0.25 | -0.05 | -0.46 |
| 2. Input VS Performance | | | | | | | |
| 2.1 Nominals | ## | -0.34 | -0.41 | -0.38 | -0.232 | 0.61* | -0.06 |
| 2.2 Verbals | ## | -0.44 | -0.2 | -0.64 | -0.84 | 0.287 | -0.55 |
| 2.3 Relations | ## | 0.476 | 0.278 | 0.379 | -0.2 | 0.181 | -0.32 |

- The symbol ## marks insufficient data, very low frequency, which make the analysis of correlation not possible
- $r$ (8) = .6391, $p$ = .05*

From Table 5.12, although there is a significant correlation between nominal inputs and children's production of nominals at 24 months, it is hard to conclude that parental input affects children's first words. As can be seen in Table 5.12, significant correlations were not found in other cases, but rather, most of them are negative correlations and some of them contain insufficient data. The negative correlations can possibly imply the opposite correlation between input and first words. For example, children would acquire and produce fewer nominals if parents produced more nominals, or vice versa. However, the latter case seems to be impossible in a normal situation.

Accordingly, there are two possible explanations for the negative correlation results. The first is that parental input does not affect the number of items in the child's lexicon. Once children have acquired a certain number of items, then they are said to have acquired a certain number of items stored in their lexicon. The second explanation possibly concerns children's attention during interaction periods. Tomasello and Farrar (1986) claimed that in addition to the understanding of the existence of objects and participants within each particular interaction setting, the acquisition of language requires children's attention to the particular word-referring objects or actions. In the case of Thai children, it might be the case that parents did not care whether their child would pay attention to what they said, but rather, tried to interact entertainingly. Accordingly, parents' speech could neither draw much attention nor make children speak correlatively.

However, examination in details of each participant's family found that there are some correlations between input and first words for some particular cases as shown in Table 5.13.

***Table 5.13 Results of correlation between parental inputs and children's first words for individual cases***

| Participants | nticSema Categories | Input VS Lexicon (Competence) | Input VS Performance (Performance) |
|---|---|---|---|
| L01 | NOM | 0.785** | 0.955** |
| | VER | -0.68 | -0.93 |
| | REL | -0.28 | 0.085 |
| L02 | NOM | -0.37 | ## |
| | VER | -0.24 | ## |
| | REL | -0.8 | ## |
| L03 | NOM | -0.2 | -0.51 |
| | VER | -0.45 | 0.336 |
| | REL | -0.49 | 0.389 |
| L04 | NOM | 0.724* | ## |
| | VER | -0.38 | -0.92 |
| | REL | 0.988*** | 1*** |
| L05 | NOM | 0.486 | 0.212 |
| | VER | -0.46 | 0.043 |
| | REL | 0.278 | 0.514 |
| L06 | NOM | 0.727* | 0.392 |
| | VER | 0.257 | 0.059 |
| | REL | 0.999*** | 1*** |
| L07 | NOM | 0.479 | -0.15 |
| | VER | 0.659* | 0.514 |
| | REL | ## | ## |
| L08 | NOM | 0.823** | 0.882*** |
| | VER | 0.025 | 0.74* |
| | REL | -0.59 | -0.38 |

| Participants | Semantic Categories | Input VS Lexicon (Competence) | rformanceInput VS Pe (Performance) |
|---|---|---|---|
| L09 | NOM | 0.666* | 0.728* |
| | VER | 0.742* | 0.609 |
| | REL | 0.625 | -0.2 |
| L10 | NOM | 0.586 | 0.255 |
| | VER | 0.317 | 0.183 |
| | REL | 0.942*** | 0.441 |

- The symbol ## marks insufficient data, very low frequency which make the analysis of correlation not possible
- $r$ (8) = .6391, $p$ = .05*
  = .7646, $p$ = .01**
  = .8721, $p$ = .001***

***Table 5.14 Summary of cases found in correlation test as significant***

| Semantic Categories | Number of cases found as significant (n=10) | |
|---|---|---|
| | Input VS Lexicon | Input VS Production |
| NOM | 5 (L01, L04, L06, L08, L09) | 3 (L01, L08, L09) |
| VER | 2 (L07, L09) | 1 (L08) |
| REL | 3 (L04, L06, L10) | 2 (L04, L06) |

From Table 5.13 and 5.14, it can be seen that there are more positive correlations than negative correlations in both correlation tests. Moreover, some of them are significant from the level of .05 to .001. This means that adult input possibly affects children's lexicon and performance to some certain extent. However, it is difficult to give more details in terms of semantic categories, because the correlation results are unsystematic. Correlations are found sporadically for nominals (L01, L04, L06, L08, L09), verbals (L07, L08, L09), and relations (L04, L06, L10).

One possible explanation for the weak correlation between input and children first words might due to the type of input. It should be noted that input used in this study is parental input, fathers and mothers speech addressed to children. However, in reality, children interact with a number of other people within their family such as, brother, sister, uncle, aunt, grandfather, grandmother, caretaker, etc. and outsiders such as doctors, nurses, shopkeepers, and other children. These people might produce many different items to the children, and these varieties can possibly effect the correlation results found in this study. Moreover, because of the limitation in memory, children might be confused with all kinds of speech around them and take reaction by producing nothing or producing some particular items upon their own attention.

Although the correlation results for Thai input and Thai first words could not provide a clear picture about the effect of input on children's lexicon and performance, it does suggest that child language ability may not always be predicted from parents' performance. Talkative parents might not necessarily be good facilitators for language acquisition.

**5.3.5 Conclusions**

In the longitudinal study, lexical acquisition by 10 Thai children was investigated in four major areas: onset and rate, lexical categories, relationship between comprehension and production in lexical acquisition, and correlation between parental input and children's first words. Two types of first words data were used in this study. The first set of data represents lexical items in children's underlying lexicon, while the second set of data represents frequency of occurrence of items in children's performance.

There was some degree of individual variation (which might result from different kinds of environment) in the acquisition of first words. Both the onset of the first words, and the onset of the vocabulary explosion occurred at different ages for different children. In addition, the duration of the vocabulary explosion period differs from child to child and directly effects the total number of first words in children's lexicon. In other words, the longer the length of the period of vocabulary explosion, the greater the number of words children acquire.

Examination of the two sets of data — from the questionnaires which represent the number of words in children's lexicon, and from the videos of interaction which represent the frequency of words in performance — reveals that the frequency of occurrence of items in children's performance does not demonstrate constant increase of children's vocabulary. It was suggested that performance data might not be appropriate for the study of lexical development.

Regarding lexical categories, children's first words were investigated in both the syntactic and semantic domains. According to the syntactic classification, it was found that the number of content words outnumbers function words throughout the period of investigation. This indicates the higher degree of salience of content words over function words and also reflects the relative frequencies of content and function words in the adult language. According to the semantic classification, most of children's first words were found to be nominals as found in the cross-sectional study. However, the frequency of occurrence of items in performance demonstrates that children possibly produce items in the verbals and the relations categories more frequently than in the nominals category. This is because items in these categories, especially the word /mam1 mam1/ 'to eat', seems to be more necessary for their daily life than nominals. This suggests that the investigation of the development of words in different lexical categories from different sources of data might provide different kinds of findings.

Regarding the characteristics of parental input, it was found that adults' speech was distributed with more verbals and relations than nominals throughout the period of investigation. However, the number of nominal items tends to increase over time and outnumber verbal and relation items around the vocabulary explosion period (21 months). Possibly children acquire more nominals than other categories during the period of vocabulary explosion. Thus, parents tend to produce fewer tokens, but more types of nominals than those of verbals and relations. Examination of the correlation between parental input and children's first words reveals that children do not have to receive a large amount of linguistic input in order to acquire their first words, or interact with adults productively. Moreover, children's attention is another possible factor for how well they acquire and produce language.

**5.4 Summary and Discussion**

Lexical acquisition of Thai children was investigated in two major studies: a cross-sectional and a longitudinal study.

Firstly, the cross-sectional study of lexical acquisition aimed to investigate normative data for Thai children acquiring their first words. From this study, a broad picture of the development of first words was reported in three traditional areas of study: onset and rate, lexical categories, relationship between comprehension and production in lexical acquisition. It was found that Thai children acquire their first words as early as 9 months. The number of lexical items increases over time at two distinct rates: gradual and drastic. The rapid rate of lexical acquisition is a distinctive characteristic of children's lexical development known as the period of vocabulary explosion, and this occurs between 18 and 21 months of age. In terms of lexical categories, syntactically, content words are acquired before and more readily than function words. Semantically, the distribution of words types from highest to lowest is nominals, verbals, and relations in the children's lexicon. Regarding the relationship between comprehension and production in lexical acquisition, it was found that at the onset of development, at which the rate of acquisition is gradual, children understand the meanings of particular items before being able to produce it. However, in the period of vocabulary explosion, when the rate of development is rapid, children seem to produce particular words before being able to understand its meaning, presumably in an imitative context.

Secondly, the longitudinal study of lexical acquisition aimed to investigate the details of individual development of first words and its correlation to adult input. Children's first words were divided into two sets representing two levels of lexical knowledge: lexical items, representing competence, and frequency, representing performance. It was found that there was a large degree of individual variation. Regarding the onset and rate of lexical development, children start to acquire their first words at different ages, between 9 and 12 months. It was also found that different children have different paces of lexical development. In particular, children enter the vocabulary explosion period at different ages. Moreover, the length of the period differs from child to child—ranging from three to nine months, and it directly reflects the number of items in children's lexicon at 24 months.

Regarding lexical categories, it was found that the two sets of data provide two different findings. According to the lexical item data, the mean number of words distributed in two syntactic and three semantic categories conform to the findings in the cross-sectional study. That is, content words are dominant in the syntactic domain, and nominals are dominant in the semantic domain. However, from individual examination of the frequency of occurrence in adult-child interaction, it was found that in the syntactic domain, function words tend to comprise a larger proportion of words in children's performance at older ages. In the semantic domain, some children used verbals and relations more than they did nominals. Findings from the two sets of data urge researchers of child language to be aware and careful of the selection of data and methodology for conducting research in this area.

Finally, examination of the correlation between input and first words provides both negative and positive correlations, which was mostly not significant across age and semantic categories. Closer investigation of individual participants reveals that there seems to be some significant correlations in some cases, but the generalization can not be drawn. Therefore, it can be stated that parental input plays a role to some extent in children's acquisition of their first words. However, it cannot be claimed that children acquire and produce words

successfully solely due to parental input. The relationship between input and first words was not found to be strong in the present study.

# Chapter 6
# Summary, Limitations, and Discussion

## 6.1 Overview

The acquisition of "first words" of Thai children in phonological and lexical aspects was investigated. Findings indicate the necessity of both the universal and the language specific hypotheses to account for early lexical acquisition. In addition, it was found that individual variation, individual preference, and the characteristic of parental input are also important factors influencing this phenomenon. In this chapter, findings from the investigation of first words both in phonological and lexical aspects are summarized (Sections 6.1.1 and 6.1.2). Limitations of this study are pointed out in Section 6.2, and new findings and recommendations for future research are discussed in Section 6.3.

### 6.1.1 Phonological Acquisition

Findings from the study of phonological acquisition support Hypothesis 1 — which predicts that in the early period of development, children's first words reflect a different phonological system from that of adults; and this system gradually changes and moves towards the adult phonological system. Children's phonological system during the early period of development can be viewed in terms of two related universal explanations: the ease in production and children's incomplete anatomical development.

From the comparison between distributions of phonological elements in child and adult language, it was found that when children develop, their phonological system moves toward that of the adult. These findings support the language specific explanation. In addition to the two theoretical explanation it was found that other factors such as individual preference and the characteristics of words themselves also play an important role in phonological acquisition. The detailed explanations are as follows.

In the acquisition of phonology, important evidence in support of the universal explanation for children's incomplete phonological system was found. When children start to acquire their first words, their productive ability seems to limit the particular phonological characteristics. Therefore, the children's phonological system is different from that of the adult. Investigation of the distributions of sounds in the four phonological elements, syllables, consonants, vowels, and tones, reflects the ease and the order of acquisition. Sounds that occur most frequently are those that contain more simple phonological characteristics than those that occur less frequently. Results are shown in Table 6.1.

***Table 6.1 The acquisition of the phonological system in Thai***

| Phonological Elements | Early-acquired Elements | Order of Acquisition |
|---|---|---|
| 1. Syllable Structures | | |
| 1.1 Open Syllables | CV | CV > CVV > CCV |
| 1.2 Close Syllables | CVC | CVC > CVVC > CCVC |
| 2. Consonants | C | C > CC |
| 2.1 Initials | Stops, Nasals, Continuants | Stops > Nasals > Continuants > Fricatives |
| 2.2 Finals | Nasals | Nasals > Continuants > Stops |

| Phonological Elements | Early-acquired Elements | Order of Acquisition |
|---|---|---|
| 3. Vowels<br>3.1 Monophthongs<br><br>3.2 Diphthongs | V<br>/a/, /i/, /u/<br><br>/ia/ | V > VV<br>/a/ > /i/ > /u/ > /O/ > /x/ > /o/ > /e/ > /U/ > /q/<br>/ia/ > /ua/ > /Ua/ |
| 4. Tones | Mid, Falling, Low, High, Rising | - |

Moreover, it was found that children often substitute monosyllabic or disyllabic words for adult polysyllabic words. In addition, evidence supporting the language specific hypothesis was also found in this study. As the target of acquisition, it was found that characteristics of Thai language (considered from the distribution of phonological elements in Thai language) are also important for the acquisition of the phonological system. The distribution of consonants, vowels, and tones in children's productions is similar to that in adults as proposed by Luksaneeyanawin (1992) and Hanpanich (1993). This indicates that, regardless of some limitations in production, children are developing their language toward that of the adult. In addition, the acquisition of accent also reveals the fact that children have acquired specific characteristics of the adult language right from early periods of language development. Monosyllabic and disyllabic productions of children reflect the accentual patterns of Thai polysyllabic words as proposed by Luksaneeyanawin (1983) as shown in Table 6.2.

***Table 6.2 Relationships between children's production and adults' accentual system***

| Children's Production of Polysyllabic Words | Syllable(s) Produced |
|---|---|
| 1. Monosyllabic<br>2. Disyllabic | Primary Accented Syllable in Target<br>Primary + Secondary Accented Syllables in Target |

However, findings also suggest the importance of individual preference and the characteristics of parental input in phonological acquisition. It was found that some children prefer to produce some particular words than others at certain ages. This might be because they find that certain words are important and provide many benefits to them. Words that are found to be used with high frequency at certain periods are /mam1 mam1/ 'to eat', /mxx2/ 'mother', /?a0 raj0/ 'what', /naj4/ 'where', /khraj/ 'who', /bUUn bUUn/ 'onomatopoeia for vehicles'. It should be noted that some of these words, e.g. /mam1 mam1/, and /bUUn2 bUUn2/ are found much more frequently in infant-directed speech than in adult-directed speech. The preference in production for these certain words is reflected in the distribution of some phonological elements in the children's data.

Moreover, in the acquisition of accent, it was found that the characteristics of words themselves sometimes determine the choice of production, as found in children's production of polysyllabic compounds and polysyllabic repetitives.

### 6.1.2 Lexical Acquisition

In the acquisition of lexical items, cross-sectional data provides a broad picture of lexical development as shown in Table 6.3. It also suggests that there is a high degree of individual variation in child language development.

***Table 6.3 Generalization of lexical development***

| Parameters | Findings |
|---|---|
| 1. Onset | 9-15 months |
| 2. Rate | Two Types:<br>Gradual Development: 9-15 months, 21-24 months<br>Rapid Development: 18-21 months (Vocabulary Explosion) |
| 3. Lexical Categories<br>3.1 Syntactic Domain<br>3.2 Semantic Domain | Order of Acquisition:<br>Content Words > Function Words<br>Nominals > Verbals > Relations |
| 4. The Relationship between Comprehension and Production | Two Types:<br>Comp. > Prod. : 9-24 months<br>Prod. > Comp. : from 18 months (some items only) |

The longitudinal study of 10 Thai children provides more detailed findings regarding lexical development. Results generally confirm the variation of lexical development among children. It was found that children start to acquire their first words at different ages and the length of the "vocabulary explosion" period differs ranging from 3 to 9 months. Moreover, the length of this period directly relates to the number of lexical items children had acquired — the longer the period, the higher number of items acquired.

Some findings from the longitudinal study confirm what was found in the cross-sectional study. In the syntactic domain it was found that more of the children's first words were content rather than function words. The universal-based "natural partitions hypothesis" seems to be a valid explanation for the acquisition of first words in the semantic domain. It was found that children's first words are noun dominant and the proportion of first words is Nominals > Verbals > Relations. Therefore, findings from the investigation of lexical development in the syntactic and the semantic domains confirm Hypothesis 2. In addition, longitudinal examination of the relationship between comprehension and production suggests that during the period of vocabulary explosion children might possibly produce some items before being able to understand their partial meaning.

In relation to Hypothesis 3 — which predicts that the specific characteristics of infant-directed speech will determine the domain of words children acquire at every stage of development, findings from correlations between parental input and children's first words do not strongly confirm this hypothesis. Some correlations between parental input and children's first words were found, but in general it was found that there was not a strong association between input and output. Negative correlations were also found which suggest that children's attention might be another factor to account for the frequency in production.

From comparison of the two types of data used for the study of lexical development, it was found that different methods of data collection can provide different results. In general, data representing the underlying lexicon demonstrates the developmental aspect of lexical acquisition, whereas data representing performance does not.

In addition, concerning the lexical categories, especially the controversial issue about the 'noun bias' phenomenon, it was found that the two sets of data provided different results regarding the proportions of words in the semantic domain. In the set of data representing the underlying lexicon, all children overwhelmingly acquired nominals over verbals and relations. However, in the set of data representing performance, some

children used verbals and relations almost equally or more frequently than nominals. This finding indicates the effect of different data collection methods on the results found in studies of language acquisition.

## 6.2 Limitations of the Research

### 6.2.1 Data Collection

It was found that there were limitations in the data collection methods used which could affect the results found on first words acquisition in this study.

The first problem was found in the use of word checklist questionnaires for eliciting data from the cross-sectional group of participants. Although participants were asked to add additional items which are not listed in the questionnaires, some of the participants, especially parents of older children, did not. This might be because children at this stage understand and produce a lot of words and the parents were not able to remember all of them. In contrast, participants in the longitudinal study who continuously answered the questionnaires over the period of investigation seem to add much more new items, which are not listed. Accordingly, this resulted in a lower range of data in the cross-sectional study than in the longitudinal study. Thus, this might suggest the limitation of using open-ended questionnaires in eliciting data from older-age children, otherwise longitudinal data collection — continuously collecting data from young age — might be appropriate.

The second problem concerns the use of the 20-minute period of parent-child interaction for the analysis of lexical development. As found in this study, some children produce very few words within 20 minutes and this gives insufficient data for the analyses of correlations between adult input and children's first words as shown in Table 5.11. The data might have been richer if the interaction period had been longer, however the collection of more extensive longitudinal data is very time-consuming and labor-intensive.

## 6.3 Discussion and Recommendations

In this section, some interesting findings from this study are discussed and some recommendations for future research are given. The discussion consists of four topics: the acquisition of Thai language, tone development, and vocabulary explosion.

### 6.3.1 Thai Language Acquisition

As evident in this study, the acquisition of first language can be explained from a universal or language specific perspective. Thai children follow some common patterns in phonological and lexical developments with children acquiring other languages, but also develop language-specific characteristics related to that of Thai adults. For examples, the emergence of more complicated phonological elements of the adult's language (Stops > Nasals > Continuants > Fricatives for initial consonants, and Nasals > Continuants > Stops for final consonants). Accordingly, in order to clarify our understanding about first language acquisition, research in this area needs to consider both crosslinguistic research of language acquisition, and the characteristics of the native language.

### 6.3.2 Tone Development

It was found that Thai children acquire tone very early. Five tones were produced at around 12 months of age with a very low error rate (3.49%) compared to consonants. The acquisition of suprasegmentals — such as pitch, intonation, and accent — before segmentals — such as consonants and vowels — has been reported in the literature of

child language. From a classic study of his son's "protolanguage"[15], Halliday (1975) proposed that his son use eight contrastive pitch ranges to communicate with him consistently. Each type of pitch range has its own communicative function. For example the use of the mid low pitch range would normally express the "personal function" — naming things. Accordingly, finding from this study seems to support the priority in acquisition of tones over consonants and vowels.

In relation to the acquisition of tone in tone languages, it is interesting to ask whether children acquiring other tone languages such as Chinese, and Vietnamese acquire tones earlier than other phonological components, like consonants and vowels. If so, what are the important factors that facilitate the acquisition of tones? In addition to the production aspects, acoustic analyses of children's tones in terms of development could also be carried out, because acoustic cues might possibly be another candidate for the factors of acquisition.

In relation to perception, if tone-language children perceive the variation of non-language pitch better than non-tone-language children. The results of this question would help clarify whether the acquisition of tone language facilitates the perception of non-linguistic pitch, and whether linguistic pitch is related to non-linguistic pitch.

### 6.3.3 Vocabulary Explosion

From the investigation of lexical development, it was found that the duration of the vocabulary explosion period directly affects the total number of items children acquire at 24 months, that is the longer the duration, the greater the number of items children acquire. It should be noted that the case L02 did not show a vocabulary explosion even at the age of 24 months. This leads to the question of whether the vocabulary explosion period is necessary for children language development. If it is so, how late could this period occur in normally developing children, late talkers, and language retarded children? Findings from research in this topic would be very useful for the normative determination of child language development.

### 6.3.4 Individual Variation in Child Development

The lexical development study revealed that there is a large degree of individual variation. It was found that children acquire their first words (from 9 to 15 months) at different ages and have different rates (gradual and rapid development) and pace of development (different duration of vocabulary explosion period ranging from three to nine months). In particular, the participant L02 is an interesting case to be discussed. The child was reported to acquire his first words at 9 months, but the increase in the number of items in his lexicon was quite stable. He had approximately 57 words in acquisition at 24 months of age, while his number of words in comprehension was 266. In addition, in the adult-child interaction data, even though he showed good responses with other adults during the video recording, he did not speak throughout the period of investigation. Correlation between L02's input and first words was mostly not possible, because the child produced nothing whereas the adult input was relatively similar to other adult participants. This seems to be a good evidence to suggest that children do not necessarily need large amounts of linguistic reinforcement (input) in order to acquire and produce their native language.

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[15] Halliday (1975) defined "protolanguage as a particular language created by infants during the period of non-linguistic development or babbling (the period when adult-like linguistic forms have not yet been appeared). The protolanguage is used as a tool for infants to communicate with other adults with very high consistency.

In relation to this, it might be interesting to ask what the linguistic characteristics of this child are when he starts to talk (presumably after 24 months of age). Would he produce one-word utterances or multi-word utterances? Would he be able to produce words as accurately as other 24-month-olds? Would he enter the vocabulary explosion period later? Findings from research in this area would be useful examining normative development.

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# APPENDICES

**APPENDIX A:**
**An Example of Consent Form, Letter Asking For Cooperation, and List of 10 Subjects in the Longitudinal Study**

**แบบแสดงความร่วมมือในการวิจัย**

**โครงการวิจัยปฏิสัมพันธ์ระหว่างมารดากับทารก**

**ระหว่างศูนย์วิจัยการประมวลผลภาษาและวัจนะ คณะอักษรศาสตร์**

**จุฬาลงกรณ์มหาวิทยาลัย กับ MARCS Auditory Laboratories Sydney University of Western Sydney, Australia**

ข้าพเจ้า ..... อายุ .....ปี

อาชีพ ..... ที่อยู่ปัจจุบัน .....

.....

โทรศัพท์/โทรสาร .....

สถานที่ทำงาน .....

.....

โทรศัพท์/โทรสาร .....

ยินดีที่จะเข้าร่วมในโครงการวิจัยปฏิสัมพันธ์ระหว่างมารดากับทารก โดยอนุญาตให้มีการบันทึกเสียงและภาพ ของการปฏิสัมพันธ์ระหว่างข้าพเจ้ากับบุตรของข้าพเจ้า ในช่วงอายุต่าง ๆ ตั้งแต่ 6 เดือน ถึง 2 ปี

ลงชื่อ ..... มารดา ลงชื่อ .....

ผู้ทำวิจัย

(.....) (.....)

***หัวหน้าโครงการฝ่ายไทย:***

ผู้ช่วยศาสตราจารย์ ดร. สุดาพร ลักษณียนาวิน ผู้อำนวยการโครงการวิจัยปฏิสัมพันธ์ระหว่างมารดากับทารก ศูนย์วิจัยการประมวลผลภาษาและวัจนะ ภาควิชาภาษาศาสตร์ คณะอักษรศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย โทร: 02-218-4857 E-mail: Sudaporn.L@chula.ac.th

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3. Mr.Colin Schoknecht Laboratory Manager of MARCS Auditory Laboratories Ssydney, University of Western Sydney, Australia E-mail: c.schoknecht@uwsedu.au

**Primary Information of 10 Longitudinal Participants**

**Child's name: Chonnanet Karnsomlarp (L01) Nickname: C**
**Sex: Girl Birthday: 28 Jul 2000**
**Mother: Mrs. Hongthong Karnsomlarp Occupation: Government official**
**Sisters/Brothers: None No. of people in family: 4**

| Child development | | Age in months | | | | | |
|---|---|---|---|---|---|---|---|
| | | 9 | 12 | 15 | 18 | 21 | 24 |
| Physical | 1. Crawls | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | 2. Sits unsupported | | ✓ | ✓ | ✓ | ✓ | ✓ |
| | 3 Stands | | | ✓ | ✓ | ✓ | ✓ |
| | 4. Walks smoothly | | | | ✓ | ✓ | ✓ |
| Commu-nicative | 5. Babbles | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | 6. Produces adult-like words | | ✓ | ✓ | ✓ | ✓ | ✓ |
| | 7. Produces two-word utterances | | | | ✓ | ✓ | ✓ |
| | 8. Produces multi-word utterances | | | | | | ✓ |

**Child's name: Samavee Boonyacholasin (L02) Nickname: Boss**
**Sex: Boy Birthday: 21 Sep 2000**
**Mother: Mrs. Delailar Boonyacholasin Occupation: Government official**
**Sisters/Brothers: 1 sister No. of people in family: 5**

| Child development | | Age in months | | | | | |
|---|---|---|---|---|---|---|---|
| | | 9 | 12 | 15 | 18 | 21 | 24 |
| Physical | 1. Crawls | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | 2. Sits unsupported | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | 3 Stands | | ✓ | ✓ | ✓ | ✓ | ✓ |
| | 4. Walks smoothly | | | ✓ | ✓ | ✓ | ✓ |
| Commu-nicative | 5. Babbles | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | 6. Produces adult-like words | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | 7. Produces two-word utterances | | | | | | |
| | 8. Produces multi-word utterances | | | | | | |

**Child's name: Pakorn Wisitanupong (L03)** **Nickname: Chombun**
**Sex: Boy** **Birthday: 2 Oct 2000**
**Mother: Mrs. Somjintana Wisitanupong** **Occupation: Government official**
**Sisters/Brothers: None** **No. of people in family: 3**

| Child development | | Age in months | | | | | |
|---|---|---|---|---|---|---|---|
| | | 9 | 12 | 15 | 18 | 21 | 24 |
| Physical | **1. Crawls** | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | **2. Sits unsupported** | | ✓ | ✓ | ✓ | ✓ | ✓ |
| | **3 Stands** | | | | ✓ | ✓ | ✓ |
| | **4. Walks smoothly** | | | | ✓ | ✓ | ✓ |
| Commu-nicative | **5. Babbles** | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | **6. Produces adult-like words** | | ✓ | ✓ | ✓ | ✓ | ✓ |
| | **7. Produces two-word utterances** | | | | ✓ | ✓ | ✓ |
| | **8. Produces multi-word utterances** | | | | | | ✓ |

**Child's name: Jaruwanna Ruangroj (L04)** **Nickname: Prim**
**Sex: Girl** **Birthday: 3 Oct 2000**
**Mother: Mrs. Parinya Ruangroj** **Occupation: Government official**
**Sisters/Brothers: None** **No. of people in family: 4**

| Child development | | Age in months | | | | | |
|---|---|---|---|---|---|---|---|
| | | 9 | 12 | 15 | 18 | 21 | 24 |
| Physical | **1. Crawls** | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | **2. Sits unsupported** | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | **3 Stands** | | ✓ | ✓ | ✓ | ✓ | ✓ |
| | **4. Walks smoothly** | | | ✓ | ✓ | ✓ | ✓ |
| Commu-nicative | **5. Babbles** | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | **6. Produces adult-like words** | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | **7. Produces two-word utterances** | | | | | | ✓ |
| | **8. Produces multi-word utterances** | | | | | | ✓ |

**Child's name: Worawat Pincheng (L05)** **Nickname: Fluk**
**Sex: Boy** **Birthday: 22 Oct 2000**
**Mother: Mrs. Kanoksri Pincheng** **Occupation: Housewife**
**Sisters/Brothers: 1 brother** **No. of people in family: 4**

| Child development | | Age in months | | | | | |
|---|---|---|---|---|---|---|---|
| | | 9 | 12 | 15 | 18 | 21 | 24 |
| Physical | 1. Crawls | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | 2. Sits unsupported | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | 3 Stands | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | 4. Walks smoothly | | ✓ | ✓ | ✓ | ✓ | ✓ |
| Commu-nicative | 5. Babbles | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | 6. Produces adult-like words | | ✓ | ✓ | ✓ | ✓ | ✓ |
| | 7. Produces two-word utterances | | | | | ✓ | ✓ |
| | 8. Produces multi-word utterances | | | | | | ✓ |

**Child's name: Peerawat Nutchengbong (L06)** **Nickname: Pee**
**Sex: Boy** **Birthday: 26 Oct 2000**
**Mother: Mrs. Supatra Nutchengbong** **Occupation: Employee**
**Sisters/Brothers: None** **No. of people in family: 3**

| Child development | | Age in months | | | | | |
|---|---|---|---|---|---|---|---|
| | | 9 | 12 | 15 | 18 | 21 | 24 |
| Physical | 1. Crawls | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | 2. Sits unsupported | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | 3 Stands | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | 4. Walks smoothly | | ✓ | ✓ | ✓ | ✓ | ✓ |
| Commu-nicative | 5. Babbles | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | 6. Produces adult-like words | | ✓ | ✓ | ✓ | ✓ | ✓ |
| | 7. Produces two-word utterances | | | | | ✓ | ✓ |
| | 8. Produces multi-word utterances | | | | | | ✓ |

**Child's name: Hathaichanok Angkhananuwat (L07)** **Nickname: Baiwan**
**Sex: Girl** **Birthday: 30 Oct 2000**
**Mother: Mrs. Cholada Angkhananuwat** **Occupation: Employee**
**Sisters/Brothers: 1 sister** **No. of people in family: 5**

| Child development | | Age in months | | | | | |
|---|---|---|---|---|---|---|---|
| | | 9 | 12 | 15 | 18 | 21 | 24 |
| Physical | **1. Crawls** | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | **2. Sits unsupported** | | ✓ | ✓ | ✓ | ✓ | ✓ |
| | **3 Stands** | | ✓ | ✓ | ✓ | ✓ | ✓ |
| | **4. Walks smoothly** | | | ✓ | ✓ | ✓ | ✓ |
| Commu-nicative | **5. Babbles** | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | **6. Produces adult-like words** | | ✓ | ✓ | ✓ | ✓ | ✓ |
| | **7. Produces two-word utterances** | | | | | | ✓ |
| | **8. Produces multi-word utterances** | | | | | | ✓ |

**Child's name: Ananda Homhualdii (L08)** **Nickname: Uai**
**Sex: Girl** **Birthday:6 Nov 2000**
**Mother: Mrs. Sunida Homhualdii** **Occupation: Employee**
**Sisters/Brothers: None** **No. of people in family: 3**

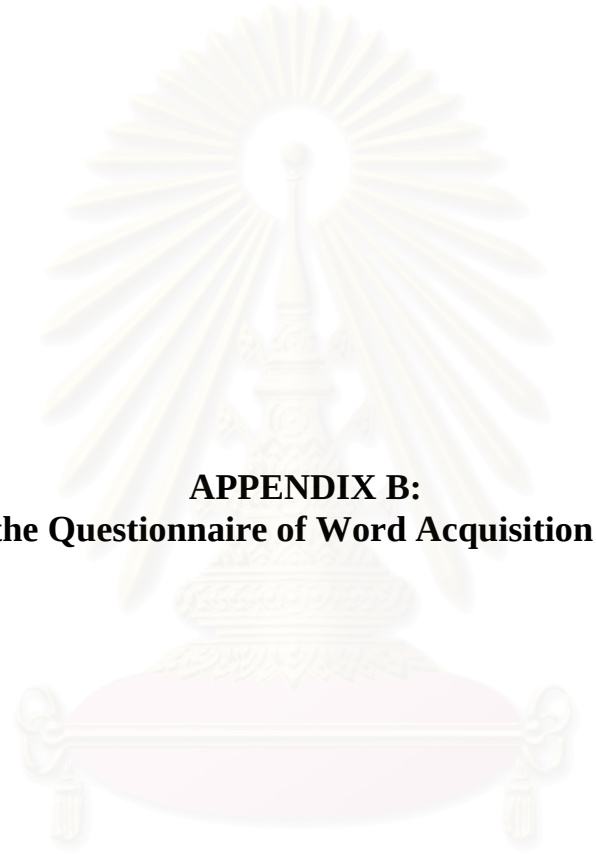
| Child development | | Age in months | | | | | |
|---|---|---|---|---|---|---|---|
| | | 9 | 12 | 15 | 18 | 21 | 24 |
| Physical | **1. Crawls** | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | **2. Sits unsupported** | | ✓ | ✓ | ✓ | ✓ | ✓ |
| | **3 Stands** | | ✓ | ✓ | ✓ | ✓ | ✓ |
| | **4. Walks smoothly** | | ✓ | ✓ | ✓ | ✓ | ✓ |
| Commu-nicative | **5. Babbles** | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | **6. Produces adult-like words** | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | **7. Produces two-word utterances** | | | | | ✓ | ✓ |
| | **8. Produces multi-word utterances** | | | | | | ✓ |

**Child's name: Warit Archasong (L09)** **Nickname: Pan**
**Sex: Boy** **Birthday: 11 Nov 2000**
**Mother: Mrs. Khanitha Archasong** **Occupation: Government official**
**Sisters/Brothers: None** **No. of people in family: 3**

| Child development | | Age in months | | | | | |
|---|---|---|---|---|---|---|---|
| | | 9 | 12 | 15 | 18 | 21 | 24 |
| Physical | **1. Crawls** | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | **2. Sits unsupported** | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | **3 Stands** | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | **4. Walks smoothly** | | | ✓ | ✓ | ✓ | ✓ |
| Commu-nicative | **5. Babbles** | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | **6. Produces adult-like words** | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | **7. Produces two-word utterances** | | | ✓ | ✓ | ✓ | ✓ |
| | **8. Produces multi-word utterances** | | | | | ✓ | ✓ |

**Child's name: Pranchalee Prasertwit (L10)** **Nickname: Mai**
**Sex: Girl** **Birthday: 16 Nov 2000**
**Mother: Mrs. Narumon Prasertwit** **Occupation: Government official**
**Sisters/Brothers: None** **No. of people in family: 3**

| Child development | | Age in months | | | | | |
|---|---|---|---|---|---|---|---|
| | | 9 | 12 | 15 | 18 | 21 | 24 |
| Physical | **1. Crawls** | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | **2. Sits unsupported** | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | **3 Stands** | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | **4. Walks smoothly** | | ✓ | ✓ | ✓ | ✓ | ✓ |
| Commu-nicative | **5. Babbles** | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | **6. Produces adult-like words** | | ✓ | ✓ | ✓ | ✓ | ✓ |
| | **7. Produces two-word utterances** | | | | | ✓ | ✓ |
| | **8. Produces multi-word utterances** | | | | | ✓ | ✓ |



**APPENDIX B:**
**An Example of the Questionnaire of Word Acquisition in Thai (QWAT)**

# แบบสอบถามการรู้คำของเด็กไทย

**ก. ข้อมูลทั่วไป**

1. วันที่ทำการบันทึก.....อายุเด็กในวันที่บันทึก.....ปี.....เดือน.....วัน

ผู้ทำการบันทึกมีความสัมพันธ์กับเด็กโดยเป็น o บิดา o ญาติ ระบุ.....

o มารดา o อื่น ๆ ระบุ.....

ชื่อบุตร..... นามสกุล..... ชื่อเล่น.....

เพศ o ชาย o หญิง

เกิดเมื่อวันที่..... เดือน..... ปี.....

เป็นบุตรคนที่ o 1 o 2 o 3 o อื่น ๆ ระบุ.....

ในจำนวนบุตรทั้งหมด o 1 o 2 o 3 o อื่น ๆ ระบุ..... คน

2. 2.1 บิดาชื่อ..... นามสกุล.....

2.2 มารดาชื่อ..... นามสกุล.....

2.3 ภาษาที่ใช้ภายในครอบครัว (เลือกได้มากกว่า 1 ข้อ)

o ภาษาไทยกรุงเทพฯ o ภาษาไทยถิ่นอีสาน

o ภาษาไทยถิ่นภาคกลาง o ภาษาอังกฤษ

o ภาษาไทยถิ่นเหนือ o ภาษาจีน

o ภาษาไทยถิ่นใต้ o อื่น ๆ ระบุ.....

3. 3.1 กรุณาเรียงลำดับบุคคลที่มักจะคลุกคลีหรือเล่นกับบุตรของท่าน จากบ่อยที่สุดไปจนถึงน้อยที่สุด 5 อันดับแรก (เช่น แม่ พ่อ พี่เลี้ยง ยาย พี่ชาย เป็นต้น)

1..... 2..... 3..... 4..... 5.....

3.2 บุตรของท่านจะชอบ เมื่อได้เล่นหรืออยู่กับใครมากที่สุด .....

3.3 ในวันปกติที่ไม่ใช่วันหยุด ผู้ดูแลบุตรของท่านคือ

o มารดาของเด็กเอง o พี่เลี้ยงซึ่งอยู่บ้านเดียวกัน

o ญาติซึ่งมีความสัมพันธ์กับเด็กโดยเป็น..... o สถานรับฝากเลี้ยงเด็ก

o เพื่อนบ้าน o อื่นๆ ระบุ.....

3.4 ภาษาที่บุคคลดังกล่าวพูดคือ (เลือกได้มากกว่า 1 ข้อ)

o ภาษาไทยกรุงเทพฯ o ภาษาไทยถิ่นอีสาน

o ภาษาไทยถิ่นภาคกลาง o ภาษาอังกฤษ

o ภาษาไทยถิ่นเหนือ o ภาษาจีน

o ภาษาไทยถิ่นใต้ o อื่น ๆ ระบุ.....

4. 4.1 ของเล่นที่บุตรของท่านชอบเล่นคือ (เลือกได้มากกว่า 1 ข้อ)

o ตุ๊กตุ่นตุ๊กตา ระบุลักษณะ (เช่น ตุ๊กตาหมี สีขาว).....

o หุ่นยนต์

o โมบาย ระบุลักษณะ (เช่น รูปปลา).....

o หนังสือภาพ ระบุภาพที่ชอบดู.....

o ลูกบอล ระบุลักษณะ (เช่น สีแดง มีรูปหมีติดอยู่).....

o เครื่องดนตรีของเล่น ระบุลักษณะ (เช่น กีต้าร์ มีรูปหมี).....

o อื่น ๆ ระบุ.....

4.2 เกมส์หรือการละเล่นที่บุตรของท่านชอบเล่น คือ (เลือกได้มากกว่า 1 ข้อ)

o ร้องเพลง ระบุเพลงที่ชอบ.....

o เต้น ระบุชื่อเพลงที่ชอบเต้นเมื่อได้ยิน.....

o ตบแปะ (มีเพลงประกอบ) ระบุเนื้อเพลงท่อนแรก.....

o จ้ำจี้ผลไม้ (มีเพลงประกอบ)

o จ๊ะเอ๋

o ขายของ (ระบุสิ่งที่เล่นขาย).....

o อื่น ๆ ระบุ.....

4.3 นอกเหนือจากของเล่น และเกมส์แล้ว บุตรของท่านแสดงท่าทางสนุกหรือชอบใจเมื่อ (เลือกได้มากกว่า 1 ข้อ)

o อาบน้ำ

o รับประทานอาหาร หรือขนม

o เปลี่ยนผ้าอ้อม หรือเสื้อผ้า

o อื่น ๆ ระบุ.....

4.4 สิ่งที่บุตรของท่านรับประทานเป็นประจำคือ (เลือกได้มากกว่า 1 ข้อ)

o นม

o อาหาร ระบุ (เช่น โจ๊ก).....

o เครื่องดื่ม ระบุ (เช่น น้ำ น้ำส้ม).....

o ขนม ระบุ (เช่น ปีโป้).....

o ผลไม้ ระบุ.....

5. 5.1 กรุณาระบุรายการสิ่งที่บุตรของท่านเล่น รวมทั้งชื่อที่ใช้เรียกของสิ่งนั้น 20 ชิ้น โดยเรียงลำดับความถี่ในการเล่น

| ของเล่น | ลักษณะ (รูปร่าง, สี) | ชื่อที่เรียก |
|---|---|---|
| ตัวอย่าง: ตุ๊กตา | หมี สีน้ำตาล | เจ้าหมี, ปีเตอร์ |
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**คำแนะนำในการตอบแบบสอบถามตอน ตรวจสอบคำศัพท์**

คำที่ให้ไว้ในรายการคำศัพท์ต่อไปนี้ เป็นชุดคำที่แบ่งกลุ่มตามประเภททางความหมายของคำ โดยให้ท่านผู้ปกครองเลือกใส่เครื่องหมาย X ลงในช่องทางด้านขวาของคำแต่ละคำ โดยให้พิจารณาแยกเป็น 2 ส่วนคือ

1. บุตรของท่านเข้าใจความหมายของคำนั้น ๆ แล้วหรือไม่
2. บุตรของท่านสามารถพูดออกเสียงของคำนั้น ๆ แล้วหรือไม่

ถ้าท่านคิดว่า บุตรของท่านเข้าใจความหมายของคำดังกล่าวแล้ว ให้ใส่เครื่องหมาย X ลงในช่อง “เข้าใจ” ถ้าคิดว่ายังไม่เข้าใจก็ให้เว้นว่างไว้ และถ้าบุตรของท่านสามารถพูดหรือออกเสียงเพื่อสื่อความหมายของคำดังกล่าว ก็ให้ใส่เครื่องหมาย X ลงในช่อง “พูด” ด้วย นอกจากนี้ถ้าบุตรของท่านพูดออกเสียงได้ แต่พูดคำที่ไม่ตรงกับคำที่ให้ไว้ กรุณาใส่คำที่บุตรของท่านพูดในช่อง “พูด” แทนการใส่เครื่องหมาย X ดังตัวอย่าง

ก. เข้าใจ แต่ไม่พูด

| คำ | เข้าใจ | พูด |
|---|---|---|
| หมา | X | |

ข. พูดได้เหมือนคำที่ให้ แต่ไม่เข้าใจ

| คำ | เข้าใจ | พูด |
|---|---|---|
| หมา | | X |

ค. พูดได้เหมือนคำที่ให้ และเข้าใจ

| คำ | เข้าใจ | พูด |
|---|---|---|
| หมา | X | X |

ง. พูดได้แต่ใช้คำแตกต่างกับคำที่ให้ และไม่เข้าใจ

| คำ | เข้าใจ | พูด |
|---|---|---|
| หมา | | โฮ่ง |

จ. พูดได้แต่ใช้คำแตกต่างกับคำที่ให้ และเข้าใจ

| คำ | เข้าใจ | พูด |
|---|---|---|
| หมา | X | โฮ่ง |

ถ้าท่านคิดว่าบุตรของท่านยังไม่เข้าใจความหมายของคำ ๆ นั้น และยังพูดไม่ได้ ก็ให้เว้นว่างไว้ทั้งช่อง “เข้าใจ” และ “พูด” นอกจากนี้ท่านสามารถเพิ่มเติมคำที่นอกเหนือจากที่ให้ไว้ ในกรณีที่คิดว่าบุตรของท่านรู้ได้ ในช่องว่างท้ายตารางคำแต่ละหมวด

**ข. ตรวจสอบคำศัพท์**

รายการคำศัพท์ต่อไปนี้ เป็นคำศัพท์ที่ได้จากงานวิจัยเกี่ยวกับคำศัพท์กลุ่มแรก ๆ ที่เด็กรู้ ปัจจัยสำคัญในการตัดสินว่า เด็กรู้คำ ๆ หนึ่ง คือ ความเข้าใจ (recognition) และการใช้ (production) ในแง่ของความเข้าใจ เด็กจะต้องเคยได้ยินคำ ๆ นั้นในการใช้เรียกสิ่งของหนึ่ง ๆ และจดจำได้ว่าหมายถึงสิ่งใดเมื่อผู้ใหญ่ใช้คำ ๆ นั้นอีก ในแง่ของการใช้นั้น เด็กจะต้องสามารถออกเสียง หรือใช้คำนั้น ๆ ในการเรียกสิ่งของ หรือการกระทำต่าง ๆ ได้

อนึ่ง การออกเสียงคำอาจเบี่ยงเบนไปจากปกติได้บ้าง เช่น “นก” อาจออกเสียงเป็น “โนะ” หรืออาจใช้คำผิดเนื่องจากมีความคล้ายคลึงกับสิ่งของอื่น ๆ เช่น ใช้ “หมา” เรียก แมว เป็นต้น กรุณาเลือกคำศัพท์ต่อไปนี้ตามที่ท่านเห็นว่าบุตรของท่าน “เข้าใจ”, “พูดได้” โดยพิจารณาที่ความหมายของคำที่ใช้เป็นสำคัญ ในกรณีที่บุตรของท่านสามารถออกเสียงเพื่อสื่อถึงสิ่งนั้น ๆ ได้ กรุณาใส่คำ หรือเสียงที่ออกจริงลงในช่อง “พูด” ด้วย เช่น เด็กอาจเรียก “แมว” ว่า “หมา” ก็เลือกที่ช่อง “เข้าใจ” ในคำว่า “แมว” และใส่คำ “หมา” ในช่อง “พูด” ของคำว่า “แมว” เป็นต้น แต่ถ้าออกเสียงเหมือนคำที่ให้ไว้ก็ไม่ต้องใส่คำใด ๆ เพียงแต่เลือกช่อง “พูด” เท่านั้น

*หมายเหตุ ถ้าบุตรของท่านเข้าใจหรือสามารถพูดคำอื่นใดนอกจากนี้ในหมวดต่าง ๆ ขอความกรุณาเพิ่มเติมคำดังกล่าวนั้นในช่องว่างที่เว้นไว้ที่ท้ายกลุ่มคำแต่ละกลุ่มด้วย

**1. ชื่อสัตว์ (ของจริงหรือของเล่น)**

| คำ | เข้าใจ | พูด | คำ | เข้าใจ | พูด | คำ | เข้าใจ | พูด |
|---|---|---|---|---|---|---|---|---|
| หมี | | | กวาง | | | งู | | |
| ช้าง | | | ยีราฟ | | | จระเข้ | | |
| ม้า | | | ลิง | | | เสือ | | |
| สิงโต | | | เต่า | | | วัว | | |
| ควาย | | | กบ | | | กา | | |
| ยุง | | | มด | | | นก | | |
| แมลงสาบ | | | กระต่าย | | | แมว | | |
| ไก่ | | | เป็ด | | | หนู | | |
| หมู | | | สุนัข | | | ปลา | | |
| จิ้งจก | | | แมลงวัน | | | ผึ้ง | | |
| **สัตว์** | | | **แมลง** | | | | | |
| | | | | | | | | |
| | | | | | | | | |

**2. คน, อาชีพและเครือญาติ**

| คำ | เข้าใจ | พูด | คำ | เข้าใจ | พูด | คำ | เข้าใจ | พูด |
|---|---|---|---|---|---|---|---|---|
| พ่อ | | | แม่ | | | ชื่อตัวเอง | | |
| พี่ | | | น้อง | | | ปู่ | | |
| ย่า | | | ตา | | | ยาย | | |
| ลุง | | | ป้า | | | น้า | | |
| อา | | | ครู | | | หมอ | | |
| พยาบาล | | | ทหาร | | | ตำรวจ | | |
| แม้ค้า/พ่อค้า | | | ชาวนา | | | นักร้อง | | |
| ดารา | | | **เด็ก** | | | **ผู้ใหญ่** | | |
| **ผู้ชาย** | | | **ผู้หญิง** | | | **คน** | | |
| | | | | | | | | |

### 3. ยานพาหนะ (ของจริงหรือของเล่น)

| คำ | เข้าใจ | พูด | คำ | เข้าใจ | พูด | คำ | เข้าใจ | พูด |
|---|---|---|---|---|---|---|---|---|
| รถ | | | รถเข็น | | | จักรยาน | | |
| มอร์เตอร์ไซค์ | | | รถแอร์ | | | แท็กซี่ | | |
| รถเมล์ | | | รถไฟ | | | เรือ | | |
| เครื่องบิน | | | | | | | | |

### 4. ของเล่น

| คำ | เข้าใจ | พูด | คำ | เข้าใจ | พูด | คำ | เข้าใจ | พูด |
|---|---|---|---|---|---|---|---|---|
| ตุ๊กตา | | | ลูกบอล | | | ลูกโป่ง | | |
| หุ่นยนต์ | | | ปืน | | | **ของเล่น** | | |
| | | | | | | | | |
| | | | | | | | | |

### 5. อาหารและเครื่องดื่ม

| คำ | เข้าใจ | พูด | คำ | เข้าใจ | พูด | คำ | เข้าใจ | พูด |
|---|---|---|---|---|---|---|---|---|
| **ไก่** | | | ไข่ | | | ปลา | | |
| ข้าว | | | เนื้อ | | | หมู | | |
| ก๋วยเตี๋ยว | | | นม | | | **น้ำ** | | |
| น้ำส้ม/น้ำผลไม้ | | | เป๊ปซี่/โค้ก | | | กล้วย | | |
| ส้ม | | | **แตงโม** | | | สับปะรด | | |
| มะละกอ | | | ขนมปัง | | | ไอศกรีม | | |
| ขนมเค้ก | | | ช็อคโกแลต | | | **ผลไม้** | | |
| ขนม | | | **อาหาร/ข้าว (แทนอาหาร)** | | | **เครื่องดื่ม/น้ำ (แทนเครื่องดื่ม** | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

### 6. เครื่องนุ่งห่ม, เครื่องประดับ, เครื่องสำอาง

| คำ | เข้าใจ | พูด | คำ | เข้าใจ | พูด | คำ | เข้าใจ | พูด |
|---|---|---|---|---|---|---|---|---|
| เสื้อ | | | กางเกง | | | กระโปรง | | |
| ถุงเท้า | | | รองเท้า | | | ผ้าอ้อม | | |
| ชุด/เอี๊ยม | | | กางเกงใน | | | แหวน | | |
| แว่นตา | | | สร้อย | | | กำไล | | |
| หมวก | | | แป้ง | | | น้ำหอม | | |
| แชมพู | | | สบู่ | | | ยาสีฟัน | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

**7. อวัยวะ**

| คำ | เข้าใจ | พูด | คำ | เข้าใจ | พูด | คำ | เข้าใจ | พูด |
|---|---|---|---|---|---|---|---|---|
| ตา | | | หู | | | จมูก | | |
| ปาก | | | แก้ม | | | ผม | | |
| หัว | | | คาง | | | ลิ้น | | |
| ฟัน | | | หน้า | | | คิ้ว | | |
| คอ | | | แขน | | | มือ | | |
| นิ้ว | | | เล็บ | | | อก | | |
| เอว | | | สะดือ | | | เข่า | | |
| หน้าแข้ง | | | ก้น | | | คำเรียกอวัยะเพศ | | |
| ขา | | | เท้า | | | | | |
| | | | | | | | | |

**8. บ้านและวัสดุเครื่องใช้**

| คำ | เข้าใจ | พูด | คำ | เข้าใจ | พูด | คำ | เข้าใจ | พูด |
|---|---|---|---|---|---|---|---|---|
| โต๊ะ | | | เก้าอี้ | | | หลอดไฟ | | |
| ประตู | | | รูป/ภาพ | | | ถังขยะ | | |
| พัดลม | | | หวี | | | กุญแจ | | |
| กรรไกร | | | ค้อน | | | กระเป๋า | | |
| ยา | | | เงิน | | | กระดาษ | | |
| กล่อง | | | คอมพิวเตอร์ | | | โทรทัศน์ | | |
| วิทยุ | | | วีดีโอ | | | บันได | | |
| โทรศัพท์ | | | ห้องน้ำ | | | อ่าง | | |
| ขัน | | | แปรงสีฟัน | | | ผ้าเช็ดตัว | | |
| ฝักบัว | | | ห้องนอน | | | เปล | | |
| หมอน | | | ผ้าห่ม | | | โคมไฟ | | |
| เตียง | | | ห้องครัว | | | กระทะ | | |
| ตะหลิว | | | หม้อ | | | ถ้วย | | |
| แก้ว | | | จาน | | | ชาม | | |
| ตู้เย็น | | | เตา | | | ช้อน | | |
| ส้อม | | | มีด | | | ตะเกียบ | | |
| ขวด | | | ไม้กวาด | | | ของใช้ | | |
| | | | | | | | | |
| | | | | | | | | |

**9. นอกบ้าน**

| คำ | เข้าใจ | พูด | คำ | เข้าใจ | พูด | คำ | เข้าใจ | พูด |
|---|---|---|---|---|---|---|---|---|
| สนาม | | | สระน้ำ | | | สวนสัตว์ | | |
| สวนสนุก | | | วัด | | | บ้าน | | |
| ห้างสรรพสินค้า | | | โรงเรียน | | | ตึก | | |
| ชายหาด/ทราย | | | ดอกไม้ | | | สวน | | |
| ทะเล | | | ฝน | | | เมฆ | | |
| ก้อนหิน | | | ท้องฟ้า | | | ต้นไม้ | | |
| น้ำตก | | | ภูเขา | | | น้ำพุ | | |

| คำ | เข้าใจ | พูด | คำ | เข้าใจ | พูด | คำ | เข้าใจ | พูด |
|---|---|---|---|---|---|---|---|---|
| ดาว | | | พระอาทิตย์ | | | พระจันทร์ | | |
| | | | | | | | | |
| | | | | | | | | |

## 10. กริยา (คำแสดงอาการ)

| คำ | เข้าใจ | พูด | คำ | เข้าใจ | พูด | คำ | เข้าใจ | พูด |
|---|---|---|---|---|---|---|---|---|
| กัด | | | เป่า | | | ร้อง | | |
| ร้องเพลง | | | ตื่ม | | | กิน (หม่ำๆ) | | |
| อ้า | | | มอง/ดู | | | จูบ/หอม | | |
| อ่าน | | | พูด | | | ฟัง | | |
| ยิ้ม | | | หัก | | | เอา | | |
| เขียน | | | วาด | | | ขับ (รถ) | | |
| ให้ | | | โยน | | | ตี | | |
| กอด | | | กำ | | | แบ | | |
| เก็บ | | | ดึง | | | ดัน/ผลัก | | |
| วาง | | | กด | | | ขว้าง | | |
| จับ | | | ยืน | | | ขี่ | | |
| ไป | | | มา | | | กระโดด | | |
| เตะ | | | เหยียบ | | | วิ่ง | | |
| เดิน | | | คลาน | | | กลิ้ง | | |
| นอน | | | ว่ายน้ำ | | | เปิด | | |
| ชน | | | ล้าง | | | ปิด | | |
| ช่วย | | | เล่น | | | แกว่ง | | |
| ใส่ | | | ตก | | | ฉี่ๆ | | |
| จุ๊ๆ | | | การกระทำ/ทำ (แทนการกระทำโดยรวม) | | | | | |
| | | | | | | | | |
| | | | | | | | | |

## 11. เวลา

| คำ | เข้าใจ | พูด | คำ | เข้าใจ | พูด | คำ | เข้าใจ | พูด |
|---|---|---|---|---|---|---|---|---|
| เวลา | | | เช้า | | | กลางคืน (มืด) | | |
| ตอนนี้ | | | ก่อน | | | หลัง | | |
| วัน | | | วันนี้ | | | พรุ่งนี้ | | |
| เมื่อวานนี้ | | | คืนนี้ | | | วันหยุด | | |
| | | | | | | | | |

## 12. คำแสดงอารมณ์และความรู้สึก

| คำ | เข้าใจ | พูด | คำ | เข้าใจ | พูด | คำ | เข้าใจ | พูด |
|---|---|---|---|---|---|---|---|---|
| โกรธ | | | เกลียด/ไม่ชอบ | | | กลัว | | |
| ชอบ | | | สนุก | | | เหนื่อย | | |
| หิว | | | เจ็บ/ปวด | | | | | |
| | | | | | | | | |
| | | | | | | | | |

## 13. คำบอกลักษณะ

| คำ | เข้าใจ | พูด | คำ | เข้าใจ | พูด | คำ | เข้าใจ | พูด |
|---|---|---|---|---|---|---|---|---|
| ใหญ่ | | | เล็ก | | | อ้วน | | |
| ผอม | | | ยาว | | | สั้น | | |
| สูง | | | เตี้ย | | | เร็ว | | |
| ช้า | | | สะอาด | | | สกปรก | | |
| เต็ม | | | หมด | | | สวย | | |
| หล่อ | | | หนา | | | บาง | | |
| มาก | | | น้อย | | | เก่า | | |
| ใหม่ | | | ดัง | | | ค่อย | | |
| หอม | | | เหม็น | | | อร่อย | | |
| หวาน | | | เผ็ด | | | เค็ม | | |
| เปรี้ยว | | | ขม | | | ร้อน | | |
| เย็น | | | อุ่น | | | นิ่ม | | |
| แข็ง | | | เปียก | | | แห้ง | | |
| | | | | | | | | |

## 14. คำเรียกสี

| คำ | เข้าใจ | พูด | คำ | เข้าใจ | พูด | คำ | เข้าใจ | พูด |
|---|---|---|---|---|---|---|---|---|
| ขาว | | | ดำ | | | แดง | | |
| เหลือง | | | เขียว | | | ฟ้า | | |
| น้ำเงิน | | | น้ำตาล | | | ม่วง | | |
| ชมพู | | | ส้ม | | | เทา | | |
| สี | | | | | | | | |

## 15. ทิศทาง

| คำ | เข้าใจ | พูด | คำ | เข้าใจ | พูด | คำ | เข้าใจ | พูด |
|---|---|---|---|---|---|---|---|---|
| เหนือ | | | บน | | | หน้า | | |
| ใต้ | | | ล่าง / ใต้ | | | หลัง | | |
| ตะวันออก | | | ข้าง | | | ขึ้น | | |
| ตะวันตก | | | ซ้าย | | | ลง | | |
| ที่นั่น/ทางนั้น | | | ขวา | | | ใน | | |
| ที่นี่/ทางนี้ | | | นอก | | | | | |
| | | | | | | | | |

**16.** จำนวน

| คำ | เข้าใจ | พูด | คำ | เข้าใจ | พูด | คำ | เข้าใจ | พูด |
|---|---|---|---|---|---|---|---|---|
| ศูนย์ | | | หนึ่ง | | | สอง | | |
| สาม | | | สี่ | | | ห้า | | |
| หก | | | เจ็ด | | | แปด | | |
| เก้า | | | สิบ | | | หมด/ทั้งหมด | | |
| บาง (ส่วน/อัน) | | | เท่า/เท่ากัน | | | มากกว่า | | |
| น้อยกว่า | | | | | | | | |

**17.** สรรพนาม

| คำ | เข้าใจ | พูด | คำ | เข้าใจ | พูด | คำ | เข้าใจ | พูด |
|---|---|---|---|---|---|---|---|---|
| ฉัน / หนู / เรา / เค้า | | | เขา | | | อันนี้ | | |
| เธอ / คุณ | | | อันนั้น | | | มัน | | |
| | | | | | | | | |

**18.** คำแสดงคำถาม

| คำ | เข้าใจ | พูด | คำ | เข้าใจ | พูด | คำ | เข้าใจ | พูด |
|---|---|---|---|---|---|---|---|---|
| ใคร | | | อยู่ไหน, ที่ไหน | | | เมื่อไหร่ | | |
| อะไร | | | อย่างไร / ยังไง | | | ทำไม | | |
| เท่าไหร่ | | | ใช่ไหม, รึเปล่า | | | | | |

**19.** คำเชื่อม (สันธาน)

| คำ | เข้าใจ | พูด | คำ | เข้าใจ | พูด | คำ | เข้าใจ | พูด |
|---|---|---|---|---|---|---|---|---|
| และ/กับ | | | แล้วก็ | | | หรือ | | |
| แต่ | | | เพราะ | | | ถ้า... | | |
| | | | | | | | | |

**20.** คำช่วยหน้ากริยา

| คำ | เข้าใจ | พูด | คำ | เข้าใจ | พูด | คำ | เข้าใจ | พูด |
|---|---|---|---|---|---|---|---|---|
| เกือบ/เกือบจะ | | | กำลังจะ เช่น กำลังจะกิน | | | จะ | | |
| เพิ่ง/เพิ่งจะ | | | ยัง/ยังไม่ เช่น ยังไม่กิน | | | เคย | | |
| กำลัง... เช่น กำลังกิน | | | จวน/จวนจะ | | | คง/คงจะ | | |
| มัก/มักจะ/ชอบ | | | อาจ/อาจจะ | | | น่า/น่าจะ | | |
| ควร/ควรจะ | | | ต้อง | | | อยาก | | |
| ดูเหมือน/เหมือน... | | | | | | | | |

**21. คำช่วยหลังกริยา**

| คำ | เข้าใจ | พูด | คำ | เข้าใจ | พูด | คำ | เข้าใจ | พูด |
|---|---|---|---|---|---|---|---|---|
| ...อยู่ เช่น กินอยู่ | | | ...แล้ว เช่น กินแล้ว | | | ...ไป เช่น ผอมไป, ดูไป | | |
| ...มา เช่น กินมา | | | ...ขึ้น เช่น ผอมขึ้น | | | ...ลง เช่น ผอมลง | | |
| ...เข้า เช่น กินเข้า | | | ...ออก เช่น ผอมออก | | | ...เสีย เช่น กินเสีย | | |
| ...ไว้ เช่น ดูไว้ | | | ...เอา เช่น ดูเอา | | | ...ให้ เช่น กินให้ | | |
| ...ดู เช่น กินดู | | | | | | | | |

**22. คำลงท้าย**

| คำ | เข้าใจ | พูด | คำ | เข้าใจ | พูด | คำ | เข้าใจ | พูด |
|---|---|---|---|---|---|---|---|---|
| นะ | | | ล่ะ | | | สิ | | |
| เถอะ | | | ครับ | | | ค่ะ | | |
| จ๊ะ/จ๋า | | | | | | | | |

**23. อื่น ๆ**

| คำ | เข้าใจ | พูด | คำ | เข้าใจ | พูด | คำ | เข้าใจ | พูด |
|---|---|---|---|---|---|---|---|---|
| คำด่า เช่น ไอ้บ้า! | | | สวัสดีครับ | | | บ๊ายบาย | | |
| ขอบคุณครับ | | | ไม่ใช่ | | | | | |
| | | | | | | | | |
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ผู้วิจัยขอขอบพระคุณท่านที่กรุณาสละเวลาอันมีค่าในการให้ข้อมูลเกี่ยวกับพัฒนาการของบุตรของท่าน ผู้วิจัยขอรับรองว่า ข้อมูลที่ได้นี้ จะนำไปใช้เฉพาะในงานวิจัยทางวิชาการเท่านั้น และจะถูกเก็บไว้อย่างปลอดภัย ไม่ก่อให้เกิดปัญหาต่อบุตรหรือครอบครัวของท่านในภายหลัง

สรบุศย์ รุ่งโรจน์สุวรรณ
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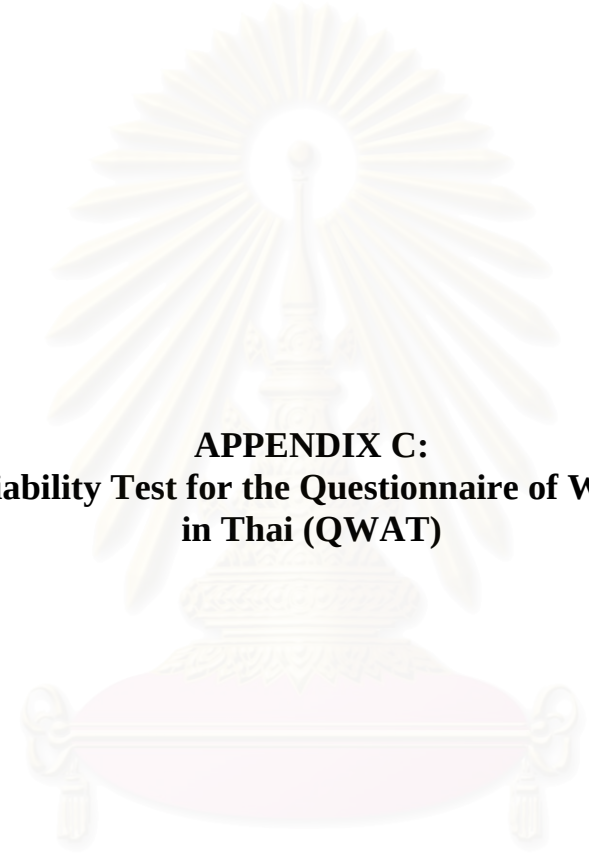

# APPENDIX C:
# Results of Reliability Test for the Questionnaire of Word Acquisition in Thai (QWAT)

**Reliability Test for the Questionnaire of Word Acquisition in Thai (QWAT)**
**Applied from the English CDI (Fenson et al. 1994)**

**Participants**: 180 parents of Thai children from 9-24 months of age (90 boys and 90 girls)
**Age (Months)**: 9, 12, 15, 18, 21, 24 (each groups consist of 30 children - 15 boys and 15 girls)
**Reliability test**: Split half correlation was used for the reliability test, following procedure below

1. Data were collected from the distribution of the word checklists to 180 parents of Thai children.
2. In doing split half correlation, items in each category were split into two groups according to the odd & even number of the items listed.
3. Data from the odd-number group and the even-number group were used to conduct the correlation test and the results are shown in the following tables

**Table A: Correlations of 22 lexical categories across age (participants = 30 for each age) and total correlation of each category (participants =180)**

**Critical values** $r$ (28) = .361 , $p$ = .05 *
= .463 , $p$ = .01 **
$r$ (178) < .3211, $p$ = .001 ***

| | 9 MO | 12 MO | 15 MO | 18 MO | 21 MO | 24 MO | Total |
|---|---|---|---|---|---|---|---|
| **Animals** | | 0 | | 0.8929** | 0.9525** | 0.9776** | 0.955*** |
| **People** | | -0.4 | 0.6286** | 0.7744** | 0.9168** | 0.9326** | 0.915*** |
| **Vehicles** | | | 0.3913* | 0.8596** | 0.6469** | 0.8255** | 0.806*** |
| **Toys** | | | 0.5222** | 0.6849** | 0.4374* | 0.5347** | 0.547*** |
| **Food and Drink** | | | 0.5963** | 0.7669** | 0.8149** | 0.8804** | 0.87*** |
| **Clothes, Accessories, and Cosmetics** | | | 0.8839** | 0.8983** | 0.7783** | 0.8005** | 0.856*** |
| **Body Parts** | | | 0.936** | 0.9077** | 0.8792** | 0.9288** | 0.942*** |
| **Household Items** | | | 0.9072** | 0.9297** | 0.9683** | 0.9459** | 0.96*** |
| **Outside** | | | 0.9555** | 0.8965** | 0.8829** | 0.8957** | 0.913*** |
| **Action Words** | | 1** | 0.8306** | 0.9583** | 0.9749** | 0.9505** | 0.971*** |
| **Words about Time** | | | | | 0.5322** | 0.7893** | 0.656*** |
| **Words about Emotion** | | | | 0.6486** | 0.5411** | 0.3435 | 0.478*** |
| **Descriptive Words** | | | | 0.9284** | 0.8667** | 0.9218** | 0.912*** |
| **Colors** | | | | 0.8378** | 0.9133** | 0.8951** | 0.901*** |
| **Directions** | | | | 0.9864** | 0.4264* | 0.6902** | 0.626*** |
| **Numbers and Qualifiers** | | | | 0.9707** | 0.9768** | 0.9779** | 0.969*** |
| **Pronouns** | | | | | 1** | 0.513** | 0.635*** |
| **Question Words** | | | | | 0.5659** | 0.5751** | 0.491*** |
| **Conjunctions** | | | | | | | 0 |
| **Preverbs** | | | | | 0.9878** | 0.5** | 0.593*** |
| **Postverbs** | | | | | 0.9784** | 0.951** | 0.955*** |
| **Final Particles** | | | | 0.5774** | 0.75** | 0.4022* | 0.544*** |

**Table B: Correlation of total scores across age, regardless of lexical categories (participants = 30 for each age)**

| | 9MO | 12MO | 15MO | 18MO | 21MO | 24MO |
|---|---|---|---|---|---|---|
| **Correlation values** | 0.296 | 0.839** | 0.975** | 0.996** | 0.994** | 0.994** |

**Correlation of total scores, regardless of age and lexical categories (participants = 180)**
Correlation value 0.997***

# APPENDIX D

Appendix D comprises data of 10 Thai children productions, from 9 to 24 months, elicited from the Corpus of Child language (videos of adult-child interaction). These data were divided into 10 cases according to the 10 participants in this study (L01-L10). In addition to children's productions, adult's target words and semantic category of words (NOM [Nominals] = words refer to concrete objects, VER [Verbals] = words refer to actions and states, REL [Relations] = words refer to relation) are also given. The data were used for the investigation of phonological acquisition (syllable structures, consonants, vowels, and tones) in this study (see Section 4.2).

**Productions of 10 Thai Children Corresponding to Target Words in the Adult Language**

(Retrieved from the Corpus of Child Language)

**Participant: L01**

| Age | Target Words | Children's Productions | Tokens | Sem. | Age | Target Words | Children's Productions | Tokens | Sem. |
|---|---|---|---|---|---|---|---|---|---|
| 12 MO | ca2 | ca1 | 1 | REL | | liN0 | diN0 | 1 | NOM |
| 15 MO | pa1 (paj0) | pa1 | 1 | VER | | nuu4 | nuu4 | 1 | NOM |
| | | pa3 | 1 | VER | | ca2 | ca1 | 20 | REL |
| | paj0 | pha1 | 1 | VER | | maj2 | maj2 | 5 | REL |
| | | pap1 | 1 | VER | | ?Um0 | ?Um0 | 3 | REL |
| | hx1 | hx1 | 1 | VER | | caa2 | caa2 | 2 | REL |
| | miaw4 | mia2 | 1 | VER | | ?oj3 | ?oj3 | 2 | REL |
| | ?am2 | ?am2 | 1 | VER | | ca3 | ca3 | 1 | REL |
| | siN4 too0 | too4 | 1 | NOM | | mii0 | mii0 | 1 | VER |
| | ca2 | ca1 | 14 | REL | | hUUm4 | hUUm4 | 1 | REL |
| 18 MO | ?aw0 | ?aw0 | 5 | VER | | ?qq0 | ?qq0 | 1 | REL |
| | miaw4 | miaw2 | 4 | VER | | rak3 | jak3 | 1 | VER |
| | miaw3 | miaw2 | 1 | VER | 21 MO | ?um2 | ?um2 | 18 | VER |
| | ?um2 | ?um2 | 3 | VER | | jim3 | jim3 | 12 | VER |
| | paj0 | paj0 | 2 | VER | | ?aw0 | ?aw0 | 5 | VER |
| | thiaw2 | jiaw2 | 1 | VER | | laj4 | jaj4 | 2 | VER |
| | ha2 | ha2 | 1 | VER | | paj0 | paj0 | 2 | VER |
| | hii2 | hii2 | 1 | VER | | rOON3 | jON3 | 1 | VER |
| | huu2 | huu2 | 1 | VER | | kat1 | ca1 | 1 | VER |
| | nom0 | nom0 | 3 | NOM | | tham0 | tam1 | 1 | VER |
| | mot3 | mot3 | 2 | NOM | | mxx2 | mxx2 | 17 | NOM |
| | chaaN3 | caaN3 | 1 | NOM | | hON2 ?xx0 | hON4 ?xx0 | 2 | NOM |
| | ma0 lxxN0 saap1 | caap1 | 1 | NOM | | | ?xx0 | 13 | NOM |
| | nok3 | nok3 | 1 | NOM | | phii2 | pii2 | 5 | NOM |
| | nii2 | nii2 | 1 | NOM | | | phii2 | 1 | NOM |
| | phii2 | bii2 | 2 | NOM | | phOO2 | pOO2 | 4 | NOM |
| | | pii2 | 1 | NOM | | nii2 | nii2 | 3 | NOM |
| | phOO2 | mOO2 | 1 | NOM | | khraj0 | haj0 | 3 | NOM |
| | mxx2 | mxx2 | 1 | NOM | | khii2 mUUk2 | mUUk2 | 2 | NOM |

| Age | Target Words | Children's Productions | Tokens | Sem. | Age | Target Words | Children's Productions | Tokens | Sem. |
|---|---|---|---|---|---|---|---|---|---|
| 21 MO | kaj1 | caj1 | 2 | NOM | | kha2 | ?a2 | 1 | REL |
| | ?a0 raj0 | jaj0 | 2 | NOM | | rew0 | jew0 | 5 | VER |
| | paa2 | pa2 | 1 | NOM | | leew4 | lxxw4 | 1 | VER |
| | | baa2 | 1 | NOM | | sii4 | sii2 | 1 | VER |
| | kra0 taaj1 | kaj1 | 1 | NOM | 24 MO | thaaj1 | taj1 | 5 | VER |
| | nok3 | nok3 | 1 | NOM | | pxn3 pxn3 | pxn3 pxn3 | 4 | VER |
| | klON2 | kON2 | 1 | NOM | | paj0 | paj0 | 3 | VER |
| | faj0 | faj0 | 1 | NOM | | maa0 | maa0 | 3 | VER |
| | juN0. | juN0. | 1 | NOM | | ?OOk1 | ?OO1 | 3 | VER |
| | ?an0 nii3 | ?an0 nii3 | 1 | NOM | | klap1 | cap1 | 3 | VER |
| | | nii3 | 1 | NOM | | cip3 cip3 | cip3 cip3 cip3 | 2 | VER |
| | hON4 | hON4 ?xx0 | 1 | NOM | | | cip3 cip3 | 1 | VER |
| | luN0 | lum2 | 1 | NOM | | kaap2 kaap2 | cap2 cap2 | 2 | VER |
| | pxxN2 | pxxN2 | 1 | NOM | | | cap2 | 1 | VER |
| | taa0 | taa0 | 1 | NOM | | miaw3 miaw3 | miaw3 miaw3 | 2 | VER |
| | naam3 | naam3 | 1 | NOM | | chuaj2 | cuaj2 | 2 | VER |
| | sa0 dUU0 | dUU0 | 1 | NOM | | ?a0 raj0 (tham0 ...) | jaj0 | 2 | VER |
| | mot3 | mot3 | 1 | NOM | | tok1 | co1 | 2 | VER |
| | naj4 | naj4 | 1 | NOM | | hii2 hii2 | hii2 | 1 | VER |
| | caa4 | caa4 | 6 | REL | | | hii0 | 1 | VER |
| | ca2 | ca2 | 5 | REL | | | hii2 hii2 | 1 | VER |
| | ?a1 | ?a1 | 5 | REL | | kat1 | kat1 | 1 | VER |
| | ?uj3 | ?uj3 | 3 | REL | | duu0 | duu0 | 1 | VER |
| | maj2 | maj2 | 2 | REL | | jaak1 | jaak1 | 1 | VER |
| | ?ooj3 | ?ooj3 | 2 | REL | | kin0 | kin0 | 1 | VER |
| | ?aa2 | ?aa2 | 2 | REL | | khuj0 | khuj0 | 1 | VER |
| | maj1 | baj1 | 1 | REL | | niip1 | niip1 | 1 | VER |
| | waaj3 | waaj2 | 1 | REL | | ?ee1 ?ee3 | ?ee1 ?ee3 | 1 | VER |
| | lxxw3 | lxxw3 | 1 | REL | | ?aa1 ?aa3 | ?aa1 ?aa3 | 1 | VER |
| | nOj1 | nOj1 | 1 | REL | | ?oo1 ?oo3 | ?oo1 ?oo3 | 1 | VER |
| | ?aa0 | ?aa0 | 1 | REL | | Nxx0 Nxx0 | kxx0 | 1 | VER |
| | di3 | di3 | 1 | REL | | ?aw0 | ?aw0 | 1 | VER |
| | di1 | di1 | 1 | REL | | klxxN2 | kxxN2 | 1 | VER |
| | ?Um0 | ?Um0 | 1 | REL | | ?aap1 naam3 | ?aap0 naam3 | 1 | VER |

| Age | Target Words | Children's Productions | Tokens | Sem. | Age | Target Words | Children's Productions | Tokens | Sem. |
|---|---|---|---|---|---|---|---|---|---|
| 24 MO | | ?aap0 | 1 | VER | | nok3 | dok3 | 1 | NOM |
| | tuum2 taam2 | tum2 taam2 | 1 | VER | | | tok3 | 1 | NOM |
| | tuN3 chxN1 tuN3 chxN1 | tu3 cxw4 ?u0 cxw1 | 1 | VER | | wua0 | wua0 | 2 | NOM |
| | hoN2 hoN2 | hoN2 hoN2 | 1 | VER | | khwaaj0 | haj0 | 2 | NOM |
| | hoo2 hoo2 | hoo2 hoo2 | 1 | VER | | ciN0 coo2 | coo2 | 2 | NOM |
| | baaj3 baaj0 | baaj0 | 1 | VER | | mxxw0 miaw4 | mxxw0 | 2 | NOM |
| | tham0 Naan0 | naaN0 | 1 | VER | | | mi1 miaw4 | 2 | NOM |
| | ?a0 raj0 | jaj0 | 57 | NOM | | nia2 | nia2 | 2 | NOM |
| | | ?a0 jaj0 | 10 | NOM | | khwan4 | khan4 | 2 | NOM |
| | nii2 | nii2 | 19 | NOM | | ma3 la3 kOO0 | ma3 ?OO0 | 2 | NOM |
| | khraj0 | khaj0 | 13 | NOM | | cak1 kra0 jaan0 | jaan0 | 2 | NOM |
| | phOO2 | pOO2 | 6 | NOM | | klON2 thaaj1 ruup2 | cON2 taaj1 | 1 | NOM |
| | | bOO2 | 1 | NOM | | kuk3 kaj1 | kuk3 kaj1 | 1 | NOM |
| | | phOO2 | 2 | NOM | | nii2 | jii2 | 1 | NOM |
| | naj4 | naj4 | 9 | NOM | | kop1 | ?op1 | 1 | NOM |
| | maa4 | maa4 | 6 | NOM | | mii4 | mii4 | 1 | NOM |
| | ruup2 | juup2 | 5 | NOM | | puu0 | puu0 | 1 | NOM |
| | klON2 | cON2 | 4 | NOM | | kaj1 | kaj1 | 1 | NOM |
| | pet1 | pet1 | 4 | NOM | | kluaj2 | kuaj2 | 1 | NOM |
| | siN4 too0 | cii4 coo0 | 1 | NOM | | khaaN3 khaaw0 | ha3 haw0 | 1 | NOM |
| | | coo0 | 3 | NOM | | dek1 | jek1 | 1 | NOM |
| | | too0 | 1 | NOM | | txxN0 moo0 | txN0 boo2 | 1 | NOM |
| | maa3 | ma3 | 3 | NOM | | can0 caaw2 | can0 | 1 | NOM |
| | cOO0 ra0 khee2 | khee2 | 3 | NOM | | | caw2 | 1 | NOM |
| | chaaN3 | chaaN3 | 3 | NOM | | kra0 paw4 | paw2 | 1 | NOM |
| | mxx2 hoN4 | mxx2 hoN4 | 3 | NOM | | plaa0 | paa0 | 1 | NOM |
| | | hON4 ?xx0 | 3 | NOM | | khaaw2 | haaw2 | 1 | NOM |
| | faj0 | paj0 | 3 | NOM | | mot3 | mo3 | 1 | NOM |
| | dxxt1 | ?xxk1 | 3 | NOM | | fon4 | pa1 | 1 | NOM |
| | mOO4 | mOO4 | 3 | NOM | | khon0 nii3 | kan0 nii3 | 1 | NOM |
| | rot3 | jot3 | 1 | NOM | | nii3 | nii3 | 1 | NOM |
| | | jo3 | 1 | NOM | | paa2 sim0 | paa2 chim0 | 1 | NOM |
| | taw1 | taw1 | 2 | NOM | | ma3 phraaw3 | m phaaw3 | 1 | NOM |
| | nOON3 sii0 | chii0 | 2 | NOM | | ?an0 nan3 | ?an0 nan3 | 1 | NOM |

| Age | Target Words | Children's Productions | Tokens | Sem. |
|---|---|---|---|---|
| 24 MO | khon0 nan3 | khon0 nan3 | 1 | NOM |
| | ?a1 | ?a1 | 88 | REL |
| | chaj2 | chaj2 | 6 | REL |
| | | haj2 | 5 | REL |
| | lxxw3 | jxxw3 | 8 | REL |
| | | ?xxw3 | 1 | REL |
| | ca2 | ca2 | 5 | REL |
| | maj2 | maj2 | 5 | REL |
| | ?uj3 | ?uj3 | 4 | REL |
| | ?uj2 | ?uj2 | 2 | REL |
| | sii4 | cii4 | 2 | REL |
| | Naj0 | Naj0 | 1 | REL |
| | ?Um0 | ?Um0 | 1 | REL |
| | caa2 | caa2 | 1 | REL |
| | mUan4 | mUan4 | 1 | REL |
| | ?UU0 | ?uu0 | 1 | REL |
| | pa1 (plaaw1) | pa1 | 1 | REL |
| | tOOn0 jen0 | tOn0 jen0 | 1 | REL |
| | daaj2 | daaj2 | 1 | REL |
| | rak3 | jak3 | 2 | VER |
| | mii0 | mii0 | 1 | VER |
| | | mii2 | 1 | VER |
| | taaj0 | taaj0 | 1 | VER |
| | dii0 | dii0 | 1 | VER |
| | rOOn3 | jON2 | 1 | VER |
| | jen0 | jen0 | 1 | VER |
| | pen0 | pen0 | 1 | VER |
| | chOOp2 | hOOp2 | 1 | VER |
| | suaj4 | huaj4 | 1 | VER |
| | rew0 | jew0 | 1 | VER |
| | dxxN0 | dxxw0 | 1 | VER |

**Participant: L02** - - - -

**Participant: L03**

| Age | Target Words | Children's Productions | Tokens | Sem. |
|---|---|---|---|---|
| 15 MO | ?a0 raj0 | ?a0 jaaj0 | 1 | NOM |
| | | ?a0 jaj0 | 1 | NOM |
| | mot3 | mep3 | 1 | NOM |
| | mii0 | mee0 | 2 | VER |
| | | mii0 | 13 | VER |
| | maj2 | maj2 | 11 | REL |
| | naj4 | naj4 | 2 | NOM |
| | chaj2 | jaj2 | 1 | REL |
| | mxx2 | maam0 | 3 | NOM |
| | | maam1 | 1 | NOM |
| | | ma3 | 1 | NOM |
| | | maam3 | 1 | NOM |
| | | maa0 | 3 | NOM |
| | | maa2 | 1 | NOM |
| | nii2 | ?ii2 | 1 | NOM |
| | kaj1 | caj1 | 2 | NOM |
| | ca3 ?e4 | ca1 | 1 | VER |
| | | ca1 ?x1 ?x1 | 1 | VER |
| | | ?e3 | 1 | VER |
| | | ca1 ?x1 | 1 | VER |
| | | ?e1 | 1 | VER |
| | | ca1 ?a1 | 1 | VER |
| | | ca1 ?e1 | 2 | VER |
| | | cO1 ca1 ?e1 | 1 | VER |
| | | ca3 ?i1 | 3 | VER |
| | | ca3 ca3 ?i1 | 2 | VER |
| | | ca3 ca1 | 1 | VER |
| | | ca1 ca1 ?i2 | 1 | VER |
| 18 MO | ?aw0 | ?aw0 | 5 | VER |
| | cip3 cip3 | cip3 cip3 | 3 | VER |
| | ?uut3 ?uut3 | ?uut3 | 2 | VER |
| | ?op3 ?op3 | ?op1 | 1 | VER |

| Age | Target Words | Children's Productions | Tokens | Sem. | Age | Target Words | Children's Productions | Tokens | Sem. |
|---|---|---|---|---|---|---|---|---|---|
| 18 MO | kaap2 kaap2 | paap1 | 1 | VER | 21 MO | ciap3 | ciap3 | 2 | VER |
| | | paap1 paap1 | 1 | VER | | jaaN1 nii3 | jaaN1 Nii3 | 1 | VER |
| | ?ee1 ?ee3 | ?e1 ?ee2 | 1 | VER | | thiaw2 | tiaw2 | 1 | VER |
| | miaw3 miaw3 | Niaw2 | 1 | VER | | paj0 | paj0 | 1 | VER |
| | Nxx0 Nxx0 | Nxx0 Nxx0 | 1 | VER | | len2 | len2 | 1 | VER |
| | tum2 | cum2 | 1 | VER | | ?UUt3 | ?UUt3 | 1 | VER |
| | | ?xt3 cum2 | 1 | VER | | khOp1 khun0 khrap3 | kOp1 kun0 kap3 | 1 | VER |
| | ?an0 nia3 | nia3 | 8 | NOM | | | kun0 dap3 | 1 | VER |
| | | ?an0 nia3 | 1 | NOM | | naN2 | naN2 | 1 | VER |
| | faj0 | waj0 | 3 | NOM | | kiN3 kiN3 | kiN3 kiN3 | 1 | VER |
| | naam3 | naam3 | 3 | NOM | | ciak3 | liN0 | 1 | VER |
| | pum1 | pum1 | 3 | NOM | | maa0 | maa0 | 1 | VER |
| | nii2 | nii2 | 2 | NOM | | nuun2 | nuun2 | 4 | NOM |
| | | nii3 | 1 | NOM | | rot3 | lot3 | 4 | NOM |
| | ?a0 raj0 | laj0 | 2 | NOM | | paa3 | paa3 | 4 | NOM |
| | ma3 la3 kOO0 | tOO | 2 | NOM | | kun0 cxx0 | kun0 cxx0 | 3 | NOM |
| | khOOn3 | cOOn4 | 2 | NOM | | | cxx0 | 1 | NOM |
| | sii2 (dog's name) | wii2 | 2 | NOM | | tua0 ciN2 cOOk1 | tua0 ciN2 cOO4 | 2 | NOM |
| | | bii2 | 2 | NOM | | | ciN2 | 2 | NOM |
| | kun0 cxx0 | cxx0 | 1 | NOM | | | ka1 ciN2 cOO4 | 2 | NOM |
| | kaa0 | kaa0 | 1 | NOM | | phleeN0 chaaN3 | peeN0 caaN3 | 2 | NOM |
| | kra0 taaj1 | ka0 taaj1 | 1 | NOM | | nii2 | nii2 | 1 | NOM |
| | kaj1 | caj1 | 1 | NOM | | maa4 | maa4 | 1 | NOM |
| | paa3 | baa3 | 1 | NOM | | bOn0 | bon0 | 1 | NOM |
| | cek1 | ce1 | 1 | NOM | | nok3 kra0 saa4 | nok3 taa4 | 1 | NOM |
| | | je1 | 1 | NOM | | troN0 nii3 | toN0 nii3 | 1 | NOM |
| | khrap3 | cap3 | 2 | REL | | tha0 lee0 | lee0 | 1 | NOM |
| | | kap3 | 2 | REL | | naam3 | naam3 | 1 | NOM |
| | na3 | na3 | 1 | REL | | nuat1 | nuat1 | 1 | NOM |
| | maj2 | maj2 | 1 | REL | | tua0 nii3 | tua0 nii3 | 1 | NOM |
| | waj4 | waj4 | 1 | VER | | ?an0 nii3 | ?an0 nii3 | 1 | NOM |
| | juu1 | duu1 | 1 | VER | | tua0 mii4 | tua0 pii4 | 1 | NOM |
| 21 MO | ?aw0 | ?aw0 | 4 | VER | | kra0 diN1 | diN1 | 1 | NOM |
| | pqqt1 | pqqt3 | 2 | VER | | liN0 | liN0 | 1 | NOM |

| Age | Target Words | Children's Productions | Tokens | Sem. | Age | Target Words | Children's Productions | Tokens | Sem. |
|---|---|---|---|---|---|---|---|---|---|
| 21 MO | lqqj0 | lqqj0 | 1 | REL | | troN0 nii3 | toN0 nii3 | 2 | NOM |
| | hUUm4 | hUUm4 | 1 | REL | | nuu4 | nuu4 | 2 | NOM |
| | ?Um0 | ?um0 | 1 | REL | | thaan1 | taan0 | 2 | NOM |
| | juu1 | juu1 | 1 | VER | | troN naj4 | toN0 naj4 | 2 | NOM |
| | mii0 | mii0 | 1 | VER | | rot3 | jot3 | 1 | NOM |
| | waj4 | waj4 | 1 | VER | | raaN0 | jaaN0 | 1 | NOM |
| | nak1 | nak1 | 1 | VER | | man0 | man0 | 1 | NOM |
| 24 MO | saj1 | ?aj1 | 1 | VER | | ?an0 nuun3 | ?an0 nuun3 | 1 | NOM |
| | | caj1 | 6 | VER | | thaaN0 nii3 | taN0 nii3 | 1 | NOM |
| | tOO1 | cOO1 | 7 | VER | | nan2 | nan3 | 1 | NOM |
| | kin0 | kin0 | 6 | VER | | tua0 liN0 | tua0 jiN0 | 1 | NOM |
| | paj0 | paj0 | 4 | VER | | | jiN0 | 1 | NOM |
| | khian4 | kian4 | 2 | VER | | som2 | com2 | 1 | NOM |
| | khUn2 | ?Un2 | 2 | VER | | kluaj2 | kuaj2 | 1 | NOM |
| | maa0 | maa0 | 2 | VER | | luuk2 ?om0 | ?uk2 ?om0 | 1 | NOM |
| | mun4 | num4 | 2 | VER | | tua0 mxxw0 | tua0 mxxw0 | 1 | NOM |
| | rOON3 | ?OON0 | 1 | VER | | klON2 thaaj1 ruup2 | taaj1 | 1 | NOM |
| | puun3 puun3 | buun3 buun3 | 1 | VER | | ?an0 nia3 | ?an0 nia3 | 1 | NOM |
| | ?aw0 | ?aw0 | 1 | VER | | thaan1 | taan1 | 1 | NOM |
| | tOOk1 | tOk1 | 1 | VER | | ?an0 | ?an0 | 1 | NOM |
| | jip1 | ?ip1 | 1 | VER | | maaj3 | maaj3 | 1 | NOM |
| | rap3 | jap3 | 1 | VER | | ?an0 naj4 | ?an0 naj4 | 1 | NOM |
| | nii2 | nii2 | 16 | NOM | | puu0 | puu0 | 1 | NOM |
| | ?an0 nii3 | ?an0 nii3 | 10 | NOM | | mxx2 | mxx2 | 1 | NOM |
| | | ?a1 ?an0 nii3 | 1 | NOM | | cek1 | ce2 | 1 | NOM |
| | | nii3 | 1 | NOM | | kra0 pON4 | ?a0 pON4 | 1 | NOM |
| | kaj1 | kaj1 | 6 | NOM | | paa3 | pa3 | 1 | NOM |
| | ?a0 raj0 | jaj0 | 6 | NOM | | | paa3 | 1 | NOM |
| | | ?a0 jaj0 | 1 | NOM | | thii2 nuun2 | tii2 nuun2 | 1 | NOM |
| | naj4 | naj4 | 4 | NOM | | ?a1 | ?a1 | 1 | REL |
| | rot3 faj0 | ?ot3 waj0 | 3 | NOM | | daaj2 | daj2 | 15 | REL |
| | chiN0 chaa3 | ciN0 caa3 | 3 | NOM | | maj2 | maj2 | 14 | REL |
| | nuun2 | nuun2 | 3 | NOM | | lqqj0 | jqqj0 | 6 | REL |
| | nia2 | nia2 | 6 | NOM | | lxxw3 | jx3 | 1 | REL |

| Age | Target Words | Children's Productions | Tokens | Sem. |
|---|---|---|---|---|
| 24 MO | | lxxw3 | 2 | REL |
| | kOOn1 | cOOn1 | 3 | REL |
| | chai2 | jaj2 | 1 | REL |
| | | caj2 | 1 | REL |
| | tham0 maj0 | tam0 maj0 | 2 | REL |
| | tON2 | jON2 | 1 | REL |
| | ?oo2 hoo4 | ?oo2 ?oo4 | 1 | REL |
| | naj0 | naj0 | 1 | REL |
| | juu1 | cuu1 | 1 | VER |
| | | duu1 | 1 | VER |
| | | juu1 | 5 | VER |
| | suuN4 | cuuN4 | 3 | VER |
| | chOOp2 | cOOp2 | 2 | VER |
| | cqq0 | cqq0 | 2 | VER |
| | wian0 hua4 | wian0 jua4 | 2 | VER |
| | ruu3 | juu3 | 1 | VER |
| | mii0 | mii0 | 1 | VER |
| | lut1 | jut1 | 1 | VER |
| | jaaw0 | jaaw0 | 1 | VER |
| | waj3 | waj1 | 1 | VER |

**Participant: L04**

| Age | Target Words | Children's Productions | Tokens | Sem. |
|---|---|---|---|---|
| 18 MO | ?aw0 | ?aw0 | 1 | VER |
| 21 MO | paj0 | paj0 | 3 | VER |
| | maa0 | maa0 | 1 | VER |
| | maa4 | maa4 | 1 | NOM |
| | plaa0 | paa0 | 1 | NOM |
| | naa0 | naa0 | 1 | NOM |
| | maj2 | maj2 | 1 | REL |
| | mii0 | mii0 | 1 | VER |
| 24 MO | paj0 | paj0 | 8 | VER |
| | ?aw0 | ?aw0 | 5 | VER |

| Age | Target Words | Children's Productions | Tokens | Sem. |
|---|---|---|---|---|
| | nOOn0 | nOOn0 | 5 | VER |
| | kha0 jap1 | ?a0 jap1 | 4 | VER |
| | rOON3 phleeN0 | pheeN0 | 4 | VER |
| | | hOON3 peeN0 | 1 | VER |
| | khUn2 | khUn2 | 2 | VER |
| | loN0 | loN0 | 2 | VER |
| | maa0 | maa0 | 2 | VER |
| | saj1 | ?aj1 | 2 | VER |
| | haj2 | haj2 | 2 | VER |
| | duu0 | duu0 | 1 | VER |
| | ra0 bam0 | ?a0 bam0 cheN3 bam0 | 1 | VER |
| | lom3 | lom3 | 1 | VER |
| | naN2 | naN2 | 1 | VER |
| | tham0 Naan0 | tham0 Naan0 | 1 | VER |
| | lon1 | lon1 | 1 | VER |
| | khaw2 | khaw2 | 1 | VER |
| | cap1 | cap1 | 1 | VER |
| | khian4 | hian4 | 1 | VER |
| | kin0 | kin0 | 1 | VER |
| | choN0 | hoN0 | 1 | VER |
| | nii2 | nii2 | 16 | NOM |
| | mxx2 | mxx2 | 10 | NOM |
| | nOON3 pim0 | pi1 | 1 | NOM |
| | | pim0 | 8 | NOM |
| | | nOON3 pim0 | 1 | NOM |
| | rot3 | lot3 | 8 | NOM |
| | taw0 riit2 | taw0 jit2 | 6 | NOM |
| | | taw0 lit2 | 1 | NOM |
| | nuun2 | nuun2 | 6 | NOM |
| | bOn0 | baN0 | 6 | NOM |
| | Nuu0 | Nuu0 | 5 | NOM |
| | mOO4 | mOO4 | 5 | NOM |
| | naj4 | naj4 | 4 | NOM |
| | | naj1 | 1 | NOM |

| Age | Target Words | Children's Productions | Tokens | Sem. | Age | Target Words | Children's Productions | Tokens | Sem. |
|---|---|---|---|---|---|---|---|---|---|
| 24 MO | rot3 faj0 | ?a3 faj0 | 3 | NOM | | siaN4 | ?en4 | 1 | NOM |
| | | lo3 hwaj0 | 1 | NOM | | plaa0 | paa0 | 1 | NOM |
| | | lo3 haj0 | 1 | NOM | | plaa0 kra0 pON4 | paa0 ?a0 pON4 | 1 | NOM |
| | maa3 laaj0 | maa3 laaj0 | 3 | NOM | | maa0 maa2 | maa0 maa2 | 1 | NOM |
| | | maa3 ?aaj0 | 1 | NOM | | ?xp3 pqn2 | ?xp3 pqn2 | 1 | NOM |
| | puu0 | puu0 | 4 | NOM | | kaj1 | kaj1 | 1 | NOM |
| | lOON0 thaaw3 | lOON0 thaaw3 | 3 | NOM | | khrUaN2 taw0 riit2 | kqN2 ta0 jiit2 | 1 | NOM |
| | faam0 cOO0 ra0 khee2 | ?aam khee2 | 4 | NOM | | taw0 kxxt3 | taw0 kx3 | 1 | NOM |
| | chaaN3 | chaaN3 | 1 | NOM | | baan2 | baan2 | 1 | NOM |
| | | caaN3 | 1 | NOM | | chak3 krook2 | ?ak3 hook2 | 1 | NOM |
| | | haaN3 | 1 | NOM | | thii2 chii1 | ?ii2 chii1 | 1 | NOM |
| | phOO2 | pOO2 | 2 | NOM | | naam3 | naam3 | 1 | NOM |
| | | phOO2 | 1 | NOM | | troN0 nii3 | toN0 nii3 | 1 | NOM |
| | khOON4 | khON4 | 3 | NOM | | thii2 | thii2 | 1 | REL |
| | mii4 phUN2 | mii4 phUN2 | 3 | NOM | | maj2 | maj2 | 9 | REL |
| | | mii4 mii4 phUN2 | 1 | NOM | | ca1 | ca1 | 5 | REL |
| | nom0 traa0 mii4 | mon0 mii4 | 3 | NOM | | jaa1 | jaa1 | 2 | REL |
| | cOO0 ra0 khee2 | khee2 | 2 | NOM | | daaj2 | daj2 | 1 | REL |
| | rOON0 pha0 jaa0 baan0 | baN0 baN0 | 2 | NOM | | lqqj0 | lqj0 | 1 | REL |
| | muu4 | muu4 | 2 | NOM | | chaj2 | chaj2 | 1 | REL |
| | nom0 | nom0 | 2 | NOM | | ?iik1 lxxw3 | ?iik1 lxxw3 | 1 | REL |
| | ?an0 nii3 | nii3 | 2 | NOM | | duaj2 | duaj2 | 1 | REL |
| | ?a0 raj0 | ?a0 ?aj0 | 1 | NOM | | lxxw3 | lxxw3 | 1 | REL |
| | | ?a0 jaj0 | 1 | NOM | | khqqj0 | khqqj0 | 1 | REL |
| | maa3 | maa3 | 2 | NOM | | kha2 | kha2 | 1 | REL |
| | maa4 | maa4 | 2 | NOM | | juu1 | juu1 | 15 | VER |
| | klON2 thaaj1 ruup2 | ?ON2 ?aj1 ?uup2 | 1 | NOM | | | ?uu1 | 1 | VER |
| | | cON2 haj1 ?uup2 | 1 | NOM | | | cu1 | 1 | VER |
| | | taj1 ?uup2 | 1 | NOM | | mii0 | mii0 | 14 | VER |
| | nom0 keen0 | nom0 keen0 | 2 | NOM | | cep1 | cep1 | 1 | VER |
| | khaaN2 nOOk2 | khaN2 nOOk2 | 1 | NOM | | NuaN2 nOOn0 | juan2 nOOn0 | 1 | VER |
| | (tua0) hip3 poo0 | pip3 poo0 | 1 | NOM | | ?a0 rOj1 | ?a0 ?Oj0 | 1 | VER |
| | | tua0 pip3 poo0 | | NOM | | ?aaj0 | ?aj0 | 1 | VER |
| | thii2 nuun2 | thii2 nuun2 | 1 | NOM | | tua0 jaj1 | cua0 jaj1 | 1 | VER |

**Participant: L05**

| Age | Target Words | Children's Productions | Tokens | Sem. |
|---|---|---|---|---|
| 15 MO | bUUn2 bUUn2 | bUU2 | 2 | VER |
| | | bUU0 | 1 | VER |
| | | bUUn0 | 1 | VER |
| | | ?a0 bUU2 | 1 | VER |
| | mam1 mam1 | mam3 mam0 | 2 | VER |
| | ca3 ?ee4 | cee4 | 1 | VER |
| | ciN2 cok1 | cO2 | 1 | NOM |
| | | coo0 | 1 | NOM |
| | nii2 | jii2 | 1 | NOM |
| 18 MO | bUUn2 bUUn2 | bUUn2 bUUn2 | 7 | VER |
| | | bUUn2 (3) | 5 | VER |
| | | bUU0 | 2 | VER |
| | | bUU0 (3) | 2 | VER |
| | | bUU2 bUU2 | 2 | VER |
| | | bUU2 (4) | 2 | VER |
| | | bUUn0 bUUn0 | 2 | VER |
| | | bUUn2 (5) | 1 | VER |
| | | bUU2 (8) | 2 | VER |
| | | bUU2 bUU2 bUUn2 | 1 | VER |
| | | bUU2 | 1 | VER |
| | | bUUn0 (3) | 1 | VER |
| | | bUU4 | 1 | VER |
| | | bUU0 (6) | 1 | VER |
| | ?ee1 ?ee3 | ?e1 ?e3 | 4 | VER |
| | pO1 | pO1 pO1 | 4 | VER |
| | haa4 | haa4 | 3 | VER |
| | | ?aa4 | 1 | VER |
| | huu2 | huu2 | 2 | VER |
| | bin0 | min0 min0 | 3 | VER |
| | | min0 | 1 | VER |
| | | min0 bin0 bin0 | 1 | VER |

| Age | Target Words | Children's Productions | Tokens | Sem. |
|---|---|---|---|---|
| | | bin0 bin0 | 1 | VER |
| | | ?a1 min0 min0 | 1 | VER |
| | saj1 | haj4 | 1 | VER |
| | miaw4 | miaw4 | 1 | VER |
| | han0 loo4 | joo4 joo4 | 1 | VER |
| | | joo4 | 1 | VER |
| | daj0 noo0 saw4 | caw4 | 9 | NOM |
| | maa4 | maa4 | 4 | NOM |
| | plaa0 | paa0 | 6 | NOM |
| | rom2 | bom0 | 3 | NOM |
| | phii4 | pii4 | 3 | NOM |
| | | phii4 | 2 | NOM |
| | | bii4 | 1 | NOM |
| | pet1 | pet1 | 2 | NOM |
| | | pxt1 | 1 | NOM |
| | siN4 too0 | too0 | 2 | NOM |
| | Nuu0 | Nuu0 | 2 | NOM |
| | chaaN3 | caaN4 | 1 | NOM |
| | | caN4 | 1 | NOM |
| | phii2 | bii2 | 1 | NOM |
| | kaj1 | caj1 | 1 | NOM |
| | | kaj1 | 1 | NOM |
| | | kaj2 | 1 | NOM |
| | nia2 | nia2 | 1 | NOM |
| | nii2 | nii2 | 1 | NOM |
| | kwaaN0 | kwaam0 | 1 | NOM |
| | ciN0 coo2 | coo3 | 1 | NOM |
| | nok3 juuN0 | luN0 | 1 | NOM |
| | maj2 | mii4 | 1 | REL |
| | kx1 | kx1 | 1 | VER |
| | puu0 | buu0 | 1 | NOM |
| | maa3 | maa4 | 1 | NOM |
| | lan2 thom0 | bam2 bom0 | 1 | NOM |
| | | bam0 bom0 | 1 | NOM |

| Age | Target Words | Children's Productions | Tokens | Sem. | Age | Target Words | Children's Productions | Tokens | Sem. |
|---|---|---|---|---|---|---|---|---|---|
| 18 MO | paak1 | paak1 | 1 | NOM | | | lot3 paj0 | 11 | NOM |
| | khrap3 | kap3 | 2 | REL | | chii1 | cii1 | 13 | NOM |
| | ?a3 | ?a3 | 1 | REL | | hON2 naam3 | naam3 | 13 | NOM |
| | | ?aa3 | 1 | REL | | sa0 paj3 dqq2 mxxn0 | waj3 mxxn0 | 4 | NOM |
| | ?ii4 | ?ii4 | 1 | REL | | | waj3 bxxn0 | 1 | NOM |
| | ?ooj3 | ?oj2 | 1 | REL | | | mxxn0 | 1 | NOM |
| | thUN4 | tUN4 | 1 | VER | | rot3 | ?ot3 | 5 | NOM |
| | | cUN4 | 4 | VER | | taw1 | taw1 | 4 | NOM |
| | men4 | men4 | 3 | VER | | | caw1 | 1 | NOM |
| 21 MO | bUUn2 bUUn2 | bUUn2 bUUn2 | 11 | VER | | tam0 ruat1 | ?uat1 | 4 | NOM |
| | piw2 piw2 | piw2 (3) | 11 | VER | | phii4 | pii4 | 4 | NOM |
| | | piw2 piw2 | 4 | VER | | naam3 | naam3 naam3 | 4 | NOM |
| | | piw2 (4) | 3 | VER | | | naam3 | 1 | NOM |
| | | piw2 (5) | 3 | VER | | hxx0 phom4 | ?xx0 ?om4 | 1 | NOM |
| | | piw2 | 1 | VER | | | ?xx0 pom4 | 3 | NOM |
| | | piw2 piw2 piw0 | 1 | VER | | chut3 sa0 pai3 dqq2 mxxn0 | chut3 pxxn0 | 3 | NOM |
| | haa4 | ?aa4 | 8 | VER | | | chut3 pxxn0 | 1 | NOM |
| | | haa4 | 1 | VER | | maa3 | maa3 | 3 | NOM |
| | maa0 | maa0 | 8 | VER | | | maa3 maa3 | 1 | NOM |
| | te1 | te1 | 3 | VER | | phat3 lom0 | lom0 | 1 | NOM |
| | baaj3 baaj1 | baaj3 baaj1 | 2 | VER | | | ?om0 | 2 | NOM |
| | | waaj3 waaj1 | 1 | VER | | puu0 | puu0 puu0 | 3 | NOM |
| | chon0 | con0 | 2 | VER | | rot3 faj0 | ?ot3 paj0 | 2 | NOM |
| | puun3 puun3 chUk1 chak1 | pUUn2 cOk1 cak1 | 1 | VER | | mOO0 tqq0 saj0 | mOO0 caj0 | 1 | NOM |
| | | cak1 cak1 | 1 | VER | | | mOO0 faj0 | 1 | NOM |
| | | cOk1 cak1 | 1 | VER | | | mOO0 caj0 | 1 | NOM |
| | ?aw0 | ?aw0 | 2 | VER | | nii2 | nii2 | 1 | NOM |
| | hoN2 hoN2 | ?oN2 ?oN2 | 2 | VER | | | nii3 | 1 | NOM |
| | len2 | len2 | 1 | VER | | khraj0 | kaj0 | 1 | NOM |
| | loo4 loo4 | woo4 woo4 | 1 | VER | | kaaN0 keeN0 | kaaN0 keeN | 1 | NOM |
| | chiik1 | ?iip1 | 1 | VER | | cuu4 | ?uu4 | 1 | NOM |
| | kep1 | kep1 | 1 | VER | | maa4 | maa4 | 1 | NOM |
| | rot3 faj0 | ?ot3 faj0 | 1 | NOM | | klON2 | kON2 kON2 | 1 | NOM |
| | | lot3 faj0 | 1 | NOM | | lqqj0 | lqqj0 | 3 | REL |

| Age | Target Words | Children's Productions | Tokens | Sem. | Age | Target Words | Children's Productions | Tokens | Sem. |
|---|---|---|---|---|---|---|---|---|---|
| 21 MO | maj2 | maj2 | 2 | REL | | hoN2 hoN2 | hoN2 hoN2 | 1 | VER |
| | na3 | na3 | 2 | REL | | pqqt1 | pqqt1 | 1 | VER |
| | lxxw3 | lxxw3 | 2 | REL | | tii0 | tii0 | 1 | VER |
| | ?e3 | ?e3 | 1 | REL | | ?U3 | ?u3 | 1 | VER |
| | Naj0 | Naj0 | 1 | REL | | han0 loo4 | haa0 loo4 haa0 loo4 | 1 | VER |
| | khrap3 | kap3 | 1 | REL | | | loo4 | 1 | VER |
| | puat1 chii1 | bOOt1 cii1 | 4 | VER | | | ta0 ?qq4 | 1 | VER |
| | | pOOt1 cii1 | 1 | VER | | thoo0 ra0 sap1 | cap1 | 1 | VER |
| | taaj0 | taaj0 | 4 | VER | | | cap1 cap1 cap1 | 1 | VER |
| | waj4 | waj4 | 3 | VER | | | cap1 cap1 cap1 | 1 | VER |
| | cep1 | ?ep1 | 1 | VER | | ?am2 | ?am2 (5) | 1 | VER |
| | | cep1 | 1 | VER | | lOOk1 | ?OOk1 | 1 | VER |
| | keN1 | keN1 | 2 | VER | | mxx2 | mxx2 | 20 | NOM |
| | mot1 | mot1 | 1 | VER | | nii2 | nii2 | 14 | NOM |
| | suaj4 | cuaj4 | 1 | VER | | puu0 | puu0 puu0 | 9 | NOM |
| | nak1 | nak1 | 1 | VER | | ?a0 raj0 | ?a0 laj0 | 8 | NOM |
| | puat1 | pOOt1 cii1 | 1 | VER | | | laj0 | 1 | NOM |
| | waj3 | waj3 | 1 | VER | | | waj0 | 1 | NOM |
| 24 MO | paj0 | paj0 | 10 | VER | | | ?aj0 | 4 | NOM |
| | piw2 piw2 | piw2 piw2 | 11 | VER | | rot3 faj0 | lot3 paj0 | 1 | NOM |
| | | piw2 | 8 | VER | | | ?ot3 ?waj0 | 1 | NOM |
| | maa0 | maa0 | 5 | VER | | | ?ot3 paj0 | 2 | NOM |
| | ?a0 raj0 | laj0 | 2 | VER | | | lot3 faj0 | 1 | NOM |
| | | ?aj0 | 3 | VER | | | ?ot3 faj0 | 1 | NOM |
| | sa0 wat1 dii0 khrap3 | dii0 khap3 | 2 | VER | | khraj0 | ?aj0 | 5 | NOM |
| | cup3 | dup3 | 1 | VER | | chaaN3 | taaN3 | 1 | NOM |
| | | tu3 | 1 | VER | | | caaN3 | 4 | NOM |
| | tham0 | kham0 | 2 | VER | | sa0 pai3 dqq2 maxxn0 | paj3 mxxn0 | 4 | NOM |
| | ?aan1 | ?aan1 | 2 | VER | | siaN4 | tiaN4 | 2 | NOM |
| | phuut2 | puut2 | 2 | VER | | maa4 | maa4 | 2 | NOM |
| | haj2 | haj2 | 1 | VER | | faa3 | paa3 | 2 | NOM |
| | baaj3 baaj0 | waaj3 waaj0 | 1 | VER | | tua0 | tua0 | 2 | NOM |
| | thiaw2 | tiaw2 | 1 | VER | | thoo4 suam2 | ?oo4 ?uam2 | 2 | NOM |
| | com0 | ?om0 | 1 | VER | | | cuam2 | 1 | NOM |

| Age | Target Words | Children's Productions | Tokens | Sem. |
|---|---|---|---|---|
| 24 MO | phii4 | phii4 | 2 | NOM |
| | phii2 | phii2 | 1 | NOM |
| | tua0 dai0 noo0 saw4 | ?ua0 haw4 | 1 | NOM |
| | tha0 lee0 | lee0 | 1 | NOM |
| | naam3 | naam3 | 2 | NOM |
| | liN0 | liN0 | 1 | NOM |
| | fqqt3 | fqqt3 | 1 | NOM |
| | faj0 | ?aj0 | 1 | NOM |
| | klON2 | kON2 kON2 | 1 | NOM |
| | nia2 | nia2 | 1 | NOM |
| | sUa4 | cUa4 | 1 | NOM |
| | hip3 poo0 | ?ip3 poo0 | 1 | NOM |
| | jii0 raap3 | jii0 jaap3 | 1 | NOM |
| | maa3 laaj0 | maa3 ?aaj0 | 1 | NOM |
| | maj2 | maj2 | 19 | REL |
| | khrap3 | khap3 | 1 | REL |
| | | kap3 | 2 | REL |
| | | ?ap0 | 5 | REL |
| | lxxw3 | lxxw3 | 5 | REL |
| | maN2 | maN2 | 4 | REL |
| | lqqj0 | laaj0 | 1 | REL |
| | | lqqj0 | 1 | REL |
| | | ?qqj0 | 1 | REL |
| | duaj2 | ?uaj2 | 2 | REL |
| | | duaj2 | 1 | REL |
| | nOj1 | nOj1 | 3 | REL |
| | lqq4 | lqq4 | 2 | REL |
| | | nOO4 | 1 | REL |
| | thaw2 | ?aw2 | 2 | REL |
| | ?a1 | ?a1 | 2 | REL |
| | waaj3 | waaj3 | 2 | REL |
| | kan0 | kan0 | 1 | REL |
| | hqj3 | ?qj3 | 1 | REL |
| | Naj0 | Naj0 | 1 | REL |

| Age | Target Words | Children's Productions | Tokens | Sem. |
|---|---|---|---|---|
| | baaN2 | baaN2 | 1 | REL |
| | chaj2 | caj2 | 1 | REL |
| | si1 | chi1 | 1 | REL |
| | rak3 | jak3 | 5 | VER |
| | | dak3 | 1 | VER |
| | juu1 | juu1 | 4 | VER |
| | | ?uu1 | 1 | VER |
| | pen0 | pen0 | 5 | VER |
| | cop1 | top1 | 2 | VER |
| | | cop1 | 2 | VER |
| | mii0 | mii0 | 4 | VER |
| | klua0 | kua0 | 4 | VER |
| | dUU2 | dUU2 | 2 | VER |
| | taaj0 | taaj0 | 1 | VER |
| | | paaj0 | 1 | VER |
| | ruu3 | luu3 | 1 | VER |
| | | ?uu3 | 1 | VER |
| | kot3 | ?ot3 | 2 | VER |
| | naa2 klua0 | naa2 kua0 | 1 | VER |
| | dap1 | dap1 | 1 | VER |
| | phia3 | pia3 | 1 | VER |
| | waj3 | waj1 | 1 | VER |
| | mot1 | mot1 | 1 | VER |

**Participant: L06**

| Age | Target Words | Children's Productions | Tokens | Sem. |
|---|---|---|---|---|
| 15 MO | mam1 mam1 | mam1 mam1 | 1 | VER |
| | | mam1 | 1 | VER |
| 18 MO | bUUn2 bUUn | bUUn2 | 3 | VER |
| | | bUUn2 bUUn2 | 2 | VER |
| | laa0 kOOn1 | ?aa0 | 2 | VER |
| | | kxn1 | 3 | VER |
| | | bxn1 | 1 | VER |

| Age | Target Words | Children's Productions | Tokens | Sem. | Age | Target Words | Children's Productions | Tokens | Sem. |
|---|---|---|---|---|---|---|---|---|---|
| 18 MO | | ?aa0 kxn1 | 1 | VER | | maa0 | maa0 | 4 | VER |
| | paj0 | paj0 | 2 | VER | | khaw2 | ?aa2 | 3 | VER |
| | ?um2 | ?um2 ?um2 | 1 | VER | | saj1 | caj0 | 1 | VER |
| | | ?un2 | 1 | VER | | | caj1 | 1 | VER |
| | pqqt1 | pqqt1 pqqt1 pqqt1 | 1 | VER | | len2 | ?en2 | 1 | VER |
| | ?uut3 ?uut3 | ?uut3 ?uut3 | 1 | VER | | mat3 | mat3 | 1 | VER |
| | maa0 | maa0 maa0 | 1 | VER | | jip1 | jip1 | 1 | VER |
| | phii2 | pii2 | 8 | NOM | | phii2 | pii2 | 12 | NOM |
| | | bii2 | 5 | NOM | | thUN4 | tuN4 | 4 | NOM |
| | | pii2 pii2 | 3 | NOM | | bOn0 | pan0 | 1 | NOM |
| | | pii2 bii2 | 1 | NOM | | taa0 | caa0 | 1 | NOM |
| | ?oot3 | ?oot3 | 5 | NOM | | phii0 | pii0 | 1 | NOM |
| | bOn0 | bOn4 | 2 | NOM | | rot3 | ?ot3 | 1 | NOM |
| | | bOn1 | 1 | NOM | | phOO2 | pOO2 | 1 | NOM |
| | fqqn0 | pqn0 | 2 | NOM | | paak1 kaa0 | paak1 kaa0 | 1 | NOM |
| | | bqn4 | 2 | NOM | | mxx2 | mxx2 | 1 | NOM |
| | | bqn0 | 2 | NOM | | nuun2 | nuun2 | 1 | NOM |
| | | wan0 | 1 | NOM | | khrap3 | cap3 | 7 | REL |
| | | wqn0 | 1 | NOM | | duaj2 | duaj2 | 1 | REL |
| | rot3 | jot3 jot3 | 1 | NOM | | kan0 | kan0 | 1 | REL |
| | | jot3 | 2 | NOM | | mot1 | bot1 | 2 | VER |
| | phii0 | pii0 | 1 | NOM | | sii4 dxxN0 | ?ii4 dxxN0 | 1 | VER |
| | ?aj0 tim0 | tim4 | 1 | NOM | 24 MO | ?aw0 | ?aw0 | 7 | VER |
| | nuun2 | nuun2 | 1 | NOM | | kin0 | kin0 | 2 | VER |
| | fOOt1 | baat1 | 1 | NOM | | khOOp1 khun0 | ?un0 | 2 | VER |
| | thaan1 | taan2 | 1 | NOM | | thxxm4 | kxxm4 | 1 | VER |
| | maj2 | maj2 | 1 | REL | | | ?xxm4 | 1 | VER |
| | khrap3 | cap3 | 1 | REL | | haa4 | ?aa4 | 2 | VER |
| | dii0 | dii0 | 1 | VER | | lom3 | lom3 | 2 | VER |
| | mii0 | mii0 | 1 | VER | | miaw4 | miaw2 | 2 | VER |
| | juu1 | cuu1 | 1 | VER | | duu0 | duu0 duu0 | 1 | VER |
| 21 MO | kep1 | kep1 | 4 | VER | | laaN3 | ?aaN3 | 1 | VER |
| | | ?ep1 | 1 | VER | | faak1 | ?aak1 | 1 | VER |
| | | kep1 (4) | 1 | VER | | thiN3 | ?iN3 | 1 | VER |

| Age | Target Words | Children's Productions | Tokens | Sem. |
|---|---|---|---|---|
| 24 MO | chon0 | con0 | 1 | VER |
| | khaw2 | ?aw2 | 1 | VER |
| | cON2 | ?aN2 | 1 | VER |
| | tom2 | too2 | 1 | VER |
| | nOOn0 | nOOn0 | 1 | VER |
| | ?um2 | ?um2 ?um2 | 1 | VER |
| | luk3 | ?u3 | 1 | VER |
| | khUn2 | jun2. | 1 | VER |
| | pqqt1 | bqqt1 | 1 | VER |
| | naN2 | ?aN2 | 1 | VER |
| | mxx2 | mxx2 | 10 | NOM |
| | khOON4 thxxm4 | kOON4 kxxm4 | 6 | NOM |
| | phii2 | pii2 | 6 | NOM |
| | naj4 | naj4 | 2 | NOM |
| | mxx2 kaj1 sxxn4 kha0 jan4 | mxx2 kaj1 kiaN4 kan4 | 4 | NOM |
| | | mxx2 kaj1 mxx2 kaj1 | 1 | NOM |
| | | kaj1 | 1 | NOM |
| | phii0 phii0 | pii0 pii0 | 1 | NOM |
| | | pii0 | 1 | NOM |
| | phOO2 | pOO2 | 1 | NOM |
| | naam3 phu3 | ?am3 pu3 | 1 | NOM |
| | bik3 sii0 | bik3 cii0 | 1 | NOM |
| | laat2 phraaw3 | ?aat2 taaw4 | 1 | NOM |
| | huu4 | huu4 | 1 | REL |
| | pam3 cet3 | pam3 cet3 | 1 | NOM |
| | pam3 | pam3 cet3 | 1 | NOM |
| | pam3 pOO0 tOO0 thOO0 | pam3 pOO0 kOO0 | 1 | NOM |
| | khOn4 kxn1 | kOn4 kxn1 | 1 | NOM |
| | kha0 ja1 | ?a1 | 1 | NOM |
| | cak1 kra0 jaan0 | ?ak1 kaan0 | 1 | NOM |
| | rUaN2 siN4 too0 | ?uaN2 ciN4 too0 | 1 | NOM |
| | mxxN0 wan0 cOOm0 - ta0 kla1 | m laN0 | 1 | NOM |
| | | ka1 | 1 | NOM |
| | naam3 | naam3 | 1 | NOM |

| Age | Target Words | Children's Productions | Tokens | Sem. |
|---|---|---|---|---|
| | kharp3 | kap3 | 7 | REL |
| | maj2 | maj2 | 6 | REL |
| | nOj1 | nOj1 | 2 | REL |
| | chaj2 | chaj2 | 1 | REL |
| | lxxw3 | lxxw3 | 1 | REL |
| | kap1 | kap1 kap1 | 1 | REL |
| | duaj2 | kuaj2 | 1 | REL |
| | lqqj0 | ?aj0 | 1 | REL |
| | ca1 | ca1 | 1 | REL |
| | ?a1 | ?a1 | 1 | REL |
| | khrap3 phom4 | kap3 pom4 | 1 | REL |
| | phet1 | phet1 | 1 | VER |
| | | pet1 | 2 | VER |
| | ciN0 | ciN0 | 2 | VER |
| | | ciN0 ciN0 | 2 | VER |
| | sxxp1 | cxxp1 | 1 | VER |
| | rak3 | ?ak3 | 1 | VER |
| | son0 | ?on0 | 1 | VER |
| | nit3 diaw0 | tit3 tiaw0 | 1 | VER |
| | jq3 jx3 | jq3 jq3 | 1 | VER |
| | chUa2 | ?Ua2 | 1 | VER |
| | juu1 | ?uu1 | 1 | VER |
| | klaj2 | kaj2 kaj2 | 1 | VER |

**Participant: L07**

| Age | Target Words | Children's Productions | Tokens | Sem. |
|---|---|---|---|---|
| 12 MO | mxx2 | bxx2 | 2 | NOM |
| 15 MO | cok3 cok3 | cok3 cok3 | 1 | VER |
| | | cok3 (4) | 1 | VER |
| | ?a0 raj0 | jaj0 | 14 | NOM |
| | | ja1 jaj0 | 4 | NOM |
| | | ?a1 jaj0 | 3 | NOM |
| | | jaa0 jaj0 | 1 | NOM |

| Age | Target Words | Children's Productions | Tokens | Sem. | Age | Target Words | Children's Productions | Tokens | Sem. |
|---|---|---|---|---|---|---|---|---|---|
| 15 MO | | laj0 | 1 | NOM | 24 MO | ten2 | ten2 | 9 | VER |
| | | ?a0 jaj2 | 1 | NOM | | pit1 | pit1 | 6 | VER |
| | | da1 daj0 | 1 | NOM | | ?aw0 | ?aw0 | 4 | VER |
| | | jaj1 jaj0 | 1 | NOM | | duu0 | duu0 | 3 | VER |
| | | jaj0 ja1 | 1 | NOM | | pqqt1 | pqqt1 | 2 | VER |
| | | | 1 | NOM | | jOOt1 | cOOt1 | 1 | VER |
| | mxx2 | mxx2 | 1 | NOM | | pOOn2 | pOOn2 | 1 | VER |
| | | mxx3 | 1 | NOM | | tUN3 tuN0 … | tuN3 tuN0 | 1 | VER |
| | tua0 ?a0 raj0 | too0 jaj0 | 2 | NOM | | nii2 | nii2 | 3 | NOM |
| | | too0 ?aj0 | 1 | NOM | | khaaw2 | kaaw2 | 3 | NOM |
| | | too0 lxx0 | 1 | NOM | | mxx2 | mxx2 | 3 | NOM |
| | | too4 jaj0 | 1 | NOM | | faa4 | paa4 | 2 | NOM |
| | nii2 | nii2 | 1 | NOM | | ?a0 raj0 | ?aj0 | 1 | NOM |
| | nuu4 | nuu4 | 1 | NOM | | troN0 nia3 | tom0 nia2 | 1 | NOM |
| | maa3 | maaN0 | 1 | NOM | | bxxp1 nii3 | bxxt1 nii3 | 1 | NOM |
| | juu1 | juu1 | 1 | VER | | phOO2 | pOO2 | 1 | NOM |
| 18 MO | kaj1 | kaj4 | 1 | NOM | | ?uj3 | ?uuj3 | 3 | REL |
| | | kaj1 | 1 | NOM | | | ?uj3 | 2 | REL |
| | | ?oo3 kaj1 | 1 | NOM | | waj3 | jaj3 | 1 | REL |
| | plaa0 | paa0 | 1 | NOM | | | caj3 | 2 | REL |
| | ciN0 coo2 | koo2 | 1 | NOM | | juu1 | juu1 | 2 | REL |
| 21 MO | tak1 | cak1 | 4 | VER | | | ?uu1 | 1 | REL |
| | ?an0 nii3 | nan0 nii3 | 1 | NOM | | ?OOj3 | ?oj3 | 3 | REL |
| | | ?an0 nii3 | 1 | NOM | | duaj2 | duaj2 | 2 | REL |
| | | nii3 | 1 | NOM | | huu4 | ?uu4 | 2 | REL |
| | naam3 | naam3 | 1 | NOM | | Naj0 | ?aj0 | 2 | REL |
| | nii2 | nii2 | 1 | NOM | | lxxw3 | ?xxw3 | 1 | REL |
| | puu0 | puu0 | 1 | NOM | | | pxxw3 | 1 | REL |
| | khan4 | can4 | 1 | NOM | | ?iik1 | ?iik1 | 1 | REL |
| | ?iik1 | ?iik1 | 3 | REL | | maN2 | maN2 | 1 | REL |
| | maj2 | maj2 | 1 | REL | | na3 | na3 | 1 | REL |
| | sii4 faa3 | paa3 cii4 | 1 | VER | | maj3 | maj3 | 1 | REL |
| | sii4 dam0 | ?ii4 dam0 | 1 | VER | | ?a1 | ?a1 jaj0 | 1 | REL |
| | sii4 muaN2 | muam2 | 1 | VER | | maj2 | maj2 | 1 | REL |

| Age | Target Words | Children's Productions | Tokens | Sem. |
|---|---|---|---|---|
| 24 MO | si1 | ?ii0 | 1 | REL |
| | rOOn3 | lOOn3 | 5 | VER |
| | rew0 | jew0 | 2 | VER |
| | tit1 | cit1 | 1 | VER |
| | keN1 | kee0 | 1 | VER |
| | suk1 | cuk1 | 1 | VER |
| | cop1 | top1 | 1 | VER |
| | phet1 | pxt1 | 3 | VER |

**Participant: L08**

| Age | Target Words | Children's Productions | Tokens | Sem. |
|---|---|---|---|---|
| 12 MO | caa4 caa4 ca2 | caa2 | 1 | VER |
| | | caa4 caa4 caa2 | 1 | VER |
| | | caa4 caa4 caa1 | 1 | VER |
| | paa2 | paa3 | 1 | NOM |
| | | paa2 | 2 | NOM |
| | | ?a1 paa2 | 1 | NOM |
| | | paa2 paa0 | 1 | NOM |
| | | pa2 | 1 | NOM |
| | | pa3 pa1 | 1 | NOM |
| | mxx2 | bx1 | 3 | NOM |
| | | pxx0 px1 | 1 | NOM |
| | | ?a0 px1 | 1 | NOM |
| | phOO2 | ?a1 pOO2 | 2 | NOM |
| | | jaa0 jaa0 poo2 | 1 | NOM |
| 15 MO | pqqt1 | pqqt1 | 1 | VER |
| | fak3 thOON0 | taa0 | 3 | NOM |
| | | tOO0 | 1 | NOM |
| | nia2 | mia2 | 1 | NOM |
| | muu4 | muu4 | 1 | NOM |
| | pet1 | pet1 | 1 | NOM |
| | mxxw0 | maw4 | 1 | NOM |
| | liN0 | di1 | 1 | NOM |

| Age | Target Words | Children's Productions | Tokens | Sem. |
|---|---|---|---|---|
| | maa3 | ma3 | 1 | NOM |
| | kop1 | bot1 | 1 | NOM |
| | | kop1 | 1 | NOM |
| | luuk2 pooN1 | poo2 | 1 | NOM |
| | khrUaN2 bin0 | bi1 | 1 | NOM |
| | ?aj0 tim0 | tip1 | 1 | NOM |
| | | tim0 | 1 | NOM |
| | kheek3 | keek3 | 1 | NOM |
| | ?xp3 pqn2 | phq3 | 1 | NOM |
| | nom0 | nom2 | 1 | NOM |
| | plaa0 | paa0 | 1 | NOM |
| | nom4 | nom4 | 1 | NOM |
| | pet1 | pe1 | 1 | NOM |
| | doo1 ree0 mii0 | lee0 | 1 | NOM |
| | | bee0 | 1 | NOM |
| 18 MO | ?um2 | ?um2 | 20 | VER |
| | | ?a1 ?um2 | 1 | VER |
| | jUUn0 | jUUn0 | 4 | VER |
| | tok1 | to1 | 1 | VER |
| | | do1 | 1 | VER |
| | | tok1 | 1 | VER |
| | ?aan1 | ?aan1 | 2 | VER |
| | ?eek1 ?ii3 ?eek2 ?eek2 | ?e1 ?e2 | 2 | VER |
| | | ?e1 ?ek2 | 1 | VER |
| | maa0 | maa0 | 2 | VER |
| | thiaw2 | tiaw2 | 2 | VER |
| | khUn2 | khUn2 | 1 | VER |
| | paj0 | paj0 | 1 | VER |
| | ?uut3 ?uut3 | ?uut3 ?uut3 | 1 | VER |
| | hoN2 hoN2 | hoN2 | 1 | VER |
| | ?aw0 | ?aw0 | 1 | VER |
| | luk3 | ?uk3 | 1 | VER |
| | ?uj4 | ?uj4 | 8 | NOM |
| | puu0 | puu0 | 3 | NOM |

| Age | Target Words | Children's Productions | Tokens | Sem. | Age | Target Words | Children's Productions | Tokens | Sem. |
|---|---|---|---|---|---|---|---|---|---|
| 18 MO | plaa0 | paa0 | 3 | NOM | | jaaj0 | ?aaj0 | 1 | NOM |
| | | ?a1 paa0 paa0 | 1 | NOM | | ?OOt3 | ?OO3 | 1 | NOM |
| | | paa0 paa0 | 1 | NOM | | nii0 | nii0 | 1 | NOM |
| | kaj1 | kaj1 | 3 | NOM | | num1 | num1 | 1 | NOM |
| | muak1 | muak1 | 3 | NOM | | koo2 | koo2 | 1 | NOM |
| | | mua0 | 1 | NOM | | ham4 | ham4 | 1 | NOM |
| | mxx2 | mxx2 | 3 | NOM | | jOOt2 | jOOt2 | 1 | NOM |
| | chaaN3 | caaN3 | 2 | NOM | | klON2 | kON2 | 1 | NOM |
| | | chaaN3 | 2 | NOM | | ruup2 | ?uup2 | 1 | NOM |
| | muu4 | muu4 | 2 | NOM | | khaa4 | khaa4 | 1 | NOM |
| | mxxm1 | mxm4 | 2 | NOM | | chaj2 | caj2 | 1 | REL |
| | cu3 | cu3 | 3 | NOM | | | chaj2 | 1 | REL |
| | khOON4 | ?on4 | 2 | NOM | | sii4 | chii4 | 1 | VER |
| | phii2 | bii2 | 1 | NOM | | sii4 dxxN0 | dxxN0 | 3 | VER |
| | | ?ii2 | 1 | NOM | | | cii3 dxxN0 | 1 | VER |
| | | pii2 | 2 | NOM | | sii4 khiaw4 | ?iaw0 | 2 | VER |
| | nii2 | ?ii0 | 1 | NOM | | | kiw4 | 1 | VER |
| | | nii2 | 1 | NOM | | sii4 lUaN4 | lUaN0 | 2 | VER |
| | taw1 | ?aw0 | 1 | NOM | | sii4 som2 | com2 | 1 | VER |
| | | taw1 | 1 | NOM | | | chii4 chom2 | 1 | VER |
| | siN4 too0 | too0 | 1 | NOM | | suaj4 | ?uaj4 | 1 | VER |
| | maa3 | maa3 | 1 | NOM | 21 MO | ?um2 | ?um2 | 12 | VER |
| | pet1 | pet1 | 1 | NOM | | ?aan1 | ?aan1 | 7 | VER |
| | ?uut3 (muu4) | ?uut3 | 1 | NOM | | ?aw0 | ?aw0 | 7 | VER |
| | maa4 | maa4 | 1 | NOM | | duu0 | duu0 | 2 | VER |
| | mii4 | mii4 | 1 | NOM | | jip1 | jip1 | 1 | VER |
| | kx1 | kx1 | 1 | NOM | | ?aa2 | ?aa2 | 1 | VER |
| | hua4 | hua4 | 1 | NOM | | ?eek1 ?ii3 ?eek2 ?eek2 | ?e1 ?e1 ?e1 ?eek2 | 1 | VER |
| | niw3 pooN2 | poo2 | 1 | NOM | | | ?e1 ?ee2 ?ee2 | 1 | VER |
| | niw3 kOj2 | kOj2 | 1 | NOM | | | ?eek2 | 1 | VER |
| | niw3 klaaN0 | kaaN4 | 1 | NOM | | kin0 | kin0 | 1 | VER |
| | ?Oj2 | ?Oj2 | 1 | NOM | | kup1 kap1 | kup1 kap1 | 1 | VER |
| | ?on2 | ?on2 | 1 | NOM | | lom3 | ?om3 | 1 | VER |
| | wiw0 | wiw0 | 1 | NOM | | tham0 | tham0 | 1 | VER |

| Age | Target Words | Children's Productions | Tokens | Sem. | Age | Target Words | Children's Productions | Tokens | Sem. |
|---|---|---|---|---|---|---|---|---|---|
| 21 MO | (tham0) ?a0 raj0 | jaj0 | 1 | VER | | maa3 laaj0 | maa3 jaaj0 | 2 | NOM |
| | pit1 | pit1 | 1 | VER | | dok3 maa4 | dOk3 maa4 | 2 | NOM |
| | mxx2 | mxx2 | 21 | NOM | | bii0 phUN2 | bii0 phUN2 | 2 | NOM |
| | ?an0 nan3 | ?an0 naa3 | 7 | NOM | | siN4 too0 | chiN4 too0 | 2 | NOM |
| | kwaaj0 | kwaaj0 | 4 | NOM | | kxt3 mxxw0 | kxt3 mxxw0 | 2 | NOM |
| | | khwaaj0 | 2 | NOM | | thOON3 | thOON0 | 2 | NOM |
| | chaaN3 | chaaN2 | 4 | NOM | | ?xn3 mot3 | ?xn0 mot3 | 2 | NOM |
| | | caaN2 | 1 | NOM | | pet1 | pet1 | 2 | NOM |
| | | ?aaN2 | 1 | NOM | | ?an0 nii3 | ?an0 nii3 | 2 | NOM |
| | nii2 | nii2 | 5 | NOM | | muu4 | muu4 | 2 | NOM |
| | tua0 | tua0 | 5 | NOM | | cOO0 ra0 khee2 | ?ee2 | 1 | NOM |
| | phii4 sUa2 | pii4 chUa2 | 3 | NOM | | kOk3 koo0 daj0 | kOk3 koo0 dee0 | 1 | NOM |
| | | pii4 cUa2 | 1 | NOM | | nok3 kxxw2 | kxxw2 | 1 | NOM |
| | ?uj4 | ?uj4 | 3 | NOM | | jii0 raap3 | ?ii0 ?aap3 | 1 | NOM |
| | ?a0 raj0 | jaj0 | 3 | NOM | | khaaw0 wua0 | kaaw0 wua0 | 1 | NOM |
| | | ?a0 jaj0 | 3 | NOM | | plaa0 | paa0 | 1 | NOM |
| | phx3 | phe3 | 3 | NOM | | plaa0 cha0 laam4 | paa0 laam0 | 1 | NOM |
| | kx1 | kx1 | 3 | NOM | | maa3 | maa3 | 1 | NOM |
| | kaj1 | kaj1 | 3 | NOM | | hOOt3 maa3 | hon3 maa3 | 1 | NOM |
| | bxx0 mii4 | bxx0 mii4 | 3 | NOM | | nok3 kra0 cOOk1 theet2 | thet2 | 1 | NOM |
| | luuk2 | luuk2 | 2 | NOM | | | ka0 cOOk1 thet2 | 1 | NOM |
| | | juuk2 | 1 | NOM | | taw1 | taw1 | 1 | NOM |
| | man0 | man0 | 3 | NOM | | mii4 pxn0 daa2 | mii4 pxn0 daa2 | 1 | NOM |
| | phUN2 | phUN2 | 3 | NOM | | ?ii0 lee3 fen2 chaaN3 | ?ee0 wen2 chaaN3 | 1 | NOM |
| | sua4 | chUa4 | 3 | NOM | | plaa0 waan0 | paa0 waan0 | 1 | NOM |
| | | chUU4 | 2 | NOM | | hip3 poo0 | hip3 poo0 | 1 | NOM |
| | maa3 naam3 | maa3 naam3 | 3 | NOM | | khaa0 mew0 ?uut1 | ?uut1 | 1 | NOM |
| | cOO0 ra0 khee2 - | khee2 jaj0 | 3 | NOM | | | ka0 mew0 ?uut1 | 1 | NOM |
| | krOk3 koo0 daj0 | | | NOM | | sii0 baa2 maa3 laaj0 | chii2 maa3 jaaj0 | 1 | NOM |
| | wua0 | ?ua0 | 2 | NOM | | sa0 nek3 Nuu0 | Nuu0 | 1 | NOM |
| | fOk3 kop1 | fOk3 kop1 | 2 | NOM | | | ca0 nek3 Nuu0 | 1 | NOM |
| | taa0 | taa0 | 2 | NOM | | pet1 nOOj3 | pet1 nOOj3 | 1 | NOM |
| | ?um2 | ?um2 | 2 | VER | | maw3 nuu4 | maw0 nuu4 | 1 | NOM |
| | phik3 muu4 | pik3 muu4 | 2 | NOM | | | nuu4 | 1 | NOM |

| Age | Target Words | Children's Productions | Tokens | Sem. | Age | Target Words | Children's Productions | Tokens | Sem. |
|---|---|---|---|---|---|---|---|---|---|
| 21 MO | dia0 kwaaN0 | dia0 kaaN0 | 1 | NOM | | kha2 | kha2 | 3 | REL |
| | thaaN0 nii3 | thaN0 nii3 | 1 | NOM | | lxxw3 | jxxw3 | 2 | REL |
| | rxp3 bit1 kra0 taaj1 | jxp3 bit1 taaj1 | 1 | NOM | | | lxxw3 | 1 | REL |
| | kxx0 rOt1 | kxx0 ?Ot1 | 1 | NOM | | ?iik1 | ?iik1 | 2 | REL |
| | ciN0 coo2 | ciN0 cOO0 | 1 | NOM | | maj1 | maj1 | 2 | REL |
| | thai0 kqq2 sUa4 | thai0 chUa4 | 1 | NOM | | Naj0 | Naj0 | 1 | REL |
| | hiN1 hOj2 | hiN2 hOj1 | 1 | NOM | | jaj1 | jaj1 | 5 | VER |
| | | hiN1 hOj2 | 1 | NOM | | rak3 | jak3 | 3 | VER |
| | taw1 thOON0 | taw1 thOON0 | 1 | NOM | | mot1 | mo1 | 3 | VER |
| | tak3 ka0 txxn0 | cak3 txxn0 | 1 | NOM | | keN1 | ken1 | 2 | VER |
| | mxxN0 pOO0 | mxxN0 | 1 | NOM | | too0 | too0 | 2 | VER |
| | | mxxN0 pOO0 | 1 | NOM | | nOOj3 | nOOj2 | 2 | VER |
| | kwaaN0 | kwaaN0 | 1 | NOM | | jq3 jx3 | jq0 jx3 | 2 | VER |
| | nuun2 | nuun2 | 1 | NOM | | juu1 | juu1 | 1 | VER |
| | dak3 pet1 | dak3 pet1 | 1 | NOM | | hok1 | hok1 | 1 | REL |
| | dOk3 maa4 | dOk3 maa4 | 1 | NOM | | mii0 | mii0 | 1 | VER |
| | maN0 kii2 liN0 | maN3 kii2 jiN0 | 1 | NOM | 24 MO | kin0 | kin0 | 9 | VER |
| | hOOt3 maa3 | hOOt3 maa3 | 1 | NOM | | kat1 | kat1 | 4 | VER |
| | kop1 | kop1 | 1 | NOM | | ciak3 ciak3 | kiak3 kiak3 | 1 | VER |
| | nOON3 | nOON3 | 1 | NOM | | | ciak3 ciak3 | 2 | VER |
| | kuN2 | kuN2 | 1 | NOM | | ?aw0 | ?aw0 | 2 | VER |
| | ?an0 nii3 | nii3 | 1 | NOM | | riak2 | liak2 | 2 | VER |
| | ?ia0 huu4 | ?ia0 huu4 | 1 | NOM | | haa4 | haa4 | 2 | VER |
| | mUU0 | mUU0 | 1 | NOM | | laj2 | ?aj2 | 2 | VER |
| | khaa4 | khaa4 | 1 | NOM | | bin0 | bin0 | 2 | VER |
| | heet2 hua4 | het2 hua4 | 1 | NOM | | ?aan1 | ?aan1 | 1 | VER |
| | poo0 po1 | po0 po1 | 1 | NOM | | duu0 | duu0 | 1 | VER |
| | kra0 taaj1 | ka0 taaj1 | 1 | NOM | | tham0 | tham0 | 1 | VER |
| | | taaj1 ?a1 taaj1 taaj1 | 1 | NOM | | (tham0) ?a0 raj0 | laj0 | 1 | VER |
| | mii4 | mii4 | 1 | NOM | | dqqn0 | dqqn0 | 1 | VER |
| | ca0 muuk1 | muuk1 | 1 | NOM | | naN2 | naN2 | 1 | VER |
| | ?a1 | ?a1 | 8 | REL | | mxx2 | mxx2 | 17 | NOM |
| | caa4 | caa4 | 7 | REL | | ?uj4 | ?uj4 | 9 | NOM |
| | maj2 | maj2 | 6 | REL | | nok3 | nok3 | 8 | NOM |

| Age | Target Words | Children's Productions | Tokens | Sem. | Age | Target Words | Children's Productions | Tokens | Sem. |
|---|---|---|---|---|---|---|---|---|---|
| 24 MO | man0 | man0 | 7 | NOM | | nan2 | nan2 | 2 | NOM |
| | naj4 | naj4 | 6 | NOM | | lUat2 | ?Uat2 | 1 | NOM |
| | ?xn3 mot3 | ?an0 mot3 | 5 | NOM | | | wUat2 | 1 | NOM |
| | maN3 kii2 liN0 | naN3 kii2 jiN0 | 5 | NOM | | hua4 | hua4 | 2 | NOM |
| | | maN3 kii1 | 1 | NOM | | ?an0 nii3 | ?an0 nii3 | 1 | NOM |
| | | maN3 maN3 khii1 jiN0 | 1 | NOM | | bee0 bii2 maaj0 | be0 bii2 maaj0 | 1 | NOM |
| | ?a0 raj0 | ?a0 laj0 | 1 | NOM | | ?a0 nan0 daa0 | ?a0 nan0 daa0 | 1 | NOM |
| | | ?a jaj0 | 5 | NOM | | phat3 lom0 | lom0 | 1 | NOM |
| | | jaj0 | 3 | NOM | | ?xn3 mot3 | ?xn3 | 1 | NOM |
| | mUU0 | mUU0 | 5 | NOM | | | mot3 mot3 | 1 | NOM |
| | khaa4 | khaa4 | 5 | NOM | | phOO2 | phOO2 | 1 | NOM |
| | kra0 taaj1 | ka0 taaj1 | 4 | NOM | | plaa0 | paa0 | 1 | NOM |
| | luuk2 | luuk2 | 4 | NOM | | laj0 ?On2 siN4 too0 | laj3 ?On1 khiN4 too0 | 1 | NOM |
| | nii2 | nii2 | 4 | NOM | | khon0 | khon0 | 1 | NOM |
| | bqqt3 nok3 | bqqt3 nok3 | 4 | NOM | | ?ii0 lee3 fen2 chaaN3 | ?ii0 ?ee3 wen2 chaaN3 | 1 | NOM |
| | siN4 too0 | hiN4 too0 | 1 | NOM | | | wen2 chaaN3 | 1 | NOM |
| | | khiN4 too0 | 1 | NOM | | | ?ee3 fen2 chaaN3 | 1 | NOM |
| | | chiN4 too0 | 1 | NOM | | khOON4 | khOON4 | 1 | NOM |
| | niw3 pooN2 | pooN2 | 3 | NOM | | phii2 | pii2 | 1 | NOM |
| | niw3 chii3 | chii3 | 3 | NOM | | ma0 lxxN0 | ma3 jxxN0 | 1 | NOM |
| | niw3 klaaN0 | kaaN0 | 3 | NOM | | kON2 phop3 | dON2 phop3 | 1 | NOM |
| | niw3 naaN0 | naaN0 | 3 | NOM | | jaaj0 | jaaj0 | 1 | NOM |
| | niw3 kOj2 | kOj2 | 3 | NOM | | bun0 mii0 | bun0 mii0 | 1 | NOM |
| | kwaaN0 | kwaaN0 | 3 | NOM | | maw3 nuu4 | ma3 nuu0 | 1 | NOM |
| | sa0 nek3 Nuu0 | cha0 nek3 Nuu0 | 4 | NOM | | dOk3 maa4 | dOk3 maa4 | 1 | NOM |
| | | Nuu0 | 2 | NOM | | | maa4 | 1 | NOM |
| | khxx0 rOt1 | khxx0 jOt1 | 3 | NOM | | sUa4 | chUa4 | 1 | NOM |
| | | khxx0 | 1 | NOM | | dia0 kwaaN0 | dxx0 kwaaN0 | 1 | NOM |
| | hip3 poo0 | ?ip1 poo0 poo0 | 2 | NOM | | heet2 hua4 | het2 hua4 | 1 | NOM |
| | | hip0 poo0 | 1 | NOM | | hxx0 phom4 | hxx0 phom4 | 1 | NOM |
| | mii4 | mii4 | 2 | NOM | | ?aaj0 taa0 | ?aa0 taa0 | 1 | NOM |
| | naam3 nUN1 | naam3 nUN1 | 2 | NOM | | ?ia0 huu4 | ?ia0 huu4 | 1 | NOM |
| | ?em0 khee0 | ?em0 khee0 | 2 | NOM | | ca0 muuk1 | ca0 muuk1 | 1 | NOM |
| | thaj0 kqq2 | thaj0 kqq2 | 2 | NOM | | fan0 | kwan0 | 1 | NOM |

| Age | Target Words | Children's Productions | Tokens | Sem. |
|---|---|---|---|---|
| 24 MO | nek3 khOO0 | nek3 khOO0 | 1 | NOM |
| | cOO0 ra0 khee2 | cOO0 ja0 khee2 | 1 | NOM |
| | mxx2 khun0 khun4 thOON0 | mxx4 khun0 | 1 | NOM |
| | | mxx2 khun0 khun4 dOON0 | 1 | NOM |
| | nok3 pet1 naam3 | nok3 pet1 | 1 | NOM |
| | naj4 | naj4 | 1 | NOM |
| | khon0 naj4 | khon0 naj4 | 1 | NOM |
| | ?a1 | ?a1 | 19 | REL |
| | lqqj0 | jqqj0 | 7 | REL |
| | khwaa4 | waa1 | 1 | REL |
| | | hwaa1 | 1 | REL |
| | | kwaa1 | 4 | REL |
| | maj2 | maj2 | 4 | REL |
| | saaj3 | chaaj3 | 3 | REL |
| | kha3 | ka3 | 2 | REL |
| | kha2 | kha2 | 2 | REL |
| | sOON4 | chOON4 | 1 | REL |
| | daaj2 | daj2 | 1 | REL |
| | ha3 | ha3 | 1 | REL |
| | ?aaj3 | ?aaj3 | 1 | REL |
| | waaj3 | waaj3 | 1 | REL |
| | nq3 | nq3 | 1 | REL |
| | duaj2 | duaj2 | 1 | REL |
| | hqj3 | hqj3 | 1 | REL |
| | tham0 maj0 | tham0 maj0 | 1 | REL |
| | hUUm4 | hUm0 | 1 | REL |
| | bon0 | bon | 1 | REL |
| | ?aw2 | ?aw2 | 1 | REL |
| | naa2 rak3 | naa2 jak3 | 6 | VER |
| | chOOp2 | chOOp2 | 4 | VER |
| | naam3 Nqn0 | nam3 man0 | 3 | VER |
| | ruu3 | ?uu3 | 3 | VER |
| | jq3 jx3 | jq3 jx3 | 3 | VER |
| | nOOj3 | nOOj3 | 2 | VER |
| | tem0 | tem0 | 2 | VER |
| | jaak1 | jaak1 | 1 | VER |
| | ciN0 ciN0 | ciN0 | 1 | VER |
| | | ciN0 ciN0 | 1 | VER |
| | rak3 | jak3 jak3 | 1 | VER |

**Participant: L09**

| Age | Target Words | Children's Productions | Tokens | Sem. |
|---|---|---|---|---|
| 12 MO | bUUn2 bUUn2 | bUUn2 | 1 | VER |
| | | BUUn0 | 1 | VER |
| | kun0 cxx0 | chx0 | 1 | NOM |
| | | cxx0 | 2 | NOM |
| | | cx0 | 1 | NOM |
| | | ?a1 cx0 cx0 | 1 | NOM |
| | ciN2 cok1 | ce1 | 1 | NOM |
| | bOn0 | bOn0 | 1 | NOM |
| | mxx2 | mxx2 | 1 | NOM |
| | paa2 | pa1 | 1 | NOM |
| | | pap1 | 1 | NOM |
| 15 MO | te1 | ce1 | 8 | VER |
| | ?oo4 | ?oo4 | 4 | VER |
| | haj2 | haj2 | 2 | VER |
| | kep1 | kep1 | 2 | VER |
| | pit1 | pit1 | 2 | VER |
| | mam1 mam1 | ma0 mam1 | 1 | VER |
| | jip1 | jip1 | 1 | VER |
| | duut1 | jot1 | 1 | VER |
| | | jut1 | 1 | VER |
| | | dut1 | 1 | VER |
| | len2 | jen2 | 2 | VER |
| | | wen2 | 1 | VER |
| | bOn0 | bOn0 | 15 | NOM |
| | | bOn4 | 1 | NOM |

| Age | Target Words | Children's Productions | Tokens | Sem. | Age | Target Words | Children's Productions | Tokens | Sem. |
|---|---|---|---|---|---|---|---|---|---|
| 15 MO | chOOn3 | cOn4 | 10 | NOM | | rot4 | jot3 | 2 | NOM |
| | | cOOn4 | 1 | NOM | | maa4 | maa0 | 1 | NOM |
| | | cOOn3 | 1 | NOM | | | pa1 | 1 | NOM |
| | sOm2 | com2 | 8 | NOM | | caa2 | caa2 | 2 | REL |
| | paa2 | pa2 | 7 | NOM | | caa4 | caa4 | 1 | REL |
| | maa4 | maa4 | 6 | NOM | 18 MO | tOO1 | cOO1 | 4 | VER |
| | kra0 cok1 | cok1 | 6 | NOM | | lom3 | jom3 | 4 | VER |
| | | ka1 cok1 | 1 | NOM | | ?aw0 | ?aw0 | 3 | VER |
| | pxxN2 | pxN2 | 6 | NOM | | kaap2 kaap2 | kaap2 kaap2 | 2 | VER |
| | phra3 | pha3 | 1 | NOM | | haa4 | haa4 | 2 | VER |
| | | pa3 | 4 | NOM | | bUUn2 bUUn2 | bUM2 | 2 | VER |
| | mxx2 | mxx2 | 3 | NOM | | haa2 | haa2 | 2 | VER |
| | maa3 | maa3 | 2 | NOM | | kOOp1 khun0 khrap3 | kun0 kap3 | 1 | VER |
| | dOOk1 maaj3 | nO1 maaj3 | 2 | NOM | | waaN0 | taam0 | 1 | VER |
| | klON1 | jON1 | 1 | NOM | | ?op3 ?op3 | ?o3 ?O1 ?o3 ?O1 | 1 | VER |
| | | cON1 | 1 | NOM | | | co3 ?o1 co3 ?o1 | 1 | VER |
| | thii2 pit1 | thii2 pit1 | 2 | NOM | | joon0 | jon0 | 1 | VER |
| | faa4 | caa4 | 2 | NOM | | tak1 | tak1 tak1 | 1 | VER |
| | nOON3 | nON4 | 2 | NOM | | chUk1 chak1 puun3 puun3 | chUk1 chak1 puun3 puun3 | 1 | VER |
| | | nOON3 | 2 | NOM | | kaa0 waw1 | ka0 waw3 waw2 | 1 | VER |
| | tii1 | cii4 | 2 | NOM | | ?eek1 ?ii3 ?eek2 ?eek2 | ?ek2 ?ek2 | 1 | VER |
| | pan0 | paN0 | 1 | NOM | | hii2 hii2 | hii2 | 1 | VER |
| | mii4 | mii4 | 1 | NOM | | miaw3 miaw3 | miaw3 | 1 | VER |
| | phat3 lom0 | lom0 | 1 | NOM | | puut2 | puut2 | 1 | VER |
| | plaa0 | paa0 | 1 | NOM | | pit1 | pit1 | 1 | VER |
| | nuun2 | nuun2 | 1 | NOM | | ?aap1 naam3 | ?aap1 naam3 | 1 | VER |
| | wii4 | wii0 | 1 | NOM | | miaw4 miaw4 | miaw4 | 1 | VER |
| | sOm2 | com2 com2 | 1 | NOM | | ?a0 raj0 | ?a0 jaj0 | 14 | NOM |
| | cak1 kra0 jaan0 | kan0 | 1 | NOM | | pet1 | pet1 | 4 | NOM |
| | naN4 sUU4 | cuu4 | 1 | NOM | | nok3 | nok3 | 4 | NOM |
| | phOO2 | bOO2 | 1 | NOM | | nOON3 niw0 | nOON3 niw0 | 4 | NOM |
| | | pOO2 | 1 | NOM | | mxxw0 | mxxw0 | 4 | NOM |
| | klON2 | cON2 | 1 | NOM | | maa4 | maa4 laj0 | 3 | NOM |
| | ruup2 | juup2 | 1 | NOM | | liN0 | jiN0 | 3 | NOM |

| Age | Target Words | Children's Productions | Tokens | Sem. | Age | Target Words | Children's Productions | Tokens | Sem. |
|---|---|---|---|---|---|---|---|---|---|
| 18 MO | mxx2 | mxx2 | 3 | NOM | | siN4 too0 | chiN4 too0 | 1 | NOM |
| | maa3 laaj0 | maa3 laaj0 | 2 | NOM | | taw1 | taw0 | 1 | NOM |
| | | maa3 jaaj0 | 1 | NOM | | kop1 | top1 | 1 | NOM |
| | | maa4 laj0 | 1 | NOM | | wxn2 | wxn2 | 1 | NOM |
| | phOO2 | phOO2 | 2 | NOM | | khOON4 | khON4 | 1 | NOM |
| | | pOO2 | 1 | NOM | | nOON3 niw0 | nOON3 niw0 | 1 | NOM |
| | ?xp3 pqn2 | pqn2 | 2 | NOM | | chaaN3 | caaN3 | 1 | NOM |
| | ?a0 Nun1 | Nun1 | 1 | NOM | | pii0 poo2 | pii0 poo2 | 1 | NOM |
| | | jun1. | 1 | NOM | | hip3 poo0 | poo0 | 1 | NOM |
| | luN0 | juN0. | 2 | NOM | | pxxN2 | pxxN2 | 1 | NOM |
| | faa4 | faa4 | 2 | NOM | | chOOn3 | chOOn3 | 1 | NOM |
| | ?an0 nii3 | ?an0 nii3 | 2 | NOM | | kaj1 | taj1 | 1 | NOM |
| | nOOn4 | nOOn4 | 1 | NOM | | nii3 | nii3 | 1 | NOM |
| | khwaaj0 | kwaj0 | 1 | NOM | | tuk3 ka0 taa0 | tuk3 ka0 caa0 | 1 | NOM |
| | jaaj0 | jaaj0 | 1 | NOM | | rot3 | jot3 | 1 | NOM |
| | nok3 kxxw2 | nok3 kxxw2 | 1 | NOM | | khrUaN2 bin0 | bin0 | 1 | NOM |
| | mii4 | mii4 | 1 | NOM | | rot3 faj0 | jot3 faj0 | 2 | NOM |
| | sUa4 | hUa4 | 1 | NOM | | maa3 | maa3 | 1 | NOM |
| | nok3 juuN0 | juuN0 | 1 | NOM | | kluaj2 | kuaj2 | 1 | NOM |
| | | nok3 juN0 | 1 | NOM | | phii2 naa0 | pii2 naa0 | 1 | NOM |
| | nii2 | nii2 | 1 | NOM | | fan0 | fan0 | 1 | NOM |
| | daj0 noo0 saw4 | caw4 | 1 | NOM | | klON2 | kON2 | 1 | NOM |
| | ma3 Neek1 | ma3 ?eek1 | 1 | NOM | | maj2 | maj2 | 2 | REL |
| | phii2 | phii2 | 1 | NOM | | lqqj0 | bqqj0 | 2 | REL |
| | nok3 huuk2 | nok3 huuk2 | 1 | NOM | | daaj2 | daj2 | 1 | REL |
| | kha0 ja1 | ja1 | 1 | NOM | | kOOn1 | cOOn1 | 1 | REL |
| | plaa0 | paa0 | 1 | NOM | | pUN2 | pUN2 | 5 | VER |
| | ta0 klaa2 | ta1 kaa2 | 1 | NOM | | sii4 dam0 | chii4 dam0 | 2 | VER |
| | fa3 raN1 | fa3 jaN1 | 1 | NOM | | | sii4 dam0 | 1 | VER |
| | ma3 phraaw3 | paaw3 | 1 | NOM | | sii4 khiaw4 | chii4 khiaw1 | 2 | VER |
| | ta0 kiap1 | ke0 jOOt1 | 1 | NOM | | | khiaw4 khiaw4 | 1 | VER |
| | ma3 la3 kOO0 | tOO0 | 1 | NOM | | cep1 | cep1 | 2 | VER |
| | cak1 kra0 jaan0 | cak1 ca0 jaan0 | 1 | NOM | | sii4 ?a0 raj0 | chii4 jaj0 | 1 | VER |
| | pra0 tuu0 | pa0 cuu0 | 1 | NOM | | | cii4 jaj0 | 1 | VER |

| Age | Target Words | Children's Productions | Tokens | Sem. | Age | Target Words | Children's Productions | Tokens | Sem. |
|---|---|---|---|---|---|---|---|---|---|
| 18 MO | khan0 | khan0 | 2 | VER | | thuu4 | thuu4 | 1 | VER |
| | men4 | men4 | 2 | VER | | ?aw0 | ?aw0 | 1 | VER |
| | chOOp2 | chOOp2 | 1 | VER | | bin0 | bin0 | 1 | VER |
| | sii4 som2 | sii4 com2 | 1 | VER | | klap1 | kap1 | 1 | VER |
| | maak2 | maak2 | 1 | VER | | maa4 | maa4 | 6 | NOM |
| | sut1 sut1 | sut1 sut1 | 1 | VER | | nOON3 pan0 | nOON3 pan0 | 5 | NOM |
| | phia3 | phia3 | 1 | VER | | ?aa0 maa2 | ?aa0 maa2 | 4 | NOM |
| 21 MO | paj0 | paj0 | 12 | VER | | ?aa0 koN0 | ?aa0 koN0 | 4 | NOM |
| | rON3 | jOON3 | 7 | VER | | | ?aa0 coN0 | 1 | NOM |
| | | lOON2 | 2 | VER | | nii2 | nii2 | 4 | NOM |
| | haj2 | haj2 | 4 | VER | | tha0 lee0 | ta0 jee0 | 4 | NOM |
| | maa0 | maa0 | 3 | VER | | rot3 | lot3 | 1 | NOM |
| | kx1 | kx1 | 3 | VER | | | jot3 | 1 | NOM |
| | naN2 | naN2 | 3 | VER | | | ?ot3 | 1 | NOM |
| | khOO4 | khOO4 | 3 | VER | | mxx2 ?uan2 | mxx2 ?uan2 | 3 | NOM |
| | tii0 | tii0 | 2 | VER | | | mxx2 duan2 | 1 | NOM |
| | loN0 | loN0 | 1 | VER | | nom0 | nom0 | 3 | NOM |
| | | joN0 | 1 | VER | | maaj3 | maaj3 | 3 | NOM |
| | khaap2 | khaap2 | 2 | VER | | luN0 jooN2 | luN0 jooN2 | 2 | NOM |
| | rOON3 phleeN0 | jON3 beN0 | 2 | VER | | rot3 keN4 | lot3 keN4 | 2 | NOM |
| | waj3 | waj3 | 2 | VER | | huu4 | huu4 | 2 | NOM |
| | lom3 | ?om3 | 2 | VER | | mxxN0 mum0 | mxxN0 mum0 | 2 | NOM |
| | khUn2 | khUn2 | 1 | VER | | luN0 | luN0 | 1 | NOM |
| | cap1 | cap1 | 1 | VER | | lUat2 | lUat2 | 1 | NOM |
| | bOk3 bOk3 | pOk3 pOk3 | 1 | VER | | mOO4 | mOO0 | 1 | NOM |
| | laj4 | laj4 | 1 | VER | | jaa0 | jaa0 | 1 | NOM |
| | chiit1 | chiit1 | 1 | VER | | ?ii3 Naaw1 | ?ii3 Naw4 | 1 | NOM |
| | phia3 | pia3 | 1 | VER | | nOON3 niw0 | nOON3 niw0 | 1 | NOM |
| | chon0 | chon | 1 | VER | | khun0 phOO2 ?an4 | khun0 phOO2 ?an4 | 1 | NOM |
| | thoo0 (ra0 sap1) | thoo0 | 1 | VER | | faj0 | faj0 | 1 | NOM |
| | phuut2 | phuut2 | 1 | VER | | ?an0 nia3 | ?an0 nia3 | 1 | NOM |
| | kin0 | kin0 | 1 | VER | | khun0 mxx2 ?uan2 | khun0 mxx2 ?uan2 | 1 | NOM |
| | laaN3 | laaN3 | 1 | VER | | khOON4 | khOON4 | 1 | NOM |
| | tOO1 | cOO1 | 1 | VER | | naj4 | naj4 | 1 | NOM |

| Age | Target Words | Children's Productions | Tokens | Sem. | Age | Target Words | Children's Productions | Tokens | Sem. |
|---|---|---|---|---|---|---|---|---|---|
| 21 MO | man0 | man0 | 1 | NOM | | daN0 | daN0 | 6 | VER |
| | hON2 ?xx0 | hON2 ?xx0 | 1 | NOM | | dii0 | dii0 | 5 | VER |
| | mxx2 | mxx2 ?uan2 | 1 | NOM | | mot1 | mot1 | 4 | VER |
| | rot3 ciw4 | ?ot3 ciw4 | 1 | NOM | | juu1 | juu1 | 3 | VER |
| | khOON4 len2 | khOON4 jen2 | 1 | NOM | | mii0 | mii0 | 2 | VER |
| | kha0 nom4 | kha0 nom4 | 1 | NOM | | sii4 ?a0 raj0 | sii4 ?a0 jaj0 | 2 | VER |
| | nia2 | nia2 | 1 | NOM | | sii4 chom0 phuu0 | chii4 chom0 puu0 | 1 | VER |
| | ma0 lxxN0 saap1 | mxxN0 chaap1 | 1 | NOM | | phaN0 | phaN0 | 1 | VER |
| | mOO0 tqq0 saj0 | mOO0 chaj0 | 1 | NOM | | hiw4 | hiw4 | 1 | VER |
| | baan2 | baan2 | 1 | NOM | | khan0 | khan0 | 1 | VER |
| | pik3 ka0 cuu0 | wik3 ka0 cuu0 | 1 | NOM | | sii4 som2 | sii4 som2 | 1 | VER |
| | taw1 | taw1 | 1 | NOM | | sii4 dxxN0 | sii4 dxxN0 | 1 | VER |
| | maj2 | maj2 | 19 | REL | | sii4 khiaw4 | sii4 khiaw0 | 1 | VER |
| | lqqj0 | ?qqj0 | 1 | REL | | jq3 jx3 | jq3 jx3 | 1 | VER |
| | | jqqj0 | 11 | REL | 24 MO | ?aw0 | ?aw0 | 13 | VER |
| | duaj2 | duaj2 | 8 | REL | | haj2 | haj2 | 10 | VER |
| | kap1 | kap1 | 6 | REL | | paj0 | paj0 | 7 | VER |
| | ?a1 | ?a1 | 5 | REL | | pqqt1 | pqqt1 | 5 | VER |
| | daaj2 | daaj2 | 5 | REL | | maa0 | maa0 | 3 | VER |
| | lxxw3 | jxxw3 | 4 | REL | | fiaN2 / khwiaN2 | wiaN2 | 2 | VER |
| | khrap3 | khap3 | 4 | REL | | kat1 | kat1 | 2 | VER |
| | ?uj2 | ?uj2 | 4 | REL | | tii0 | tii0 | 1 | VER |
| | kwaa1 | kwaa1 | 4 | REL | | | cii0 | 1 | VER |
| | maN2 | maN2 | 3 | REL | | jiap1 | jiap1 | 2 | VER |
| | nOj1 | nOj1 | 2 | REL | | sUU3 | chUU3 | 2 | VER |
| | si1 | si1 | 2 | REL | | pit1 | pit1 | 2 | VER |
| | lx1 | lx1 | 1 | REL | | dom0 | dom0 | 1 | VER |
| | na1 | na3 | 1 | REL | | duu0 | duu0 | 1 | VER |
| | kan0 | kan0 | 1 | REL | | bxN1 | bxN1 | 1 | VER |
| | ?oo2 hoo4 | ?oo2 hoo4 | 1 | REL | | chon0 | chon0 | 1 | VER |
| | chaj2 | chaj2 | 1 | REL | | tot1 | zot1 | 1 | VER |
| | lqq4 | ?qq4 | 1 | REL | | ?uut3 ?uut3 | ?ut3 ?ut3 | 1 | VER |
| | sii4 | sii4 | 1 | VER | | rOON3 | dOON3 | 1 | VER |
| | jaa1 | jaa4 | 1 | REL | | phan0 | phan0 | 1 | VER |

| Age | Target Words | Children's Productions | Tokens | Sem. | Age | Target Words | Children's Productions | Tokens | Sem. |
|---|---|---|---|---|---|---|---|---|---|
| 24 MO | waaN0 | waaN0 | 1 | VER | | muu4 | muu4 | 1 | NOM |
| | te1 | te1 | 1 | VER | | man0 | man0 | 1 | NOM |
| | thee0 | thee0 | 1 | VER | | sOO4 cOO0 rOO0 | sOO4 cOO0 jOO0 | 1 | NOM |
| | khOOp1 khun0 | khOp1 khun0 | 1 | VER | | khOON4 len2 | khOON4 jrn2 | 1 | NOM |
| | nOON3 pan0 | nOON3 pan0 | 13 | NOM | | phii2 | phii2 | 1 | NOM |
| | | pan0 | 3 | NOM | | ?an0 nii3 | ?an0 nii3 | 1 | NOM |
| | nii2 | nii2 | 6 | NOM | | maj2 | maj2 | 13 | REL |
| | kxxw2 | kxxw2 | 5 | NOM | | kOOn1 | kOOn1 | 11 | REL |
| | sUa4 | sUa4 | 4 | NOM | | ?a1 | ?a1 | 7 | REL |
| | phOO2 ?an4 | phOO2 ?an4 | 3 | NOM | | ca1 | ca0 | 4 | REL |
| | khaw4 / khaw3 | kaw3 | 3 | NOM | | naj0 | naj0 | 3 | REL |
| | waj3 (dog's name) | waj3 | 4 | NOM | | lxxw3 | lxxw3 | 3 | REL |
| | naam3 | naam3 | 9 | NOM | | ?ooj2 | ?oj2 | 2 | REL |
| | khun0 paa2 | khun0 paa2 | 3 | NOM | | Naj0 | Naj0 | 2 | REL |
| | | paa2 | 1 | NOM | | nOj1 | nOj1 | 2 | REL |
| | bOp3 bii2 | bOp3 bii2 | 2 | NOM | | khrap3 | kap3 | 1 | REL |
| | liN1 | jiN0 | 2 | NOM | | | khap3 | 1 | REL |
| | khOON4 | khOON4 | 2 | NOM | | laN4 | laN4 | 1 | REL |
| | kOO0 kaj1 | kOO0 kaj1 | 2 | NOM | | khaaN2 laaN2 | haN2 laaN2 | 1 | REL |
| | bik3 sii0 | bik3 sii0 | 2 | NOM | | | jaan2 | 1 | REL |
| | ?aj2 pan0 | ?aj1 pan0 | 2 | NOM | | kOO2 | kOO2 | 1 | REL |
| | khxn0 taa0 luup3 | khxn0 taa0 tuup3 | 1 | NOM | | lqqj0 | ?qqj0 | 1 | REL |
| | baan2 | baan2 | 1 | NOM | | na3 | na3 | 1 | REL |
| | som2 | som2 | 1 | NOM | | ?Um2 | ?Um2 | 1 | REL |
| | hON2 | hON2 | 1 | NOM | | chaj2 | chaj2 | 1 | REL |
| | nom4 | nom4 | 1 | NOM | | rU3 plaaw1 | la3 pa2 | 1 | REL |
| | jaa0 dom0 | jaa0 jom0 | 1 | NOM | | diaw4 | da4 | 1 | REL |
| | maaj3 | maaj3 | 1 | NOM | | hqj3 | haj3 | 1 | REL |
| | kOp3 | kOp3 | 1 | NOM | | si1 | si1 | 1 | REL |
| | cOO0 ra0 khee2 | cOO0 ja0 khee2 | 1 | NOM | | khrap3 phom4 | pom4 | 1 | REL |
| | kha0 nom4 | kha0 nom4 | 1 | NOM | | ?uj2 | ?uj2 | 1 | REL |
| | dak3 pet1 | dOk3 pet1 | 1 | NOM | | juu1 | juu1 | 6 | VER |
| | maa4 | maa4 | 1 | NOM | | mii0 | mii0 | 5 | VER |
| | rot3 | jot3 | 1 | NOM | | ta0 lok1 | ta0 lok1 | 3 | VER |

| Age | Target Words | Children's Productions | Tokens | Sem. |
|---|---|---|---|---|
| 24 MO | | lok1 | 3 | VER |
| | pen0 | pen0 | 2 | VER |
| | phOO0 | phOO0 | 2 | VER |
| | lq3 | lq3 | 1 | VER |
| | daN0 | daN0 | 1 | VER |
| | daaj2 | daj2 | 1 | VER |
| | klua0 | kua0 | 1 | VER |
| | dUU2 | dUU2 | 1 | VER |
| | jq3 | jq3 jx3 | 1 | VER |
| | nxn2 | nxn2 | 1 | VER |
| | ?un1 | ?un0 | 1 | VER |
| | jen0 | jen0 | 1 | VER |

**Participant: L10**

| Age | Target Words | Children's Productions | Tokens | Sem. |
|---|---|---|---|---|
| 12 MO | mam1 mam1 | ?a1 mx1 | 1 | VER |
| | | ?a1 mam1 mam1 mam1 | 1 | VER |
| 15 MO | mam1 mam1/mxm1 mxm1 | mxm1 | 18 | VER |
| | | ma1 | 1 | VER |
| | | ?a1 mam1 | 1 | VER |
| | naam3 | naam3 | 1 | NOM |
| | nOON3 maj4 | maj4 | 1 | NOM |
| 18 MO | nOOn0 | nOOn0 | 9 | VER |
| | duu0 | duu0 | 5 | VER |
| | kep1 | kep1 | 5 | VER |
| | paj0 | paj0 | 4 | VER |
| | kin0 | cin0 | 2 | VER |
| | | kin0 | 1 | VER |
| | pit1 | pit1 | 2 | VER |
| | miaw3 miaw3 | miaw3 | 1 | VER |
| | hOOm4 | ?Om4 | 1 | VER |
| | len2 | len2 | 1 | VER |
| | haj2 | haj2 | 1 | VER |

| Age | Target Words | Children's Productions | Tokens | Sem. |
|---|---|---|---|---|
| | ?am2 | ?am2 | 1 | VER |
| | kOOt1 | cOOt1 | 1 | VER |
| | | kOOt1 | 1 | VER |
| | pit1 | pit3 | 1 | VER |
| | ?aa2 | ?aa2 | 1 | VER |
| | cON2 | cON2 | 1 | VER |
| | khaj4 | khaj4 | 1 | VER |
| | pqqt1 | pat1 | 1 | VER |
| | fak3 thOON0 | tOON0 | 8 | NOM |
| | rOON0 thaaw3 | taaw3 | 6 | NOM |
| | | thaaw3 | 2 | NOM |
| | nOON3 | nOON3 | 5 | NOM |
| | kaj1 | kaj1 | 4 | NOM |
| | som2 | tom2 | 4 | NOM |
| | taN0 | taN0 | 5 | NOM |
| | | taaN3 | 2 | NOM |
| | | taN4 | 1 | NOM |
| | nii2 | nii2 | 3 | NOM |
| | nuu4 | nuu4 | 3 | NOM |
| | naN4 | naN0 | 3 | NOM |
| | ?un0 taa2 mxxn0 | mxxn4 | 1 | NOM |
| | | mxxn0 | 2 | NOM |
| | pet1 | pet1 | 2 | NOM |
| | ciN2 cok1 | cok1 | 1 | NOM |
| | | ?ok1 | 1 | NOM |
| | | ?ii0 cok1 | 1 | NOM |
| | naj4 | naj4 | 2 | NOM |
| | nok3 | nok3 | 2 | NOM |
| | plaa0 mUk1 | mq1 | 1 | NOM |
| | | ma1 | 1 | NOM |
| | (nOON3) maj4 | maj4 | 2 | NOM |
| | sa0 dUU0 | dii0 | 2 | NOM |
| | taa0 | taa0 | 2 | NOM |
| | chaaN3 | taaN3 | 2 | NOM |

| Age | Target Words | Children's Productions | Tokens | Sem. | Age | Target Words | Children's Productions | Tokens | Sem. |
|---|---|---|---|---|---|---|---|---|---|
| 18 MO | | caaN3 | 1 | NOM | | maj2 | maj2 | 5 | REL |
| | khxxn4 | kxn4 | 2 | NOM | | daaj2 | daj2 | 3 | REL |
| | maa4 | maa4 | 1 | NOM | | mii0 | mii0 | 2 | VER |
| | plaa2 | paa2 | 1 | NOM | | dii0 | dii0 | 2 | VER |
| | phuu2 jiN4 | jiN4 | 1 | NOM | | keN1 | keN1 | 1 | VER |
| | | niN4 | 1 | NOM | | ?a0 rOj1 | wOj1 | 1 | VER |
| | muak1 | mo1 | 1 | NOM | | cep1 | cep1 cep1 | 1 | VER |
| | rom2 | tom2 | 1 | NOM | | lap1 | ?aap0 | 1 | VER |
| | muu4 | ?uu4 | 1 | NOM | | troN0 | toN0 | 1 | VER |
| | ?xp3 pqn2 | bxn2 | 1 | NOM | | hen4 | hen4 | 1 | VER |
| | | pqn2 | 1 | NOM | | boo4 | boo4 | 1 | VER |
| | cOO0 ra0 khee2 | kee2 | 1 | NOM | 21 MO | nOOn0 | nOOn0 | 7 | VER |
| | kha0 nom4 | nom4 | 1 | NOM | | | ton0 | 1 | VER |
| | nOON3 | nOON0 | 1 | NOM | | | nOON0 | 1 | VER |
| | mot3 | mqt3 | 1 | NOM | | mam1 mam1 | mam1 | 8 | VER |
| | kluaj2 | tOj2 | 1 | NOM | | kep1 | kep1 | 8 | VER |
| | ca0 muuk1 | muuk1 | 1 | NOM | | tUUn1 | cin1 | 4 | VER |
| | | mu1 | 1 | NOM | | paj0 | paj0 | 4 | VER |
| | khrUan2 bin0 | bin0 | 1 | NOM | | khian4 | kian4 | 4 | VER |
| | khiw3 | kiw3 | 1 | NOM | | len2 | cen2 | 2 | VER |
| | kxxm2 | kxxm2 | 1 | NOM | | | jen2 | 1 | VER |
| | paak1 | paak1 | 1 | NOM | | khOO4 | cOO4 | 2 | VER |
| | maa3 | mx3 | 1 | NOM | | | jOO0 | 1 | VER |
| | maaj3 | maaj3 | 1 | NOM | | duu0 | cuu0 | 3 | VER |
| | plaa0 | paa0 | 1 | NOM | | kra0 taak3 | caak3 | 1 | VER |
| | ?aj0 tim0 | tim0 | 1 | NOM | | | tuu0 taak3 tuu0 taak3 | 1 | VER |
| | huu4 | huu4 | 1 | NOM | | | taak3 | 2 | VER |
| | naa2 phaak1 | pa1 | 1 | NOM | | ?aw0 | ?aw0 | 1 | VER |
| | kra0 paw4 | paw4 | 1 | NOM | | | naw0 | 1 | VER |
| | kun0 cxx0 | cxx0 | 1 | NOM | | haa4 | haa0 | 2 | VER |
| | kuk3 kaj1 | tak3 taj1 | 1 | NOM | | ?am2 | ?am2 | 2 | VER |
| | khuat1 | kuat1 | 1 | NOM | | phuuk1 | puuk1 | 2 | VER |
| | thoN0 thaj0 | too0 taj0 | 1 | NOM | | jUUn0 | jUUn0 | 1 | VER |
| | ?a1 | ?a1 | 6 | REL | | chuaj2 | cuaj2 | 1 | VER |

| Age | Target Words | Children's Productions | Tokens | Sem. | Age | Target Words | Children's Productions | Tokens | Sem. |
|---|---|---|---|---|---|---|---|---|---|
| 21 MO | jip1 | cip1 | 1 | VER | | baan2 | baan2 | 2 | NOM |
| | ?aan1 | naan1 | 1 | VER | | taw1 | caw1 | 2 | NOM |
| | phuuk1 | cuk1 | 1 | VER | | maaj3 | maj3 | 2 | NOM |
| | kin0 | kin0 | 1 | VER | | plaa0 mUk1 | mUk1 | 2 | NOM |
| | naj4 | naj4 | 36 | NOM | | tiw4 | ciw4 | 2 | NOM |
| | mxx2 | mxx2 | 16 | NOM | | kwaaN0 | caaN0 | 1 | NOM |
| | ?aj0 tim0 | cim0 | 10 | NOM | | NuaN0 | NaaN0 | 1 | NOM |
| | nOON3 | nOON3 | 9 | NOM | | kha0 nom4 | jom4 | 1 | NOM |
| | taN0 | caN0 | 8 | NOM | | liN0 | ciN0 | 1 | NOM |
| | paak1 kaa0 | kaa0 | 6 | NOM | | siN4 too0 | cxxN0 cOO0 | 1 | NOM |
| | | taa0 | 1 | NOM | | nOO0 | nOO0 | 1 | NOM |
| | chaaN3 | chaaN3 | 2 | NOM | | hip3 poo0 | poo0 | 1 | NOM |
| | | caaN3 | 5 | NOM | | nuun2 | nuun2 | 1 | NOM |
| | ?uut1 | tuut1 | 4 | NOM | | maa4 | maa4 | 1 | NOM |
| | nia0 | nia0 | 4 | NOM | | maj4 | maj4 | 1 | NOM |
| | plOOj0 | pOj0 | 4 | NOM | | phuu2 jiN4 | jiN4 | 1 | NOM |
| | luN0 | ?uN0 | 2 | NOM | | ton2 maaj3 | con2 maj3 | 1 | NOM |
| | | luN0 | 1 | NOM | | dOOk1 maaj3 | dOk1 maj3 | 1 | NOM |
| | jii0 raap3 | jii0 laap3 | 2 | NOM | | thoN0 | toN0 | 1 | NOM |
| | | dii0 laap3 | 1 | NOM | | lek3 | jek3 | 1 | NOM |
| | | laap3 | 2 | NOM | | koot3 | koot3 | 1 | NOM |
| | | jaap3 | 1 | NOM | | cuu0 nia1 | cuu0 nia1 | 1 | NOM |
| | haan1 | naan1 | 1 | NOM | | fak3 thOON0 | tOON0 | 1 | NOM |
| | | Naan1 | 1 | NOM | | nok3 | nok3 | 1 | NOM |
| | | haan1 | 1 | NOM | | nia2 | nia2 | 1 | NOM |
| | cii0 | cii0 | 3 | NOM | | rOON0 thaaw3 | jON0 taaw3 | 1 | NOM |
| | sia3 | cia3 | 3 | NOM | | phOO2 | pOO2 | 1 | NOM |
| | luaN4 | ?uaN4 | 2 | NOM | | naaj0 | naaj0 | 1 | NOM |
| | | cuaN4 | 1 | NOM | | tOk3 | tOk3 | 1 | NOM |
| | phii2 | pii2 | 3 | NOM | | pOO0 | pOO0 | 1 | NOM |
| | sUa4 | cUa4 | 4 | NOM | | jaaj0 | jaaj0 | 1 | NOM |
| | nuu4 | nOO4 | 2 | NOM | | thin4 | cin4 | 1 | NOM |
| | rxt2 | cet2 | 2 | NOM | | nii2 | nii2 | 1 | NOM |
| | kaj1 | kaj1 | 2 | NOM | | chaj2 | caj2 | 3 | REL |

| Age | Target Words | Children's Productions | Tokens | Sem. | Age | Target Words | Children's Productions | Tokens | Sem. |
|---|---|---|---|---|---|---|---|---|---|
| 21 MO | | ?aj2 | 1 | REL | | | haj1 | 1 | VER |
| | | jaj2 | 1 | REL | | han0 loo4 | loo4 | 3 | VER |
| | lxxw3 | cxxw3 | 1 | REL | | maa0 | maa0 | 2 | VER |
| | | jxxw3 | 2 | REL | | waj3 | waj3 | 1 | VER |
| | | kxxw3 | 1 | REL | | | paj3 | 1 | VER |
| | maj2 | maj0 | 1 | REL | | rii1 | ?e2 | 1 | VER |
| | | maj2 | 2 | REL | | chii1 | cii1 | 1 | VER |
| | naj4 | naj4 | 2 | NOM | | duu0 | duu0 | 1 | VER |
| | chaaw3 | caap3 | 1 | REL | | jOOt1 | jOOt1 | 1 | VER |
| | kan0 | kan0 | 1 | REL | | khUUn0 | khUUn0 | 1 | VER |
| | sii4 | cii4 | 1 | VER | | kot1 | ?ot1 | 1 | VER |
| | na3 | na3 | 1 | REL | | khOO4 | khOO4 | 1 | VER |
| | ca2 | ca2 | 1 | REL | | thOj4 | thOj4 | 1 | VER |
| | troN0 | toN0 | 1 | VER | | kx1 | kx1 | 1 | VER |
| | mot1 | mut1 | 1 | VER | | nOOn0 | nOOn0 | 1 | VER |
| | mii0 | mii0 | 1 | VER | | kOOt1 | ka0 | 1 | VER |
| | sii4 dam0 | cii4 dam0 | 1 | VER | | loN0 | loN0 | 1 | VER |
| | niN2 | ciN2 | 1 | VER | | haa4 | haa4 | 1 | VER |
| | chqqj4 | cqj4 | 1 | VER | | kha0 jaw1 | jaw1 | 1 | VER |
| 24 MO | sa1 | ca1 | 5 | VER | | thUU4 | tU3 | 1 | VER |
| | | la1 | 1 | VER | | khwaaN2 | ?aaN2 | 1 | VER |
| | rat3 | lat3 | 5 | VER | | phii2 | phii2 | 26 | NOM |
| | ?aw0 | ?aw0 | 4 | VER | | naj4 | naj4 | 23 | NOM |
| | | ?a1 | 1 | VER | | khOON4 | hON4 | 16 | NOM |
| | len2 | len2 | 5 | VER | | rxxp3 bit1 | lxp3 bit1 | 12 | NOM |
| | kin0 | kin0 | 5 | VER | | mxx2 | mxx2 | 10 | NOM |
| | haj2 | haj2 | 2 | VER | | phom4 | hom4 | 6 | NOM |
| | | ?aj2 | 3 | VER | | | thom4 | 2 | NOM |
| | faak1 | faak1 | 3 | VER | | nuu4 | nuu4 | 8 | NOM |
| | | paak1 | 2 | VER | | mii4 | mii4 | 7 | NOM |
| | naN2 | naN2 | 4 | VER | | ?an0 nii3 | nii3 | 6 | NOM |
| | thuam2 | tum2 | 4 | VER | | | ?an0 nii3 | 3 | NOM |
| | paj0 | paj0 | 4 | VER | | nom0 | nom0 | 5 | NOM |
| | saj1 | caj1 | 2 | VER | | nii2 | nii2 | 4 | NOM |

| Age | Target Words | Children's Productions | Tokens | Sem. | Age | Target Words | Children's Productions | Tokens | Sem. |
|---|---|---|---|---|---|---|---|---|---|
| 24 MO | mii4 phuu0 | mii4 puu0 | 3 | NOM | | khuat1 | khuat1 | 1 | NOM |
| | | mii4 phuu0 | 1 | NOM | | luN0 lek3 | luN0 lek3 | 1 | NOM |
| | | phuu0 | 1 | NOM | | nOON3 tOON0 | nOON3 nOON3 tOON0 | 1 | NOM |
| | | puu0 | 2 | NOM | | ?an0 noon3 | noon3 | 1 | NOM |
| | ca0 muuk1 | muuk1 | 4 | NOM | | khim4 | kim4 | 1 | NOM |
| | nOON3 tOON0 | nOON3 tOON0 | 1 | NOM | | jaaj0 kqqt1 | jaj0 ?qt1 | 1 | NOM |
| | | nOON3 cOON0 | 3 | NOM | | ?an0 nuun3 | nuun3 | 1 | NOM |
| | maj4 | maj4 | 4 | NOM | | klON2 | tON2 | 1 | NOM |
| | kra0 taaj1 | taaj1 | 4 | NOM | | maj2 | maj2 | 7 | REL |
| | phra3 | pha3 | 3 | NOM | | laN4 | laN4 | 3 | REL |
| | puu0 | puu4 | 1 | NOM | | lxxw3 | jxxw3 | 2 | REL |
| | | puu0 | 2 | NOM | | | lxxw3 | 1 | REL |
| | huu4 | huu4 | 2 | NOM | | duaj2 | duaj2 | 3 | REL |
| | paak1 | paak1 | 2 | NOM | | maj1 | maj1 | 2 | REL |
| | wat3 | wat3 | 1 | NOM | | na3 | na3 | 2 | REL |
| | | bat3 | 1 | NOM | | ?a1 | ?a1 | 2 | REL |
| | nom0 klON1 | nom0 cON1 | 1 | NOM | | laaN2 | laaN2 | 1 | REL |
| | | nom0 pON1 | 1 | NOM | | ca2 | ca2 | 1 | REL |
| | troN0 naj4 | toN0 naj4 | 1 | NOM | | daaj2 | daj2 | 1 | REL |
| | | coN0 naj4 | 1 | NOM | | chaj2 | thaj2 | 1 | REL |
| | luN0 | luN0 | 2 | NOM | | ?Um0 | ?Um0 | 1 | REL |
| | phOO2 | phOO2 | 2 | NOM | | tON2 | tON2 | 1 | REL |
| | luuk2 | juuk2 | 2 | NOM | | ciN0 | ?iN0 | 1 | REL |
| | pet1 | pet1 | 2 | NOM | | juu1 | juu1 | 6 | VER |
| | paa2 tuk3 | paa2 | 1 | NOM | | priaw2 | piaw2 | 5 | VER |
| | | paa2 tuk3 | 1 | NOM | | cep1 | cep1 | 2 | VER |
| | chaaN3 | haaN3 | 1 | NOM | | jq3 | jq3 | 2 | VER |
| | hip3 poo0 | ?ip3 poo0 | 1 | NOM | | cop1 | cop1 | 2 | VER |
| | phii2 tuk3 | phii2 tuk3 | 1 | NOM | | khit3 thUN4 | tUN4 | 1 | VER |
| | tua0 nan3 | tua0 nan3 | 1 | NOM | | jaaw0 | jaaw0 | 1 | VER |
| | naN4 jaaN0 | caN0 | 1 | NOM | | rew0 | lew0 | 1 | VER |
| | mOOn4 | mOOn4 | 1 | NOM | | phOO0 | phOO0 | 1 | VER |
| | pep3 sii2 | pep3 cii2 | 1 | NOM | | ?a0 rOj1 | lOj1 | 1 | VER |
| | dek1 | dek1 | 1 | NOM | | lUUm0 | lUUm0 | 1 | VER |

# APPENDIX E

Appendix E comprises data of 10 Thai children production from, 9 to 24 months, elicited from the QWAT (The questionnaire of word acquisition in Thai). Parents of the 10 children were asked to report their children's production of polysyllabic words listed in the questionnaire. In relation to the acquisition of accentual system, children's production of monosyllabic and disyllabic one-word utterances of the adult's polysyllabic target words was investigated. Tables in Appendix E also provide the frequency of number of children who produced the particular items (n=10). (See Section 4.3).

**Productions of Polysyllabic Words by 10Thai Children from 9 to 24 Months**
**[Classified by Type/s of Accented Syllable/s Being Pronounced]**

**1. Primary Accented Syllable** (The last syllable only)

| Target Words | Children's Productions | Meanings | Tokens (Age in Months) | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | 9 | 12 | 15 | 18 | 21 | 24 |
| /ciN2 'cok1/ | [cok1] | lizard | 0 | 1 | 4 | 6 | 6 | 6 |
| /kun0 'cxx0/ | [cxx0] | key | 0 | 1 | 2 | 4 | 6 | 6 |
| /?a0 'raj0/ | [raj0] | what | 0 | 0 | 2 | 2 | 3 | 3 |
| /kuaj4 'tiaw4/ | [tiaw4] | noodle | 0 | 0 | 1 | 3 | 4 | 5 |
| /ta0 'kraa2/ | [kraa2] | basket | 0 | 0 | 1 | 1 | 1 | 1 |
| /kaaN0 'keeN0/ | [keeN0] | plants | 0 | 0 | 1 | 6 | 7 | 6 |
| /kra0 'cok1/ | [cok1] | mirror | 0 | 0 | 1 | 1 | 1 | 1 |
| /pep3 'sii2/ | [sii2] | pepsi cola | 0 | 0 | 1 | 4 | 7 | 5 |
| /sa0 'dUU0/ | [dUU0] | navel | 0 | 0 | 2 | 4 | 7 | 7 |
| /kra0 'taaj1/ | [taaj1] | rabbit | 0 | 0 | 1 | 4 | 4 | 3 |
| /?aj0 'tim0/ | [tim0] | ice-cream | 0 | 0 | 1 | 4 | 4 | 3 |
| /pra0 'tuu0/ | [tuu0] | door | 0 | 0 | 1 | 4 | 5 | 3 |
| /kaa0 'tuun0/ | [tuun0] | cartoon | 0 | 0 | 2 | 2 | 2 | 2 |
| /sa0 'buu1/ | [buu1] | soap | 0 | 0 | 1 | 5 | 6 | 6 |
| /kra0 'pON4/ | [pON4] | can | 0 | 0 | 1 | 1 | 1 | 1 |
| /kra0 'paw4/ | [paw4] | bag, purse | 0 | 0 | 2 | 4 | 7 | 6 |
| /?xp3 'pqn2/ | [pqn2] | apple | 0 | 0 | 2 | 2 | 2 | 1 |
| /chom0 'phuu2/ | [phuu2] | rose-apple | 0 | 0 | 1 | 2 | 2 | 2 |
| /phxxm0 'phqt2/ | [phqt2] | diaper | 0 | 0 | 1 | 1 | 1 | 1 |
| /kha0 'ja1/ | [ja1] | rubbish | 0 | 0 | 2 | 2 | 2 | 2 |
| /?a0 'rOj1/ | [rOj1] | delicious | 0 | 0 | 1 | 3 | 3 | 3 |
| /fa3 'raN1/ | [raN1] | guava | 0 | 0 | 1 | 1 | 1 | 1 |
| /naj0 'luaN4/ | [luaN4] | the king | 0 | 0 | 1 | 1 | 1 | 1 |
| /ta0 'kiap1/ | [kiap1] | chopsticks | 0 | 0 | 0 | 1 | 3 | 3 |
| /kiN2 'kaa1/ | [kaa1] | chameleon | 0 | 0 | 0 | 1 | 1 | 1 |
| /txk3 'sii2/ | [sii2] | taxi | 0 | 0 | 0 | 1 | 1 | 1 |
| /kra0 'daat1/ | [daat1] | tissue paper | 0 | 0 | 0 | 1 | 3 | 2 |
| /ban0 'daj0/ | [daj0] | ladders | 0 | 0 | 0 | 1 | 3 | 3 |
| /kra0 'thoon4/ | [thoon4] | spittoon | 0 | 0 | 0 | 1 | 2 | 2 |
| /ma0 'muaN2/ | [muaN2] | mango | 0 | 0 | 0 | 1 | 1 | 1 |
| /dq1 'mOO0/ | [mOO0] | mall | 0 | 0 | 0 | 1 | 2 | 2 |
| /jii0 'raap3/ | [raap3] | giraffe | 0 | 0 | 0 | 3 | 3 | 2 |
| /?a0 'Nun1/ | [Nun1] | grapes | 0 | 0 | 0 | 2 | 3 | 3 |
| /kha0 'nun4/ | [nun4] | jackfruit | 0 | 0 | 0 | 1 | 1 | 1 |
| /ca0 'muuk1/ | [muuk1] | nose | 0 | 0 | 0 | 4 | 6 | 6 |
| /tam0 'ruat1/ | [ruat1] | policeman | 0 | 0 | 0 | 2 | 3 | 1 |
| /?aa0 'haan4/ | [haan4] | food | 0 | 0 | 0 | 1 | 1 | 1 |
| /kaaw2 '?ii2/ | [?ii2] | chair | 0 | 0 | 0 | 3 | 4 | 4 |
| /lOON0 'kOON0/ | [kOON0] | Lansium domesticum | 0 | 0 | 0 | 0 | 1 | 1 |
| /kiN1 'kUU0/ | [kUU0] | millepede | 0 | 0 | 0 | 0 | 1 | 1 |
| /kan0 'kraj0/ | [kraj0] | scissors | 0 | 0 | 0 | 0 | 4 | 4 |
| /chxxm0 'phuu0/ | [phuu0] | shampoo | 0 | 0 | 0 | 0 | 1 | 1 |
| /kaa0 'fxx0/ | [fxx0] | coffee | 0 | 0 | 0 | 0 | 1 | 1 |
| /ta0 'lee0/ | [lee0] | sea | 0 | 0 | 0 | 0 | 2 | 2 |
| /kam0 'laj0/ | [laj0] | bracelet | 0 | 0 | 0 | 0 | 1 | 2 |
| /naN4 'sUU4/ | [sUU4] | book | 0 | 0 | 0 | 0 | 1 | 1 |
| /sa0 'naam4/ | [naam4] | playground | 0 | 0 | 0 | 0 | 1 | 1 |
| /kra0 'tha3/ | [tha3] | pan | 0 | 0 | 0 | 0 | 1 | 0 |
| /saa4 'lii2/ | [lii2] | Chinese pear | 0 | 0 | 0 | 0 | 1 | 0 |
| /kra0 'pooN0/ | [pooN0] | skirt | 0 | 0 | 0 | 0 | 1 | 2 |
| /tham0 'maj0/ | [maj0] | why | 0 | 0 | 0 | 0 | 0 | 1 |
| /'fluu0 ?OO0 'raaj0/ | [raaj0] | fluoride | 0 | 0 | 1 | 1 | 1 | 1 |

**Primary Accented Syllable (continue)**

| Target Words | Children's Productions | Meanings | Tokens (Age in Months) | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | 9 | 12 | 15 | 18 | 21 | 24 |
| /'mOO0 tqq0 'saj0/ | [saj0] | motorcycle | 0 | 0 | 2 | 6 | 6 | 7 |
| /'daj0 noo0 'saw4/ | [saw4] | dinosour | 0 | 0 | 1 | 1 | 1 | 1 |
| /'sok1 ka0 'pok1/ | [pok1] | dirty | 0 | 0 | 1 | 2 | 2 | 2 |
| /'ma0 la0 'kOO0/ | [kOO0] | papaya | 0 | 0 | 1 | 2 | 3 | 5 |
| /'tuk3 ka0 'taa0/ | [taa0] | doll | 0 | 0 | 1 | 3 | 3 | 2 |
| /'naa0 li0 'kaa0/ | [kaa0] | clock | 0 | 0 | 2 | 3 | 3 | 3 |
| /'cOO0 ra0 'khee2/ | [khee2] | crocodile | 0 | 0 | 0 | 2 | 3 | 3 |
| /'wii0 dii0 '?oo0/ | [?oo0] | video | 0 | 0 | 0 | 1 | 2 | 2 |
| /kOm0 'piw3 'tqq2/ | [tqq2] | computer | 0 | 0 | 0 | 0 | 2 | 2 |
| /pha0 'jaa0 'baan0/ | [baan0] | nurse | 0 | 0 | 0 | 0 | 1 | 2 |
| /'wit3 tha0 ju3/ | [ju3] | radio | 0 | 0 | 0 | 0 | 2 | 2 |
| /'chOk3 koo0 'lxt3/ | [lxt3] | chocolate | 0 | 0 | 0 | 0 | 0 | 1 |
| /plak3 'faj0/ | [faj0] | plug | 0 | 0 | 1 | 1 | 2 | 2 |
| /naam3 'kxN4/ | [kxN4] | ice | 0 | 0 | 1 | 1 | 1 | 1 |
| /phra3 'can0/ | [can0] | moon | 0 | 0 | 1 | 1 | 1 | 2 |
| /siN 'too0/ | [too0] | lion | 0 | 0 | 1 | 5 | 1 | 4 |
| /rOON0 'thaaw3/ | [thaaw3] | shoes | 0 | 0 | 2 | 5 | 1 | 0 |
| /luuk2 'pooN1/ | [pooN1] | balloon | 0 | 0 | 2 | 6 | 1 | 7 |
| /khoom0 'faj0/ | [khoom0 faj0] | lamp | 0 | 0 | 1 | 3 | 1 | 3 |
| /sa0 'wit3 faj0/ | [faj0] | switch | 0 | 0 | 1 | 1 | 1 | 1 |
| /lOOt1 'faj0/ | [faj0] | bulb | 0 | 0 | 2 | 5 | 8 | 8 |
| /dOOk1 'maaj3/ | [maaj3] | flower | 0 | 0 | 1 | 3 | 3 | 3 |
| /ton2 'maaj3/ | [maaj3] | tree | 0 | 0 | 1 | 4 | 7 | 6 |
| /tuu2 'yen0/ | [yen0] | refrigerator | 0 | 0 | 1 | 2 | 2 | 2 |
| /phat3 'lom0/ | [lom0] | fan | 0 | 0 | 1 | 4 | 4 | 3 |
| /phii4 'sua2/ | [sua2] | butterfly | 0 | 0 | 1 | 2 | 2 | 2 |
| /maaj3 'kwaat1/ | [kwaat1] | bloom | 0 | 0 | 0 | 2 | 3 | 4 |
| /mxx2 'thaw2/ | [thaw2] | grandmother | 0 | 0 | 0 | 1 | 1 | 1 |
| /naam3 'tok1/ | [tok1] | waterfall | 0 | 0 | 0 | 1 | 1 | 1 |
| /wxn2 'taa0/ | [taa0] | glasses | 0 | 0 | 0 | 4 | 1 | 5 |
| /thuN4 'thaaw3/ | [thaaw3] | socks | 0 | 0 | 0 | 4 | 1 | 5 |
| /hON2 'nOOn0/ | [nOOn0] | bedroom | 0 | 0 | 0 | 1 | 1 | 3 |
| /waaj2 'naam3/ | [naam3] | to swim | 0 | 0 | 0 | 2 | 1 | 2 |
| /sa1 'naam3/ | [naam3] | pool | 0 | 0 | 0 | 3 | 1 | 3 |
| /hON2 'naam3/ | [naam3] | bathroom | 0 | 0 | 0 | 1 | 1 | 4 |
| /mxxN0 'mum0/ | [mum0] | spider | 0 | 0 | 0 | 2 | 2 | 2 |
| /baj0 'maaj3/ | [maaj3] | leaf | 0 | 0 | 0 | 1 | 1 | 1 |
| /naam3 'som2/ | [som2] | orange juice | 0 | 0 | 0 | 4 | 4 | 4 |
| /phaa2 'hom1/ | [hom1] | blanket | 0 | 0 | 0 | 3 | 4 | 3 |
| /plaa0 'laj4/ | [laj4] | eel | 0 | 0 | 0 | 1 | 1 | 1 |
| /sOj2 'khOO0/ | [khOO0] | necklace | 0 | 0 | 0 | 0 | 1 | 1 |
| /phOO2 'thaw2/ | [thaw2] | grandfather | 0 | 0 | 0 | 0 | 1 | 1 |
| /fak3 'thOOn0/ | [thOOn0] | pumpkin | 0 | 0 | 0 | 0 | 1 | 1 |
| /khOO4 'thoot2/ | [thoot2] | Im sorry. | 0 | 0 | 0 | 0 | 1 | 1 |
| /fak1 'bua0/ | [bua0] | shower | 0 | 0 | 0 | 0 | 1 | 1 |
| /mii4 'phuu0/ | [phuu0] | POOH | 0 | 0 | 0 | 0 | 1 | 0 |
| /rOON3 'phleeN0/ | [phleeN0] | to sing | 0 | 0 | 0 | 0 | 1 | 0 |
| /thOON3 'faa3/ | [faa3] | sky | 0 | 0 | 0 | 0 | 1 | 3 |
| /rot3 'faj0/ | [faj0] | train | 0 | 0 | 0 | 0 | 1 | 2 |
| /rOON0 'rian0/ | [rian0] | school | 0 | 0 | 0 | 0 | 3 | 3 |
| /khOON4 'len2/ | [len2] | toy | 0 | 0 | 0 | 0 | 1 | 0 |
| /plaa0 'mUk1/ | [mUk1] | squid | 0 | 0 | 0 | 0 | 1 | 0 |
| /phaa2 '?OOm2/ | [?OOm2] | diaper | 0 | 0 | 0 | 0 | 1 | 1 |
| /wan0 'jut1/ | [jut1] | holiday | 0 | 0 | 0 | 0 | 1 | 1 |
| /'phra3 ?aa0 'thit3/ | [thit3] | sun | 0 | 0 | 1 | 2 | 2 | 2 |

**Primary Accented Syllable (continue)**

| Target Words | Children's Productions | Meanings | Tokens (Age in Months) | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | 9 | 12 | 15 | 18 | 21 | 24 |
| /'prxxN0 sii4 'fan0/ | [fan0] | toothbrush | 0 | 0 | 1 | 3 | 3 | 3 |
| /'phaa2 chet3 'tua0/ | [tua0] | towel | 0 | 0 | 0 | 1 | 1 | 2 |
| /kaaN0 'keeN0 'naj0/ | [naj0] | underwear | 0 | 0 | 0 | 0 | 0 | 1 |
| /'phon4 la0 'maaj3/ | [maaj3] | fruit | 0 | 0 | 0 | 0 | 0 | 1 |
| /'rot3 pik3 '?ap2/ | [?ap2] | trunk | 0 | 0 | 0 | 0 | 0 | 1 |
| /khrUaN2 'bin0/ | [bin0] | airplane | 0 | 0 | 2 | 3 | 3 | 3 |
| /naN4 'sUU4/ | [sUU4] | book | 0 | 0 | 1 | 1 | 2 | 2 |
| /nok3 'khaw4/ | [khaw4] | dove | 0 | 0 | 0 | 1 | 1 | 1 |
| /can0 'caaw2/ | [caaw2] | moon | 0 | 0 | 0 | 1 | 1 | 1 |
| /naam3 'phu3/ | [phu3] | waterspring | 0 | 0 | 0 | 3 | 4 | 4 |
| /rot3 'mee0/ | [mee0] | bus | 0 | 0 | 0 | 1 | 2 | 2 |
| /mxxN0 'maw2/ | [maw2] | a kind of insects | 0 | 0 | 0 | 1 | 1 | 1 |
| /txxN0 'moo0/ | [moo0] | watermelon | 0 | 0 | 0 | 3 | 4 | 5 |
| /phuu2 'jiN4/ | [jiN4] | female | 0 | 0 | 0 | 1 | 0 | 1 |
| /luuk2 'thOO3/ | [thOO3] | apricot | 0 | 0 | 0 | 0 | 1 | 1 |
| /naa2 'phaak1/ | [phaak1] | forehead | 0 | 0 | 0 | 0 | 1 | 1 |
| /luuk2 'phlap3/ | [phlap3] | date plum | 0 | 0 | 0 | 0 | 1 | 1 |
| /hun1 'jon0/ | [jon0] | robot | 0 | 0 | 0 | 0 | 1 | 0 |
| /phuu2 'chaaj0/ | [chaaj0] | male | 0 | 0 | 0 | 0 | 0 | 1 |
| /phuu2 'jaj1/ | [jaj1] | adult | 0 | 0 | 0 | 0 | 0 | 1 |
| /'cak1 ka0 'jaan0/ | [jaan0] | bicycle | 0 | 0 | 2 | 3 | 3 | 1 |
| /kha0 'nom4 'paN0/ | [paN0] | bread | 0 | 0 | 2 | 3 | 4 | 6 |
| /'thoo0 ra0 'sap1/ | [sap1] | telephone | 0 | 0 | 1 | 2 | 4 | 3 |
| /'nok3 kra0 'cOOk1/ | [cOOk1] | sparrow | 0 | 0 | 0 | 1 | 2 | 2 |
| /'thoo0 ra0 'that3/ | [that3] | television | 0 | 0 | 0 | 2 | 2 | 1 |
| /ma0 'lxxN0 'pOO0/ | [pOO0] | dragonfly | 0 | 0 | 0 | 1 | 1 | 1 |
| /'nok3 phi3 'raap2/ | [raap2] | pigeon | 0 | 0 | 0 | 1 | 1 | 1 |
| /ma0 'lxxN0 'saap1/ | [saap1] | cockroach | 0 | 0 | 0 | 0 | 1 | 0 |
| /'nok3 khun4 'thOON0/ | [thOON0] | mynah | 0 | 0 | 0 | 0 | 1 | 1 |
| /'nok3 ?ii0 'phxxn0/ | [phxxn0] | a kind of birds | 0 | 0 | 0 | 0 | 1 | 1 |
| /ma0 'lxxN0 'phuu2/ | [phuu2] | carpenter bee | 0 | 0 | 0 | 0 | 0 | 1 |
| /'baaj3 'baaj0/ | [baaj0] | bye bye | 0 | 0 | 2 | 5 | 5 | 5 |

**2. Secondary Accented Syllable (only)**

There is no pronunciation of only the secondary accented syllable in the data.

**3. Primary and Secondary Accented Syllables** (2-syllable Production)

| Target Words | Children's Productions | Meanings | Tokens (Age in Months) | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | 9 | 12 | 15 | 18 | 21 | 24 |
| /'kxn0 taa0 'luup3/ | [kxn0 luup3] | | 0 | 0 | 0 | 1 | 1 | 1 |
| /'mOO0 tqq0 'saj0/ | [mOO0 saj0] | motorcycle | 0 | 0 | 0 | 1 | 1 | 1 |
| /kOm0 'piw3 'tqq2/ | [piw3 tqq2] | computer | 0 | 0 | 0 | 0 | 1 | 1 |
| /'chOk3 koo0 'lxt3/ | [chOk3 lxt3] | chocolate | 0 | 0 | 0 | 0 | 0 | 1 |
| /'sap1 pa0 'rot3/ | [sap1 rot3] | pineapple | 0 | 0 | 0 | 0 | 0 | 1 |
| /'cOO0 ra0 'khee2/ | [cOO0 khee2] | crocodile | 0 | 0 | 0 | 0 | 0 | 1 |
| /hee0 li0 'kOp3 'tqq2/ | [kOp3 tqq2] | helicopter | 0 | 0 | 0 | 0 | 1 | 1 |
| /'rot3 kra0 'ba1/ | [rot3 ba1] | small-sized truck | 0 | 0 | 0 | 1 | 0 | 0 |
| /'muak1 kan0 'nOk3/ | [muak1 nOk3] | helmet | 0 | 0 | 0 | 1 | 1 | 1 |
| /kaaN0 'keeN0 'naj0/ | [keeN0 naj0] | underwear | 0 | 0 | 0 | 0 | 2 | 4 |
| /'thaN4 kha0 'ja1/ | [thaN4 ja1] | bin | 0 | 0 | 0 | 0 | 1 | 1 |
| /'phra3 ?aa0 'thit3/ | [phra3 thit3] | sun | 0 | 0 | 0 | 0 | 1 | 1 |
| /'prxxN0 sii4 'fan0/ | [prxxN0 fan0] | tooth brush | 0 | 0 | 0 | 0 | 0 | 1 |
| /'mii0 pxn0 'daa2/ | [mii0 daa2] | panda | 0 | 0 | 0 | 0 | 0 | 1 |
| /'thoo0 ra0 'that3/ | [thoo0 that3] | television | 0 | 0 | 0 | 0 | 1 | 2 |
| /'nok3 phi3 'raap2/ | [nok3 raap2] | pigeon | 0 | 0 | 0 | 0 | 1 | 1 |
| /kha0 'nom4 'paN0/ | [nom4 paN0] | bread | 0 | 0 | 0 | 0 | 1 | 1 |
| /'cak1 kra0 'jaan0/ | [cak1 jaan0] | bicycle | 0 | 0 | 0 | 0 | 0 | 2 |
| /'thoo0 ra0 'sap1/ | [thoo0 sap1] | telephone | 0 | 0 | 0 | 0 | 0 | 1 |
| /'mii4 koo0 ?aa0 'laa2/ | [mii4 laa2] | koala bear | 0 | 0 | 0 | 0 | 0 | 1 |
| /sa0 'paj3 dqq2 'mxxn0/ | [paj3 mxxn0] | spiderman | 0 | 0 | 0 | 0 | 1 | 1 |
| /'naaN0 pha0 jaa0 'baan0/ | [naaN0 baan0] | nurse | 0 | 0 | 0 | 0 | 0 | 1 |

**4. Primary and Other Unaccented Syllables**
(2-syllable Production: unaccented syllable + the last syllable)

| Target Words | Children's Productions | Meanings | Tokens (Age in Months) | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | 9 | 12 | 15 | 18 | 21 | 24 |
| /'thaN0 kha0 'ja1/ | /thaN0 kha0 ja1/ | bin | 0 | 0 | 0 | 0 | 1 | 1 |
| /'mii4 pxn0 'daa2/ | /mii4 pxn0 daa2/ | panda | 0 | 0 | 0 | 0 | 1 | 0 |
| /'phaa2 chet3 'tua0/ | /phaa2 chet3 tua0/ | towel | 0 | 0 | 0 | 0 | 3 | 3 |
| /'jaa0 sa1 'phom4/ | /jaa0 sa1 phom4/ | champoo | 0 | 0 | 0 | 0 | 1 | 2 |
| /'prxxN0 sii4 'fan0/ | /prxxN0 sii4 fan0/ | tooth brush | 0 | 0 | 0 | 0 | 2 | 2 |

# APPENDIX F

Appendix F comprises lexical items acquired by 180 Thai children, from 9 to 24 months, in the cross-sectional study. The data were elicited from the distribution of the QWAT (The questionnaire of word acquisition in Thai) to 180 parents. The parents were asked to report their children's lexicon (words that have been understood and produced by the children). The first table shows mean items acquired at 24 months, while the second table shows mean items acquired from 9 to 24 months. In addition, These items were classified into syntactic domain (two syntactic categories: content words and function words), and semantic domain (three semantic categories: nominals, verbals, and relations). The data were used for the investigation of lexical development in the cross-sectional study (see Section 5.2).

**Lexical in Acquisition of Thai Children in Cross-sectional Study at 24 Months of Age (217 words in average)**

**Nominals (153)**

| | | | |
|---|---|---|---|
| fish | bird | chicken | dog |
| cat | tiget | turtle | elephant |
| ant | bear | monkey | duck |
| lizard | snake | horse | cow/ox |
| mosquito | rabbit | pig | lion |
| frog | giraffe | crocodile | mouse |
| buffalo | cockroach | mother | father |
| grandfather (mo.) | own name | elder bro./sis. | younger bro./sis. |
| grand mother (fa.) | grand mother(mo.) | aunt | uncle |
| grandfather (fa.) | teacher | car | ship |
| bike | train | plane | bicycle |
| bus | push cart | taxi | ball |
| doll | balloon | gun | toy |
| water | fish | milk | chicken |
| egg | ice-cream | rice | pork |
| coca-cola | banana | bread | sweets |
| juice | orange | noodle | watermelon |
| papaya | chocolate | shirt | pants |
| powder | socks | shoes | soap |
| glasses | cap | shampoo | diaper |
| necklace | toothpaste | eyes | mouth |
| ears | nose | legs | hair |
| teeth | hand/s | finger/s | buttom |
| penis | feet | cheeks | head |
| neck | eyebrows | arm | navel |
| tongue | chin | face | nail |
| knee | drug | television | key |
| table | bin | money | toothbrush |
| pillow | door | fan | comb |
| telephone | glass | spoon | knife |
| chair | bag | stairs | bathroom |
| blanket | plate | bloom | radio |
| bottle | paper | towel | bed |
| bedroom | fridge | picture | scissors |
| pot | bowl | rain | house |
| spring | tree | school | flower |
| sea | stone | waterfall | star |
| sun | moon | what | where |
| who | | | |

**Verbals (60)**

| | | | |
|---|---|---|---|
| to eat | to bite | bye bye | to pee |
| to hit | to go | to sleep | to kiss |
| to stand | to come | to close | to blow |
| to sing | to see | to throw | to kick |
| to open | to wash | to cry | to take |
| to hug | to keep | to put | to catch |
| to ride | to step on | to walk | to crash |
| to fall | to go downward | hi | to say |
| to smile | to write | to give | to pull |
| to run | to put into | to go upward | to open one's mouth |
| to read | to jump | to craw | to help |
| to shut up | hurt | afraid | fun |
| hungry | like | hot (weather) | hot (chilli) |
| wet | cold | bad smell | delicious |
| beautiful | good smell | empty | sweet |

**Relations (4)**

| | | | |
|---|---|---|---|
| night | above | /ca2/, /ca4/ (final particles) | no |

Lexical Items Acquired by Thai Children from 9 to 24 Months (Cross-sectional Study)
(According to frequency)

**1. According to Semantic Classification: Nominals** (Concrete animate and inanimate objects), **Verbals** (Actions and states), and **Relations**

| **Semantic Categories** | **9 MO (n=1)** | **12 MO (n=4)** | **15 MO (n=33)** | **18 MO (n=85)** | **21 MO (n=196)** | **24 MO (n=217)** |
|---|---|---|---|---|---|---|
| **Nominals** | **0** | **3** mother, father, cat | **26** mother, fish, father, dog, lizard, fish (meat), cat, milk, chicken, bird, grandfather (mother's father), grandmother (mother's mother), balloon, ball, water, plane, eyes, elder (brother/sister), grandmother (father's mother), aunt | **73** mother, father, dog, fish, fish (meat), cat, milk, chicken (meat) water, chicken, plane, bird, grandmother (father's mother), grandmother (mother's mother), lizard, the child's name, grandfather (mother's father), car, ball, aunt (parent's elder sister), doll, eyes, balloon, rice, mouth, bear, elephant, horse, ant, elder (brother/sister), egg, orange, shoes, sexual organ, stove, bike, train, banana, bread, candy, pants, ear, nose, monkey, mosquito, ship, shirt, powder, tiger, duck, pig, younger (brother/sister), | **134** mother, dog, father, milk, fish, fish (meat), chicken, ball, water, shirt, pants, mouth, grandmother (mother's mother), balloon, chicken (meat), shoes, eyes, ear, nose, leg, elephant, cat, pig, car, powder, hair, hand, foot, bird, lizard, grandfather (mother's father), plane, rice, hat, bottom, sexual organ, spoon, horse, the child's name, elder (brother/sister), egg, orange, soap, head, teeth, chair, bear, ant, younger (brother/sister), grandmother (father's mother), aunt (parent's | 153 mother, father, fish, water, bird, chicken, dog, fish (meat), cat, car, milk, eyes, mouth, medicine, grandfather (mother's father), ship, chicken, ear, nose, leg, television, tiger, turtle, the child's name, elder (brother/sister), younger (brother/sister), ball, egg, ice-cream, shirt, pants, powder, hair, teeth, hand, fingers, key, elephant, car, grandmother, (father's mother), grandmother (mother's mother), bike, doll, balloon, rice, pig, socks, shoes, soap, bottom, sexual organ, foot, table, bin, money, toothbrush, pillow, What, bear, monkey, |

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|---|---|---|---|---|---|---|
| | | | (parent's elder sister), car, doll, mouth, bear, the child's name, shoes | parent's elder brother, gun, juice, hat, soap, hand, leg, television, telephone, snake, grandfather (father's father), bicycle, ice-cream, drinks, hair, bottom, foot, door, key, money, rain | elder sister), gun, pig, banana, candy, socks, glasses, door, bag, medicine, pillow, cup, rain, tree, turtle, duck, ice-cream, table, bin, comb, key, money, bed, dish, snake, monkey, mosquito, doll, tongue, hand, navel, telephone, house, tiger, frog, train, ship, juice, pepsi-cola, fingers, fan, blanket, giraffe, rabbit, parent's elder, brother, noodle, watermelon, bread, cheek, television, toothbrush, towel, knife, broom, flower, moon, Where, crocodile, necklace, neck, nail, scissors, stairs, bathroom, fridge, sea, sky, cow, grandfather (father's father), bike, bus, paper, bedroom, bottle, lion, mouse, diaper, chin, radio, pool, stone, fountain, this one | duck, lizard, train, plane, pepsi-cola, banana, bread, candy, glasses, hat, cheek, head, neck, door, fan, comb, telephone, cup, spoon, knife, rain, snake, horse, cow, mosquito, rabbit, pig, aunt, (parent's elder sister), bicycle, gun, juice, orange, eye, brow, hand, navel, chair, bag, stairs, bathroom, blanket, dish, broom, house, fountain, lion, frog, noodle, watermelon, tongue, radio, bottle, tree, Where, giraffe, crocodile, mouse, bus, chin, face, nail, paper, towel, bed, school, flower, parent's elder brother, toy, papaya, shampoo, knee, bedroom, fridge, sea, Who, buffalo, cockroach, crab, teacher, barrow, taxi, chocolate, diaper, necklace, toothbrush, picture, scissors, pot, bowl, stone, waterfall, star, sun, moon |

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|---|---|---|---|---|---|---|
| **Verbals** | **1**<br>to eat | **1**<br>to eat | **6**<br>to eat, to urinate, to hit, to go, to kick, to do 'bye bye' | **11**<br>to eat, to urinate, to do 'bye bye', to go, to sleep, to close, to kick, to keep quiet, to hit, hot, wet | **58**<br>to eat, to urinate, to sleep, to do 'bye bye', to go, to walk, hungry, hot, to stand, to kick, to close, painful, to bite, to take, to open, cold, wet, to blow, to cry, to kiss, to talk, to hit, to keep, to come, to step on, to wear, afraid of, empty bad smell, to get upward, to get downward, to throw, to hug, to ride, to run, to wash, delicious, hot (taste), to sing, to look, to drive, to give, to help, to play, to smile, to jump, beautiful, to drink, to pull, to put down, to catch, to fall, to like good smell, to say 'hi', to crawl, big, to say 'thank you' | **60**<br>to eat, to bite, to do 'bye bye' to urinate, hot, to hit, to go, to sleep, hot (taste), wet, to kiss, to stand, to come, to close, painful, cold, to blow, to sing, to look, to throw, to kick, to open, to wash, bad smell, delicious, to cry, to take, to hug, to keep, to put down, to catch, to ride, to step on, to walk, to crash, to fall, afraid of, beautiful, to get downward, to say 'hi', to talk, to smile, to write, to give, to pull, to run, to wear, fun, hungry, good smell, to get upward, to open one's mouth, to read, to jump, to crawl, to help, to keep quiet, to like, empty, sweet |
| **Relations** | **0** | **0** | **1**<br>/ca2/ | **1**<br>/ca2/ | **4**<br>no, on/above, /ca2/, /khrap3/ | **4**<br>/ca2/, no, night, on/above |



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**2. According to Syntactic Classification: Content Words** (Words containing lexical meanings) and **Function Words** (Words containing grammatical meaning)

| Syntactic Categories | 9 MO (n=1) | 12 MO (n=4) | 15 MO (n=33) | 18 MO (n=85) | 21 MO (n=196) | 24 MO (n=217) |
|---|---|---|---|---|---|---|
| **Content Words** | **1**<br>to eat | **4**<br>mother, father, cat, to eat | **32**<br>mother, fish, father, dog, lizard, fish (meat), cat, milk, chicken, bird, grandfather (mother's father), grandmother (mother's mother), balloon, ball, water, plane, eyes, elder (brother/sister), grandmother (father's mother), aunt (parent's | **84**<br>mother, father, dog, fish, fish (meat), cat, milk, chicken (meat) water, chicken, plane, bird, grandmother (father's mother), grandmother (mother's mother), lizard, the child's name, grandfather (mother's father), car, ball, aunt (parent's elder sister), doll, eyes, balloon, rice, mouth, bear, elephant, horse, ant, elder (brother/sister), egg, orange, shoes, sexual organ, stove, bike, train, banana, bread, candy, pants, ear, nose, monkey, mosquito, ship, shirt, powder, tiger, duck, pig, younger (brother/sister), parent's elder brother, gun, | **192**<br>mother, dog, father, milk, fish, fish (meat), chicken, ball, water, shirt, pants, mouth, grandmother (mother's mother), balloon, chicken (meat), shoes, eyes, ear, nose, leg, elephant, cat, pig, car, powder, hair, hand, foot, bird, lizard, grandfather (mother's father), plane, rice, hat, bottom, sexual organ, spoon, horse, the child's name, elder (brother/sister), egg, orange, soap, head, teeth, chair, bear, ant, younger (brother/sister), grandmother (father's mother), aunt (parent's elder sister), gun, pig, banana, candy, socks, | **210**<br>mother, father, fish, water, bird, chicken, dog, fish (meat), cat, car, milk, eyes, mouth, medicine, grandfather (mother's father), ship, chicken, ear, nose, leg, television, tiger, turtle, the child's name, elder (brother/sister), younger (brother/sister), ball, egg, ice-cream, shirt, pants, powder, hair, teeth, hand, fingers, key, elephant, car, grandmother, (father's mother), grandmother (mother's mother), bike, doll, balloon, rice, pig, socks, shoes, soap, bottom, sexual organ, foot, table, bin, money, toothbrush, pillow, bear, monkey, duck, lizard, train, plane, pepsi- |

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|---|---|---|---|---|---|---|
| | | | elder sister), car, doll, mouth, bear, the child's name, shoes, to eat, to urinate, to hit, to go, to kick, to do 'bye bye' | juice, hat, soap, hand, leg, television, telephone, snake, grandfather (father's father), bicycle, ice-cream, drinks, hair, bottom, foot, door, key, money, rain, to eat, to urinate, to do 'bye bye', to go, to sleep, to close, to kick, to keep quiet, to hit, hot, wet | glasses, door, bag, medicine, pillow, cup, rain, tree, turtle, duck, ice-cream, table, bin, comb, key, money, bed, dish, snake, monkey, mosquito, doll, tongue, hand, navel, telephone, house, tiger, frog, train, ship, juice, pepsi-cola, fingers, fan, blanket, giraffe, rabbit, parent's elder, brother, noodle, watermelon, bread, cheek, television, toothbrush, towel, knife, broom, flower, moon, Where, crocodile, necklace, neck, nail, scissors, stairs, bathroom, fridge, sea, sky, cow, grandfather (father's father), bike, bus, paper, bedroom, bottle, lion, mouse, diaper, chin, radio, pool, stone, fountain, this one, to eat, to urinate, to sleep, to do 'bye bye', to go, to walk, hungry, hot, to stand, to kick, to close, painful, to bite, to take, to | cola, banana, bread, candy, glasses, hat, cheek, head, neck, door, fan, comb, telephone, cup, spoon, knife, rain, snake, horse, cow, mosquito, rabbit, pig, aunt, (parent's elder sister), bicycle, gun, juice, orange, eye, brow, hand, navel, chair, bag, stairs, bathroom, blanket, dish, broom, house, fountain, lion, frog, noodle, watermelon, tongue, radio, bottle, tree, giraffe, crocodile, mouse, bus, chin, face, nail, paper, towel, bed, school, flower, parent's elder brother, toy, papaya, shampoo, knee, bedroom, fridge, sea, buffalo, cockroach, crab, teacher, barrow, taxi, chocolate, diaper, necklace, toothbrush, picture, scissors, pot, bowl, stone, waterfall, star, sun, moon, to eat, to bite, to do 'bye bye' to urinate, hot, to hit, to go, to sleep, hot (taste), wet, to kiss, to stand, to come, to |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | open, cold, wet, to blow, to cry, to kiss, to talk, to hit, to keep, to come, to step on, to wear, afraid of, empty bad smell, to get upward, to get downward, to throw, to hug, to ride, to run, to wash, delicious, hot (taste), to sing, to look, to drive, to give, to help, to play, to smile, to jump, beautiful, to drink, to pull, to put down, to catch, to fall, to like good smell, to say 'hi', to crawl, big, to say 'thank you' | close, painful, cold, to blow, to sing, to look, to throw, to kick, to open, to wash, bad smell, delicious, to cry, to take, to hug, to keep, to put down, to catch, to ride, to step on, to walk, to crash, to fall, afraid of, beautiful, to get downward, to say 'hi', to talk, to smile, to write, to give, to pull, to run, to wear, fun, hungry, good smell, to get upward, to open one's mouth, to read, to jump, to crawl, to help, to keep quiet, to like, empty, sweet |
| **Function Words** | **0** | **0** | **1**<br>/ca2/ | **1**<br>/ca2/ | **4**<br>no, on/above, /ca2/, /khrap3/ | **7**<br>What, Where, Who, /ca2/, no, night, on/above |

# APPENDIX G

Appendix G comprises lexical items acquired by 10 Thai children, from 9 to 24 months, in the longitudinal study. Tables were divided into 10 cases according to the 10 participants (L01-L10). Each table consists of two major columns. The column on the left shows lexical items elicited from the distribution of the QWAT (The questionnaire of word acquisition in Thai) to parents of the 10 children. Parents were asked to report their children's lexicon (words the have been understood and produced by the children). The column on the right shows lexical items elicited from the Corpus of Child Language (videos of adult-child interactions), and the frequency of occurrence of each item was also given in the brackets. In addition, the data were classified into three semantic categories: nominals, verbals, and relations. The data were used for the investigation of lexical development in the longitudinal study (see Section 5.3)

## Participant: L01

| Age | Semantic | Word Acquired as Analysed from QWAT | | | | | | | | Word Acquired as Analyzed from Video Tapes | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 MO | NOM | พ่อ | ย่า | | | | | | | | | | | |
| | VER | กิน | | | | | | | | | | | | |
| | REL | จ้ะ | | | | | | | | จ้ะ (1) | | | | |
| 15 MO | NOM | แมว | หมา | หมี | ม้า | กบ | ปลา | สิงโต | เนื้อปลา | สิงโต (1) | | | | |
| | | พี่ | แม่ | ป้า | ปู่ | เครื่องบิน | นม | น้ำ | รองเท้า | | | | | |
| | | ฝน | | | | | | | | | | | | |
| | VER | ร้องเพลง | ขับ | ไป | เหมียวๆ | พา | แฮ่ | ปับๆ | | ไป (2) | แฮ่ (1) | เหมียว (1) | พา (1) | ปับ (1) |
| | | | | | | | | | | กิน (1) | | | | |
| | REL | | | | | | | | | จ้ะ (14) | | | | |
| 18 MO | NOM | งู | ช้าง | ลิง | เต่า | ยุง | มด | นก | กระต่าย | นม (3) | มด (2) | ช้าง (1) | แมลงสาบ (1) | นก (1) |
| | | แมลงสาบ | ไก่ | เป็ด | หนู | หมู | จิ้งจก | นกเขา | แมงเม่า | หนู (1) | นี่ (1) | พี่ (2) | พ่อ (1) | ลิง (1) |
| | | นกกระจอก | กิ้งก่า | แมลงปอ | ผีเสื้อ | ปลาไหล | แมงมุม | กุ้ง | ชี | แม่ (1) | | | | |
| | | น้อง | ตา | ยาย | น้า | รถ | มอเตอร์ไซค์ | เรือ | ตุ๊กตา | | | | | |
| | | บอล | ลูกโป่ง | ไข่ | ข้าว | เนื้อไก่ | เนื้อหมู | ก๋วยเตี๋ยว | น้ำส้ม | | | | | |
| | | กล้วย | แตงโม | ขนมปัง | ขนม | มะม่วง | ชมพู่ | ส้ม | เสื้อ | | | | | |
| | | กางเกง | ถุงเท้า | แหวน | แว่นตา | หมวก | แป้ง | สบู่ | นาฬิกา | | | | | |
| | | ดวงตา | ปาก | หู | จมูก | แก้ม | ผม | หัว | คาง | | | | | |
| | | ฟัน | หน้า | คิ้ว | มือ | นิ้ว | เล็บ | สะดือ | ก้น | | | | | |
| | | อวัยวะเพศ | ขา | เท้า | หลอดไฟ | โคมไฟ | ประตู | พัดลม | หวี | | | | | |
| | | กุญแจ | กระเป๋า | ยาย | เงิน | ทีวี | ห้องน้ำ | แปรงสีฟัน | หมอน | | | | | |
| | | ผ้าห่ม | หม้อ | ช้อน | ไม้กวาด | มุ้ง | บ้าน | ดอกไม้ | หิน | | | | | |
| | | พระอาทิตย์ | พระจันทร์ | นี่ | พี่ | | | | | | | | | |
| | VER | ร้อง | หอม | เอา | ยืน | เปิด | ปิด | ฉี่ | อุ้ม | เอา (5) | เหมียว (5) | อุ้ม (3) | ไป (2) | ฉี่ (1) |
| | | เที่ยว | หยิบ | จับ | สวัสดี | ขอบคุณ | บ๊ายบาย | ไม่ชอบ | ชอบ | ฮู่ (1) | ฮ่า (1) | ฮี่ (1) | รัก (1) | มี (2) |
| | | เจ็บ | สวย | อร่อย | เผ็ด | ร้อน | รัก | ฮู่ | ฮ่า | | | | | |
| | | ฮี้ | มี | | | | | | | | | | | |
| | REL | ไม่ | โอ๊ย | อืม | หืม | เออ | | | | จ้ะ (23) | ไม่ (5) | อืม (3) | โอ๊ย (2) | เออ (1) |
| | | | | | | | | | | หืม (1) | | | | |

| Age | Semantic | Word Acquired as Analysed from QWAT | | | | | | | | Word Acquired as Analyzed from Video Tapes | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 21 MO | NOM | ยีราฟ | ควาย | แมลงวัน | นกอีแพน | จิงโจ้ | ลุง | หมอ | ตำรวจ | แม่ (17) | ห้องแอร์ (15) | พี่ (6) | พ่อ (6) | นี่ (5) |
| | | คน | ขวัญ(คน) | แป้ง(คน) | ป้าชิม | พระ | รถเมล์ | รถไฟ | รถไฟฟ้า | ใคร (3) | น้ำมูก (2) | ไก่ (2) | อะไร (2) | ป้า (2) |
| | | กาแฟ | ลำไย | สร้อยคอ | แป้งพัฟ | ลิ้น | น้ำมูก | เก้าอี้ | ถังขยะ | กระต่าย (1) | นก (1) | กล้อง (1) | ไฟ (1) | ยุง (1) |
| | | กระดาษ | คอมพิวเตอร์ | วีดีโอ | เตียง | กล้อง | ห้องแอร์ | ส้อม | โรงเรียน | แม่ (1) | ลุง (1) | แป้ง (1) | ตา (1) | น้ำ (1) |
| | | ท้องฟ้า | ต้นไม้ | น้ำพุ | ดาว | ใคร | อะไร | | | สะดือ (1) | มด (1) | ไหน (1) | | |
| | VER | กัด | เป่า | ดู | พูด | ยิ้ม | เขียน | วาด | ตี | อุ้ม (18) | ยิ้ม (12) | เอา (5) | ไหล (2) | ไป (2) |
| | | กอด | กำ | แบ | เก็บ | ดึง | กด | จับ | มา | ร้อง (1) | กัด (1) | ทำ (1) | เร็ว (5) | เหลว (1) |
| | | เหยียบ | เดิน | นอน | ว่ายน้ำ | ล้าง | เล่น | ตก | จุ๊ๆ | สี (1) | | | | |
| | | เกา | ทำงาน | นวด | กลับ | ลง | จิ๊บๆ | หิว | ไหล | | | | | |
| | | ร้อง | ทำ | หิว | สกปรก | เหม็น | หวาน | ขม | เปียก | | | | | |
| | | ใหม่ | เหลว | สี | | | | | | | | | | |
| | REL | ครับ | ค่ะ | ว้าย | แล้ว | หน่อย | ตอนเย็น | อะ | อุ๊ย | จ้ะ (11) | อะ (8) | อุ๊ย (3) | ไม่ (2) | โอ๊ย (2) |
| | | ไหม | สิ | | | | | | | ว้าย (1) | ไหม (1) | แล้ว (1) | หน่อย (1) | สิ (2) |
| | | | | | | | | | | อืม (1) | ค่ะ (1) | | | |
| 24 MO | NOM | จระเข้ | เสือ | วัว | แมลงภู่ | ตัวต่อ | พยาบาล | ในหลวง | จักรยาน | อะไร (67) | นี่ (22) | ใคร (13) | พ่อ (9) | ไหน (9) |
| | | แท็กซี่ | ปิ๊กอั๊พ | รถดูดส้วม | รถขยะ | รถปูน | มะละกอ | ไอติม | ช็อคโกแล็ต | หมา (6) | รูป (5) | กล้อง (4) | เป็ด (4) | สิงโต (5) |
| | | ป๊อกกี้ | กระโปรง | กางเกงใน | กำไล | ยาสีฟัน | คอ | โต๊ะ | บันได | ม้า (3) | จระเข้ (3) | ช้าง (3) | แม่ (6) | ไฟ (3) |
| | | ผ้าเช็ดตัว | ห้องนอน | ถ้วย | จาน | มีด | รูป | แดด | เด็ก | แดด (3) | หมอ (3) | รถ (2) | เต่า (2) | ซี (2) |
| | | สตรอเบอรี่ | ค้างคาว | คน | มะพร้าว | | | | | นก (2) | วัว (2) | ควาย (2) | จิงโจ้ (2) | แมว (4) |
| | | | | | | | | | | ขวัญ (2) | มะละกอ (2) | จักรยาน (2) | กล้อง (1) | ไก่ (2) |
| | | | | | | | | | | สตรอเบอรี่ (1) | กบ (1) | หมี (1) | ปู (1) | กล้วย (1) |
| | | | | | | | | | | ค้างคาว (1) | เด็ก (1) | แตงโม (1) | พระจันทร์ (2) | กระเป๋า (1) |
| | | | | | | | | | | ปลา (1) | ข้าว (1) | มด (1) | ฝน (1) | คน (2) |
| | | | | | | | | | | ป้าชิม (1) | มะพร้าว (1) | นั้น (2) | | |
| | VER | อ่าน | ล้ม | ถ่าย | แป๊นๆ | ออก | ก้าบๆ | ช่วย | อยาก | ถ่าย (5) | แป๊นๆ (4) | ไป (3) | มา (3) | ออก (3) |
| | | คุย | หนีบ | เอ่เอ๊ | แง | แกล้ง | ตบ | โฮ่งๆ | ตาย | กลับ (3) | จิ๊บๆ (3) | ก้าบๆ (3) | เหมียวๆ (2) | ช่วย (2) |
| | | ตุ๊งแฉ่งๆ | ตู้มต้าม | | | | | | | อะไร (2) | ตก (2) | ฮี่ (3) | กัด (1) | ดู (1) |
| | | | | | | | | | | อยาก (1) | กิน (1) | คุย (1) | หนีบ (1) | เอ่เอ๊ (3) |
| | | | | | | | | | | แง (1) | เอา (1) | แกล้ง (1) | อาบน้ำ (2) | ตู้มต้าม (1) |
| | | | | | | | | | | ตุ๊งแฉ่งๆ (1) | โฮ่งๆ (2) | บ๊ายบาย (1) | ทำงาน (1) | สี (2) |

| Age | Semantic | Word Acquired as Analysed from QWAT | Word Acquired as Analyzed from Video Tapes |
|---|---|---|---|
| 24 MO | VER | | รัก (2) มี (2) ตาย (1) ดี (1) ร้อน (1)<br>เย็น (1) เป็น (1) ชอบ (1) สวย (1) เร็ว (1)<br>แดง (1) |
| | REL | กลางคืน นะ ใช่ ไง เหมือน รึเปล่า ได้ | อะ (88) ใช่ (11) แล้ว (9) จ๊ะ (6) ไม่ (5)<br>อุ๊ย (6) ไง (1) อืม (2) เหมือน (1) เปล่า (1)<br>ตอนเย็น (1) ได้ (1) |

## Participant: L02

| Age | Semantic | Word Acquired as Analysed from QWAT | | | | | | | | Word Acquired as Analyzed from Video Tapes |
|---|---|---|---|---|---|---|---|---|---|---|
| 9 MO | NOM | พ่อ | | | | | | | | |
| | VER | | | | | | | | | |
| | REL | | | | | | | | | |
| 12 MO | NOM | แม่ | | | | | | | | |
| | VER | กิน | | | | | | | | |
| | REL | | | | | | | | | |
| 15 MO | NOM | | | | | | | | | |
| | VER | | | | | | | | | |
| | REL | | | | | | | | | |
| 18 MO | NOM | ย่า | เมย์(คน) | นก | หมา | ปลา | มอร์เตอร์ไซค์ | ปืน | สระน้ำ | |
| | | ฝน | น้ำตก | ใคร | | | | | | |
| | VER | เอา | กัด | ตี | เตะ | นอน | ช่วย | ตก | ฉี่ | |
| | | ตด | บ๊ายบาย | เปียก | หลับ | | | | | |
| | REL | ครับ | ไม่ | | | | | | | |
| 21 MO | NOM | | | | | | | | | |
| | VER | | | | | | | | | |
| | REL | | | | | | | | | |
| 24 MO | NOM | ม้า | ลิง | เสือ | วัว | ยุง | มด | แมว | ไก่ | |
| | | เป็ด | รถ | เรือ | เครื่องบิน | ลูกบอล | ลูกโป่ง | หุ่นยนต์ | เนื้อไก่ | |
| | | เนื้อปลา | น้ำ | น้ำส้ม | ตา | หู | ปาก | แก้ม | สะดือ | |
| | | ก้น | อวัยวะเพศ | ขา | | | | | | |
| | VER | | | | | | | | | |
| | REL | จ้ะ | | | | | | | | |

# Participant: L03

| Age | Semantic | Word Acquired as Analysed from QWAT | | | | | | | | Word Acquired as Analyzed from Video Tapes | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9 MO | NOM | | | | | | | | | | | | | |
| | VER | | | | | | | | | | | | | |
| | REL | | | | | | | | | | | | | |
| 12 MO | NOM | แม่ | พ่อ | | | | | | | | | | | |
| | VER | กิน | | | | | | | | | | | | |
| | REL | | | | | | | | | | | | | |
| 15 MO | NOM | ปลา | ไก่ | กา | นก | หมา | หมี | แมว | จิ้งจก | อะไร (2) | มด (1) | ไหน (1) | แม่ (10) | นี่ (1) |
| | | ม้า | ย่า | ตา | ยาย | อา | ลูกโป่ง | ข้าว | นม | ไก่ (2) | | | | |
| | | ฟลูออไรด์ | อะไร | ไหน | มด | นี่ | | | | | | | | |
| | VER | มี | จ๊ะเอ๋ | | | | | | | จ๊ะเอ๋ (17) | | | | |
| | REL | ไม่ | | | | | | | | | | | | |
| 18 MO | NOM | ง | ช้าง | ยีราฟ | เต่า | เสือ | วัว | ยุง | เป็ด | นี่ (12) | ไฟ (3) | น้ำ (3) | ปุ่ม (3) | อะไร (2) |
| | | แมงมุม | นกพิราบ | ตัวเอง | พี่ | ปู่ | น้ำแข็ง(คน) | รถ | จักรยาน | มะละกอ (3) | ช้อน (2) | หมา (4) | กุญแจ (1) | กา (1) |
| | | เครื่องบิน | รถไฟ | ตุ๊กตา | ปืน | ปลา | น้ำ | น้ำส้ม | กล้วย | กระต่าย (1) | ไก่ (1) | พ่อ (1) | เจ็ก (2) | |
| | | ส้ม | แตงโม | มะละกอ | ขนมปัง | องุ่น | เสื้อ | กางเกง | ถุงเท้า | | | | | |
| | | รองเท้า | แว่นตา | สร้อย | หมวก | แป้ง | ตา | หู | จมูก | | | | | |
| | | ปาก | ผม | ฟัน | มือ | สะดือ | จู๋ | ขา | เท้า | | | | | |
| | | โต๊ะ | เก้าอี้ | หลอดไฟ | ประตู | ถังขยะ | พัดลม | หวี | กุญแจ | | | | | |
| | | กระเป๋า | เงิน | กระดาษ | โทรทัศน์ | บันได | โทรศัพท์ | กะละมัง | ขัน | | | | | |
| | | แปรงสีฟัน | หมอน | โคมไฟ | ขวด | ช้อน | ไม้กวาด | ปุ่ม | กระโถน | | | | | |
| | | กล้อง | ดอกไม้ | กระต่าย | ทะเล | ก้อนหิน | ต้นไม้ | ใบไม้ | พระจันทร์ | | | | | |
| | | อันนั้น | ทางโน้น | | | | | | | | | | | |
| | VER | เตะ | เดิน | ตาม | กัด | เป่า | จูบ | เอา | เขียน | เอา (5) | จิ๊บๆ (3) | อู๊ด (2) | อ๊บ (1) | ก้าบๆ (2) |
| | | ขับ(รถ) | ตี | เก็บ | วาง | ขี่ | ไป | นอน | เปิด | เอกอี๊เอ้กเอ้ก(1 | เหมียว (1) | แงๆ (1) | ตุ้ม (2) | ไหว (1) |
| | | ปิด | ช่วย | ฉี่ | อึ | แปรง(ฟัน) | ขึ้น | ลง | บ๊ายบาย | อยู่ (1) | | | | |
| | | อ๊บ | ก้าบๆ | เอกอี๊เอ้กเอ้ก | จิ๊บๆ | เหมียว | กา | แงๆ | โฮ่งๆ | | | | | |
| | | ฮี่ๆ | กลัว | ชอบ | สนุก | หิว | เจ็บ | ตกใจ | หมด | | | | | |
| | | สวย | น้อย | อร่อย | ร้อน | เย็น | เปียก | อู๊ด | ตุ้ม | | | | | |

| Age | Semantic | Word Acquired as Analysed from QWAT | | | | | | | | Word Acquired as Analyzed from Video Tapes | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 18 MO | VER | อยู่ | ไหว | | | | | | | | | | | |
| | REL | ครับ | หน่อย | บน | สอง | สาม | เหมือน | นะ | | ครับ (4) | นะ (1) | ไม่ (1) | | |
| 21 MO | NOM | จระเข้ | ลิง | กบ | หมู | แมลงวัน | จิ้งจอก | นกกระสา | เรือ | นู่น (4) | รถ (4) | พ่อ (4) | กุญแจ (4) | จิ้งจอก (4) |
| | | บอล | หมู | ไอติม | ขนม | อาหาร | กางเกง | แหวน | สบู่ | เพลงช้าง (2) | อันนี้ (4) | หมา (2) | บอล (1) | นกกระสา (1) |
| | | แก้ม | ผม | หัว | คาง | ลิ้น | หน้า | คิ้ว | แขน | ตรงนี้ (1) | ทะเล (1) | น้ำ (1) | หนวด (1) | ผี (1) |
| | | นิ้ว | เล็บ | ก้น | เข่า | หนวด | หลอดไฟ | รูป | กรรไกร | กระดิ่ง (1) | ลิง (1) | | | |
| | | ค้อน | เงิน | วิทยุ | ห้องน้ำ | ผ้าเช็ดตัว | ฝักบัว | ห้องนอน | ผ้าห่ม | | | | | |
| | | เตียง | แก้ว | จาน | ตู้เย็น | มีด | กระดิ่ง | บ้าน | ทราย | | | | | |
| | | ฝน | ท้องฟ้า | น้ำตก | นั่น | หนู(สรรพนาม) | นู่น | เพลงช้าง | ผี | | | | | |
| | VER | ร้อง | ร้องเพลง | ดื่ม | อ่าน | ดู | อ้า | พูด | ฟัง | เอา (4) | เปิด (2) | เจี๊ยก (3) | อย่างนี้ (1) | เที่ยว (1) |
| | | ยิ้ม | หัก | ให้ | โยน | กอด | แบ | ดึง | ดัน | ไป (1) | เล่น (1) | อี๊ด (1) | ขอบคุณ (2) | นั่ง (1) |
| | | กด | ขว้าง | ยืน | มา | กระโดด | เหยียบ | วิ่ง | คลาน | กิ๊งๆ (1) | มา (1) | อยู่ (1) | มี (1) | ไหว (1) |
| | | ชน | ล้าง | ใส่ | ตก | จุ๊ๆ | สวัสดี | ทำ | ถ่ายรูป | หนัก (1) | | | | |
| | | เจี๊ยก | เที่ยว | เล่น | อี๊ด | ขอบคุณ | นั่ง | ไม่ชอบ | มาก | | | | | |
| | | ดัง | นิ่ม | กิ๊งๆ | หนัก | | | | | | | | | |
| | REL | ไม่ | หลัง | ใน | หนึ่ง | แล้ว | ...มา | อีก | แล้ว | เลย (1) | หืม (1) | อืม (1) | | |
| | | เลย | หืม | อืม | | | | | | | | | | |
| 24 MO | NOM | กวาง | สิงโต | ควาย | แมลงสาบ | หนู | ผึ้ง | แมลง | น้อง | อันนี้ (35) | ไก่ (6) | อะไร (7) | ไหน (7) | รถไฟ (3) |
| | | หมอ | รถเข็น | มอร์เตอร์ไซค์ | รถเมล์ | ไข่ | ลูกอม | คอ | อก | ชิงช้า (3) | นู่น (5) | ตรงนี้ (3) | หนู (2) | ถ่าน (2) |
| | | เอว | ห้องครัว | หม้อ | ชาม | เตา | ส้อม | ตะปู | สวนสัตว์ | รถ (1) | ราง (1) | มัน (1) | นั้น (1) | ลิง (2) |
| | | วัด | ห้าง | โรงเรียน | เมฆ | ชิงช้า | น้ำพุ | ธงชาติ | ถ่าน | ส้ม (1) | กล้วย (1) | ลูกอม (1) | แมว (1) | กล้อง (1) |
| | | ราง | มัน(สรรพนาม) | ปู | เจ้ | กระป๋อง | ใคร | | | ต้นไม้ (1) | ปู (1) | เจ้/พี่ (1) | แม่ (1) | กระป๋อง (1) |
| | | | | | | | | | | พ่อ (2) | | | | |
| | VER | กำ | กลิ้ง | แกว่ง | หยิบ | หมุน | รับ | เจอ | ต่อ | ใส่ (7) | ต่อ (17) | กิน (6) | ไป (4) | เขียน (2) |
| | | ออก | ปั๊นๆ | ตอก | ใหญ่ | เล็ก | อ้วน | ยาว | เร็ว | ขึ้น (2) | มา (2) | หมุน (2) | ออก (1) | ปั๊นๆ (1) |
| | | สะอาด | สกปรก | เต็ม | ค่อย | เหม็น | แข็ง | แห้ง | เวียนหัว | เอา (1) | ตอก (1) | หยิบ (1) | รับ (1) | อยู่ (7) |
| | | สูง | รู้ | หลุด | ไว้ | | | | | สูง (3) | ชอบ (2) | เจอ (2) | เวียนหัว (2) | รู้ (1) |
| | | | | | | | | | | มี (1) | หลุด (1) | ยาว (1) | ไว้ (1) | |
| | REL | ได้ | ใช่ | ทำไม | ต้อง | สิ | ไอ้บ้า | โอ้โห | นอก | ได้ (15) | ไม่ (14) | เลย (6) | แล้ว (3) | ก่อน (3) |

| Age | Semantic | Word Acquired as Analysed from QWAT | | | | | | | | Word Acquired as Analyzed from Video Tapes | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24 MO | REL | ไม่ | ซ้าย | ขวา | ใน | ได้ | ยัง | กำลัง | อยู่ | ใช่ (2) | ทำไม (2) | ต้อง (1) | ใน (1) | โอ้โห (1) |
| | | เสีย | เช้า | มืด | ก่อน | คืนนี้ | | | | | | | | |

## Participant: L04

| Age | Semantic | Word Acquired as Analysed from QWAT | | | | | | | | Word Acquired as Analyzed from Video Tapes | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9 MO | NOM | แม่ | | | | | | | | | | |
| | VER | กิน | | | | | | | | | | |
| | REL | | | | | | | | | | | |
| 12 MO | NOM | | | | | | | | | | | |
| | VER | | | | | | | | | | | |
| | REL | | | | | | | | | | | |
| 15 MO | NOM | อาหาร | น้ำ | | | | | | | | | |
| | VER | เอา | มา | | | | | | | | | |
| | REL | | | | | | | | | | | |
| 18 MO | NOM | พ่อ | ยาย | ป้า | ก๋วยเตี๋ยว | เครื่องดื่ม | แมว | หมา | | | | |
| | VER | อิ่ม | | | | | | | | เอา (1) | | |
| | REL | จ๋า | อย่า | | | | | | | | | |
| 21 MO | NOM | หมี | งู | ช้าง | ม้า | ลิง | เสือ | เต่า | ควาย | หมา (1) | ปลา (1) | นา (1) |
| | | ยุง | มด | นก | แมลงสาบ | ไก่ | เป็ด | หนู | หมู | | | |
| | | หมา | ปลา | จิ้งจก | แมลงวัน | ผึ้ง | กิ้งกือ | นา | ตัวเอง | | | |
| | | พี่ | น้อง | ตา | ลุง | น้า | คน | รถ | รถเข็น | | | |
| | | รถเมล์ | เรือ | เครื่องบิน | ตุ๊กตา | บอล | ลูกโป่ง | ปืน | เนื้อไก่ | | | |
| | | ไข่ | เนื้อปลา | ข้าว | หมู | นม | เป๊ปซี่ | กล้วย | ส้ม | | | |
| | | มะละกอ | ไอติม | ขนมเค้ก | ช็อกโกแล็ต | ลองกอง | กุ้ง | เสื้อ | กางเกง | | | |
| | | ถุงเท้า | ผ้าอ้อม | กางเกงใน | สร้อย | กำไล | หมวก | แป้ง | สบู่ | | | |
| | | ลิปสติก | ตา | หู | จมูก | ปาก | แก้ม | ผม | หัว | | | |
| | | ลิ้น | ฟัน | หน้า | คิ้ว | คอ | แขน | มือ | นิ้ว | | | |
| | | เล็บ | สะดือ | ก้น | อวัยวะเพศ | ขา | เท้า | พุง | โต๊ะ | | | |
| | | ถังขยะ | กุญแจ | กรรไกร | กระเป๋า | ยา | เงิน | กระดาษ | โทรทัศน์ | | | |
| | | บันได | อ่าง | ขัน | เปล | หมอน | เตียง | แก้ว | จาน | | | |
| | | ช้อน | มีด | สระน้ำ | บ้าน | โรงเรียน | ทะเล | ฝน | ต้นไม้ | | | |
| | | พระจันทร์ | | | | | | | | | | |
| | | ขึ้น | ลง | กัด | เป่า | ร้อง | ดื่ม | อ้า | ดู | ไป (3) | มา (1) | มี (1) |

| Age | Semantic | Word Acquired as Analysed from QWAT | | | | | | | | Word Acquired as Analyzed from Video Tapes | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 21 MO | VER | หอม | อ่าน | พูด | เขียน | ให้ | โยน | ตี | กอด | | | | | |
| | | กำ | เก็บ | ดึง | วาง | กด | จับ | ยืน | ขี่ | | | | | |
| | | ไป | เหยียบ | วิ่ง | เดิน | คลาน | นอน | เปิด | ปิด | | | | | |
| | | ชน | ล้าง | ช่วย | เล่น | ใส่ | ตก | ฉี่ | บ๊ายบาย | | | | | |
| | | ไม่เอา | เร็ว | หมด | สวย | เหม็น | อร่อย | เผ็ด | ร้อน | | | | | |
| | | อุ่น | เย็น | เปียก | แห้ง | กลัว | หิว | เจ็บ | รัก | | | | | |
| | | ไม่รัก | ดื้อ | มี | | | | | | | | | | |
| | REL | ไม่ | บน | หน้า | ล่าง | หลัง | ใน | ทั้งหมด | ยัง | ไม่ (1) | | | | |
| | | ...อยู่ | แล้ว | | | | | | | | | | | |
| 24 MO | NOM | กวาง | ยีราฟ | จระเข้ | สิงโต | วัว | กา | กระต่าย | สัตว์ | อันนี้ (18) | ตรงนี้ (1) | แม่ (10) | ปิ่ม (10) | รถ (8) |
| | | แมลง | ฮิปโป | ม้าลาย | ย่า | ครู | หมอ | พยาบาล | ทหาร | เตารีด (8) | นู่น (6) | โรงพยาบาล(8) | งู (5) | หมอ (5) |
| | | ตำรวจ | แม่ค้า | นักร้อง | เด็ก | ผู้ใหญ่ | ผู้ชาย | จอ(คน) | ผู้หญิง | ที่ไหน (5) | รถไฟ (5) | ม้าลาย (4) | ปู (4) | รองเท้า (3) |
| | | จักรยาน | มอร์เตอร์ไซค์ | แท็กซี่ | รถไฟ | รถซ็อปเปอร์ | หุ่นยนต์ | ของเล่น | มือถือ | ฟาร์มฯ (4) | ช้าง (3) | พ่อ (3) | ของ (3) | หมีผึ้ง (4) |
| | | ค้อนยาง | กระปุกออมสิน | น้ำส้ม | แตงโม | สับปะรด | ขนมปัง | ผลไม้ | ขนม | นม (7) | จระเข้ (2) | หมู (2) | อะไร (2) | ม้า (2) |
| | | แอ๊บเปิ้ล | สะตอ | นมอัดเม็ด | เงาะ | มังคุด | มะม่วง | ปลากระป๋อง | กระโปรง | หมา (2) | กล้อง (3) | ข้างนอก (1) | ฮิปโป (2) | ที่โน่น (1) |
| | | รองเท้า | ชุด | แหวน | แว่นตา | แชมพู | น้ำหอม | ยาสีฟัน | เสื้อผ้า | เสียง (1) | ปลา (1) | ปลากระป๋อง(1) | มาม่า (1) | แอ๊ปเปิ้ล (3) |
| | | เครื่องประดับ | เครื่องสำอาง | ต่างหู | โลชั่น | คาง | เอว | เข่า | หน้าแข้ง | ไก่ (1) | เตาแก๊ส (1) | บ้าน (1) | ซักโครก (2) | น้ำ (1) |
| | | เก้าอี้ | หลอดไฟ | ประตู | รูป | พัดลม | ค้อน | กระดาษ | กล่อง | | | | | |
| | | คอมพิวเตอร์ | โทรทัศน์ | วิทยุ | วีดีโอ | บันได | โทรศัพท์ | ห้องน้ำ | แปรงสีฟัน | | | | | |
| | | ผ้าเช็ดตัว | ฝักบัว | ห้องนอน | ผ้าห่ม | โคมไฟ | ห้องครัว | กระทะ | ตะหลิว | | | | | |
| | | หม้อ | ถ้วย | ชาม | ตู้เย็น | เตา | ส้อม | ขวด | ไม้กวาด | | | | | |
| | | ผ้าเช็ดมือ | ไม้ถูพื้น | ผ้าเช็ดเท้า | เตารีด | เตาแก๊ส | ซักโครก | สนาม | สวนสัตว์ | | | | | |
| | | วัด | ห้าง | ทราย | ดอกไม้ | สวน | เมฆ | ก้อนหิน | ท้องฟ้า | | | | | |
| | | น้ำตก | น้ำพุ | ดาว | พระอาทิตย์ | ฟาร์มจระเข้ | ใคร | ไหน | นู่น | | | | | |
| | | โรงพยาบาล | ปู | ของ | หมีผึ้ง | นี้ | อะไร | กล้อง | ข้างนอก | | | | | |
| | | โน่น | เสียง | มาม่า | | | | | | | | | | |
| | VER | ร้องเพลง | ฟัง | ยิ้ม | หัก | วาด | ขับ(รถ) | แบ | ผลัก | ไป (8) | เอา (5) | นอน (5) | ขยับ (4) | ร้องเพลง (5) |
| | | ขว้าง | กระโดด | เตะ | กลิ้ง | ว่ายน้ำ | แกว่ง | ทำ | จุ๊ๆ | ขึ้น (2) | ลง (2) | มา (2) | ใส่ (2) | ให้ (2) |
| | | ถอย | ทำงาน | หล่น | เข้า | ขยับ | ขึ้น | ลง | เต้น | ดู (1) | ระบำ (1) | ล้ม (1) | นั่ง (1) | ทำงาน (1) |
| | | ล้ม | นั่ง | เข้า | ชง | ไม่ชอบ | ชอบ | สนุก | เหนื่อย | หล่น (1) | เข้า (1) | จับ (1) | เขียน (1) | กิน (1) |

| Age | Semantic | Word Acquired as Analysed from QWAT | | | | | | | | Word Acquired as Analyzed from Video Tapes | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24 MO | VER | ใหญ่ | เล็ก | อ้วน | ยาว | สูง | ช้า | สะอาด | สกปรก | ชง (1) | อยู่ (17) | มี (14) | เจ็บ (1) | ง่วง (1) |
| | | หล่อ | มาก | ใหม่ | ดัง | หอม | หวาน | เค็ม | เปรี้ยว | อร่อย (1) | อาย (1) | ใหญ่ (1) | | |
| | | ขม | นิ่ม | แข็ง | ง่วง | | | | | | | | | |
| | REL | นะ | ค่ะ | คำด่า | เช้า | กลางคืน | ตอนนี้ | ก่อน | หลัง | ไม่ (9) | จะ (5) | อย่า (2) | ได้ (1) | เลย (1) |
| | | วันนี้ | พรุ่งนี้ | เมื่อวานนี้ | คืนนี้ | ข้าง | ที่นี่ | เท่ากัน | เกือบ | ใช่ (1) | อีก (1) | ด้วย (1) | แล้ว (2) | เคย (1) |
| | | กำลังจะ | จะ | กำลัง | เหมือน | เคย | ...มา | ...เข้า | ...เสีย | ค่ะ (1) | | | | |
| | | ...เอา | ...ให้ | ...ดู | ใช่ | อีก | ได้ | เลย | ด้วย | | | | | |

# Participant: L05

| Age | Semantic | Word Acquired as Analysed from QWAT | | | | | | | | Word Acquired as Analyzed from Video Tapes | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9 MO | NOM | | | | | | | | | | | | | |
| | VER | | | | | | | | | | | | | |
| | REL | | | | | | | | | | | | | |
| 12 MO | NOM | แม่ | | | | | | | | | | | | |
| | VER | กิน | | | | | | | | | | | | |
| | REL | | | | | | | | | | | | | |
| 15 MO | NOM | หมา | ปลา | จิ้งจก | พ่อ | ตา | ยาย | รถ | เครื่องบิน | จิ้งจก (2) | นี่ (1) | จิ้งจก (2) | | |
| | | นม | เป็ปซี่ | นี่ | | | | | | | | | | |
| | VER | บิ๊อ/บิ๊น(ขับรถ) | จ๊ะเอ๋ | | | | | | | บิ๊อ (5) | จ๊ะเอ๋ (1) | กิน (2) | | |
| | REL | | | | | | | | | | | | | |
| 18 MO | NOM | ไก่ | งู | ช้าง | ยีราฟ | ม้า | ลิง | เสือ | สิงโต | ไดโนเสาร์ (9) | หมา (4) | ปลา (6) | ลั่นทม (5) | ผี (6) |
| | | เต่า | กบ | มด | นก | กระต่าย | แมว | ไก่ | เป็ด | เป็ด (3) | สิงโต (2) | งู (2) | ช้าง (2) | พี่ (1) |
| | | จิงโจ้ | ตัวเอง | พี่(เฟิร์สท) | ลั่นทม | ผี | กวาง | นกยูง | ปู | ไก่ (3) | นี่ (2) | กวาง (1) | จิงโจ้ (1) | นกยูง (1) |
| | | หมี | แกะ | ไดโนเสาร์ | จักรยาน | มอร์เตอร์ไซค์ | แท็กซี่ | รถไฟ | เรือ | หมี (1) | แกะ (1) | ปู (1) | หมา (1) | ปาก (1) |
| | | ตุ๊กตา | ลูกโป่ง | ปืน | เนื้อไก่ | เนื้อปลา | น้ำ | แตงโม | เสื้อ | | | | | |
| | | กางเกง | รองเท้า | แว่นตา | หมวก | แป้ง | สบู่ | ตา | จมูก | | | | | |
| | | ปาก | ก้น | จู๋ | โต๊ะ | ประตู | กระเป๋า | เงิน | โทรทัศน์ | | | | | |
| | | วีดีโอ | ผ้าห่ม | ร่ม | สระน้ำ | ต้นไม้ | น้ำพุ | | | | | | | |
| | VER | ไป | เป่า | นอน | ว่ายน้ำ | ปิด | ใส่ | ฉี่ | แกะ | บิ๊น (30) | เอ่เอ๊ (1) | เปาะๆ (1) | หา (4) | ฮู่ (2) |
| | | สวัสดี | บ๊ายบาย | ขอบคุณ | ฮัลโหล | เอ่เอ๊ | ทำเปาะๆ | ใส่ | ฮู่ | บิน (7) | ใส่ (1) | เหมียว (1) | ฮัลโหล (2) | ถึง (5) |
| | | บิน | เหมียว | ไม่เอา | หมด | อร่อย | เผ็ด | ร้อน | เป๊ียก | เหม็น (3) | | | | |
| | | เหม็น | ถึง | | | | | | | | | | | |
| | REL | ถึง | อี๋ | อ๊ะ | โอ๊ย | ครับ | | | | ครับ (2) | อ๊ะ (2) | อี๋ (1) | โอ๊ย (1) | |
| 21 MO | NOM | จระเข้ | วัว | หมู | น้อง | ตำรวจ | เด็ก | ลูกบอล | ของเล่น | บิ๊น (11) | รถไฟ (15) | ห้องน้ำ (13) | รถ (5) | เต่า (5) |
| | | ไข่ | ข้าว | หมู | ก๋วยเตี๋ยว | ขนม | ถุงเท้า | ยาสีฟัน | หู | ตำรวจ (4) | ผี (4) | น้ำ (5) | ผม (4) | ม้า (3) |
| | | ผม | หัว | คาง | ลิ้น | ฟัน | หน้า | คิ้ว | คอ | พัดลม (3) | ปู (3) | ชุด (4) | นี่ (2) | ใคร (1) |
| | | แขน | มือ | นิ้ว | สะดือ | ขา | เท้า | หลัง | เก้าอี้ | กางเกง (1) | จู๋ (1) | หมา (1) | ม้า (1) | กล้อง (2) |
| | | ถังขยะ | พัดลม | หวี | กุญแจ | กรรไกร | ยาย | กระดาษ | กล่อง | มอร์เตอร์ไซค์ (3) | | สไปเดอร์แมน (9) | | |

| Age | Semantic | Word Acquired as Analysed from QWAT | | | | | | | | Word Acquired as Analyzed from Video Tapes | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 21 MO | NOM | บันได | โทรศัพท์ | ห้องน้ำ | อ่าง | ขัน | แปรงสีฟัน | ผ้าเช็ดตัว | ฝักบัว | | | | | |
| | | ห้องนอน | หมอน | เตียง | กระทะ | ตะหลิว | หม้อ | ถ้วย | แก้ว | | | | | |
| | | จาน | ชาม | ตู้เย็น | เตา | ช้อน | มีด | ตะเกียบ | ขวด | | | | | |
| | | ไม้กวาด | ส้วม | สนาม | ห้างฯ | โรงเรียน | ทราย | ดอกไม้ | ฝน | | | | | |
| | | ท้องฟ้า | ใคร | ที่ไหน | อะไร | ชุด | | | | | | | | |
| | VER | กัด | ร้อง | ร้องเพลง | ดื่ม | อ้า | ดู | จูบ | อ่าน | บิ้น (11) | ปิ้วๆ (23) | หา (9) | มา (8) | เตะ (3) |
| | | พูด | ฟัง | ยิ้ม | เอา | เขียน | วาด | ให้ | โยน | บ๊ายบาย (3) | ชน (2) | ฉึกฉัก (3) | เอา (2) | โฮ่งๆ (2) |
| | | ตี | กอด | เก็บ | ดึง | ผลัก | วาง | กด | จับ | เล่น (1) | ฮัลโหล (1) | ฉึก (1) | เก็บ (1) | ปวดฉี่ (6) |
| | | บีบ | ขี่ | มา | กระโดด | เตะ | เหยียบ | วิ่ง | เดิน | ตาย (4) | ไหว (3) | เจ็บ (2) | เก่ง (2) | หมด (1) |
| | | คลาน | กลิ้ง | เปิด | ชน | ล้าง | ช่วย | เล่น | ตก | สวย (1) | หนัก (1) | ไว้ (1) | | |
| | | จุ๊ๆ(ให้เงียบ) | ขึ้น | ลง | เที่ยว | จิ้ม | ขี่ | ปิ้วๆ(ยิงปืน) | ฉี่ | | | | | |
| | | โฮ่งๆ | ฉึกฉัก | ฉึก | ปวดฉี่ | ไว้ | ไม่ชอบ | กลัว | ชอบ | | | | | |
| | | สนุก | เหนื่อย | หิว | เจ็บ | สวย | ดัง | ขม | เย็น | | | | | |
| | | เสร็จ | ตาย | เก่ง | หนัก | ไหว | | | | | | | | |
| | REL | หลัง | หมด | อีก | เลย | ได้ | แล้ว | ไม่ | เอ๊ะ | เลย (3) | ไม่ (2) | นะ (2) | แล้ว (2) | ไง (1) |
| | | ไง(นี่ไง) | นะ | | | | | | | ครับ (1) | เอ๊ะ (1) | | | |
| 24 MO | NOM | แมลงสาบ | ฮิปโป | ม้าลาย | ลุง | ป้า | อา | ครู | หมอ | แม่ (20) | นี่ (2) | ปู (9) | อะไร (14) | รถไฟ (8) |
| | | พยาบาล | ทหาร | รถเข็น | หุ่นยนต์ | น้ำส้ม | ส้ม | กล้วย | สับปะรด | ใคร (5) | ช้าง (5) | เสียง (2) | หมา (2) | ฟ้า (2) |
| | | ขนมปัง | ไอติม | ผ้าอ้อม | กางเกงใน | แหวน | สร้อย | แชมพู | แก้ม | ตัว (2) | โถส้วม (2) | ผี (2) | พี่ (1) | ไดโนเสาร์ (1) |
| | | หน้า | คิ้ว | เล็บ | เข่า | วิทยุ | ไฟ | กล้อง | โถส้วม | ทะเล (1) | น้ำ (2) | ลิง (1) | เฟิร์สท (1) | ไฟ (1) |
| | | บ้าน | ทะเล | เสียง | ปากกา | ทางนี้ | ตัว | | | ส้วม (1) | กล้อง (1) | เสือ (1) | ฮิปโป (1) | ยีราฟ (1) |
| | | | | | | | | | | ม้าลาย (1) | สไปเดอร์แมน (4) | | | |
| | VER | โป้ง | หัก | กำ | แบ | ผลัก | แกว่ง | ทำ | หลอก | ไป (10) | ปิ้วๆ (19) | มา (5) | ทำอะไร (5) | สวัสดี (2) |
| | | ระบำ | เที่ยว | อึ | สับ | จม | มืด | แข็ง | ใจร้าย | จุ๊บ (2) | อ่าน (2) | พูด (2) | ให้ (1) | บ๊ายบาย (1) |
| | | โกรธ | ตื๊อ | รัก | อยู่ | เป็น | จบ | มี | รู้ | เที่ยว (1) | จม (1) | โฮ่งๆ (1) | เปิด (1) | ตี (1) |
| | | คด | ดับ | เพี๊ยะ | ไว้ | | | | | อึ (1) | ฮัลโหล (3) | สับ (3) | กิน (1) | หลอก (1) |
| | | | | | | | | | | รัก (6) | อยู่ (5) | เป็น (5) | จบ (4) | มี (4) |
| | | | | | | | | | | กลัว (4) | ตื๊อ (2) | ตาย (2) | รู้ (2) | คด (2) |
| | | | | | | | | | | น่ากลัว (1) | ดับ (1) | เพี๊ยะ (1) | ไว้ (1) | หมด (1) |

| Age | Semantic | Word Acquired as Analysed from QWAT | | | | | | | | Word Acquired as Analyzed from Video Tapes | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24 MO | REL | ด้วย | เหรอ | หน่อย | บน | หน้า | ล่าง | นอก | อยาก | ไม่ (19) | ครับ (8) | แล้ว (5) | บ้าง (5) | เลย (3) |
| | | ...อยู่ | แล้ว | บ้าง | เท่า | อะ | ว้าย | กัน | เฮ้ย | ด้วย (3) | หน่อย (3) | เหรอ (3) | เท่า (2) | อะ (2) |
| | | ใช่ | สิ | | | | | | | ว้าย (2) | กัน (1) | เฮ้ย (1) | ไง (1) | ใช่ (1) |
| | | | | | | | | | | สิ (1) | | | | |

# Participant: L06

| Age | Semantic | Word Acquired as Analysed from QWAT | | | | | | | | Word Acquired as Analyzed from Video Tapes | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9 MO | NOM | | | | | | | | | | | | | |
| | VER | | | | | | | | | | | | | |
| | REL | | | | | | | | | | | | | |
| 12 MO | NOM | แม่ | | | | | | | | | | | | |
| | VER | กิน | | | | | | | | | | | | |
| | REL | | | | | | | | | | | | | |
| 15 MO | NOM | ปลา | เนื้อปลา | ขยะ | ยา | มอร์เตอร์ไซค์ | เครื่องบิน | จักรยาน | รถกระบะ | | | | | |
| | VER | ฉี่ | เปิด | สกปรก | | | | | | กิน (2) | | | | |
| | REL | | | | | | | | | | | | | |
| 18 MO | NOM | หมี | ช้าง | ม้า | ลิง | เสือ | กา | ยุง | มด | พี่ (15) | โอ๊ต (6) | ตัวเอง (3) | บอล (3) | เฟิน (8) |
| | | นก | กระต่าย | แมว | ไก่ | เป็ด | หนู | หมู | หมา | รถ (2) | ไอติม (1) | นู่น (1) | ฟอร์ด (1) | ถ่าน (1) |
| | | จิ้งจก | ตัวเอง | พี่ | ตา | ยาย | ลุง | ป้า | ตำรวจ | | | | | |
| | | ยาม | โอ๊ต | ฟอร์ด | แท็กซี่ | รถเมล์ | รถไฟ | เรือ | รถตู้ | | | | | |
| | | รถ | ลูกบอล | ลูกโป่ง | ปืน | ไข่ | ข้าว | ก๋วยเตี๋ยว | นม | | | | | |
| | | น้ำ | น้ำส้ม | กล้วย | ส้ม | มะละกอ | ไอติม | ขนม | กาแฟ | | | | | |
| | | โจ๊ก | ข้าวต้ม | เสื้อ | กางเกง | ถุงเท้า | รองเท้า | หมวก | แป้ง | | | | | |
| | | สบู่ | ยาสีฟัน | ตา | หู | จมูก | ปาก | ผม | หัว | | | | | |
| | | ลิ้น | ฟัน | แขน | มือ | นิ้ว | เล็บ | เข่า | ก้น | | | | | |
| | | จู๋ | ขา | เท้า | โต๊ะ | เก้าอี้ | หลอดไฟ | ประตู | พัดลม | | | | | |
| | | กุญแจ | เงิน | บันได | โทรศัพท์ | แปรงสีฟัน | ผ้าเช็ดตัว | หมอน | ผ้าห่ม | | | | | |
| | | แก้ว | จาน | ช้อน | มีด | ตะเกียบ | มุ้ง | ถ่าน | บ้าน | | | | | |
| | | ฝน | ต้นไม้ | น้ำพุ | พระอาทิตย์ | ปั๊มน้ำมัน | นู่น | เฟิน | | | | | | |
| | VER | ดื่ม | เอา | ตี | กอด | เก็บ | ยืน | ไป | มา | บิ๊นๆ (5) | ลาก่อน (7) | ไป (2) | อุ้ม (1) | เปิด (1) |
| | | เตะ | เหยียบ | เดิน | นอน | ล้าง | ปิด | ใส่ | ยก | ปู๊นๆ (1) | อู๊ดๆ (1) | มา (1) | ดี (1) | มี (1) |
| | | จอด | อุ้ม | สวัสดี | บ๊ายบาย | ขอบคุณ | คืน | ลาก่อน | กลัว | อยู่ (1) | | | | |
| | | หิว | ยาว | เหม็น | เผ็ด | เปรี้ยว | ร้อน | เย็น | เปียก | | | | | |
| | | อิ่ม | ดี | ปู๊นๆ | บิ๊นๆ | มี | อยู่ | อู๊ดๆ | | | | | | |
| | | ครับ | จ๋า | หลัง | ไม่ | | | | | ไม่ (1) | ครับ (1) | | | |

| Age | Semantic | Word Acquired as Analysed from QWAT | | | | | | | | Word Acquired as Analyzed from Video Tapes | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 21 MO | NOM | กวาง | ยีราฟ | สิงโต | เต่า | วัว | ควาย | กบ | พ่อ | พี่ (13) | ถุง (4) | บอล (1) | ตา (1) | รถ (1) |
| | | น้อง | ปู่ | ย่า | ผีตาโบ่ | ไก่ | หมู | ขนมปัง | เงาะ | พ่อ (1) | ปากกา (1) | แม่ (1) | นู่น (1) | |
| | | มังคุด | มะนาว | ทุเรียน | นมเปรี้ยว | ข้าวเหนียว | หมูปิ้ง | ตับปิ้ง | แฮ็ค | | | | | |
| | | เครื่องบิน | เครื่องบินไอพ่น | รถดักดิน | ล้อ | แว่นตา | กรรไกร | กระเป๋า | วิทยุ | | | | | |
| | | ฝักบัว | ห้องนอน | เตียง | กระทะ | หม้อ | ไม้กวาด | ถุง | กระโถนฉี่ | | | | | |
| | | ทะเล | ก้อนหิน | พระจันทร์ | เซเว่นอีเลฟเว่น | ขี้ตา | ปากกา | | | | | | | |
| | VER | กัด | ดู | ยิ้ม | ขี่ | กระโดด | วิ่ง | ชน | ช่วย | เก็บ (6) | มา (4) | เข้า (3) | ใส่ (2) | เล่น (1) |
| | | เกา | ถอย | ซักผ้า | แปรงฟัน | เก็บ | มัด | หยิบ | ฉี่ | มัด (1) | หยิบ (1) | หมด (2) | สีแดง (1) | |
| | | ขว้าง | เข้า | เล่น | เหนื่อย | เจ็บ | ใหญ่ | เล็ก | หมด | | | | | |
| | | ใหม่ | ขม | เสีย | สีส้ม | สีเขียว | สีแดง | | | | | | | |
| | REL | แล้ว | ด้วย | กัน | | | | | | ครับ (7) | ด้วย (1) | กัน (1) | | |
| 24 MO | NOM | แมลงสาบ | ทหาร | พี่พลับ | เป๊ปซี่ | ของแถม | แอ๊ปเปิ้ล | โยเกิต | ลูกชิ้น | แม่ (10) | ของแถม (6) | พี่ (6) | ไหน (2) | ตัวเอง (2) |
| | | กุ้ง | เบียร์ | กางเกงใน | แหวนเพชร | สร้อย | แชมพู | แก้ม | คาง | พ่อ (1) | น้ำพุ (1) | บิ๊กซี (1) | ลาดพร้าว (1) | หู (1) |
| | | คิ้ว | สะดือ | คอมพิวเตอร์ | ทีวี | ชาม | ดอกไม้ | น้ำตก | จันเจ้า | ปั๊ม (3) | ขอนแก่น (1) | ขยะ (1) | จักรยาน (1) | สิงโต (1) |
| | | บิ๊กซี | ใคร | ที่ไหน | อะไร | เปตอง | ขอนแก่น | ลาดพร้าว | แม่ไก่แสนขยัน | ไก่ (1) | น้ำ (1) | แมลงวันฯ (2) | แม่ไก่แสนขยัน (5) | |
| | | แมลงวันจอมตะกละ (การ์ตูน) | | | | | | | (การ์ตูน) | | | | | |
| | VER | อ่าน | เขียน | วาง | จับ | ขึ้น | โทร | ชน | อ้วก | เอา (7) | กิน (2) | ขอบคุณ (2) | แถม (2) | หา (2) |
| | | ลุก | หา | แถม | หา | ล้ม | เหมียว | ฝาก | ทิ้ง | ล้ม (2) | เหมียว (2) | ดู (1) | ล้าง (1) | ฝาก (1) |
| | | เข้า | จ้อง | ต้ม | นั่ง | สูง | น้อย | ดัง | หอม | ทิ้ง (1) | ชน (1) | เข้า (1) | จ้อง (1) | ต้ม (1) |
| | | หวาน | แข็ง | เยอะ | จริง | แสบ | รัก | ชน | นิดเดียว | นอน (1) | อุ้ม (1) | ลุก (1) | ขึ้น (1) | เปิด (1) |
| | | เชื่อ | อยู่ | ใกล้ | | | | | | นั่ง (1) | เผ็ด (3) | จริง (4) | แสบ (1) | รัก (1) |
| | | | | | | | | | | ชน (1) | นิดเดียว (1) | เยอะ (1) | เชื่อ (1) | อยู่ (1) |
| | | | | | | | | | | ใกล้ (1) | | | | |
| | REL | จริง | หน่อย | ...ขึ้น | ใช่ | เลย | จะ | อะ | | ครับ (7) | ไม่ (6) | หน่อย (2) | ใช่ (1) | แล้ว (1) |
| | | | | | | | | | | กับ (1) | ด้วย (1) | เลย (1) | จะ (1) | อะ (1) |
| | | | | | | | | | | ครับ (1) | | | | |

## Participant: L07

| Age | Semantic | Word Acquired as Analysed from QWAT | | | | | | | | Word Acquired as Analyzed from Video Tapes | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9 MO | NOM | | | | | | | | | | | | | |
| | VER | | | | | | | | | | | | | |
| | REL | | | | | | | | | | | | | |
| 12 MO | NOM | อาหาร | น้ำ | แมว | พ่อ | แม่ | ป้า | เครื่องบิน | | แม่ (2) | | | | |
| | VER | กิน | ร้องเพลง | อ้า | จูบ | | | | | | | | | |
| | REL | | | | | | | | | | | | | |
| 15 MO | NOM | ช้าง | ม้า | นก | เป็ด | หมา | จิ้งจก | หนู | ย่า | อะไร (32) | แม่ (2) | นี่ (1) | หนู (1) | ม้า (1) |
| | | ยาย | รถไฟ | เรือ | ไข่ | นม | อันนี้ | อะไร | | | | | | |
| | VER | บ๊ายบาย | ก็อบๆ | อยู่ | | | | | | ก๊อบๆ (2) | อยู่ (1) | | | |
| | REL | | | | | | | | | | | | | |
| 18 MO | NOM | วัว | กระต่าย | ไก่ | ปลา | จิงโจ้ | รถ | แท็กซี่ | เสื้อ | ไก่ (3) | ปลา (1) | จิงโจ้ (1) | | |
| | | กางเกง | สร้อย | ตา | ห้างสรรพสินค้า | ทะเล | อันนั้น | ใคร | | | | | | |
| | VER | ฉี่ | อึ | | | | | | | | | | | |
| | REL | | | | | | | | | | | | | |
| 21 MO | NOM | หมี | งู | เสือ | ยุง | หมู | ปู | พี่ | น้อง | อันนี้ (4) | น้ำ (1) | ปู (1) | ขัน (1) | |
| | | ตา | อาพร | ชินจัง | จักรยาน | ลูกบอล | ลูกโป่ง | ถุงเท้า | รองเท้า | | | | | |
| | | แว่นตา | หมวก | หู | จมูก | ปาก | แก้ม | ผม | หัว | | | | | |
| | | สะดือ | ก้น | อวัยวะเพศ | ขา | เท้า | หลอดไฟ | ประตู | ถังขยะ | | | | | |
| | | กุญแจ | กระเป๋า | ยา | เงิน | ห้องน้ำ | ผ้าห่ม | ขัน | ฝน | | | | | |
| | | ท้องฟ้า | ต้นไม้ | ดาว | พระจันทร์ | ที่ไหน | | | | | | | | |
| | VER | เอา | ตี | ขี่ | ไป | ปิด | ใส่ | ตัก | ระบายสี | ตัก (4) | ฟ้า (1) | ดำ (1) | ม่วง (1) | |
| | | กลัว | หิว | เจ็บ | หมด | สวย | หอม | เหม็น | เปรี้ยว | | | | | |
| | | ร้อน | เย็น | เปียก | ฟ้า | ดำ | ม่วง | | | | | | | |
| | REL | บ้า(คำด่า) | ไม่ | บน | ยัง | แล้ว | อีก | | | อีก (3) | ไม่ (1) | | | |
| 24 MO | NOM | เต่า | มด | แมลงสาบ | หมอ | พี่พลับ | รถเข็น | มอร์เตอร์ไซค์ | รถแอร์ | อันนี้ (3) | ข้าว (3) | แม่ (3) | ฝา (2) | อะไร (1) |
| | | ตุ๊กตา | ปืน | ของเล่น | เป๊ปซี่ | ข้าว | ก๋วยเตี๋ยว | กล้วย | ส้ม | ตรงนี้ (1) | พ่อ (1) | | | |
| | | แตงโม | กระโปรง | ผ้าอ้อม | กางเกงใน | แหวน | กำไล | แป้ง | แชมพู | | | | | |
| | | มือ | นิ้ว | เล็บ | โต๊ะ | เก้าอี้ | รูป | พัดลม | หวี | | | | | |

| Age | Semantic | Word Acquired as Analysed from QWAT | | | | | | | | Word Acquired as Analyzed from Video Tapes | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24 MO | NOM | กรรไกร | กระดาษ | โทรทัศน์ | วิทยุ | บันได | โทรศัพท์ | อ่าง | แปรง | | | | | |
| | | ผ้าเช็ดตัว | ฝักบัว | เปล | หมอน | โคมไฟ | เตียง | กระทะ | ตะหลิว | | | | | |
| | | หม้อ | ถ้วย | แก้ว | จาน | ชาม | ตู้เย็น | เตา | ช้อน | | | | | |
| | | ส้อม | มีด | ตะเกียบ | ขวด | ไม้กวาด | ฝาก | สระน้ำ | วัด | | | | | |
| | | บ้าน | โรงเรียน | ดอกไม้ | เมฆ | น้ำตก | พระอาทิตย์ | คลอง | | | | | | |
| | VER | กัด | เป่า | ดู | พูด | หัก | เขียน | วาด | ให้ | เต้น (9) | ปิด (6) | เอา (4) | ดู (3) | เปิด (2) |
| | | โยน | กอด | กำ | เก็บ | ดึง | ดัน | วาง | กด | หยอด (1) | ป้อน (1) | เต้น (1) | ร้อน (5) | เร็ว (2) |
| | | ขว้าง | จับ | ยืน | มา | กระโดด | เตะ | เหยียบ | วิ่ง | เผ็ด (3) | ติด (1) | เก่ง (1) | สุก (1) | จบ (1) |
| | | เดิน | กลิ้ง | นอน | เปิด | ล้าง | เล่น | ตก | จุ๊ๆ | | | | | |
| | | ลง | ปิด | หยอด | เต้น | ป้อน | ใหญ่ | สกปรก | มาก | | | | | |
| | | ดัง | อร่อย | หวาน | เผ็ด | แข็ง | สนุก | ขาว | ดำ | | | | | |
| | | เหลือง | เขียว | น้ำเงิน | ชมพู | สีส้ม | ติด | เก่ง | สุก | | | | | |
| | | จบ | เร็ว | | | | | | | | | | | |
| | REL | กลางคืน | หน้า | ซ้าย | ขวา | นอก | หมด | ...อยู่ | ...ดู | อู๊ย (5) | โอ๊ย (3) | ...ไว้ (3) | ...อยู่ (3) | ด้วย (2) |
| | | นะ | ค่ะ | จ๋า | อู๊ย | ด้วย | ไว้ | อีก | หู(อุทาน) | หู (2) | ไง (2) | แล้ว (2) | อีก (1) | บ้าง (1) |
| | | ไง | บ้าง | ไหม | อะ | สิ | โอ๊ย | | | นะ (1) | ไหม (1) | อะ (1) | ไม่ (1) | สิ (1) |

# Participant: L08

| Age | Semantic | Word Acquired as Analysed from QWAT | | | | | | | | Word Acquired as Analyzed from Video Tapes | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9 MO | NOM | พ่อ | | | | | | | | | | | | |
| | VER | กิน | | | | | | | | | | | | |
| | REL | | | | | | | | | | | | | |
| 12 MO | NOM | แม่ | ลุง | ตี่ | หนุ่ม | ยอด | ยาย | อุ๋ย | ตา | ป้า (6) | แม่ (5) | พ่อ (4) | | |
| | | ป้า | มด | หมา | นก | แมว | ปลา | หมี | ช้าง | | | | | |
| | | ม้า | กา | เป็ด | หมู | ผึ้ง | รถ | ตุ๊กตา | ลูกบอล | | | | | |
| | | ลูกโป่ง | ปลา | น้ำ | ขนมเค้ก | ตา | หู | จมูก | ปาก | | | | | |
| | | สะดือ | | | | | | | | | | | | |
| | VER | ฉี่ | | | | | | | | | | | | |
| | REL | | | | | | | | | | | | | |
| 15 MO | NOM | พี่ | น้อง | ปู่ | ย่า | นี่ | เพลงโดเรมี | งู | จระเข้ | ฟักทอง (4) | นี่ (1) | หมู (1) | เป็ด (1) | หมา (1) |
| | | ลิง | เสือ | เต่า | วัว | กบ | ยุง | กระต่าย | เรือ | ลิง (1) | มด (1) | กบ (2) | ลูกโป่ง (2) | เครื่องบิน (1) |
| | | เครื่องบิน | ปืน | เนื้อไก่ | ไข่ | ข้าว | เนื้อหมู | นม | เป๊ปซี่ | ไอติม (2) | เค้ก (1) | นม (1) | ปลา (1) | ขนม (1) |
| | | กล้วย | ส้ม | แตงโม | สับปะรด | มะละกอ | ไอติม | ฟักทอง | แอ๊ปเปิ้ล | เป็ด (1) | เพลงโดเรมี(1) | | | |
| | | เสื้อ | กางเกง | ถุงเท้า | รองเท้า | หมวก | แป้ง | สบู่ | แก้ม | | | | | |
| | | ผม | หัว | คาง | ลิ้น | ฟัน | คอ | แขน | มือ | | | | | |
| | | ก้น | อวัยวะเพศ | ขา | เก้าอี้ | ประตู | กุญแจ | | | | | | | |
| | VER | กัด | จูบ | ให้ | ตี | ขี่ | เตะ | นอน | จุ๊ๆ | เปิด (1) | | | | |
| | | เปิด | | | | | | | | | | | | |
| | REL | | | | | | | | | | | | | |
| 18 MO | NOM | กวาง | ยีราฟ | สิงโต | ควาย | แมลงสาบ | ไก่ | หนู | จิ้งจก | ตัวเอง (8) | ปู (3) | ปลา (3) | ไก่ (3) | หมวก (4) |
| | | แมลงวัน | แกะ | น้อง | ปู่ | ย่า | ลุง | น้า | จินนี่ | แม่ (3) | ช้าง (4) | หมู (2) | แหม่ม (2) | จุ๊ (3) |
| | | บังเอิญ | จุ๊ | กิ๊ฟ | เต่า | จอย | แอน | พี่นัน | ก้อง | โขน (2) | พี่ (4) | นี่ (3) | เอา (1) | เต่า (1) |
| | | อาย | ป้าภา | พิวส์ | ยอด | โก้ | ป้านี่ | อ้อย | อ้น | สิงโต (1) | ม้า (1) | เป็ด (1) | หมู (1) | หมา (1) |
| | | แหม่ม | อ๊อด | มอร์เตอร์ไซค์ | สามล้อ | ปู | รูป | โขน | น้ำ | หมี (1) | แกะ (1) | ป้าภา (2) | หัว (1) | นิ้วโป้ง (1) |
| | | หน้า | คิ้ว | นิ้ว | เท้า | นิ้วโป้ง | นิ้วก้อย | น้องกลาง | คอมพิวเตอร์ | นิ้วก้อย (1) | นิ้วกลาง (1) | อ้อย (1) | อ้น (1) | วิว (1) |
| | | โทรศัพท์ | บ้าน | ทะเล | ฝน | | | | | อาย (1) | อ๊อด (1) | หนุ่ม (1) | โก้ (1) | ทำ (1) |
| | | | | | | | | | | ยอด (1) | กล้อง (1) | รูป (1) | ขา (1) | |

| Age | Semantic | Word Acquired as Analysed from QWAT | | | | | | | | Word Acquired as Analyzed from Video Tapes | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 18 MO | VER | เป่า | อ้า | ดู | พูด | ฟัง | ยิ้ม | เอา | เขียน | อุ้ม (21) | เดิน (4) | ตก (3) | อ่าน (2) | เอ่เอ๊ (4) |
| | | โยน | กอด | ดึง | จับ | ยืน | ไป | มา | วิ่ง | มา (2) | เที่ยว (2) | ขึ้น (1) | ไป (1) | อู๊ด ๆ (1) |
| | | เดิน | คลาน | ว่ายน้ำ | ปิด | ช่วย | ขอ | ขึ้น | ลง | โฮ่ง ๆ (1) | เอ๊ก ๆ (1) | เอา (1) | ลุก (1) | สี (1) |
| | | เที่ยว | บ๊ายบาย | โฮ่ง ๆ | เจ็บ | สวย | หอม | ร้อน | เปียก | แดง (4) | เขียว (3) | เหลือง (2) | สีส้ม (2) | สวย (1) |
| | | แดง | เหลือง | เขียว | สีส้ม | อุ้ม | เอ่เอ๊ | เที่ยว | อู๊ด ๆ | | | | | |
| | | ลุก | เอ๊ก ๆ | ตก | | | | | | | | | | |
| | REL | หน่อย | ใช่ | | | | | | | ใช่ (2) | | | | |
| 21 MO | NOM | แมลงวัน | ฮิปโป | นกแก้ว | แพะ | ปลาฉลาม | หมีแพนด้า | นกกระจอกเทศ | ปลาวาฬ | แม่ (21) | อันนั้น (7) | ควาย (6) | ช้าง (7) | นี่ (8) |
| | | อูฐ | จิงโจ้ | หิ่งห้อย | เต่าทอง | ตั๊กแตน | แมลงปอ | กุ้ง | ม้าน้ำ | ตัว (5) | ผีเสื้อ (4) | ตัวเอง (3) | อะไร (6) | แพะ (3) |
| | | ม้าลาย | ลูก | มัน(สรรพ.) | ดิวปิด | โปโปะ | รถเข็น | จักรยาน | รถเมล์ | แกะ (3) | ไก่ (3) | หมี (4) | ลูก (3) | มัน (3) |
| | | ก๋วยเตี๋ยว | น้ำส้ม | ขนมปัง | แครอท | กระโปรง | ผ้าอ้อม | กางเกงใน | แว่นตา | ผึ้ง (5) | เสือ (3) | ม้าน้ำ (3) | จระเข้ (5) | หนังสือ (2) |
| | | แชมพู | เอว | ท้อง | โต๊ะ | พัดลม | กรรไกร | ถังขยะ | กระเป๋า | วัว (2) | กบ (3) | ตา (2) | หมู (4) | ม้าลาย (3) |
| | | ยา | บันได | แปรงสีฟัน | ผ้าเช็ดตัว | ห้องนอน | หมอน | ผ้าห่ม | กระทะ | หมา (3) | สิงโต (2) | แมว (2) | ท้อง (2) | มด (2) |
| | | หม้อ | ถ้วย | จาน | ตังค์ | ตู้เย็น | ช้อน | มีด | ไม้กวาด | เป็ด (4) | นกแก้ว (1) | ยีราฟ (1) | วัว (1) | ปลา (1) |
| | | ที่นี่ | สระน้ำ | ดอกไม้ | ต้นไม้ | น้ำตก | น้ำพุ | ดาว | ฉัน | ฉลาม (1) | ม้า (3) | เต่า (1) | แพนด้า (1) | ปลาวาฬ (1) |
| | | ที่ไหน | อะไร | | | | | | | ฮิปโป (1) | อูฐ (2) | งู (2) | หนู (2) | กวาง (2) |
| | | | | | | | | | | ทางนี้ (1) | กระต่าย (1) | แครอท (1) | จิงโจ้ (1) | เสือ (1) |
| | | | | | | | | | | หิ่งห้อย (2) | เต่าทอง (1) | ตั๊กแตน (1) | แมลงปอ (2) | นู่น (1) |
| | | | | | | | | | | ลิง (1) | น้อง (1) | กุ้ง (1) | หู (1) | มือ (1) |
| | | | | | | | | | | ขา (1) | หัว (1) | โปโปะ (2) | กระต่าย (3) | จมูก (1) |
| | | | | | | | | | | นกกระจอกเทศ (2) | | | | |
| | VER | ร้อง | ร้องเพลง | ขับรถ | กำ | เก็บ | วาง | กระโดด | เหยียบ | อุ้ม (12) | อ่าน (7) | เอา (7) | ดู (2) | หยิบ (1) |
| | | ชน | ล้าง | ใส่ | เที่ยว | ซื้อ | หยิบ | ขอบคุณ | ล้ม | อ้า (1) | เอ๊ก ๆ (3) | กิน (1) | กุบกับ (1) | ล้ม (1) |
| | | อึ | กุบกับ | ทำ | ไม่ชอบ | กลัว | หิว | ใหญ่/โต | เล็ก/น้อย | ทำ (1) | ทำอะไร (1) | ปิด (1) | ใหญ่ (5) | รัก (3) |
| | | ปวด | แห้ง | หมด | เยอะแยะ | ดำ | รัก | เก่ง | อยู่ | หมด (3) | เก่ง (2) | โต (2) | น้อย (2) | เยอะ (2) |
| | | หก | มี | | | | | | | อยู่ (1) | หก (1) | มี (1) | | |
| | REL | ไม่ | อีก | นะ | เช้า | กลางคืน | ใน | ล่าง | นอก | อะ (8) | จ๋า (7) | ไม่ (6) | ค่ะ (3) | แล้ว (3) |
| | | อะ | จ๋า | ค่ะ | แล้ว | อีก/ใหม่ | ไง | | | อีก/ใหม่ (4) | ไง (1) | | | |
| 24 MO | NOM | รถไฟ | ผลไม้ | สร้อย | ยาสีฟัน | เล็บ | อก | เข่า | นิ้วนาง | แม่ (17) | ตัวเอง (9) | นก (8) | มัน (7) | ไหน (6) |
| | | นิ้วชี้ | กระดาษ | โทรทัศน์ | วิทยุ | วีดีโอ | ห้องน้ำ | ขัน | ฝักบัว | อะไร (9) | มด (7) | ลิง (7) | มือ (5) | ขา (5) |

| Age | Semantic | Word Acquired as Analysed from QWAT | | | | | | | | Word Acquired as Analyzed from Video Tapes | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24 MO | NOM | ส้อม | ตะเกียบ | วัด | ห้างฯ | ก้อนหิน | พระอาทิตย์ | เอ็มเค | แฟนพันธุ์แท้ | กระต่าย (4) | ลูก (4) | นี่ (4) | นก (4) | สิงโต (4) |
| | | น้ำหนึ่ง | เลือด | เบบี้มาย | ของ | แมลง | ก้องภพ | แม่คุณขุนทอง | | นิ้วโป้ง (3) | นิ้วชี้ (3) | นิ้วกลาง (3) | นิ้วนาง (3) | นิ้วก้อย (3) |
| | | | | | | | | | | กวาง (3) | งู (6) | แครอท (4) | ฮิปโป (3) | หมี (2) |
| | | | | | | | | | | น้ำหนึ่ง (2) | เอ็มเค (2) | เสือ (3) | นั่น (2) | เลือด (2) |
| | | | | | | | | | | หัว (3) | นี่ (1) | เบบี้มาย (1) | ตัวเอง (1) | พัดลม (1) |
| | | | | | | | | | | พ่อ (1) | ปลา (1) | คน (1) | ช้าง (3) | ของ (1) |
| | | | | | | | | | | พี่ (1) | แมลง (1) | ก้องภพ (1) | ยาย (2) | หนู (1) |
| | | | | | | | | | | หมา (2) | กวาง (1) | ผม (1) | ตา (1) | หู (1) |
| | | | | | | | | | | จมูก (1) | ฟัน (1) | คอ (1) | จระเข้ (1) | นก (1) |
| | | | | | | | | | | เป็ด (1) | ไหน (2) | แม่คุณขุนทอง (2) | | |
| | VER | ดื่ม | แกว่ง | เจี๊ยก ๆ | เรียก | หา | ไล่ | บิน | นั่ง | กิน (9) | กัด (4) | เจี๊ยก ๆ (3) | เอา (2) | เรียก (2) |
| | | สนุก | เหนื่อย | อ้วน | ผอม | สะอาด | สกปรก | เก่า | อร่อย | หา (2) | ไล่ (2) | บิน (2) | อ่าน (1) | ดู (1) |
| | | หวาน | แข็ง | น่ารัก | รู้ | เต็ม | มาก/จริง | สีฟ้า | น้ำเงิน | ทำ (1) | ทำอะไร (1) | เดิน (1) | นั่ง (1) | น่ารัก (6) |
| | | สีน้ำตาล | ม่วง | สีชมพู | | | | | | ชอบ (4) | น้ำเงิน (3) | รู้ (3) | เยอะ (3) | น้อย (2) |
| | | | | | | | | | | เต็ม (1) | จริง (2) | อยาก (1) | รัก (1) | |
| | REL | บน | หน้า | หลัง | ซ้าย | ขวา | เลย | ได้ | ฮะ | อะ (19) | เลย (7) | ขวา (6) | ไม่ (4) | ค่ะ (4) |
| | | ด้วย | ทำไม | หืม | ฮะ | ว๊าย | เอ้า | เฮ้ย | หนึ่ง | ซ้าย (3) | สอง (1) | ได้ (1) | ฮะ (1) | ว๊าย (2) |
| | | สอง | สาม | สี่ | ห้างฯ | หก | เจ็ด | แปด | เก้า | นะ (1) | ด้วย (1) | เฮ้ย (1) | ทำไม (1) | หืม (1) |
| | | สิบ | | | | | | | | บน (1) | เอ้า (1) | | | |

# Participant: L09

| Age | Semantic | Word Acquired as Analysed from QWAT | | | | | | | | Word Acquired as Analyzed from Video Tapes | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9 MO | NOM | รถ | ข้าว | | | | | | | | | | | |
| | VER | | | | | | | | | | | | | |
| | REL | | | | | | | | | | | | | |
| 12 MO | NOM | ช้าง | ปลา | ม้า | จิ้งจก | แม่ | เนื้อปลา | ลูกบอล | เครื่องบิน | กุญแจ (6) | ม้า (1) | บอล (1) | แม่ (1) | |
| | | ปาก | กุญแจ | | | | | | | | | | | |
| | VER | กิน | ไป | บิ๊น(ขับรถ) | | | | | | บิ๊น (2) | | | | |
| | REL | จ้ะ | | | | | | | | | | | | |
| 15 MO | NOM | ตุ๊กตา | ลูกโป่ง | ติ๊ดตี่ | พ่อ | ย่า | น้อง | พระ | ต้อม | บอล (21) | ช้อน (10) | ส้ม (9) | ป้า (7) | หมา (7) |
| | | กบ(คน) | ติ่ว | พิณ | นี | ในหลวง | ตัวเอง | หมี | ลิง | จิ้งจก (6) | แป้ง (6) | พระ (5) | แม่ (3) | ม้า (2) |
| | | เสือ | สิงโต | เต่า | กบ | ยุง | มด | นก | แมว | ดอกไม้ (2) | กล่อง (2) | ฝา (4) | น้อง (4) | ติ๊ดตี่ (2) |
| | | ไก่ | หมา | ผีเสื้อ | ไดโนเสาร์ | ป้า | แป้ง | ฝา | หนัง | ตัวเอง (1) | กระโถน (1) | หมี (1) | พัดลม (1) | ปลา (1) |
| | | น้อง | นุ่น | กล้อง | รูป | ส้ม | หู | มือ | เท้า | นุ่น (1) | หวี (1) | จักรยาน (1) | หนังสือ (1) | ช้อน (1) |
| | | ผม | จมูก | ตา | ฟัน | แก้ม | สะดือ | จู๋ | พุง | พ่อ (2) | กล้อง (1) | รูป (1) | รถ (2) | กระจก (1) |
| | | นม | น้ำ | ไข่ | ก๋วยเตี๋ยว | เป๊ปซี่ | กล้วย | แตงโม | มะละกอ | | | | | |
| | | ขนมปัง | ไอติม | ขนม | ฝรั่ง | แอ๊ปเปิ้ล | น้ำแข็ง | ชมพู่ | ผัก | | | | | |
| | | บ้าน | ดิน | ทะเล | ต้นไม้ | พระอาทิตย์ | พระจันทร์ | ดอกไม้ | ดาว | | | | | |
| | | ต้นมะพร้าว | ข้างนอก | ข้างล่าง | หลอดไฟ | โทรศัพท์ | กระเป๋า | โทรทัศน์ | หนังสือ | | | | | |
| | | เงิน | ตระกร้า | วิทยุ | พัดลม | บ้านเลขที่5 | เจ้าขุนทอง | การ์ตูน | แปรงสีฟัน | | | | | |
| | | เพลง | เพลงชาติ | ตระกร้า | ขยะ | ถ้วย | แก้ว | ตู้เย็น | ช้อน | | | | | |
| | | ขวด | ไม้กวาด | กล่อง | กระจก | หนังสือ | ถังน้ำ | ตะกร้า | ปลั๊กไฟ | | | | | |
| | | สวิทต์ | กระโถน | รถ | จักรยาน | มอร์เตอร์ไซค์ | เรือ | เสื้อ | กางเกง | | | | | |
| | | ผ้าอ้อม | แว่นตา | แป้ง | สบู่ | นาฬิกา | กิ๊บ | หวี | กระจก | | | | | |
| | | รองเท้า | หมวก | | | | | | | | | | | |
| | VER | กัด | ดู | หอม | ยิ้ม | เอา | เขียน | ให้ | เก็บ | เตะ (8) | โอ๋ (4) | ให้ (2) | เก็บ (2) | ปิด (2) |
| | | วาง | กด | ขว้าง | จับ | เดิน | ว่ายน้ำ | ชน | ล้าง | กิน (1) | หยิบ (1) | หยุด (2) | ดูด (1) | เล่น (2) |
| | | ใส่ | เล่น | เตะ | มา | ตด | อี | ปิด | นอน | ปา (1) | | | | |
| | | นั่ง | ทำงาน | กราบ | ขอ | หมุน | สระผม | เกา | กด | | | | | |
| | | ร้องเพลง | เปิด | เที่ยว | อุ้ม | ตี | ลง | ยุ่ง | หยุด | | | | | |

| Age | Semantic | Word Acquired as Analysed from QWAT | | | | | | | | Word Acquired as Analyzed from Video Tapes | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 MO | VER | สวัสดี | ขอบคุณ | จ๋าจี๋ | จ๊ะเอ๋ | จิ๊บๆ | โฮ่งๆ | เหมียวๆ | เสียงปลา | | | | | |
| | | เสียงจิ้งจก | โกรธ | กลัว | หนาว | เจ็บ | คัน | หิว | ไม่เอา | | | | | |
| | | สกปรก | หมด | หล่อ | มาก | หอม | เหม็น | อร่อย | หวาน | | | | | |
| | | เปรี้ยว | ร้อน | เย็น | เปียก | เผ็ด | หลับ | หยิบ | ดูด | | | | | |
| | | เล่น | ป่า/ขว้าง | | | | | | | | | | | |
| | REL | ครับ | ...ให้ | ...มา | ...ไว้ | | | | | จ้ะ (3) | | | | |
| 18 MO | NOM | งู | จระเข้ | ควาย | กา | กระต่าย | แรด | ตุ๊กแก | กุ้ง | อะไร (14) | เป็ด (4) | นก (4) | น้องนิว (4) | แมว (4) |
| | | ปู | หอย | นกเพนกวิน | ปลาหมึก | หนอน | นกแก้ว | นกยูง | นกฮูก | หมา (3) | ลิง (3) | แม่ (3) | ม้าลาย (4) | พ่อ (3) |
| | | ฮิปโป | พี่นา | น้องนิว | แท็กซี่ | รถเมล์ | รถไฟ | รถพ่วง | รถบรรทุก | แอ๊ปเปิ้ล (2) | องุ่น (2) | ลุง (2) | ฝา (2) | นี่ (4) |
| | | รถกระบะ | รถบัส | รถตู้ | หุ่นยนต์ | หุ่น(ที่เป็นคน) | ส้มโอ | พริก | หมูปิ้ง | หนอน (1) | ควาย (1) | ยาย (1) | นกแก้ว (1) | หมี (1) |
| | | แตงกวา | ส้มตำ | ผัก | ไก่ | นม | น้ำส้ม | สับปะรด | ช็อคโกแลต | เสือ (1) | นกยูง (2) | ไดโนเสาร์ (1) | มะเหงก (1) | พี่ (1) |
| | | ขนมปัง | อาหาร | เครื่องดื่ม | ฟักทอง | ฟักเขียว | ไมโล | องุ่น | มังคุด | นกฮูก (1) | ถังขยะ (1) | ปาก (1) | ตะกร้า (1) | ฝรั่ง (1) |
| | | เงาะ | มะม่วง | แคนตาลูป | มะเขือเทศ | มะนาว | มะยม | มะพร้าว | ขนุน | มะพร้าว (1) | ตะเกียบ (1) | มะละกอ (1) | จักรยาน (1) | ประตู (1) |
| | | ปีโป้ | ถุงเท้า | สร้อย | หัว | ลิ้น | คิ้ว | คอ | แขน | สิงโต (1) | เต่า (1) | กบ (1) | แว่น (1) | ของ (1) |
| | | นิ้ว | เล็บ | สะดือ | เข่า | ก้น | ขา | เท้า | พุง | น้อง (1) | ช้าง (1) | ปีโป้ (1) | ฮิปโป (1) | แป้ง (1) |
| | | หนวด | หลัง | รักแร้ | มะเหงก | เก้าอี้ | ร่ม | หมวกกันน็อค | ทิชชู่ | ช้อน (1) | ไก่ (1) | ตุ๊กตา (1) | รถ (1) | เครื่องบิน (1) |
| | | บันได | ห้องน้ำ | ขัน | ห้องนอน | ผ้าห่ม | หม้อ | จาน | ชาม | รถไฟ (2) | ม้า (1) | กล้วย (1) | พี่นา (1) | ฟัน (1) |
| | | ตะเกียบ | ส้อม | กีต้าร์ | ลำโพง | ที่นอน | เข็มขัด | ปากกา | ก๊อกน้ำ | กล้อง (1) | | | | |
| | | รีโมท | ฝา | ตู้ | หนังยาง | แผ่นซีดี | ถังขยะ | สระน้ำ | ฝน | | | | | |
| | | น้ำตก | น้ำพุ | เป็ด | ม้าลาย | ลุง | ยาย | พี่ | ประตู | | | | | |
| | | ของ | ที่นั่น | ที่นี่ | โน้น | ใคร | ที่ไหน | อะไร | อันนี้ | | | | | |
| | | อันนั้น | | | | | | | | | | | | |
| | VER | เป่า | ร้อง | พูด | ฟัง | หัก | อาบน้ำ | โยน | ดึง | ต่อ (4) | ล้ม (4) | เอา (3) | ก้าบๆ (2) | หา (2) |
| | | ยืน | ขี่ | มา | กระโดด | เหยียบ | วิ่ง | ช่วย | จูง | บึ้ม (2) | ฮ่า (2) | ขอบคุณ (1) | ตาม (1) | ตัก (1) |
| | | หล่น | ฉี่ | นั่ง | ขอ | แตก | ชอบ | ร้องไห้ | จั๊กจี้ | อ๊บๆ (2) | โยน (1) | ตัก (1) | กาเหว่าร้อง(1) | ฮี่ๆ (1) |
| | | ขึ้น | ออกกำลังกาย | เติม | ถอด | ถอย | เช็ด | ถู | หมุน | เหมียว (2) | ปิด (1) | อาบน้ำ (1) | ปิ้ง (5) | สีดำ (3) |
| | | อ้วก | ชน | ต่อ | วาง | ล้ม | โยน | ฮ่า | อ๊บๆ | สีเขียว (2) | เจ็บ (2) | สีอะไร (2) | คัน (2) | เหม็น (2) |
| | | กาเหว่าร้อง | ก้าบๆ | ฮี่ๆ | เอกอี๊เอ้กเอ้ก | ต่อ | บึ้ม | ตัก | หา | ชอบ (1) | สีส้ม (1) | มาก (2) | เพี้ยะ (1) | เขียว (1) |
| | | ตาม | โยน | หลับ | ฉึกฉัก | ปู้ด(เสียงตด) | เต็ม | ดัง | เหมือน | ปู้ด (1) | ฉึกฉัก (1) | เอกอี๊เอ้กเอ้ก(1) | | |
| | | แรง | ดี | ไม่มี | มี | จั๊กจี้ | ชอบ | ง่วง | สี | | | | | |

| Age | Semantic | Word Acquired as Analysed from QWAT | | | | | | | | Word Acquired as Analyzed from Video Tapes | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 18 MO | VER | ดำ | แดง | สีส้ม | | | | | | | | | | |
| | REL | พรุ่งนี้ | บน | ล่าง | หลัง | ในหลวง | ยัง | แล้ว | อีก | ไม่ (2) | เลย (2) | ได้ (1) | ก่อน (1) | |
| | | ไหม | เลย | ของ | ไม่มี | ได้ | ก่อน | | | | | | | |
| 21 MO | NOM | ยีราฟ | แมงมุม | นกอินทรีย์ | แมลงสาบ | ลุงโย่ง | อี๊เหง่า | พิกกะจู | ลูกบาส | หมา (6) | ตัวเอง (5) | อาม่า (4) | อากง (5) | นี่ (4) |
| | | รถบรรทุก | รถเก๋ง | รถม้า | เฮลิคอปเตอร์ | ของเล่น | รถแข่ง | ขนมเค้ก | ซอส | ทะเล (4) | รถ (6) | แม่ (6) | นม (3) | ไม้ (3) |
| | | ลูกชิ้น | เฟร้นฟราย | น้ำมัน | ตำลึง | แครอท | คาง | ข้อศอก | หน้าผาก | ลุงโย่ง (3) | หู (2) | แมงมุม (2) | เลือด (1) | หมอ (1) |
| | | นิ้วโป้ง | นิ้วชี้ | นิ้วกลาง | นิ้วนาง | นิ้วก้อย | โต๊ะ | หลอดไฟ | กรรไกร | ยา (1) | อี๊เหง่า (1) | น้องนิว (1) | พ่อ (1) | ไฟ (1) |
| | | กระดาษ | คอมพิวเตอร์ | เตียง | กระทะ | มีด | ยาย | ลำโพง | ปลั๊ก | นี่ (2) | ของ (1) | ไหน (1) | มัน (1) | ห้องแอร์ (1) |
| | | สนาม | ก้อนหิน | ท้องฟ้า | ภูเขา | ตลาด | น้ำลาย | สเป๊ก | กอล์ฟ | ของเล่น (1) | ขนม (1) | แมลงสาบ (1) | บ้าน (1) | พิกกะจู (1) |
| | | มวย | แผล | เลือด | ล้อ | อากง | หมอ | อาม่า | มัน(สรรพ.) | เต่า (1) | มอร์เตอร์ไซค์ (1) | | | |
| | | ห้องแอร์ | | | | | | | | | | | | |
| | VER | ดื่ม | อ่าน | กอด | คลาน | กลิ้ง | ลุก | บ้วน | ถอย | ไป (12) | ร้อง (9) | ให้ (4) | มา (3) | แกะ (3) |
| | | หลบ | ชก | ไหล | ถู | คาบ | ฉีดยา | พ่น | ทา | นั่ง (3) | ขอ (3) | ตี (2) | ลง (2) | คาบ (2) |
| | | ดื้บ ๆ | แกะ | คาบ | ไว้ | ล้ม | ขึ้น | บ๊อก ๆ | เพี๊ยะ | ร้องเพลง (2) | ไว้ (2) | ล้ม (2) | ขึ้น (1) | จับ (1) |
| | | โทร | บิน | กลับ | ไม่สบาย | อาย | ช้า | ใหม่ | ค่อย/เบา | บ๊อก ๆ (1) | ไหล (1) | ฉีด (1) | เพี้ยะ (1) | ชน (1) |
| | | ขม | หัวทิ่ม | หงานท้อง | แบนแต๊ดแต๋ | เหลือง | เขียว | ชมพู | | โทร (1) | พูด (1) | ล้าง (1) | ต่อ (1) | ถู (1) |
| | | | | | | | | | | เอา (1) | บิน (1) | กลับ (1) | สี (1) | ดัง (6) |
| | | | | | | | | | | ดี (5) | หมด (4) | อยู่ (3) | มี (2) | สีอะไร (2) |
| | | | | | | | | | | ชมพู (1) | พัง (1) | หิว (1) | คัน (1) | สีส้ม (1) |
| | | | | | | | | | | แดง (1) | เขียว (1) | เยอะ (1) | | |
| | REL | อุ๊ย | โอ้โห | ใช่ | ข้าง | ทั้งหมด | แล้วก็ | ด้วย | บ้าง | ไม่ (19) | เลย (12) | ด้วย (8) | กับ (6) | อะ (5) |
| | | กับ | อะ | แล้ว | กว่า | หน่อย | สิ | ล่ะ | นะ | ได้ (5) | แล้ว (4) | ครับ (4) | อุ๊ย (4) | กว่า (4) |
| | | กัน | เหรอ | อย่า | | | | | | บ้าง (3) | หน่อย (2) | สิ (2) | แหละ (1) | นะ (1) |
| | | | | | | | | | | กัน (1) | โอ้โห (1) | ใช่ (1) | เหรอ (1) | อย่า (1) |
| 24 MO | NOM | ครู | ปืน | ยาสีฟัน | บ๊อบบี้ | ไว้ท์ | หน้า | อก | ตาตุ่ม | ตัวเอง (18) | นี่ (7) | แก้ว (5) | เสือ (4) | พ่อ (3) |
| | | หัวไหล่ | หน้าผาก | โยเกิต | วุ้น | รูป | ตะเกียบ | สระน้ำ | โรงเรียน | เขา (3) | ไว้ท์ (4) | น้ำ (9) | ป้า (4) | บ๊อบบี้ (2) |
| | | ตึก | เมฆ | สอจอรอ | บิ๊กซี | เขา(สรรพ.) | ป้า | ห้อง | ยาดม | ลิง (2) | ของ (2) | ไก่ (2) | บิ๊กซี (2) | แคนตาลูป(1) |
| | | | | | | | | | | ห้อง (1) | ส้ม (1) | ขนม (2) | บ้าน (1) | ยาดม (1) |
| | | | | | | | | | | ไม้ (1) | กอล์ฟ (1) | จระเข้ (1) | เป็ด (1) | หมา (1) |

| Age | Semantic | Word Acquired as Analysed from QWAT | | | | | | | | Word Acquired as Analyzed from Video Tapes | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24 MO | NOM | | | | | | | | | รถ (1) | หมู (1) | มัน (1) | สอจอรอ (1) | ของเล่น (1) |
| | | | | | | | | | | พี่ (1) | | | | |
| | VER | วาด | ล็อก | เหยียบ | แบ่ง | เท | กระเด็น | สนุก | สะอาด | เอา (13) | ให้ (10) | ไป (7) | เปิด (5) | มา (3) |
| | | เลอะ | ตลก | อุ่น | ซื้อ | ดม | อู๊ดๆ | ฟัน | เท | เขวี้ยง (2) | กัด (2) | ตี (2) | เหยียบ (2) | ซื้อ (2) |
| | | ตลก | เป็น | พอ | ดื้อ | แน่น | ขาว | สีฟ้า | น้ำเงิน | ปิด (2) | ดม (1) | ดู (1) | แบ่ง (1) | ชน (1) |
| | | ม่วง | | | | | | | | ตด (1) | อู๊ดๆ (1) | ร้อง (1) | พัน (1) | วาง (1) |
| | | | | | | | | | | เตะ (1) | เท (1) | ขอบคุณ (1) | อยู่ (6) | มี (5) |
| | | | | | | | | | | ตลก (6) | เป็น (2) | พอ (2) | เลอะ (1) | ดัง (1) |
| | | | | | | | | | | กลัว (1) | ดื้อ (1) | เยอะ (1) | แน่น (1) | |
| | REL | ซ้าย | ขวา | จะ | ใน | ไง | ก็ | อีม | รีเปล่า | ไม่ (13) | ก่อน (11) | อะ (7) | จะ (4) | ใน (3) |
| | | เดี๋ยว | เฮ้ย | โอ้ย | | | | | | แล้ว (3) | โอ้ย (2) | ไง (2) | หน่อย (2) | ครับ (2) |
| | | | | | | | | | | หลัง (1) | ก็ (1) | ล่าง (2) | เลย (1) | นะ (1) |
| | | | | | | | | | | อีม (1) | ใช่ (1) | รีเปล่า (1) | เดี๋ยว (1) | เฮ้ย (1) |
| | | | | | | | | | | หรือ (1) | สิ (1) | อุ้ย (1) | ได้ (1) | |

# Participant: L10

| Age | Semantic | Word Acquired as Analysed from QWAT | | | | | | | | Word Acquired as Analyzed from Video Tapes | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9 MO | NOM | | | | | | | | | | | | | |
| | VER | | | | | | | | | | | | | |
| | REL | | | | | | | | | | | | | |
| 12 MO | NOM | แม่ | | | | | | | | | | | | |
| | VER | กิน | เอา | ไป | มา | | | | | กิน (2) | | | | |
| | REL | จ๊ะ | | | | | | | | | | | | |
| 15 MO | NOM | ช้าง | กระต่าย | ไก่ | หมา | ปลา | จิ้งจก | พ่อ | ตัวเอง | หมา (1) | น้ำ (1) | ตัวเอง (1) | | |
| | | น้อง | ปู่ | ย่า | ตา | ยาย | ตุ๊กตา | ลูกโป่ง | ไก่ | | | | | |
| | | ปลา | นม | น้ำ | ขนมปัง | แอ๊ปเปิ้ล | นาฬิกา | หลอดไฟ | ประตู | | | | | |
| | | กุญแจ | กระเป๋า | กล่อง | ร่ม | ประตู | โคมไฟ | ตา | สะดือ | | | | | |
| | | บ้าน | ดอกไม้ | ต้นไม้ | อะไร | | | | | | | | | |
| | VER | ไข | บ๊ายบาย | ไม่เอา | หมด | | | | | กิน (20) | | | | |
| | REL | ค่ะ | ยัง | | | | | | | | | | | |
| 18 MO | NOM | หมี | กวาง | งู | ยีราฟ | จระเข้ | ม้า | ลิง | เสือ | ฟักทอง (8) | เท้า (8) | น้อง (5) | ส้ม (4) | เงิน (8) |
| | | สิงโต | เต่า | วัว | ควาย | กบ | ยุง | มด | นก | นี่ (3) | หนู (3) | หนัง (3) | เป็ด (2) | จิ้งจก (3) |
| | | แมว | เป็ด | หนู | หมู | ผึ้ง | พี่ | ป้า | ทหาร | ไหน (2) | นก (2) | ปลาหมึก (2) | ตัวเอง (2) | สะดือ (2) |
| | | ตำรวจ | เด็ก | ผู้หญิง | คน | ลูกบอล | อุลตร้าแมน | ไข่ | ข้าว | ตา (2) | ช้าง (3) | แขน (2) | หมา (1) | ป้า (1) |
| | | เนื้อหมู | น้ำส้ม | เป๊ปซี่ | กล้วย | ส้ม | ไอติม | ขนมเค้ก | ขนม | ผู้หญิง (2) | ร่ม (1) | หมวก (1) | หมู (1) | แอ๊ปเปิ้ล (2) |
| | | ปลาหมึก | กางเกง | ถุงเท้า | รองเท้า | แว่นตา | สร้อย | หมวก | แป้ง | เครื่องบิน (1) | จระเข้ (1) | ขนม (1) | น้อง (1) | มด (1) |
| | | สบู่ | หู | จมูก | ปาก | แก้ม | ผม | หัว | คาง | กล้วย (1) | จมูก (2) | คิ้ว (1) | แก้ม (1) | ปาก (2) |
| | | ฟัน | หน้า | คิ้ว | คอ | แขน | มือ | นิ้ว | เล็บ | ม้า (1) | ดอกไม้ (1) | ปลา (1) | ไอติม (1) | หู (1) |
| | | เข่า | หน้าแข้ง | ก้น | จิ๋ม | ขา | เท้า | เก้าอี้ | ถังขยะ | กระเป๋า (1) | กุญแจ (1) | ไก่ (1) | ขวด (1) | อะไร (1) |
| | | พัดลม | หวี | ยา | เงิน | กระดาษ | โทรทัศน์ | แก้ว | จาน | อุลตร้าแมน (3) | | | | |
| | | ตู้เย็น | ช้อน | ขวด | ไม้กวาด | สระน้ำ | ทะเล | ฝน | น้ำพุ | | | | | |
| | | หนู(สรรพ.) | น้องตอง | น้อง | นี่ | หนัง | ใคร | ที่ไหน | ปลาหมึก | | | | | |
| | VER | ดู | หอม | ให้ | ตี | กอด | เก็บ | จับ | เตะ | นอน (9) | ดู (5) | เก็บ (5) | ไป (4) | กิน (4) |
| | | นอน | เปิด | ปิด | ใส่ | ตก | ฉี่ | นั่ง | ลง | ปิด (3) | เหมียว (1) | หอม (1) | เล่น (1) | ให้ (1) |
| | | เหมียว | เล่น | ให้ | หยอด | ปิ๊ด | กอด | เอ่เอ๊ | ไม่เอา | หยอด (1) | อ้า (1) | กอด (1) | จ้อง (1) | ไข (1) |

| Age | Semantic | Word Acquired as Analysed from QWAT | | | | | | | | Word Acquired as Analyzed from Video Tapes | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 18 MO | VER | ไม่ชอบ | กลัว | เหนื่อย | เจ็บ | ใหญ่ | เล็ก | สกปรก | เต็ม | เปิด (1) | มี (2) | ดี (2) | เก่ง (1) | อร่อย (1) |
| | | สวย | มาก | ดัง | หอม | เหม็น | อร่อย | หวาน | เผ็ด | เจ็บ (1) | หลับ (1) | ตรง (1) | เห็น (1) | โบ๋ (1) |
| | | เปรี้ยว | ร้อน | เย็น | แข็ง | เปียก | อิ่ม | เก่ง | มี | | | | | |
| | | ดี | เก่ง | เจ็บ | หลับ | ตรง | เห็น | โบ๋ | อ้า | | | | | |
| | REL | นะ | ครับ | หลัง | ทั้งหมด | ได้ | จริง | ...อยู่ | อะ | อะ (6) | ไม่ (5) | ได้ (3) | | |
| | | ไม่ได้ | | | | | | | | | | | | |
| 21 MO | NOM | กา | แมลง | ผีเสื้อ | อูฐ | ฮิปโป | หมีพู | หมีโคอาล่า | หมีแพนด้า | ไหน (37) | แม่ (16) | ไอติม (10) | น้อง (9) | เงิน (8) |
| | | แพะ | ห่าน | กุ้ง | นกพิราบ | นกขุนทอง | นกกระจอก | แรด | ถิน(หมา) | กา (7) | ช้าง (7) | อูฐ (4) | เนีย (4) | พลอย (4) |
| | | ลุง | น้า | หมอ | พยาบาล | ผู้ชาย | ยักษ์ | พระ | พลอย | ลุง (3) | ยีราฟ (6) | ห่าน (3) | จี (3) | เชียะ (2) |
| | | เชียะ | จูเนียร์ | ติ๋ว | นาย | หลวง | ตัวก | แท็กซี่ | รถเมล์ | หลวง (2) | พี่ (2) | เสือ (3) | หนู (2) | แรด (2) |
| | | รถไฟ | รถไฟฟ้า | หุ่นยนต์ | ปืน | ของเล่น | แตงโม | ลูกท้อ | ผัก | ไก่ (2) | บ้าน (2) | เต่า (2) | ดอกไม้ (3) | ปลาหมึก (2) |
| | | ลูกพลับ | ฟักทอง | องุ่น | สาลี่ | เสื้อ | กระโปรง | ผ้าอ้อม | ชุด | ติ๋ว (2) | แป๊ว (1) | กวาง (1) | งวง (1) | ขนม (1) |
| | | แหวน | แชมพู | ยาสีฟัน | เอว | หน้าผาก | ลิ้น | อก | โต๊ะ | ลิง (1) | สิงโต (1) | นอ (1) | ฮิปโป (1) | นู่น (1) |
| | | รูป | กรรไกร | คอมพิวเตอร์ | วิทยุ | บันได | โทรศัพท์ | อ่าง | ขัน | นก (2) | หมา (1) | ตัวเอง (1) | ผู้หญิง (1) | ต้นไม้ (1) |
| | | ผ้าเช็ดตัว | เปล | หมอน | เตียง | ชาม | ส้อม | มีด | ตะเกียบ | ธง (1) | เล็ก (1) | แพะ (1) | จูเนียร์ (1) | ฟักทอง (1) |
| | | กระโถน | หลอด | ปากกา | ห้างฯ | โรงเรียน | ตึก | ก้อนหิน | ท้องฟ้า | นี่ (2) | รองเท้า (1) | พ่อ (1) | นาย (1) | ตัวก (1) |
| | | น้ำตก | พระอาทิตย์ | พระจันทร์ | จี (G) | แป๊ว | งวง | นอ | ธง | ปอ (1) | ยาย (1) | ถิน (1) | | |
| | | เล็ก(คน) | | | | | | | | | | | | |
| | VER | กัด | เป่า | ร้อง | ร้องเพลง | อ่าน | พูด | ยิ้ม | เขียน | นอน (8) | กิน (11) | เก็บ (8) | ตื่น (4) | ไป (4) |
| | | ขับ | โยน | กำ | แบ | วาง | กด | ขว้าง | ยืน | เขียน (4) | เล่น (3) | ขอ (3) | ดู (3) | กระต๊าก (4) |
| | | ขี่ | กระโดด | เหยียบ | วิ่ง | เดิน | ล้าง | ช่วย | ตื่น | เอา (2) | หา (2) | ผูก (3) | นอน (1) | ยืน (1) |
| | | ทับ | เที่ยว | โดน | ถือ | เก็บ | ชง | เต้น | ดูด | ช่วย (1) | หยิบ (1) | อ่าน (1) | สี (1) | ตรง (1) |
| | | หล่น | กลับ | ขึ้น | อุ้ม | อึ | สวัสดี | ขอโทษ | ขอ | หมด (1) | มี (1) | ดำ (1) | นิ่ง (1) | เฉย (1) |
| | | กระต๊าก | หา | ผูก | นอน | หยิบ | แบน | โกรธ | ชอบ | | | | | |
| | | สนุก | หิว | อ้วน | เร็ว | สะอาด | น้อย | ใหม่ | ขม | | | | | |
| | | อุ่น | นิ่ม | แห้ง | อยาก | หมด | นิ่ง | เฉย | | | | | | |
| | REL | บ้า(คำด่า) | ก่อน | กลางคืน | หลัง | บน | หน้า | ล่าง | ใน | ใช่ (5) | แล้ว (4) | ไม่ (3) | เช้า (1) | กัน (1) |
| | | นอก | รีเปล่า | แล้ว | ...ไป | ...ไว้ | ...ให้ | อีก | ใช่ | นะ (1) | จ๊ะ (1) | | | |
| | | ไม่ | เช้า | กัน | | | | | | | | | | |
| 24 MO | NOM | ปู | แกะ | ลา | นกฮูก | ผู้ใหญ่ | ป้าตุ๊ก | ยายเกิด | ก๋วยเตี๋ยว | พี่ (26) | ไหน (25) | ของ (16) | กระต่าย (16) | แม่ (10) |

| Age | Semantic | Word Acquired as Analysed from QWAT | | | | | | | | Word Acquired as Analyzed from Video Tapes | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24 MO | NOM | แตงโม | มะละกอ | ช็อคโกแลต | ผลไม้ | ถ้วย | หนังยาง | วัด | ดาว | ผม (8) | หนู (8) | หมี (7) | นี่ (13) | นม (5) |
| | | พระ | มัน | ของ | อันนั้น | อันโน้น | เข็ม | กล้อง | ทางนี้ | หมีพู (7) | จมูก (4) | น้องตอง (5) | ตัวเอง (4) | พระ (3) |
| | | | | | | | | | | ปู (3) | หู (2) | ปาก (2) | วัด (2) | นมกล่อง (2) |
| | | | | | | | | | | ลุง (2) | พ่อ (2) | ลูก (2) | เป็ด (2) | ป้า (2) |
| | | | | | | | | | | ช้าง (1) | ฮิปโป (1) | ตุ๊ก (1) | นั้น (1) | หนังยาง (1) |
| | | | | | | | | | | หมอน (1) | เป๊ปซี่ (1) | เด็ก (1) | ขวด (1) | เล็ก (1) |
| | | | | | | | | | | โน้น (1) | ขิม (1) | ยาย (1) | นู่น (1) | กล้อง (1) |
| | VER | วาด | ดึง | คลาน | ชน | สระผม | ซื้อ | คืน | รัด | สระผม (6) | รัด (6) | เอา (5) | เล่น (5) | กิน (5) |
| | | เขย่า | ฝาก | ฮัลโหล | ไว้ | ฉี่ | หรี่ | หยอด | คืน | ให้ (5) | ฝาก (5) | นั่ง (4) | ไป (4) | ใส่ (3) |
| | | ขอ | ถอย | แกะ | เขย่า | ผอม | ยาว | สั้น | สูง | ฮัลโหล (3) | มา (2) | ไว้ (2) | หรี่ (1) | ฉี่ (1) |
| | | หล่อ | ท่วม | ตก | ลืม | จบ | อยู่ | เยอะ | คิดถึง | ดู (1) | หยอด (1) | คืน (1) | กด (1) | ขอ (1) |
| | | พอ | ลืม | น้ำเงิน | | | | | | ถอย (1) | แกะ (1) | นอน (1) | กอด (1) | ลง (1) |
| | | | | | | | | | | หา (1) | เขย่า (1) | ถือ (1) | ขว้าง (1) | ท่วม (4) |
| | | | | | | | | | | อยู่ (6) | เปรี้ยว (5) | เจ็บ (2) | เยอะ (2) | จบ (2) |
| | | | | | | | | | | คิดถึง (1) | ยาว (1) | เร็ว (1) | พอ (1) | อร่อย (1) |
| | | | | | | | | | | ลืม (1) | น้ำเงิน (1) | | | |
| | REL | หนึ่ง | อีก/ใหม่ | ทำไม | วันหยุด | ด้วย | ได้ | ต้อง | จริง | ไม่ (7) | หลัง (3) | แล้ว (3) | ด้วย (3) | อีก/ใหม่ (2) |
| | | | | | | | | | | นะ (2) | อะ (2) | ล่าง (1) | จ้ะ (1) | ได้ (1) |
| | | | | | | | | | | ใช่ (1) | อืม (1) | ต้อง (1) | จริง (1) | |

# Biography

# Biography

Mr. Sorabud Rungrojsuwan was born on 27th May, 1976 in Bangkok. He completed Bachelor degree of Arts in Japanese from the Department of Eastern Languages, Faculty of Arts, Chulalongkorn University in 1998. In 1999, he entered the Master program in Linguistics, Faculty of Arts, Chulalongkorn University. In 2000, he passed the comprehensive examination and continued his Ph.D. program in Linguistics at the Department of Linguistics, Faculty of Arts, Chulalongkorn University.