

LEXICAL DEVELOPMENT OF THAI CHILDREN AT 0;9-2;0¹: A CROSS- SECTIONAL STUDY²

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Abstract

This study investigates lexical development of Thai children at 0;9-2;0. Based on the MacArthur Communicative Development Inventories: Words and Gestures, 1989 (CDI), a Thai version of the CDI word checklist was developed. Following a cross-sectional research design, parents of 180 children were asked to report their children's lexical development. Four main aspects

of lexical development were investigated: the onset of development, cumulative vocabularies, lexical categories of words acquired, and the relationship between comprehension and production in lexical acquisition.

It was found that individual variation plays an important role in children's lexical development. Instead of pinpointing the exact age of the onset of development, a tentative range of onset is reported about 0;9-1;3. Although children's vocabulary items increase over time, it was found that there were two distinct types of increase: gradual and rapid. The gradual increase was found from 0;9-1;6, and 1;9-2;0. The rapid increase, at about 1;6, represents a period of vocabulary explosion. It was found that Thai children's lexicon is "noun" dominant. From an examination of the relationship between word comprehension and production, it was found that comprehension precedes production at the onset of lexical development. However, data from this study also demonstrate that at about the period of vocabulary explosion, some words are comprehended only after they have been produced. It is also suggested that lexical development should also be investigated using a longitudinal research design, because data from a longitudinal study can indicate the development of individual children and might demonstrate more clearly development in terms of individual variation.

¹ Traditional convention of reference to children's age: the digit before; represents year; the digit after; represents month. For example 0;9 reads 9 months old.

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1. Introduction

The study of lexical development has a long history (Preyer 1899, Smith 1926, Buhler 1931, Nelson 1973, Benedict 1979 cited by Ingram 1989, Fenson *et al.* 1994, Bates *et al.* 1995, Au *et al.*

1994, Bates *et al.* 1995, Berglund 1999, Tardif *et al.* 1999, Hamilton *et al.* 2000, Sandhofer *et al.* 2000). Two different data collection methods have been used for the investigation of child vocabulary: longitudinal and cross-sectional. In the 'longitudinal approach', researchers follow the development of an individual child over a period of development. Studies employing this method access a detailed corpus of child lexical development. However, it is very time consuming and labor intensive. For these reasons, it can only be conducted on a small number of children. Preyer (1899), Nelson (1973), and Benedict (1979) investigated child lexical development from a longitudinal diary recording of 1, 18, and 8 children, respectively. The generalizability of results from such studies is questionable, due to the small sample size.

According to Ingram (1989), psychologists interested in language development are critical of the reliability of the previous approach. Ingram (1989) suggests that normative generalization should be made from the investigation of large numbers of subjects. The cross-sectional approach allows this. Results from cross-sectional studies suggest that children's language development varies greatly. Buhler (1931 cited by Ingram 1989) reports from his cross-sectional study of 43 German children that the onset of lexical development ranges from 0;8 to 1;5. This means that some children start to produce their first word as early as 0;8, while some of them as late as 1;5.

In the past decade, a new effective and promising technique has been developed to investigate children's early communicative development using cross-sectional studies. It is a question-

naire called "The MacArthur Communicative Development Inventories" (CDI), developed by Fenson *et al.* (1994). The CDI consists of two major parts: child's gestural behaviors and a vocabulary checklist. The CDI has been used to investigate the lexical development of 1,803 American children between 0;8 to 2;6. As a consequence, in 1996, a lexical development norm for American children was established (The MacArthur Communicative Development Inventories, 2001). The CDI has also been used as a prototypical instrument from which other inventories have been developed in 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), Finnish, French (Canadian), German, Greek, Hebrew, Icelandic, Italian, Japanese, Korean, Portuguese, Spanish, etc. (<http://www.sci.sdsu.edu/cdi/foreign.html>). Many researchers have indicated that the CDI is a valid method of assessing children's vocabulary (Berglund 1999, Hamilton *et al.* 2000).

While the study of early lexical development has advanced in a number of languages, this topic of study in Thai is just at its initial phase. Hence, an important first step is the investigation of the overall picture of lexical development in Thai which forms the basis for future research in first language acquisition in Thai. This study adapts the CDI to investigate the lexical development of Thai children at 0;9-2;0 (at 3 month intervals) in relation to the following aspects:

1. The onset of lexical development
2. The cumulative vocabularies from onset to 2;0
3. The lexical categories of words children acquire
4. The relationship between comprehension and production in early lexical development

2. Methods

2.1 Materials

“The MacArthur Communicative Development Inventories: Words and Gestures, 1989” (CDI) was used as a tool to develop the Thai word checklist.

2.1.1 Lexical Categories

The newly developed questionnaire contains 23 lexical categories. Nineteen of them are reclassified from the CDI; three other additional categories are language specific lexical categories (Panupong, 1970); and another category is for words that are not listed:

1. animals
2. people
3. vehicles
4. toys
5. food and drink
6. clothes, accessories and cosmetics
7. body parts
8. household items, room and furniture
9. outside
10. action words
11. words about time
12. words about emotion
13. descriptive words
14. colors
15. directions
16. numbers and quantifiers
17. pronouns

18. question words
19. conjunction
20. preverbs⁶
21. postverbs⁶
22. final particles⁶
23. others⁷

2.1.2 Lexical Items

The number of items in the Thai word checklist is also different from CDI. In the CDI, the number of items in each category is fixed. It is likely that parents are forced to select only the items that appear in the CDI, but an individual child might acquire different items from the same categories at the same age, and such items might go beyond what researchers expect. In other words, some children might produce other items that do not appear in the CDI. To address this issue the Thai word checklist was designed as a combination of a closed and open questionnaire. Parents are free to add any items that do not exist in the questionnaire.

The test for reliability of the QWAT was conducted, using split half correlation. 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 1.

⁶ Language-specific grammatical words of Thai

⁷ Open category for addition of other vocabulary that does not appear in The Questionnaire of Word Acquisition in Thai (QWAT).

Table 1: 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 Cosmetics	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
20. Preverbs	0.593***
21. Postverbs	0.955***
22. Final Particles	0.544***
Total	0.997***

Correlation results in Table 1 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 the word checklist.

2.1.3 Tasks

There are two related tasks for parents in order to complete the Thai word checklist. Parents are asked to decide whether their child has already under-

stood and 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 toy dog when she hears the word ‘dog’, would be said to ‘understand’ the word ‘dog’. In the case of ‘produce’, parents can mark on the particular item when they hear the child produce it regardless of whether the child understands its meaning.

It should be noted that a clear separation between comprehension and production like this is not used in the CDI because researchers using the CDI argue that it is difficult to say that the child understands anything when he or she talks (Bates *et al.* 1995). However, from short interviews with parents while collecting the present data, it was found

that parents 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 repeat, or imitate their parents' pronunciation without showing their intention to communicate. Examples of items in the Thai word checklist are shown below.

Words	Understand	Produce
หมา 'dog'		
แมว 'cat'		
ปลา 'fish'		
จิ้งจก 'lizard'		

2. Procedure

Parents of 180 normally developing Thai children between 0;9 to 2;0 were asked to complete the Thai word checklist developed from "The MacArthur Communicative Development Inventories: Words and Gestures" (1989). There were 6 groups: 0;9, 1;0, 1;3, 1;6, 1;9, and 2;0, with 30 subjects in each group. In order to avoid the possibility of bias due to variation in parents' education, only parents with a high school level education or better were selected to complete the questionnaire. After the questionnaires were completed, the data was stored on disk and statistical analysis conducted using the program Microsoft Excel 97.

3. Results

3.1 *The onset of lexical development*

The onset of lexical development is traditionally determined from the child's production of his/her first word (Smith 1926, Buhler 1931, Benedict 1979 cited by Ingram 1989). In this study, the child's acquisition of any particular item is also determined by the comprehension and production ability for the particular item. In other words, items that are checked in both the 'understand' and 'produce' columns would be counted as acquired by the child in this study. As a result, children begin to acquire their first word at different ages as shown in Table 2.

Table 2: The maximum, minimum and mean number of words acquired in each developmental period

AGE	0;9	1;0	1;3
Number of Words			
Maximum	5	23	167
Mininum	0	0	2
Mean	1.07	4.23	30.97

Table 2 shows the maximum, minimum, and mean number of words acquired by children in the age groups 0;9, 1;0, and 1;3. At 0;9 some children begin to produce their first words, and the average number of words children acquire increases to 4 and 30 words from 1;0, to 1;3. However, some

children at 0;9 and 1;0 have not acquired even one word. Nevertheless, by 1.3 all children have acquired at least 2 words.

Figure 1 and 2 demonstrate the distribution of the number of words acquired by children in the 0;9 and 1;0 groups.

Figure 1-2: Distribution of Number of Lexical Items Acquired by Thai Children in 0;9 and 1;0 groups

Figure 1: 0;9 group

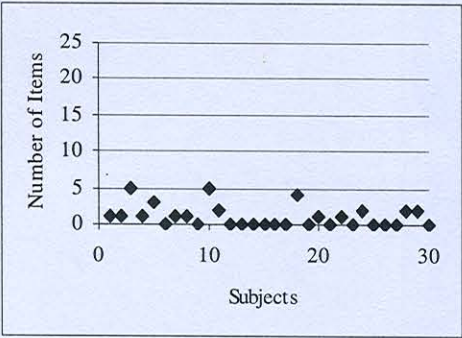
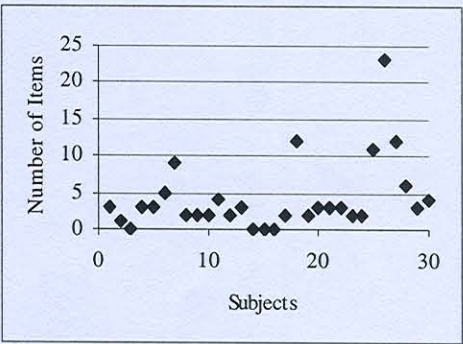


Figure 2: 1;0 group

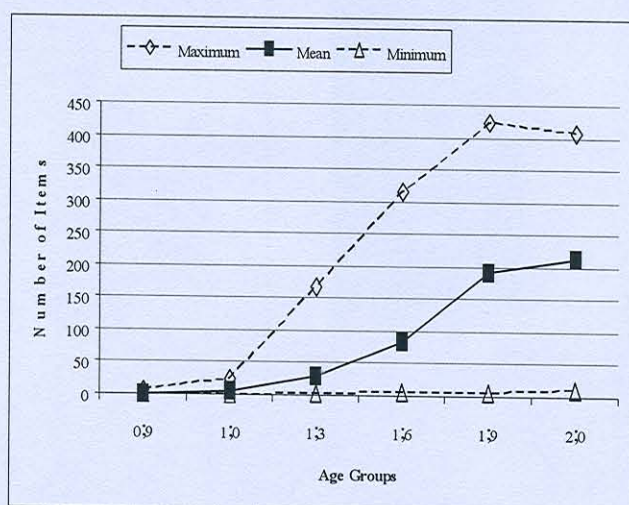


From Figures 1 and 2, it can be seen that 50% (15 out of 30) of children in the 0;9 group and 13% (4 out of 30) of children in the 1;0 group have not yet acquired any words. From this, it appears that Thai children produce their first word by about 0;9. However, the onset of lexical acquisition could extend up to 6 months later to 1;3 as the onset of lexical development ranges from 0;9 to 1;3.

3.2 Cumulative vocabulary from the onset to 2;0

As children develop, their vocabulary increases. It should be noted that any demonstration of development in this study is based on cross-sectioned data sampled at three-month intervals in different groups of children. Figure 3 demonstrates vocabulary development of children in the study.

Figure 3: Number of Words Acquired by Thai Children from 0;9 to 2;0 (n=180)



From Figure 3, it can be seen that the mean number of words acquired gradually increases from 0;9 to 1;6. After 1;6, there is a rapid increase or spurt in lexical development. From this data, there seem to be two different types of development during the period 0;9-2;0: gradual and rapid. There seems to be a period in which the development of vocabulary is rapid, namely between 1;6 and 1;9. Such rapid lexical development provides evidence for 'a period of vocabulary explosion' in Thai children.

However, in order to confirm this, an in-depth analysis will be conducted (Clark 1993). Clark states that one alternative way to determine the period of vocabulary explosion in children is to investigate the increase of new vocabulary words within children's lexicon. Table 3 shows the average number of new vocabulary items for each age group.

Table 3: Mean Number of New Vocabulary Items
in Children from 0;9 to 2;0 Groups

AGE	0;9	1;0	1;3	1;6	1;9	2;0
Number of New Words	1.07	3.16	26.74	53.83	105.7	22.47

Data in Table 3 indicate that vocabulary size increases throughout development, and also the increase in the number of new vocabulary words found at 1;9 is

distinctively high. This finding indicates that Thai children—on average—acquire words most rapidly somewhere between the ages of 1;6-1;9.

Table 4: Range of Number of Items Acquired across Age

Age	0;9	1;0	1;3	1;6	1;9	2;0
Ranges	5 (0-5)	23 (0-23)	163 (4-167)	310 (5-315)	417 (6-423)	396 (11-407)

It may be 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 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.

Apart from the period of ‘vocabulary explosion’ that has been investigated from the analysis of the average size of new vocabulary, the distribution of the number of words in each child at every age group should also be considered. The range of the number of words in acquisition in Table 4 illustrates that the range in children’s lexical ability (the difference between maximum and minimum) increases over age.

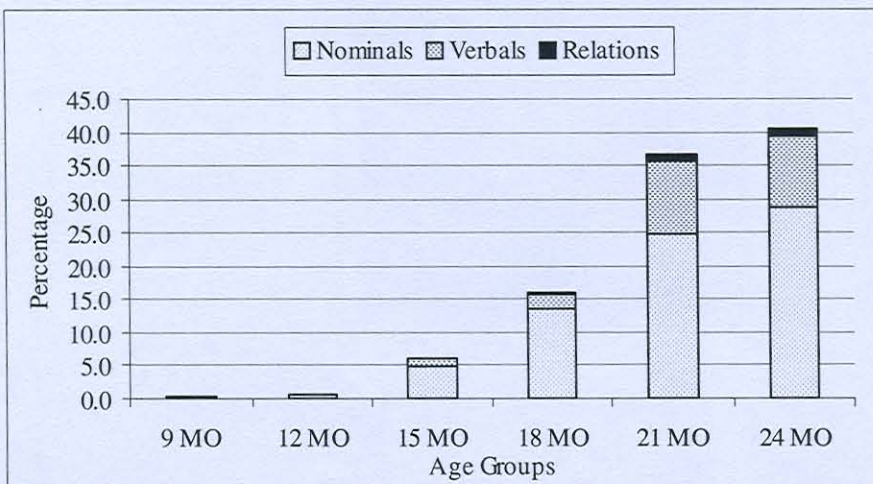
3.3 Lexical categories of words children acquired

The research on early lexical development has proposed a number of different levels of lexical categories, depending on the purpose of the studies (Nelson 1973, and Benedict 1979 cited by Ingram 1989, Gentner 1982, Clark 1993). Among the first studies in lexical development, Nelson and Benedict classified children's early word meaning into five categories: 'Specific nominals', 'General nominals', 'Action words', 'Modifiers', and 'Personal-social'. Later studies paid more attention to the two early-acquired categories: 'Nouns' and 'Verbs.' Gentner and Clark make similar higher level semantic generalizations of children's word meanings. Gentner (1982) proposed 'Nominals', 'Predicates', 'Expressive', 'Other', while Clark suggested 'Objects', 'Actions', and 'Properties and Relations' categories.

In this study, lexical items are classified into three main semantic categories according to the nature of the referents: 'nominals', 'verbals', and 'relations'. Firstly, the 'nominals' category is composed of words that refer to bounded, concrete animate and inanimate objects. It includes animals, people, things, places, and some deictic words like /ʔan nǐ/ 'this one', /khǎw/ 'he', /thaan nǐ/ 'here'. Secondly, 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. Thirdly, the 'relations' category consists of words that refer to relations within and between members of the 'nominals' and 'verbals' categories such as: prepositions, conjunctions, interjections, final particles, tense, aspect, modality, words about time, etc.

Using this classification, the proportion of 'nominals', 'verbals', and 'relations' is illustrated in Figure 4.

Figure 4: Proportion of Words in Acquisition of 0;9-2;0 Thai children According to Semantic Classification: Nominals, Verbals, and Relations (n=536 words)



From a cross-linguistic perspective, it has been reported in studies of early lexical acquisition in other languages that more than 50% of children's early words are in the 'nominals' category (Nelson 1973, Benedict 1979 cited by Ingram 1989, Gentner 1982, Ingram 1989, Clark 1993, Au *et al.* 1994). From this, it has been claimed that the semantic characteristic of 'nominals' plays an important role in children's early lexical development (Gentner 1982, Clark 1993, Au *et al.* 1994). The explanation for this pattern of lexical development is that, 'nominals' contain more salient and simpler semantic characteristics than 'verbals' and 'relations'. Referents denoted by 'nominals' are concrete, static, and easily perceivable (Gentner 1982). Gentner refers to this as the "Natural Partitioning Hypothesis".

The proportion of semantic categories in Figure 4 clearly shows that children's early words are mostly 'nominals', followed by 'verbals', and then 'relations', respectively. Data from this study of word acquisition in Thai thus support the "Natural Partitioning Hypothesis."

However, closer examination reveals that some Thai children acquire 'verbals' before 'nominals' at the onset of lexical development (0;9). Table 4 demonstrates that children at 0;9 acquire one word in the 'verbals' category, that is /mam1 mam1/ 'to eat'. Among the 30 children in the 0;9 group, one third or 10 of them acquire this word. Nevertheless, this is not strong evidence against the "Natural Partitioning Hypothesis"; rather, it appears that the "Natural Partitioning Hypothesis" might influence lexical development strongly after the onset of development, while other factors such as the characteristics of parental input might play an important role before or at the onset of development. To address this notion, it is necessary to inspect the correlation between word acquisition and characteristics of parental input at the early period of lexical development⁸.

Considering the subordinate-level categories in the Thai word checklist, it was found that most words children acquire are ones that refer to familiar persons, objects, actions, properties, and relations.

⁸ See more details about the roles of parental input in word acquisition in Au *et al.* (1994), Gopnik and Choi (1995), and Tardif *et al.* (1999).

Table 5: Words Acquired by Thai Children at 2;0 (217 words on average)

Super-ordinate Categories	Categories in CRSLP-CDI	Number of Words	Examples
Nominals	Animals	26	/kàj/ 'chicken', /mæw/ 'cat'
	People	12	/phô/ 'dad', /mê/ 'mom'
	Vehicles	9	/rot/ 'car', /ria/ 'ship'
	Toys	5	/bôn/ 'ball', /piin/ 'gun'
	Food and Drinks	18	/náam/ 'water', /plaa/ 'fish'
	Clothes, etc.	12	/sia/ 'shirt', /kaaŋ kee/ 'pants'
	Body Parts	25	/paak/ 'mouth', /taa/ 'eyes'
	Household items, etc.	33	/kun cee/ 'key', /chón/ 'spoon'
	Outside	12	/fôn/ 'rain', /tha lee/ 'sea'
	Question Words	3	/khraj/ 'who', /thi náj/ 'where'
Verbals	Actions	44	/kin/ 'to eat', /paj/ 'to go'
	Words about Emotion	5	/cep/ 'pain', /klua/ 'to be afraid of'
	Descriptive Words	10	/rón/ 'hot', /süay/ 'beautiful'
Relations	Words about Time	1	/klaaŋ khiin/ 'night'
	Directions	1	/bon/ 'above'
	Final Particles	1	/câ/
	Others	1	/mâj/ 'no'

Table 5 demonstrates that among the lexical items acquired during the early period of lexical development, most are nominals. Among subcategories under the 'verbals' category, 'actions' seem 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 2;0, have acquired on average 217 lexical items of which approximately 71% (153) are 'nominals', 27% (60) are 'verbals', and 2% (4) are 'relations.'

3.4 The relationship between comprehension and production in early lexical development

Generally, research on lexical development pays more attention to children's production of words than to their comprehension. As discussed previously with respect to the onset of lexical development, children's production is a criterion for word acquisition. However, some studies are interested in children's comprehension in relation to production (Benedict 1979 cited by Ingram 1989, Bates *et al.* 1995). One problem about the study of children's comprehension is the reliability of comprehension judgments. Researchers can investigate word acquisition objectively, but parental or

caretaker judgements should not be underestimated.

A prerequisite to the investigation of the relationship between comprehension and production is a study of the

characteristics of development in both comprehension and production separately. Figures 5 & 6 demonstrate the comparative distribution of lexical comprehension and production data.

Figure 5: Number of Words in Comprehension of Thai Children at 0;9-2;0

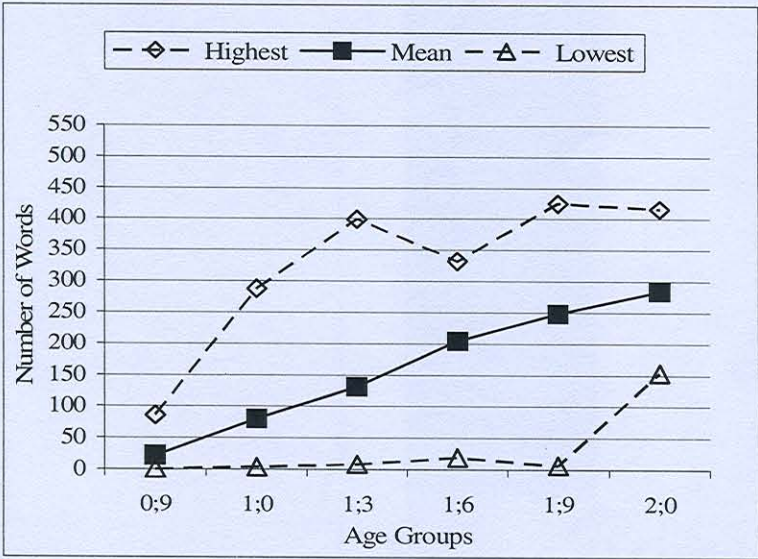
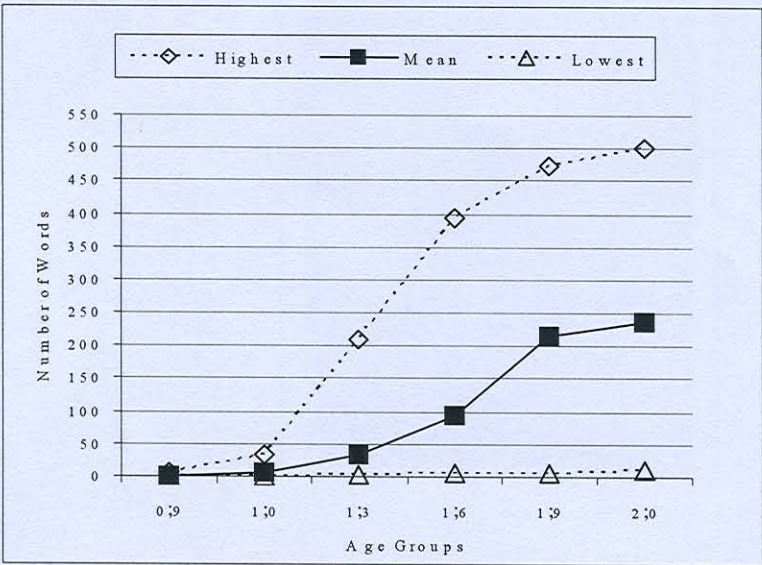


Figure 6: Number of Words in Production of Thai Children at 0;9-2;0



From Figures 5 and 6, it can be seen that the distribution of the number of words in comprehension and production is different. In comprehension, the range increases dramatically from the onset of development. At 0;9, children are able to acquire 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 1;9 which is in the period of “vocabulary explosion”. Although the range of lexical development does not progress in a linear fashion, it should be noted that the mean number of lexical items comprehended illustrates the relative rate in comprehension throughout development.

For production (see Figure 6) the pattern of lexical development varies. At 0;9 and 1;0 all children seem to have a similar rate 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 1;3-2;0, 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 rates of development of lexical production: a gradual increase (at 1;9-1;6, and 1;9-2;0) and a rapid increase (at 1;6-1;9) as discussed in section 2.

Figure 7: Number of Words in Comprehension and Production of Thai Children at 0;9-2;0, and Their Agreement (Acquisition)

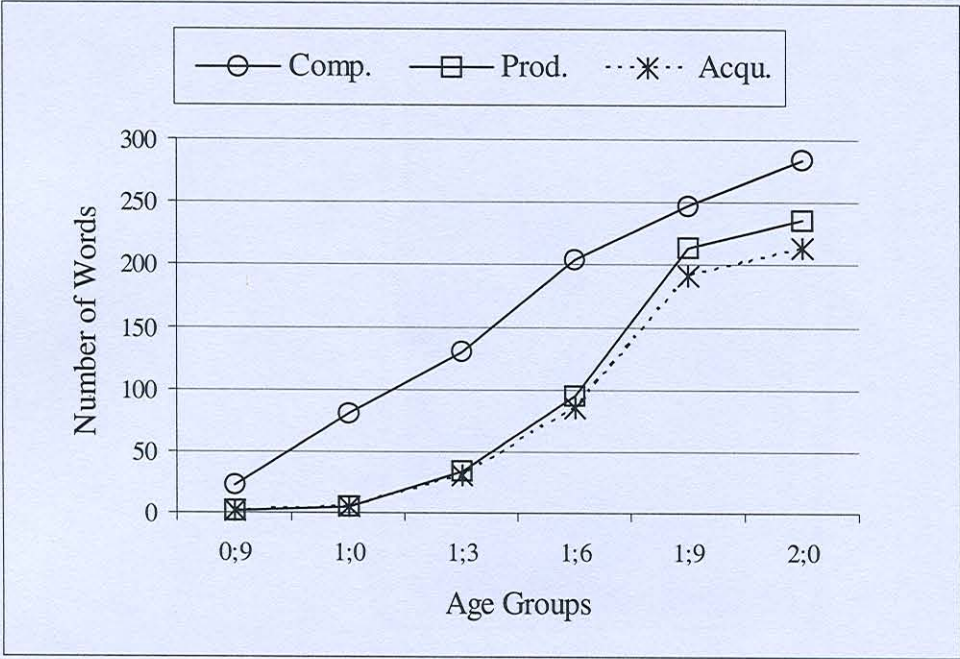


Figure 7 illustrates the number of words comprehended and produced by Thai children from 0;9 to 2;0. The figure demonstrates that the number of words in both comprehension and production increases throughout development; in particular from 1;9, there is a rapid increase in production which reflects the postulation of a vocabulary explosion period. The gap between comprehension and production narrows.

In addition, the diagram clearly shows that the number of words comprehended exceeds the number of words produced throughout the period of development. This means that children are able to understand the meaning of words that they are not yet able to say. However, Figure 7 also suggests that a child does not necessarily understand the meaning of every word he or she produces. “The acquisition line” shows the agreement between comprehension and production. Children are said to acquire any particular item when they can both understand and produce the particular word consistently. The acquisition curve closely follows the production curve until 1;3 and then drops away gradually until 2;0. This indicates that until 1;3—which is said to be the period of the onset of lexical development—the child’s production of any particular item implies his/her understanding of the meaning of the particular item. However, after 1;3, the child’s production does not imply his/her comprehension in every case. He or she just sometimes imitates the adult’s words. Words that are mostly reported as produced but not understood are among the ‘relations’ category such as colors, numbers, etc.

4. Summary and Discussion

Using a cross-sectional approach, the lexical development of 180 normally developing Thai children at 0;9-2;0 has been investigated. Drawing on the cross-linguistically recognized parental report inventory “The MacArthur Communicative Development Inventories” (CDI) (Fenson *et al.* 1994), a Thai version of CDI was developed in order to elicit data of lexical development in Thai children. The study focused on four areas of research in lexical development: the onset of lexical development, the number of words accumulated during the early developmental period, the semantic categories of words acquired, and the relationship between lexical comprehension and production.

It was found that individual variation is an important factor in all areas of lexical development. Instead of pinpointing a particular result, it is more appropriate to draw some generalities throughout development. At the onset of development, children tend to start acquiring their first words at around 0;9-1;3. The number of words in children’s lexicon normally increases over time with two different rates: the gradual and the rapid phases. The gradual rate of lexical development was found mostly in children’s development, that is from 0;9-1;6 and 1;9-2;0. The rapid phase typically occurs around 1;6-1;9 which is known as ‘the period of vocabulary explosion’.

Regarding the lexical categories, it was found that Thai children generally acquired words about concrete objects—or nominals—in higher proportions than words about actions, states—or verbals—, and relations. This finding suggests that the degree of

saliency of referents is an important factor for children's lexical acquisition; however, a third of children in this study also used words about actions. This suggests that as well as the 'Natural Partitioning Hypothesis', there are other factors such as parental input, which affect children's lexical development.

It was found that comprehension is a prerequisite for lexical production during the onset of development. However, when children have acquired a greater number of words in their lexicon—especially after the period of the vocabulary explosion—the imitative production of words without consistent comprehension is frequently found.

The cross-sectional approach gives invaluable insights into lexical development; however, we also need to pay attention to longitudinal data which give more detail about individual development, and this might lead to not only the descriptive but also the explanatory level of child language acquisition. A combination of both cross-sectional and longitudinal approaches would give more detail and greater insights into early lexical development in Thai children. This will be investigated further in future.

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