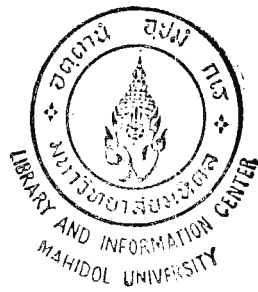


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**THE CONSTRUCTION OF THE THAI SEMANTIC
DEVELOPMENT TEST FOR CHILDREN AGED 3-7:11 YEARS
OLD IN BANGKOK METROPOLITAN**

PAWINEE ONNARK

**A THESIS SUBMITTED IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF ARTS
(COMMUNICATION DISORDERS)
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MAHIDOL UNIVERSITY**

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for the degree of Master of Arts (Communication Disorders)

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The purpose of this study was to construct a Thai Semantic Development Test for Children. It was designed to measure semantic abilities of children in three different ways: comprehension, organization, and expression. Validity and reliability coefficients of this test were studied. Raw scores were converted to standard scores and percentile ranks. Relationships between children's semantic abilities and their age, and gender were studied. The Thai Semantic Development Test for Children was constructed and administered to 150 children aged 3 to 7:11 years as a pilot study. Item difficulty and item discrimination of each test item were analyzed. The overall main test was administered to 500 children aged 3 to 7:11 years old. Subjects were divided into 5 age groups equally distributed within one year and equal ratios by gender. The test results were then analyzed using SPSS, version 10.00. Results demonstrated sufficient reliability and validity as well as usefulness of the test in measuring semantic abilities. Standard scores and percentile ranks for these children provided guidelines for interpreting children's semantic abilities. Older children had significantly higher semantic ability scores than younger children ($p < 0.01$). Boys and girls showed non significant differences in semantic ability scores.

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การศึกษานี้เป็นการสร้างแบบทดสอบพัฒนาการด้านคำศัพท์สำหรับเด็กที่ใช้วัดความสามารถด้านการเข้าใจคำศัพท์ การรวบรวมและเชื่อมโยงความหมายคำศัพท์ การให้นิยามคำศัพท์ และการศึกษาคุณภาพของแบบทดสอบโดยการหาค่า ความตรงและความเที่ยง การแปลงคะแนนดิบให้เป็นคะแนนมาตรฐานและลำดับเปอร์เซ็นต์ไทล์ รวมทั้งศึกษาปัจจัยที่มีผลต่อพัฒนาการด้านคำศัพท์ของเด็ก แบบทดสอบที่สร้างได้นำไปทดลองใช้กับเด็กนักเรียนจำนวน 150 คนที่มีอายุระหว่าง 3 ปีถึง 7 ปี 11 เดือน เพื่อศึกษาคุณภาพของข้อทดสอบรายข้อ หลังจากนั้น จึงนำแบบทดสอบฉบับสมบูรณ์ไปทดสอบกับเด็กนักเรียนจำนวน 500 คนที่มีอายุระหว่าง 3 ปี ถึง 7 ปี 11 เดือน โดยแบ่งเป็น 5 ช่วงอายุ แต่ละช่วงอายุต่างกัน 1 ปี ในแต่ละช่วงอายุมีเพศชายจำนวน 50 คน และเพศหญิงจำนวน 50 คน ผลการศึกษาพบว่าความตรงและความเที่ยงของแบบทดสอบฉบับนี้เหมาะสมสำหรับนำไปใช้ในการวัดพัฒนาการด้านคำศัพท์ของเด็ก คะแนนมาตรฐานและลำดับที่เปอร์เซ็นต์ไทล์ที่ได้จากการศึกษาสามารถนำไปใช้เป็นเกณฑ์มาตรฐานในการแปลผลคะแนนที่เด็กทำได้ นอกจากนี้ในการศึกษานี้ยังพบว่าอายุมีผลต่อการพัฒนาความสามารถทางด้านคำศัพท์ โดยเด็กที่มีอายุมักจะมีคะแนนความสามารถด้านคำศัพท์มากกว่าเด็กที่มีอายุน้อยอย่างมีนัยสำคัญที่ระดับ .01 สำหรับการศึกษาเกี่ยวกับความสัมพันธ์ระหว่างคะแนนความสามารถทางด้านคำศัพท์กับเพศของเด็กครั้งนี้พบว่าเด็กเพศชายและเด็กเพศหญิงมีคะแนนความสามารถด้านคำศัพท์ไม่แตกต่างกัน

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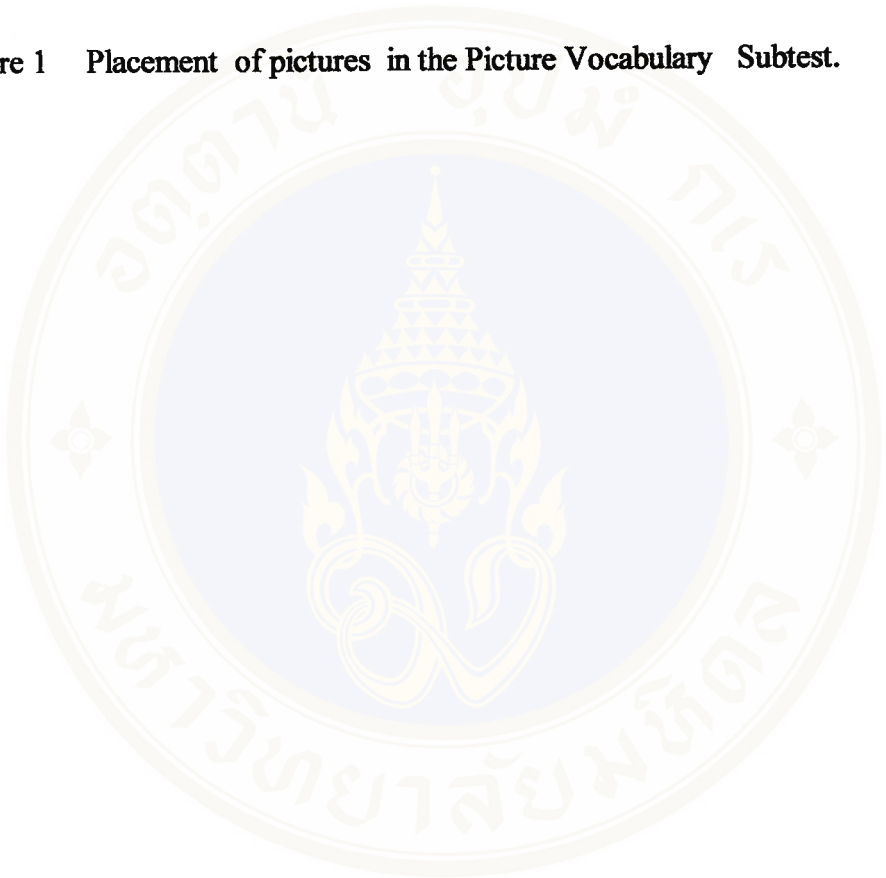
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CHAPTER I

INTRODUCTION

Statement of problem

The developmental sequences in language acquisition in young children are characterized by rapid and obvious change in the basic role systems found in linguistics including phonology, morphology, syntax and semantics. (1,2,3,4,5)

Semantics, or the content of language, is a system of rules governing the meaning or content of words, word combinations, and meaningful relationships among words and sentences. (6,7,8,9,10) It can be described in terms of word meaning, sentence or propositional meaning, and non-literal meaning. (6,8,10) Semantic knowledge includes both knowledge of individual lexical items and knowledge of how the meaning of a sentence is determined by the meanings of individual lexical items and the structure of the sentence. (7,11) Although the term “semantics” has been used to refer to various aspects of meaning in language theory, it is defined as the study of word meaning for the purposes of this study.

Most of the early language development of a child is concerned with semantic units or meaning of words. (5,9,12,13) Words are symbols that stand for something in the world (11,13), and children’s understanding that words can represent people, objects and events motivates them to learn as many words as possible for increasing communicative effectiveness (14).

Children have usually acquired their first set of 10 words by 5 months. First words are typically names for specific objects or persons and classes of objects or persons. Action words, modifiers, and grammatical function words are represented in their first 10 vocabulary words, but much less frequently. (10,15,16) The number of words in a child's vocabulary depends on the experiences and words to which the child is exposed.

Formal or standardized testing is well known as a method of assessment of child's language abilities. In Western countries, many standardized language tests are used to study semantics development by assessing either receptive skill or expressive skill, or both skills. (17) A language test that assesses receptive skill, such as the Receptive One-Word Vocabulary Picture Test (Gardner, 1985), is used to assess comprehension of single word (18). The Peabody Picture Vocabulary Test (Dunn and Dunn, 1981) is used to assess word meaning in isolation, and the Boehm Test of Basic Concepts (Boehm, 1971) is used to evaluate comprehension of word meanings in the context of a sentence. One's knowledge of basic vocabulary can be examined by tests such as the Test of Relational Concepts (Edmonston and Thane, 1988), the Illinois Test of Psycholinguistic Abilities (Kirk, Mc Carthy and Kirk, 1968), and the Detroit Test of Learning Aptitude (Baker and Leland, 1959) These tests are used to assess knowledge of word meanings, relationships between word meanings, and organization of semantic comprehension. These three tests can also examine lexical relations. (17,19)

Language tests that assess expressive skill, such as the Bankson Language Test (Bankson, 1985), are also used to assess semantic skill (18,19), The Environmental

Language Inventory, revised (McDonald, 1978) and Reynell Development Language, revised (Reynell, 1977) are both used to assess ability in naming and the use of language to describe a concept of vocabulary. (17)

The language tests that assess both receptive and expressive skill, such as the Clinical Evaluation of Language Fundamentals – 3rd Edition (Semel, Wiig and Secord, 1991), are used to assess semantic skill (18). The Measurement of Language Development (Melnick, 1975) is used to assess only semantic relationships, the Sequenced Inventory of Communication Development, revised (Hedrick, Prather and Tobin, 1984), the Test of Early Language Development –2nd Edition. Hresko, Reid and Hammill, 1981), and the Test of Language Development – Primary (Nowcomer and Hammill, 1977) are used to assess word and concept knowledge and to interpret meaning. (17)

Prior studies reported that semantics are interrelated with phonetics and syntactics. Therefore, many children with significant deficits in semantics will have some degree of disorder in other areas, e.g. significant interference with communication effectiveness (6) and effects on memory skills, reading comprehension, written language and mathematics. (13) Semantic deficits in children can be detected by assessment. In general, assessment of semantics includes an evaluation of the child's ability to comprehend (or receive) and express specific words and word relationships that are appropriate to their age level and individual experience. Three areas of language contents can be assessed: (a) vocabulary development, (b) substantive words, and (c) relational words. Thus, semantic ability is a basic component of language development which is important to a child's ability in language learning. If a child has a deficit in this

area, the effects mentioned will have occurred. One tool which is used to diagnose this deficit is the standardized language test. For these reasons, the present researcher was interested in constructing a Thai Semantic Development Test for Children in order to study the semantic abilities of children aged 3 years to 7 years 11 months in the Bangkok metropolitan area.

Purposes of the study

The purposes of this study are the following:

1. To construct and administer the Thai Semantic Development Test for Children aged 3 years to 7 years and 11 months old in Bangkok Metropolitan.
2. To study the validity of the Thai Semantic Development Test for Children.
3. To measure and assess the reliability of the Thai Semantic Development Test.
4. To study the children's standard scores, and percentile ranks.
5. To compare semantic scores relative to differences in subject's age and gender.

Research questions

The research questions are as the following:

1. What are the discrimination and difficulty levels of each item of the Thai Semantic Development Test for Children?
2. Does the Thai Semantic Development Test for children have sufficient validity?
3. Does the Thai Semantic Development Test for Children have sufficient reliability?

4. What are the computed standard scores and percentile ranks of semantic ability raw scores for Thai children aged 3 to 7:11 year?
5. Are there any relationships between the semantic abilities of children and their age and gender?

The advantages of this study

The advantages of this study are the following:

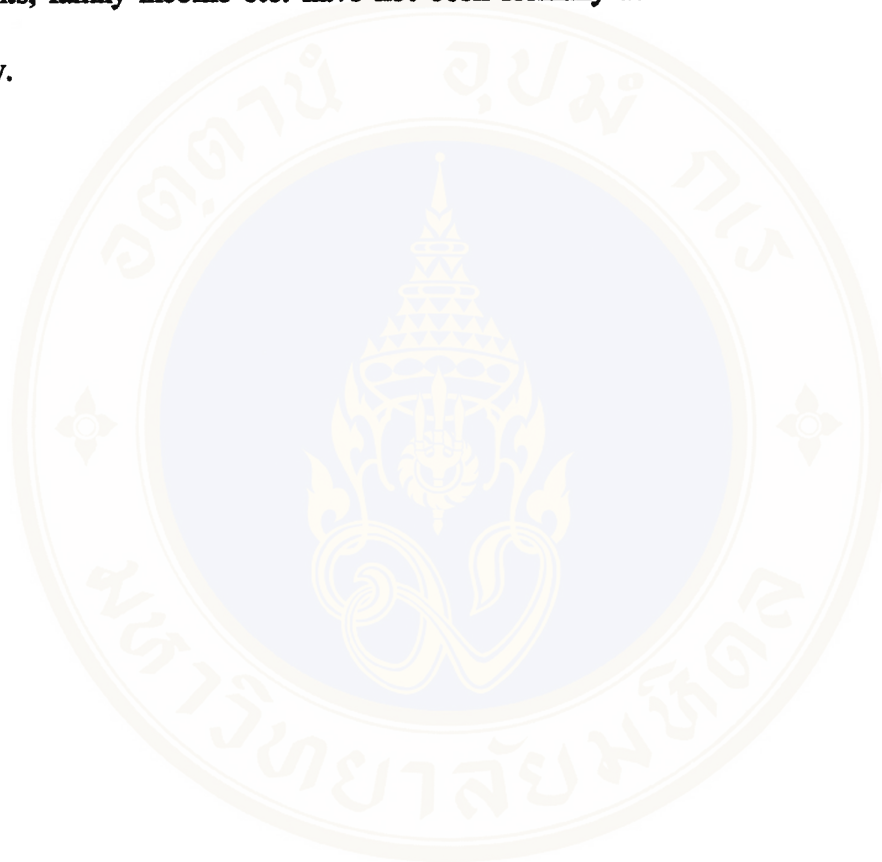
1. The Thai Semantic Development Test for children can be used as a diagnostic tool to evaluate semantic abilities of children in Bangkok and perhaps elsewhere in Thailand.
2. The results of the Thai Semantic Development Test for children can be used to guide speech and language pathologists in planning appropriate evaluations and early interventions for children who have communication disorders.
3. The preliminary data from this study about semantic abilities of Thai children aged 3 years to 7 years and 11 months can be used to guide parents, teachers, and other persons related to these children in supporting and promoting their semantic development.

Delimitation of this study

The subjects in this study were normal children aged 3-7:11 years old who were students in kindergarten and elementary schools in the Bangkok Metropolitan area.

Limitations of this study

1. This study used a Thai Semantic Development Test for Children aged 3-7:11 years old which was constructed by the researcher.
2. The effects of other mediating variables, e.g. educational levels of children's parents, family income etc. have not been formally accounted for and analyzed in this study.



CHAPTER II

REVIEW OF THE LITERATURE

This chapter contains a summary of a review of the literature pertaining to semantics, semantic development of children, and some of the factors related to semantic abilities.

1. Definition of semantics

Semantics is concerned with meaning in language and is a system of rules governing the meanings of words, word combinations, and meaningful relationships among words and sentences (6,7,8,9,10,19). Meaning can be conveyed through language at the word, sentence and discourse levels. The meaning of some words can be derived from nonlinguistic knowledge – the concepts formed through the cognitive adaptation and organization processes – that link words together (6,8,10,19,20). Therefore semantic knowledge can be described in terms of word meaning, sentence or prepositional meaning, and non-literal meaning (8).

2. Semantic development

The semantic development of children is considered from both children's comprehension ability (the words and word combinations that children understand) and their productive ability (the words and word combinations that children use)(21).

2.1 Comprehension development

Comprehension refers to children's ability to recognize the meaning of a word. The comprehension of words by children comes from their direct experience (22, 23).

They learn by using their senses such as hearing, seeing, touching, smelling and tasting. Children learn early from the perceptual features such as shape, size, movement, texture and sound. Then, children learn from the functions of thing and/or learn both the perceptual features and the functions of things together. Later on, they learn complex and abstract words (24). Comprehension is developed earlier than expression and developed much more rapidly (21,25, 26,27,28). In general, even before children produce their first word, they build up an understanding of utterances from listening to the speech of others. For example, an 8 month-old child whose mother says "where's the doggie" is likely to look around the room for the family's pet dog. Children follow many simple directions such as, "Bring me your toy" or "Don't touch the oven", even though they cannot yet express all these words in their own speech (29). The rate of word acquisition for comprehension of children age 9-20 months was twice that of production (21,25). On the average, children aged 13 months comprehended 50 words before they were able to produce 10 words (21,28). With an average of 22 words comprehended each month, children understand about 100 different words by 18 months of age (21,26,27,28,30, 31). By age 2, children comprehend a vocabulary of approximate 1,000 words (32). By age 3, children comprehend a vocabulary of approximate 1,500 words. By age 4 to 5, children comprehend approximately 1,500 to 2,500 words. During their preschool years, children learn as many as two to ten new words each day (33,34,35). Children have a vocabulary growth which continues steadily and, by age 6, children comprehend a vocabulary of around 8,000-14,000 words (2,21,33,34,36,37). Between the beginning and end of elementary school, recognition vocabulary increases fourfold, and children comprehend approximately 40,000 words (34,37,38). The word order, which children

can understand and speak are classified as: noun, verb, adjective, adverb, pronoun, preposition and conjunction (38,39).

2.1.1 Noun

A noun is category of word that the children can understand easily and produce before another word because it is used often and has meaning by itself. It is not necessary to link the meaning to another component in the sentence like another category of words (24,40). The nature of a noun is clearer, more concrete, and more readily identifiable (14,26). Therefore, children can comprehend nouns before other words. In the first 4 years, the development of noun comprehension is more dominant than other words (39), and the child's noun comprehension is more simple than that of complex and abstract words (24). By age 6 months to 12 months, children comprehend object word by paying attention to adult voices and looking around to see familiar people or things. For example, children will look around to find where their mother is when someone asks them "Where is your mom?", they will look for the object or person when they hear their names, and they will identify parts of their body when they were asked to do so. By age 18 months, children increasingly comprehend relative to numbers and categories of nouns, such as things, important people (family members), animals, vehicles, toys, food, body parts etc (24,26,28,39). When they are 30 months old, they can comprehend and differentiate between the words boy and girl. By age 3, children can comprehend 4 basic colors (red, blue, green, and yellow). By age 4, children can comprehend most of the other colors. By age 5, children can comprehend the concept of numbers one to five. By age 6, children can comprehend the relationship between different nouns. For example, they can distinguish an airplane and they know how birds and dogs are different. The development of noun

comprehension become increasingly sophisticated until linguistically complex nouns were comprehended (39). Some prior studies on nouns are as follows:

Carrow (41) studied the auditory comprehension of language in 159 children, aged 2:10 to 7:9 (years:months). The subjects were divided into 9 age groups (mean age in each group: 3:0,3:6,4:0,4:6,5:0,5:6,6:0,6:6,7:0). She developed a picture test which was composed of 38 nouns. There were *coat, glass, ball, car, tree, chair, dog, bicycle, baby, table, man, piano, pencil, farm, box, mother, sheep, boy, paint, spoon, bird, shoe, book, hand, cat, fish, girl, half, pair, red, brown, blue, orange, black, green, yellow, two, and four*. The subjects were asked to point to the picture. The results showed that 60 % of the children at mean age 3:0 could comprehend 30 nouns such as the following: *coat, glass, ball, car, tree, chair, dog, bicycle, baby, table, man, piano, pencil, farm, box, mother, sheep, boy, painter, spoon, bird, shoe, book, hand, cat, fish, girl, red, brown, blue*. In addition to the 30 words mentioned above, children at mean age 3:6 could comprehend four additional words: *orange, black, green, and yellow*. At mean age 4:0, children developed one additional word *pair*. The word *four* was developed when children were at mean age 5:6, and *half* was developed at mean aged 6:6.

Carrow (42) studied the auditory comprehension of language of 200 children, aged 3 to 7 years. The subjects were divided into 8 age groups; each group differed by 6 months intervals. The Test of Auditory Comprehensive of Language was administered to the subjects. They were asked to point to the pictures following the examiner's commands. Twenty nouns were used in this study. They were *bird, bicycle, girl, cat, farm, goat, hand, red, farmer, fisherman, musician, bicyclist, pianist, painter, fruit, dog, man, musical, back, and yellow*. The results showed that

the children aged 3:0-3:6 could comprehend 8 nouns which were: *bird, bicycle, girl, cat, farm, goat, hand, and red*. In addition to these 8 words, children aged 4:0-4:6, and 4:6-4:11 could comprehend seven additional words: *painter, fruit, dog, man, musical, back, yellow*. Two suffix nouns: *farmer, fisherman* were developed by age 5:0-5:6, and they could comprehend *musician, bicyclist, pianist* when they were over 7 years old.

Goldin Meadow et.al. (43) studied vocabulary comprehension development of 12 children, aged 14 months to 24 months. Seventy nouns were used in this study. There were *head, foot, hair, mouth, hand, teeth, finger, arm, lips, tongue, knee, elbow, thumb, armpit, fish, cat, rabbit, bear, cow, pig, giraffe, butterfly, banana, orange, grape, cake, cereal, sugar, mustard, hat, button, sock, belt, pocket, scarf, badge, clock, chair, table, door, window, house, floor, wall, sink, lamp, pot, couch, train, airplane, ball, pillow, scissors, crayon, flowers, money, paper, plate, mirror, ladder, broom, ring, cigarette, flag, tire, stamp, A, star, M, and heart*. The children were asked to point to or to pick up the objects and pass them to the examiner. The results showed that 75% of these children could comprehend nouns in many categories. Some were body parts: *head, foot, hair, mouth, hand, teeth, finger, arm*; animals: *fish, bear*; food: *banana, orange, grape, cake*; articles of clothing: *hat, sock, button, belt*; parts of the house: *clock, chair, table, door, window, home, floor*; vehicles: *train, airplane*; and miscellaneous: *articles ball, flowers, money, paper, scissors, pillow, crayon*.

Benedict (44) reported on her longitudinal studies of the development of language comprehension and production in eight children, aged 9 months to 1 year 8 months. The Bayley Scales of Infant Development (1969) was used in this study. The

data was obtained from a subject's mother checking all words that her child understood on the examiner's list (from the Bayley Test). The first fifty words were classified into 4 categories: nominals, action words, modifiers, and personal social. Nominals vocabularies were classified further into 2 classes: specific and general nominals vocabulary. The study results showed that these children could comprehend 56% of the nouns, which included 17% specific nominal vocabulary and 29% general nominal vocabulary. Specific nominal vocabulary was composed of people such as daddy, mom, animals such as Cappy (name of pet), and objects such as Roscae (name of dog toy). General nominal vocabulary was composed of inanimate objects including toys, clothes, body part, food, household items, animate objects (people or animals), and pronouns e.g. this, that, he.

Canfield et.al. (45) reviewed many studies on the topic of auditory comprehension of nouns in children aged 1:6 to 3:6. He concluded that children aged 1:6 to 2:0 could point to at least 5 body parts such as *eye, ear, mouth, hand, and nose* point correctly to at least 3 things on her dress, and point correctly to at least 8 pictures of animals or things (by pointing to a picture following a command such as "Where's the dog?"). Children aged 2:0 to 2:6 could point correctly to at least 15 pictures of animals or things at (e.g. *dog, ball, bed, doll, hair, spoon, chair, box, scissors, car, key, fork, cat, table, bottle*), and to 20 pictures when aged 3 to 3:6.

Utairatanakit (46) studied word comprehension of nouns of 195 Thai pupils in Prathom suksa One, age 5:2-6:11. One hundred and one of them were boys and ninety-four were girls. The words were extracted from seven elementary books, and randomly selected words were compiled to make four word comprehension subtests which consisted of 125 words. Sixty-five words were presented in two subtests,

which had 4 picture choices. Thirty words were presented in one subtest which had 3 words or sentences choices (this subtest had one picture in each item), and thirty words were presented in another subtest which had 3 sentence choices. All subjects were tested with these four subtests. The subjects were asked to select either picture choices and words or sentences for these four subtests following the examiner's questions. Fifty-seven nouns were used in this study. They were “รองเท้า หมวก คางคก คิน ลูกบอล น่อง สนาม หวัด ห้องเรียน คำ ขาวนา โลก หิด อากาศ กระถาง เท้า ตลาด เลขไทย น้ำมูก กลางคืน เง ท้า วันอังคาร ปก เลขอารบิก น้ำลาย ถึง ความสุข พืช ชัน หลาน ดำรง สวนสัตว์ ลำดับ แปร เป็ด ลูกอม ผิวหนัง อันตราย ป้าย คลอง สะพาน ทิศตะวันออก สัปดาห์ กลางแจ้ง เมล็ด มะระ ผู้โดยสาร อา บ่อ ไม้ไผ่ วัดดู ขาวสวน เดือนมกราคม หลัก ขาม รวงข้าว”. The results showed that more than 75% of these children could comprehend the following: รองเท้า หมวก คางคก คิน ลูกบอล น่อง สนาม หน้า หวัด ห้องเรียน คำ ขาวนา โลก หิด อากาศ กระถาง เท้า ตลาด เลขไทย น้ำมูก กลางคืน เง เท้า วันอังคาร ปก เลขอารบิก น้ำลาย ถึง ความสุข ผัก ชัน หลาน ดำรง สวนสัตว์ ลำดับ แปร เป็ด ลูกอม ผิวหนัง อันตราย ป้าย คลอง สะพาน ทิศ ตะวันออก สัปดาห์ กลางแจ้ง, and less than 75% of these children could comprehend the following: เมล็ด มะระ ผู้โดยสาร อา บ่อ ไม้ไผ่ วัดดู ขาวสวน เดือนมกราคม หลัก ขาม รวงข้าว

Pumiamorn (47) studied the comprehension and production of nouns of 151 children, aged 3 to 4 years. She developed a picture test which was composed of 86 nouns. The nouns consisted of four kinds namely: 16 animals: ปลา หม่า ช้าง ไก่ แมว หมู เสือ กบ กระต่าย ลิง ปู ม้า นก ควาย วัว เป็ด, 38 objects: หมวก รถไฟ เรือ ดินสอ รถ กะทะ หม้อ หนังสือ ล้อ หิน

ได้ะ บันได กระเป๋า เชือก กางเกง ลูกโป่ง หมวก ว่าว ร่ม กระบอง กระจก แก้ว ปืน ตุ๊กตา มิค ประตู่ กระดาษ เสื้อ
 รองเท้า เข็ม ไข่ ขวด จาน ผ้า สะพาน เต้า โทรทัศน์, 22 foods and plants: ข้าว น้ำ ต้นไม้ ผัก ดอกไม้ มะละกอ
 ไข่ ปลาทุ หอย้า พริก กล้วย แขนง ดอกบัว มะนาว ถั่ว ส้ม ฝรั่ง มะพร้าว เนื้อ หมู มังคุด มะม่วง, and 10 colors:
 ดำ แดง เหลือง เขียว ขาว ส้ม น้ำเงิน ม่วง ขั้ว น้ำตาล. The children were asked to point to the
 pictures. The results showed that 75% of these children could comprehend 15 animals
 which were: ปลา หมา ช้าง ไก่ แมว หมู เสือ กบ กระต่าย ลิง หนู ม้า นก ควายน เป็ด, 29 objects which
 were: รถ หมวก รถไฟ เรือ ดินสอ หม้อ หนังสือ ลูกโป่ง กางเกง ปืน กระเป๋าร่ม แก้ว ขวด มิค จาน ได้ะ ว่าว
 กระจก บันได หิน เชือก รองเท้า ประตู่ ไข่ ตุ๊กตา เสื้อ โทรทัศน์ ส้อม, 12 foods and plants which were: ไข่
 กล้วย พริก ส้ม หอย้า ถั่ว ฝรั่ง ข้าว น้ำ ต้นไม้ ผัก ดอกไม้, and 3 colors which were: ดำ แดง ขาว.

Panthong (48) studied auditory comprehension of language of nouns in 200 Thai children aged 3 to 4:11. The subjects were divided into 4 age groups; each group differed by 6 months intervals. She used a modified test from the Test of Auditory Comprehension of language (Panthong, and Hanchumpon, 1987). This test consisted of 20 nouns. They were ผลไม้ ผู้ชาย สุนัข นักกีฬา นัก เด็กผู้หญิง จักรยาน แมว มือ ขาวนา นักดนตรี สี เหลือง สีแดง สีดำ เครื่องดนตรี หุ่นนา สี สอง ข้างทาสี สี. The children were asked to point to the picture. The results showed that more 75% of children aged 3:0 to 3:5 could comprehend 15 nouns. They were: นัก เด็กผู้หญิง จักรยาน แมว มือ ขาวนา นักดนตรี ผลไม้ ผู้ชาย สุนัข นักกีฬา สีเหลือง สีแดง สีดำ เครื่องดนตรี. In addition to these 15 words, children aged 3:6 to 3:11 could comprehend one additional word: หุ่นนา, and developed two additional

words: สี สอง when they were 4:0 to 4:5. Also, two more: ข้างทาสี and สี were developed by children aged 4:6 to 4:11.

Hanchumpon (49) studied auditory comprehension of language in 200 children aged 5 to 5:11. The subjects were divided into 4 age groups; each group differed by 6 months intervals. She used the Test of Auditory Comprehension of Language in the Thai version (Panthong and Hanchumpon, 1987). The results indicated that more than 75% of children aged 5 to 5:11 could comprehend all nouns. They were: ผลไม้ ผู้ชาย สุนัข นักกีฬา นก เด็กผู้หญิง จักรยาน แมว มือ ขาวนา นักดนตรี สีเหลือง สีแดง สีดำ เครื่องดนตรี ทุ่งนา สีสอง ข้างทาสี สี.

Prathanee (50) studied the comprehension and production of nouns in 327 children aged 4 to 5 years. The subjects were divided into 4 age groups, and each group differed by 6 months intervals. She used a modified picture test from Pumiamorn's study which was composed of 86 nouns. The children were asked to point the pictures. The results showed that more than 75% of children could comprehend all nouns (The 86 words mentioned previously in Pumiamorn's study).

2.1.2 Verbs

Development of comprehension of verbs can be observed clearly during the first 4 years of age which evolves in a similar way to comprehension of nouns. However, children develop nouns much more than verbs (21,40,43,51,52). Verbs show the relationship of nouns, changing more than static, are less concrete, less tangible and more linguistically complex than nouns (14,26). Children comprehend verbs which show movement of body such as *bye*, *walk*, *run*, *jump* before verbs which rarely show the movement of the body such as *stand up*, *go*, *hang on*. The comprehension of

verbs depends on how often the verbs are used at home and how often children see the action. Some of the studies on verbs are the following:

Carrow (41) studied the auditory comprehension of language in 159 children, aged 2:10 to 7:9. The subjects were divided into 9 age groups, (mean age in each group: 3:0, 3:6, 4:0, 4:6, 5:0, 5:6, 6:0, 6:6, 7:0). The method used was described previously (on page 10). Six verbs were used in this study. They were *jump*, *run*, *eat*, *hit*, *catch*, and *give*. The results showed that children aged 3:0 could comprehend the following verbs: *run*, *jump*, and *eat*. In addition to, these 3 words mentioned above, children 3:6 could comprehend one additional word: *hit*. Children developed one additional word: *catch* when they were 4:0. Children age 4:6 could comprehend one additional word: *give*.

Carrow (42) studied the auditory comprehension of language in 200 children, aged 3 to 7 years. The subjects were divided into 8 age groups, and each group differed by 6 months intervals. The method used was described previously (on page 10). Eight verbs were used in this study. There were *running*, *jumping*, *hitting*, *eating*, *going*, *give*, *catching*, and *coming*. The results indicated that children aged 3:0-3:6 could comprehend the following verbs: *running*, *jumping*, and *hitting*. In addition to these 3 words, children aged 3:6-3:11 could comprehend two additional words: *going*, *give*. Children aged 4:0-4:11 developed one additional word: *eating*, and the word *catching* was developed when they were 5:6. Children aged 7 years could develop one additional word: *coming*.

Goldin Meadow, et.al. (43) studied vocabulary comprehension development of 12 children, aged 14 months to 24 months. The children were asked to act following the examiner's commands. Thirty verbs were used in this study. They were: *kiss*,

drop, pick up, sake, touch, kick, stop on, point to, fall, turn around, eat, open, close, drink, blow, throw, hug, sit, jump, run, stand, lay down, wash, push, pull, dance, kit, fly, cry, and smile. The results showed that more than 75 % of these children could comprehend transitive verbs such as: *eat, open, close, drink, blow, throw, kiss, shake, touch, and hug,* and intransitive verbs such as: *sit, jump, turn around, run, stand, lie down, drop, and fall.* Less than 75% of these children could comprehend transitive verbs such as: *wash, push, pull, dance, kick, fly, cry, smile, step on, point to, and crawl.*

Canfield et.al (45) reviewed many studies on the topic of auditory comprehension of verbs in children aged 2 to 3:6. He concluded that children aged 2:0 to 2:5 could comprehend movement verbs: *eat, speak, and cry.* In addition to, these 3 words, children aged 2:6 to 2:9 could comprehend ten more words: *run, laugh, sorry, and drink,* and the opposites of verbs such as the following: *push-pull, give-receive, come and go.* Children aged 3 to 3:6 could comprehend at least 10 verbs such as: *eat, speak, drink, give, go, cry, run, laugh, sorry, come.*

Utairatanakit. (46) studied word comprehension of 195 Thai pupils in Prathomsuksa One, age 5:2 to 6:11. One hundred and one of them were boys and ninety-four were girls. The method used was described previously (on page 12). Thirty-one verbs were used in this study. They were: พาย ปลูก กระจาย เรียง กวาด ค้าง ท่อง เล่น ลง เดินไต่ ขอบ เกา แลก เก็บ ชัก ต้องการ สังเกต เช็ด เล่น วาด รักษา หาย บวก ออกกำลังกาย นับ ปฏิบัติ เข้า ถอน ถือ โห้ ระบาย. The results indicated that the children could comprehend verbs such as: พาย ปลูก กระจาย เรียง กวาด ค้าง ท่อง เล่น ลง เดินไต่ ขอบ เกา แลก เก็บ ชัก ต้องการ สังเกต เช็ด เล่น

วาด รักษา หาย นวก ออกกำลังกาย นับ Less than 75% of these children could comprehend verbs such as: ปฏิบัติ เข้า ถอน ถือ โห้ว ระบาย.

Panthong(48) studied auditory comprehension of language of verbs in 200 Thai children, aged 3 to 4 years. The method used was described previously (on page 14). Nine verbs were used in this study. They were: วิ่ง กำลังดี ยกขึ้น กระโดด กิน ให้ เดินไป รับ เดินมา. The results showed that children aged 3 to 3:5 could comprehend verbs such as: วิ่ง กำลังดี ยกขึ้น กระโดด กิน. In addition to these 5 words, children aged 3:6 to 3:11 could comprehend one additional word: ให้. Less than 75% of children aged 4:5 to 4:11 could comprehend verbs such as: เดินไป รับ เดินมา.

Hanchumpon (49) studied auditory comprehension of language of verbs in 200 children, aged 5:0 to 6:11. The subjects were divided into 4 age groups, and each group differed by 6 months intervals. The method used was described previously (on page 15). Nine verbs were used in this study. The results showed that 75 % of children aged 5:0 to 5:11 could comprehend verbs such as: ยกขึ้น วิ่ง กำลังดี กระโดด กิน ให้ รับ. In addition to those 7 words, children aged 6:0 to 6:5 could comprehend one additional word: “เดินมา”, and less than 75% of children aged 6-6:11 could comprehend “เดินไป”.

2.1.3. Adjectives

Adjectives refer to the location and movement of objects and the relationships or space of objects. Children comprehend adjectives which are often used for humans,

and the adjectives which are used for food and toys first. They comprehended adjectives such as good, bad, beautiful, hot, cold when they were 18 months (28). They comprehend the simple adjectives *big and small* first and then they comprehend *tall, short*. Moreover, children understand adjectives which have positive meaning such as *big, tall* rather than the words which have negative meaning such as *small, short* because positive meaning words are easy to understand and clearly distinguish meaning in the environment rather than negative words (24). The studies on adjectives are the following:

Carrow (41) studied adjective comprehension of 159 children, aged 2:10 to 7:9. The subjects were divided into 9 age groups (mean age in each group: 3:0, 3:6, 4:0, 4:6, 5:0, 5:6, 6:0, 6:6, 7:0). The method used was described previously (on page 10). Ten adjectives were used in this study. They were *little, big, fast, slow, tall, short, alike, different, many, and few*. The results showed that children at mean age 3:0 could comprehend adjectives such as the following: *little, big, fast, slow*. In addition to those 4 words above, children at mean age 3:6 could comprehend two additional words: *tall, short*, and could develop one additional word *many* when children reached mean age 5:0. Children at mean age 6:0 could develop three additional words: *alike, different, and few*.

Carrow (42) studied auditory comprehension of prepositions in 200 children, aged 3 to 7 years. The subjects were divided into 8 age groups; each group differed by 6 month intervals. The method used was described previously (on page 10). The results showed that children aged 3:0 to 3:5 could comprehend *small*. Children could develop one additional word: *big* when they were 3:6 to 3:11. Children aged 4:6 to 4:11 could develop one additional word: *tall*. The word *same* was developed by

children aged 5:0-5:6, and *different* was developed when they were 6:6 to 6:11. Two more words, *gently* and *easily*, were developed when children were over 7 years of age .

Bangs (53) studied auditory comprehension of adjectives of 80 children aged 2:6 to 5:0. They were divided into 8 age groups; each group differed by 6 months intervals. The Test of Vocabulary Comprehension Scale (1975) was used in this study. The adjectives consisted of category classifications: (a) size: *big, small, tall, short, fat, thin*, (b) quantity: *heavy, and light*, and (c) sense of touch: *hard, soft*. The children were asked to pick out the objects. (e.g. "To pick the big car"). The results showed that children aged 2:6 to 3:0 could comprehend adjectives such as following: *big, tall, light and soft*. In addition to those 4 words above, children aged 3:0 to 3:6 could comprehend one additional word: *heavy*, and children aged 3:6 to 4:0 could develop two additional words: *small, hard*. Two more words, *fat* and *short*, were developed by children aged 4:0 to 4:6 and they could develop one additional word: *thin* when they were 4:6 to 5:0.

Bartlett (54) studied auditory comprehension of adjective of 120 children, aged 3 to 5 years. The subjects were divided into 6 age groups, and each group differed by 6 months intervals. Eight prepositions were used in this study. Each subject was asked to point to or to pick up an object. The results showed that children aged 3:1 to 3:6 could comprehend adjectives such as the following: *big, small*. In addition to, those 2 words mentioned above, children aged 3:7 to 5:0 could also comprehend six additional words: *long, short, tall, short, wide, and narrow*.

Canfield et. al (45) reviewed many studies on the topic of auditory comprehension of adjectives in children 2:6 to 4:6. He concluded that children aged

2:6 to 2:9 could comprehend adjectives such as the following: *big, small, hot, cold, and soft*. In addition children aged 3:0 to 3:6 could also comprehend six additional words: *tall, short, happy, sorry, tried, and afraid*. Two more words *heavy* and *soft*, were developed by children aged 3:6 to 4:0. Children aged 4:0 to 4:6 could develop two additional words: *different, same*.

Utairatanakit (46) studied word comprehension of adjective of 195 Thai pupils Prathom suksa One, age 5:2-6 :11. One hundred and one of them were boys and ninety-four were girls. The method used was described previously (on page 12). Twenty-seven adjectives were used in this study. They were: เสมอ สนุก ปลอดภัย น่ารัก หมด แรก มากกว่า กลาง ปลาย ต่าง คู่ ลดลง ครึ่ง ที่ หู ซ้าย ใหญ่ ห้า แปด ร้อน เข้า พร้อม ตั้ง จัด ใหม่ เลอะเทอะ ซ้ำ. The results indicated that children could comprehend adjectives such as the following: ใหญ่ ร้อน แรก กลาง สนุก จัด ปลาย แปด น่ารัก ต่าง เสมอ หมด เลอะเทอะ ใหม่ ซ้ำ ตั้ง เข้า ปลอดภัย.

Panthong (48) studied auditory comprehension of adjectives in 200 children, aged 3 to 4 years. The method used was described previously (on page 14). Twenty-six adjectives were used in this study. They were: สูง สูงกว่า ใหญ่ เล็ก เล็กกว่า เดียวกัน อ้วนที่สุด เหมือนกัน มากกว่า น้อยกว่า มาก หลาย ครั้ง เผ็ด ร้อน หวาน เย็น ดีใจ นุ่ม เร็ว ที่สอง ต่างกัน ง่าย ดูหนึ่ง อย่างนุ่ม นวล ซ้าย. The results showed that children aged 3 to 3:5 could comprehend adjectives such as the following: สูง ใหญ่ ใหญ่กว่า เล็ก เล็กกว่า เดียวกัน อ้วนที่สุด เผ็ด. In addition to, those 8 words mentioned above children aged 3:6 to 3:11 could also comprehend three

additional words: ใหญ่ เล็ก สูง. Children could develop one additional word: เช่น when they were 4:0 to 4:5. Children aged 4:6 to 4:11 could develop one more word: นุ่ม. Less than 75% of these children in this study could comprehend the following words: ต่างกัน คู่ ที่สอง ครั้ง ซ้าย ที่ มากกว่า คู่ ห้า.

Hanchumpon (49) studied auditory comprehension of adjective in 200 children, aged 5:0 to 5:11. The method used was described previously (on page 15). Twenty-six adjectives were used in this study. The results showed that the children aged 5:0-5:5 could comprehend adjectives such as the following : สูง สูงกว่า ใหญ่ เล็ก เล็กกว่า เค็ยกว่า อ้วนที่สุด เหมือนกัน มากกว่า น้อยกว่า มาก หลาย ครั้ง เ็ด็ด ร้อน หวาน เช่น ตีใจ นุ่ม เร็ว ที่สอง, and could develop two additional words: “ต่างกัน ง่าย” when they were 5:6 to 5:11. Less than 75% of the children in this study could comprehend as the following “คู่หนึ่ง อย่างนุ่มนวล ซ้าย”.

Panyapawakul (55) studied auditory comprehension of adjectives of 150 children, aged 3:6 to 4:11. The subjects were divided into 3 age groups, and each group differed by 6 months intervals. Different objects and toys were used for each pair of adjectives tested. Sixteen adjectives were used in this study. They were ใหญ่ เล็ก สูง เค็ย อ้วน ผอม หนัก เบา สั้น ยาว ร้อน เย็น หนัก นุ่ม หนาและบาง. Each subject was asked to point to or to pick up an object or toy. The results indicated that children aged 3:6 to 4:11 could comprehend adjectives such as the following : ใหญ่ เล็ก สูง เค็ย อ้วน ผอม หนัก เบา

สั้น ขาว ร้อน เ็น หนัก และนุ่ม”, respectively. Less than 75% of these children could comprehend as the following: “หนาและบาง”.

Ariyasoponwong (56) studied the auditory comprehension ability of some adjectives in the comparative and superlative degree of 400 Thai children, aged 3 to 4 years, 11 months. The subjects were divided into 4 age groups; each group differed by 6 month intervals. There were 50 males and 50 female in each group. Different objects and toys were used for each pair of adjectives tested. Twenty comparative degrees of adjectives and twenty superlative degrees of adjectives were used in this study. They were: ใหญ่กว่า เล็กกว่า สั้นกว่า ยาวกว่า สูงกว่า เตี้ยกว่า ชวนกว่า หอมกว่า กว้างกว่า แคบกว่า หนักกว่า เบากว่า มากกว่า (นามนับได้) น้อยกว่า (นามนับไม่ได้) หนากว่า บางกว่า มากกว่า (นามนับไม่ได้) น้อยกว่า (นามนับไม่ได้) หยาบกว่า เรียบกว่า ใหญ่ที่สุด เล็กที่สุด สั้นที่สุด ยาวที่สุด สูงที่สุด เตี้ยที่สุด ชวนที่สุด หอมที่สุด กว้างที่สุด แคบที่สุด หนักที่สุด เบาที่สุด มากที่สุด (นามนับได้) น้อยที่สุด (นามนับไม่ได้) หนาที่สุด บางที่สุด มากกว่า (นามนับไม่ได้) น้อยที่สุด (นามนับไม่ได้) หยาบที่สุด เรียบที่สุด. Each subject was asked to point to or to pick up on object or toy. The results indicated that over 75% of children aged 4:6-4:11 could comprehend the words ยาวกว่า น้อยกว่า, but less than 75% could comprehend the other comparative adjectives. In addition, the results showed that over 75% of the children in the following age groups were able to comprehend some adjectives in the superlative degree. Children aged 3:0-4:11 that could comprehend the word ใหญ่ที่สุด ชวนที่สุด. Children aged 3:6-4:11 could comprehend the word สูงที่สุด. Children aged 4:0-4:11 could comprehend the words เล็กที่สุด เตี้ยที่สุด, and

children aged 4:6-4:11 could comprehend the words สั้นที่สุด ยาวที่สุด บางที่สุด มากที่สุด น้อยที่สุด.

2.1.4. Prepositions

Children comprehend prepositions more slowly than nouns or verbs, which are the main words in sentence (57). Children comprehend the meaning of prepositions step by step. First, children have to learn by direct experience, so they comprehend the prepositions by letting themselves relate with the object in some position, such as children comprehend “under” by crawling to and under a table. When they have increased experience from playing and increased discrimination ability relative to pictures, their preposition comprehension is increased. Children comprehend prepositions which relate only position, such as “on, in” easier than preposition words which relate both position and direction such as “under, in front of” (57). The studies on preposition are the following:

Carrow (41) studied preposition comprehension of 159 children, aged 2:10 to 7:9. The subjects were divided into 9 age groups, (mean age in each group: 3:0, 3:6, 4:0, 4:6, 5:0, 5:6, 6:0, 6:6, 7:0). The method used was described previously (on page 10). Six prepositions were used in this study. They were: *on*, *under*, *in*, *by*, *between*, and *in front of*. The results showed that children aged 3 to 3:6 could comprehend prepositions such as the following: *on*, *under*, and *in*. In addition to, those 3 words mentioned above, children at mean age 3:6 to 3:11 could comprehend two additional words: *by*, and *between*, and could develop one additional word: *in front of* when children are at a mean age of 4:0 to 4:11...

Carrow (42) studied auditory comprehension of prepositions of 200 children aged 3 to 7 years. The subjects were divided into 8 age groups, and each group differed by 6 month intervals. The method used was described mentioned previously (on page 10). Eight prepositions were use in this study. They were *in, on, under, behind, in front of, in back of, beside, and middle*. The results showed that children aged 3 to 3:5 could comprehend *in*. In addition, children aged 3:6-3:11 could comprehend two additional word: *in front of and in back of*. Three more prepositions, *beside, between, and middle*, were developed by children aged 4:0 to 4:5. Children aged 5:0 to 5:6 could comprehend two additional words: *on, and behind*.

Clark (58) studied auditory comprehension of prepositions of 70 children aged 1:6 to 5:0. The subjects were divided into 7 age groups, and each group differed by 6 months intervals. Three prepositions were used in this study. They were *in, on, and under*. The children were asked to act following the examiner's commands such as "To bring X on Y". The results showed that children aged 1:6 to 1:11 could comprehend and could act correctly following the commands *in* the most. Children aged 2 to 2:5 could comprehend and could act correctly following the commands *in* rather than the command *on* and *under*. Children aged 2:6 to 3:1 could comprehend *in, on, and under*. Children could comprehend all of these prepositional words completely when they were 5 years old.

Bangs (53) studied auditory comprehension of prepositions of 80 children aged 2:6 to 5:0. The subjects were divided into 5 age groups, and each group differed by 6 month intervals. The Test of Vocabulary Comprehension Scale (1975) was used in this study. Six prepositions were used in this study. They were *in, on, under, in front of, behind, and beside*. The children were asked to act following the examiner's

command (such as “To bring X in Y”). The results showed that children aged 2:0 to 2:6 could comprehend *in*. Two more, *on* and *under*, were developed by children aged 2:6 to 3:0. Children aged 3:6 to 4:0 could develop two more words: *in front of*, *behind*, and *beside* was developed when they were 4:0 to 4:6.

Washington and Naremore (57) studied auditory comprehension and expression of spatial preposition of 80 children, aged 3 to 4:11. The subjects were divided into 4 age group, and each group differed by 6 month intervals. Eight prepositions were used in this study. They were: *insite*, *on*, *under*, *around*, *behind*, *in front of*, *between*, and *beside*. The subjects were asked to point to the picture or to pick up the object following the examiner’s command. The results showed that children could comprehend *in*, *on*, *under* when they were 3:0 to 3:5. In addition to those 3 words mentioned above, children aged 3:6 to 3:11 could comprehend two additional words: *in front of*, *behind* and could develop three additional words: *around*, *beside* and *up* when they were 4:0 to 4:11.

Utairatanakit. (46) studied word comprehension of 195 Thai pupils Prathom sukso one, aged 5:2-6:11. One hundred and one of them were boys and ninety-four were girls. The method used was described previously (on page 12). Four prepositions were used in this study “หน้า หลัง นอก ริม”. The results indicated that 75% of the children could comprehend all of these preposition.

Panthong (48) studied auditory comprehension of prepositions of 200 children, aged 3 to 5 years. The subjects were divided into 4 age groups; each group differed by 6 months intervals. The method used was described previously (on page 14). Eight adjectives were used in this study. They were: “ใน บน ใต้ กลาง ข้างหน้า ข้างหลัง ข้าง

ระหว่าง”. The results showed that children aged 3:0 to 3:5 could comprehend “ใน ข้าง หลัง ”, Moreover, children aged 3:6 to 3:11 could develop one additional word: ข้าง. Children aged 4:0 to 4:5 could develop two additional words: “กลาง ได้”, and could develop one additional words: “บน” when they were 4:6 to 4:11. Children aged over 4:11 could comprehend “ข้างหน้า ระหว่าง”.

Hanchumpon (49) studied auditory comprehension of prepositions of 200 children, aged 5:0 to 6:11. The subjects were divided into 4 age groups and each group differed by 6 months intervals. The method used was described previously (on page 15). Eight adjectives were used in this study. The results showed that children aged 5:0-5:5 could comprehend prepositions “ใน บน ได้ กลาง ข้างหลัง ข้าง”. In addition, children aged 5:6-5:11 could comprehend one additional word “ระหว่าง”. Children could develop one additional word: “ข้างหน้า” when they were 6:6-6:11.

Panyapawakul (55) studied auditory comprehension of prepositions of 150 children, aged 3:6 to 4:11. The subjects were divided into 3 age groups, and each group differed by 6 months intervals. The method used was described previously (on page 22). Six prepositions were used in this study. They were “ข้างใน ข้างนอก บน ได้ ข้าง หน้า ข้างหลัง”. The results showed that children aged 3:6 to 3:11 could comprehend “ข้าง ใน ข้างนอก บน”. In addition to those 3 words mentioned above, children aged 4:0 to 4:11 could comprehend three additional words: “ได้ ข้างหน้า ข้างหลัง”.

2.1.5 Numeral Classifiers

Numeral classifiers are linguistic units of the Thai language (49). Numeral classifiers are so called because they: (a) occur as required in noun phrases containing an expression of quantity, and (b) classify nouns according to inherent semantic features of the associated referents (59). Children comprehend and learn numeral classifiers which are used for living things first, but they may use these numeral classifiers incorrectly. Comprehension of numeral classifiers of children depends on their increasing language abilities. Children comprehend numeral classifiers, which are often used in daily life before classifier words which are less used such as “เรือก ปืน เกล ไชลง ฟุ้ง”. Children study these numeral classifiers at school which they then use correctly later on (48,49,59,60,61,62). Many researchers studied the ability of expression of Thai numeral classifiers in Thai children while there were few researchers who studied auditory comprehension of Thai numeral classifiers.

Tuaycharoen (61) conducted a longitudinal study of the usage of numeral classifiers in one Thai boy and one Thai girl aged 3 to 5 years. They were siblings. The researcher studied spontaneous speech of these two children in both natural situations such as situations in daily life, and control situations when the child play games such as ‘How many’. In collecting data on the boy, the researcher recorded his spontaneous speech on a tape recorder since he was three months to twenty-four months old, and transcribed his spontaneous speech in diary notes since he was two years and six months to four years old. The researchers collected data on the usage of numeral classifiers until the boy was ten years old. In collecting data on the girl, the researcher transcribed her spontaneous speech in diary notes since when she was three

to five years old. The researcher collected data on the usage of numeral classifier until she was six years old. The results showed that these two children used numeral classifiers when they were 2:0 to 2:6. Their characteristic usage of the numeral classifiers were repetition of nouns instead of using the numeral classifier such as “นก 2 นก”, “เป็ด 2 เป็ด”. When they were 3 years old, they often used “อัน”. They used the numeral classifier more correctly when they were 4.6 to 5.

Utairatanakit. (46) studied comprehension of numeral classifiers of 195 Thai pupils in Prathom sukka I, mean age between 5:7-6:6. One hundred and one of them were boys and ninety-four were girls. The method used was described previously (on page 12). Six numeral classifiers were used in this study. There were: “ตั้ง เล่ม คั่น ลำ ผืน ช้าง”. The results indicated that children could comprehend words with respect to the highest to lowest percentages such as: “คั่น เล่ม ผืน ลำ ตั้ง ช้าง”.

Panthong (48) studied the auditory comprehension of Thai numeral classifiers in 200 Thai children, aged 3:0 to 4:11. The method used was described previously (on page 14). Five numeral classifiers were used in this study. They were: แท่ง อัน ผุง ค้ว เขือก. The results showed that children aged 3:0 to 3:5 comprehend “แท่ง อัน”. In addition to those two words, children aged 4:0 to 4:5 could develop one additional word: ผุง, and less than 75% of children aged 4:6 to 4:11 could comprehend “ค้ว เขือก”.

Hanchumpon (49) studied the ability of auditory comprehension of Thai numeral classifiers in 200 Thai children, aged 5 to 6:11. The method used was described previously (on page 15). Five numeral classifiers were used in this study

(แห่ง อัน ฟุ้ง ตัว เชือก). The results showed that 75% of children aged 5 to 5:11 could comprehend “แห่ง อัน ฟุ้ง”. In addition to the 3 words mentioned above, children aged 6 to 6.5 could develop one additional word: ตัว. All of these subjects could not comprehend “เชือก”.

Ketudat (62) studied the ability of auditory comprehension of Thai numeral classifiers in 350 Thai children, aged 3:0 to 7:11. They were divided into 5 groups, and each group differed by 1-year interval. Ninety-six Thai numeral classifiers were used in this study, which consisted of a category classifications; namely: repeater (นับ วัด ดอก ใบ ลูก ฟา โรง), verb (ม้วน ห่อ มวน ขด), measurement (ขวน บาท โหล คู่ ช้าง), arrangement (กลุ่ม ฟุ้ง ไหลง ช่อ), verbal no (ก้าว ที่ ชก), location (แห่ง), human inhuman (คน นาย คน รูป) animate and inanimate (ตัว เชือก). The subjects were asked to point to the picture following the command (รูปภาพที่มีรูป 1 คน). The results of this study showed that more than 75% of the children aged 3:0 to 3:11 could comprehend the Thai numeral classification “คน ตัว แก้ว นับ วัด ขวน หลัง ดอก ใบ บาท แห่ง”. In addition to the 11 words mentioned above, children aged 4:0 to 4:11 could develop eight additional words: ลูก ห่อ ช้าง เม็ด กระบอก ลำ ก้อน ดิน. Children aged 5:0 to 5:11 could develop twelve additional words: ม้วน คู่ กลุ่ม ก้าว ที่ ฉบับ ผล ชัน ชี เส้น ฟอง เต็ม. Children aged 6:0 to 6:11 could develop six additional words: ขวน ชก ชัน หลอด พวง ฟัก. Children aged 7:0 to 7:11 could develop six additional words: โรง ช่อ กอ บาน สาย น้ด. Less than 75% of these children could develop words as the following: มวน ขด โหล ฟุ้ง ไหลง แห่ง คน รูป เชือก แปลง กล้า ปีก.

2.2 Expressive development

Expressive development refers to children's ability to speak or write clearly and interestingly (52). The age of beginning to speak for normal children varies from eight to sixteen months (21,27,32,35,37,63). By age 18 months, the child produces about 50 different words (21,26,27, 28,30,31). These 50 words include some that the child uses daily, and the other ones that the child rarely uses (28). These 50 words include names for things, important people, animal, vehicles, toys, food, body parts, articles of clothing the child puts on, household implements, greetings, familiar action, game routines, and modifiers that are the outcome of some action (24,28). By age 2, most children produce a vocabulary between 50 to 500 words (27,28,31,33,34,63). By age 3, children produce a vocabulary of about 900 words. By age 4 to 5, children produce a vocabulary of approximately 1,500 words in their expressive vocabulary (65). During the course of their early vocabulary (or words) development, children produce many different categories of words. The order of words which children speak are classified as: noun, verb, adjective or adverb, preposition, and conjunction. It was found that in the first 4 years of life, children speak using nouns and verbs more than other categories (16,31,39). The studies pertaining to expressive development are the following:

Smith(32) studied vocabulary development in 88 children, aged 2 to 5 years. The subjects were divided into 4 age groups, and each group differed by a 1-year interval. Speech samples were obtained from two situations: while children were playing with their friends at school, and while they were talking with mother at home. The spontaneous speech samples of each subject were tape recorded for one hour. Their speech samples were classified into 9 categories: noun, verb, adjective, adverb,

pronoun, conjunction, preposition, exclamation, and article. The results showed that the percentage of words in each category which children produced when they were 2 year were: 22% nouns, 26% verbs, 5% adjectives, 21% adverbs, 10% pronouns, 0.5% conjunctions, 2% prepositions, 7% exclamations and 1% articles. Children aged 3 years produced 16% nouns, 27% verbs, 7% adjectives, 15% adverbs, 25% pronouns, 1.5% conjunctions, 5% prepositions, 3% exclamations and 2% articles. Children aged 4 years produced 15% nouns, 26% verbs, 11% adjectives, 13% adverbs, 24% pronouns, 2% conjunctions, 7% prepositions, 7% exclamations and 5% articles. Children aged 5 years produced 15% nouns, 27% verbs, 12% adjectives, 11% adverbs, 25% pronouns, 2.5% conjunctions, 6% prepositions, 2% exclamations and 5% articles. Examples of words which children produced in each category were nouns such as *mama, train, child, one, there, here, baby, cat, and dog*, verbs: such as *do, want, have, get, can, got (has), look, make, going (to), put, take, play, go, see, come, sit, will, and know*, adjectives such as *big, and small*, adverbs such as *will, have, can, and is*, pronouns such as *I, me, you, it, you, her, and she*, conjunctions such as *and, and but*, prepositions such as *in, on, under, and to*, exclamations such as *oh, and uh*, articles such as *a, an, and the*. These results indicated that verbs were used in greater number than nouns, adjectives, adverbs and exclamations in all age-ranges.

McCarthy (66) studied vocabulary development of 140 children, aged 1.6 to 4.6. The subjects were divided into 4 age groups, and each group differed by 6 month interval. Pictures books and toys were used to stimulate the subjects to speak. Speech samples were recorded at home or at school. The spontaneous speech samples of each subject were recorded with a minimum of 50 utterances. These speech samples were classified into 9 categories: noun, verb, adjective, adverb, pronoun, conjunction,



preposition, exclamation, and miscellaneous. The results showed that the percentage of words in each category which children produced when they were 1:6-1:11 were: 49.3% nouns, 12.1% verbs, 10.3% adjectives, 7.5% adverbs, 10.4% pronouns, 0.5% conjunctions, 8.6% exclamations, and 0.2% miscellaneous. Children aged 2:0-2:6 produced: 31.2% nouns, 22.2% verbs, 12.6% adjectives, 7.1% adverbs, 17.1% pronouns, 1.2% conjunctions, 4.3% prepositions, 2.9% exclamations and 2.8% miscellaneous. Children aged 3:0-3:6 produced: 21.1% nouns, 24.2% verbs, 16.1% adjectives, 7.7% adverbs, 19.4% pronouns, 2.2% conjunctions, 6.6% prepositions, 1.7% exclamations, and 0.7% miscellaneous. Children aged 4:0-4:6 produced: 20.1% nouns, 25.3% verbs, 15.0% adjectives, 6.9% adverbs, 20.6% pronouns, 3.8% conjunctions, 6.9% prepositions, 1.0% exclamations, and 0.7% miscellaneous. Example of words that children produced in each category were: nouns such as *horse*, *cat*, and *man*, verbs such as *go*, *do*, and *got*, adjectives such as *big*, and *small*, adverbs such as *will*, *shall*, and *can*, pronouns such as *I*, *me*, *you* *it*, and *their*, conjunctions such as *and*, *to*, and *of*, prepositions such as *in*, *on*, and *up*, exclamations such as *uh*, and *oh*, miscellaneous such as *a*, *an*, and *the*.

Davis (67) studied vocabulary development of 436 children aged 5:6 to 9:6. The subject were divided into 3 age-groups (5:6, 6:6, 9:6 years:months). Picture books and toys were used to stimulate the subjects to speak. Fifty utterances of the subjects were placed into 8 categories: nouns, verbs, adjectives, pronouns, conjunctions, prepositions, exclamations, and miscellaneous. The results showed that the percentage of words in each category which children produced when they were 5 years 6 months were: 18% nouns, 26.2% verbs, 22.0% adjectives, 19.1% pronouns, 2.4% conjunctions, 8.6% prepositions, 2.0% exclamations, and 1.4% miscellaneous.

Children aged 6 years 6 months produced: 18.4% nouns, 26.2% verbs, 22.0% adjectives, 19.1% pronouns, 2.4% conjunctions, 8.6% prepositions, 2.0% exclamations, and 1.4% miscellaneous. Children aged 9 years 6 months produced: 17.5% nouns, 27.0% verbs, 20.1% adjectives, 17.4% pronouns, 5.3% conjunctions, 10.1% prepositions, 1.3% exclamations and 1.3% miscellaneous. Example of words which children produced in each category were: nouns such as *horse, Indian, man, bandit, badger, and herdsman*, verbs such as *will, shall, have, think, wonder, suppose, know, go, do, and got*, adjectives such as *one*, pronouns such as *he, and it*, conjunctions such as *and, to, and of*, prepositions such as *in, on, up, and under*, exclamations such as *uh, and oh*, miscellaneous such as *a, an, and the*. Most of these studies showed that children produced verbs more than nouns. The usage of verbs, adjectives, pronouns, prepositions, and conjunctions increased with increasing age whereas noun and exclamation usage decreased.

The Ministry of Education of Thailand (68) evaluated normal children's by testing a speech sample of 2,808 children aged 5 to 8 years. Speech samples were obtained by two methods. The first method was a controlled situation in which the children were asked to answer the same questions. The second method was using picture books which were used to stimulate the child to tell stories about the pictures. The speech samples of all subjects were classified into 6 categories: nouns, verbs, pronouns, adjectives, conjunctions, and particles. The result showed that the percentage of words in each category, which children aged 5 to 8 years, produced were: 55.4% nouns, 25.7% verbs, 2.0% pronouns, 13.4% adjectives, 2.7% conjunctions, and 0.7% particles. Example of words, which children produced in each category were: nouns such as แม่ พ่อ พี่ น้ำ หมอ คุณ หมอน ที่ ดำรง ครู ในหลวง ผู้ชาย ผู้หญิง คน บ้าน

ช้าง หมา น้ำ หนังสือ รถ ขนุน ผู้ ฟัน เด็ก แขน ปลา ชาย, verbs such as มี กิน ไป ขาย เล่น ให้ ปลูก นอน จับ ดู หา สิ่ง ตัด คืบม ยัง วัง รับ อาบน้ำ เดิน รัก ฟัง กระโดด กราบ ร้องไห้ ถู ดิน เสียใจ โหวกั๊ก, adjectives such as หวาน อร่อย ดี เล็ก ไม่ อึก ดี มาก, pronouns such as ฉัน เธอ คุณ เขา พวกมัน พวกเขา พวกเรา, conjunctions such as และ ต่อ กับ ถึง แต่ หรือ สำหรับ, particles such as ครับค่ะ ขา จำ. (The total words are contained in Appendix A-1)

Suthajinda (69) studied vocabulary development and the percentage of categories of words in 120 children, aged 3:0 to 6:11. The subjects were divided into 4 age groups, and each group differed by a 1-year interval. Ten pictures entitled “eating, mother and child, my house, child playing the toys, child was playing on the swing, and market” were used in this study. Each child was asked to look at one picture at a time and then describe the picture verbally until he or she finished all 10 pictures. Their speech samples were analyzed and classified into 4 categories: nouns, verbs, adjectives, and etc. (which included prepositions, conjunctions, and exclamations). The results showed that the percentage of words in each category which children produced when they were 3:0 to 3:11 were: 56.37% nouns, 23.65% verbs, 8.03% adjectives, and 2.95% etc. (conjunctions, prepositions and exclamations). Children aged 4:0-4:11 produced: 59.42% nouns, 23.89% verbs, 12.34% adjectives, and 4.35% etc. Children aged 5:0 to 5:11 produced: 59.93% nouns, 25.85% verbs, 12.92 % adjectives, and 5.30% etc. Children aged 6:0 to 6:11 produced 57.37% nouns, 26.37% verbs, 11.7% adjectives, and 4.51% etc. Example of words which children produced in each category were: nouns such as เขา คน น้ำ เงาะ ส้ม มะละกอ พริก ไข่ หมา เสือ ผัก ช้าง เต็ม หนังสือ รถไฟ แสง รถยนต์ สะพาน ร้าน ปลา, verbs such as กิน เล่น นั่ง ไล่ ไป มา อาบน้ำ นอน อ่าน วัง

กระโดด ร้องไห้ เสียใจ รับประทาน, adjectives such as หอม เล็ก กลม ล่าง ใหม่ หลาย มาก สกปรก ช้างใน
คู่, etc. (including propositions, conjunctions, and exclamations) such as นี่ สอง บ้าง แต่ ต่อ
ขาว แดง เขียว ออ อื้อ เอ๋ โอ้ ฮือ อุว (The total words are contained in Appendix A-2)

Paisalpanumart (70) studied categories of vocabulary in 80 Thai children aged 4 to 7 years. The subjects were divided into 4 age groups, and each group differed by a 1-year interval. Ten pictures entitled “Daily Life and Remarkable Places in the Community” were use in this study. Each subject was asked to look at one picture at a time and then tell his or her own story based on the picture until he finished all 10 pictures. Their speech samples were analyzed and classified in 6 categories: nouns, verbs, adjectives, pronouns, conjunctions, and prepositions. The results showed that the percentage of words in each category which children produced when they were 4:0 to 4:11 were: 36% nouns, 34% verbs, 9% adjectives, 13% pronouns, 6% conjunctions, and 2% prepositions. Children aged 5:0 to 5:11 produced: 34% nouns, 34% verbs, 11% adjectives, 12% pronouns, 7% conjunctions, and 2% prepositions. Children aged 6:0 to 6:11 produced: 33% nouns, 35% verbs, 12% adjectives, 10 % pronouns, 6% conjunctions, and 2% prepositions. Children aged 7:0-7:11 produced: 35% nouns, 33% verbs, 14% adjectives, 10% pronouns, 6% conjunctions, and 2% prepositions. Example of word which children produced in each category were: nouns such as ม้า รถ
โต๊ะ คน โรงเรียน หมา แมว เรือ ช้าง นก, verbs such as ตี กิน นอน เล่น, adjectives such as ตี ยาว สวย,
pronouns such as เขา เธอ ฉัน มัน นี่ พวกเขา พวกเรา, conjunctions such as และ ต่อ กับ แต่ เพราะ,
propositions such as ใน บน ใต้ (The total words are contained in Appendix A3).

Na Nakorn (71) studied the speech samples in a naturalistic context of 30 children, aged 5:0-5:11. The subjects consisted of 15 boys and 15 girls. Fifty utterances of spontaneous speech used by each of the subjects during normally scheduled conversation class were recorded by video and audio cassette recorders, transcribed, and analyzed. The results of the study showed that from the total of 5,642 words spoken, verbs were most frequently used (34.3%), second most frequently used were nouns (28.4%), modifiers (14.2%), pronouns (9.9%), conjunctions (7.9%) and prepositions (4.3%). The least frequently used by the subjects were interjections (1.0%). The words that more 75% of children produced are the following: บ้าน ไป มี ขอม แล้ว เคย ครับ คะ ขา ไม่ ก็ กับ ที่. The words that between 50%-74% of the children produced are the following: คุณแม่/แม่ คุณพ่อ/พ่อ พี่ น้อง หมา ตัว คน ได้ กิน อยู่ เป็น เล่น นอน ให้ สวัสดี คุณ มา ด้วย เรา มัน เขา/เค้า แล้ว ก็ แล้ว แต่/แต่ว่า (the other words are contained in Appendix A4).

Wilainam (72) investigated the production ability of verbs in 320 Thai children aged 3 years to 4 years 11 months. The subjects were divided by six-month intervals into 4 groups consisting of 40 males and 40 females in each group. A picture test developed by the researcher was used to evaluate each subject's speech production. The test consisted of 80 black and white fine drawing-pictures representing 80 verbs. They were ดูทีวี นั่ง นอน กินข้าว ชิม้ำ ขึ้นบันได อาบน้ำ ingspin เขียน บิน กวาดบ้าน เตะบอล ไหว้ ขับรด หวีผม สระผม แปรงฟัน ถูบถูกล เล่น จับมือ ตก ถ้างมือ ตีกลอง พายเรือ วิ่ง ี่ ูบบุหรี ีรดผ้า เดิน ปีนต้นไม้ ร้องไห้ ลงบันได กัด ดึงเชือก ตัดกระดาษ ขน ทิ้งขยะ ทาสี ฉีดยา ตากผ้า รูด ผูกเชือกกรองเท้า ยืน แดก ใส่รองเท้า ถือกระเป๋า กระโดดเชือก เปิดประตู เป่าเทียน อ่านหนังสือ เช็ดตัว ปิดประตู ข้ามถนน กอด ฟังวิทยุ ถอดเสื้อ เทน้ำ

หก ขาด หักไม้ กด ชุคดิน อ้ม ชักผ้า ฉีกกระดาษ เดิน ผลัก เหา ไชยญแจ ว่ายน้ำ หัวเราะ คบมือ หกล้ม เกาะประตู
 คลาน ดอกตะปู รดน้ำต้นไม้ เชื้อผ้า ชกน้ำหนัก เจ็นรด. Subjects were tested individually by the
 researcher at their schools. They were shown the pictures page by page and asked
 about the pictures. The questions that examiner used to elicited were: “จากภาพ____ กำลัง
 ทำอะไร” or “จากภาพ____ เป็นอย่างไร”. The results of this study showed that successful
 production ability of verbs increases with age. A 75% passing score used as a
 criterion in this study. The verbs that children could produce were 18,28,40,was and 44
 verbs for the 3:0-3:5, 3:6-3:11, 4:0-4:5, 4:6-4:11 age- groups respectively. For the 3:0-
 3:5 age groups, children could produce 18 verbs including: ดูทีวี นั่ง นอน กินข้าว ซึ่ม้า ขึ้น
 บันได อาบน้ำ ینگป็น เขียน บิน กวาดบ้าน เตะบอล โห้ว ขับรด หวีผม สระผม แปร่งฟัน อุ้มลูก. For the 3:6-
 3:11 age-groups, children could produce 28 verbs including: ดูทีวี นั่ง นอน กินข้าว ซึ่ม้า ขึ้น
 บันได อาบน้ำ ینگป็น เขียน บิน กวาดบ้าน เตะบอล โห้ว ขับรด หวีผม สระผม แปร่งฟัน อุ้มลูก เล่น จับมือ ตก ล้าง
 มือ ตีกลอง พายเรือ ริง ซึ่ สุนัขหรี ริดผ้า. For the 4:0-4:5 age groups, children could produce 40
 verbs including: ดูทีวี นั่ง นอน กินข้าว ซึ่ม้า ขึ้นบันได อาบน้ำ ینگป็น เขียน บิน กวาด
 หวีผม สระผม แปร่งฟัน อุ้มลูก เล่น จับมือ ตก ล้างมือ ตีกลอง พายเรือ ริง ซึ่ สุนัขหรี ริดผ้า เดิน ปีนต้นไม้ ร้องไห้
 ลงบันได กัด ค้างเชือก ตัดกระดาษ ทน ทิ้งขยะ ทาสี ฉีดยา ดากผ้า. For the 4:6-4:11 age-groups, children
 could produce 44 verbs including: ดูทีวี นั่ง นอน กินข้าว ซึ่ม้า ขึ้นบันได อาบน้ำ ینگป็น เขียน บิน กวาด
 บ้าน เตะบอล โห้ว ขับรด หวีผม สระผม แปร่งฟัน อุ้มลูก เล่น จับมือ ตก ล้างมือ ตีกลอง พายเรือ ริง ซึ่ สุนัขหรี ริด

ผ้า เดิน ปีนต้นไม้ ร้องไห้ ลงบันได กัด ดึงเชือก ตัดกระดาษ ขน ทิ้งขยะ ทาสี นวดยา ตากผ้า ถูบ ผูกเชือกกรองเท้า ขึ้น
 แดก

Kosapanyatham (73) investigated the production ability of verbs among children aged 3 years to 4 years. The subjects were children selected from kindergarten school in Chonburi Province. They were equal relative to gender, 85 boys and 86 girls. There were 265 verbs with 112 verbs were tested by act-out tasks, and 153 verbs were tested by a picture test developed by the researcher. For the act-out tasks, subjects were asked to express verbs that the examiner acted. What-do questions were used to elicit children's responses while the examiner acted-out the verb. For the picture test, subjects were shown the pictures page by page and asked about the pictures. What do questions was used to elicit children's answers. The results showed that more than 75% of children produced 204 verbs correctly. They were: ซี่ กลับตา ลืมตา ดู เดิน ขึ้น นั่ง ดมมือ กำมือ แบมือ แลบลิ้น กอด หายใจ กระโดด หก ร้องไห้ ใจ อี จี๋ กิน อม เลี้ยว กัด อ้า กลืน ดูด ฟัง อึ้ง ตัด ฉีก ตี หอม เหม็น ขึ้น ลง มี หมด ดำง เช็ด จับ ปล่อย กวาด ดู เปิด ปิด เข้า ออก เจอ หนี ขอ ให้ ไป กลับ ส่ง ตัก ป้อน เคา คม ชี ก้ม หัวผม แปร่งฟัน ร้องเพลง ถ่ายรูป สระผม อาบน้ำ ทำงาน ว่ายน้ำ ปีน โชน หัก เหยียบ ต่อย เคาะ อิง ขน หมุน ถอย ซ้ำม บิน ดำ ซัก ตาก ริด คัด ไล่ เท ถอด ผลัก ไหล หก ลั่น หิว ปลูก ปลุก เทียว เล่น ตรวจ นวดยา เข็ม พายเรือ ขับรถ เลี้ยว เขย่า ฟัน สับ บาด เจ็บ ร้อง ณา เป่า เกาะ หนีบ พัด ห่ม พับ กาง วาง ทา ทิ้ง นับ ช่วย แพ้ เหมือน เขียน ตกใจ กลัว รัก หัวเราะ ตื่น ขอบคุณ ขอโทษ บอก เล่า ไล่ ตาม แดก ดิค เดินรำ รำ เลี้ยว คุ้ม คลาน ล้วง จุกไฟ ไฟไหม้ ดับ กราบ ไหว้ เงย หัน ง่วง ยักคิ้ว อ้าวก คด ทับ รัว สร้าง เหนื่อย เสรีจ เก็บ แกล้ง บัง บาด เข้าแถว ตกปลา นิดน้ำ พุด รด น้ำ ราด ค้าง ช่อม คน จิ้ม ผูก แววน ลาก เข็น หยุด จบ มัด หล่น ค่อ ไซ หา ซื่อ สุนัขเห่า กัด ล้ม แกะหีบ ถอย ค้าง

เท่า รูดซิป เรียก คาย แข่ง ชนะ อ่าน เขียน รับ เลีย พัก หลุด ขโมย ขุด แฉง รอ ชั่ง ชั่ง ถีบ ข่วน สะบัด ถิ่น ยก ส่ง
 กระจก ผ่า อยาก แอบ หุบ ฟัง สั่น ดอก คาย หั่น กระโดดเชือก, and less than 75% of children
 produced 24 verbs correctly. They were: พัก หลุด ขโมย ขุด แฉง รอ ชั่ง ชั่ง ถีบ ข่วน สะบัด ถิ่น ยก
 ส่งกระจก ผ่า อยาก แอบ หุบ ฟัง สั่น ดอก คาย หั่น กระโดดเชือก.

Krisanachantr (74) investigated the production ability of adjective and preposition antonym pairs in 360 Thai children aged 4 years to 6 years 11 months. The subjects were selected from private kindergartens and 1st year elementary classes in Mueng District, Chonburi Province. They were divided into six age groups with six month-interval. A picture test developed by the researcher was used to evaluate subjects' production ability. The test consisted of 20 pictures representing 34 adjectives and 6 prepositions. There were 14 adjectives of size: ใหญ่ เล็ก สูง เตี้ย ขาว สั้น อ้วน หอม แคบ กว้าง หนา บาง ลึก ตื้น, 8 adjectives of quality สดปรก สะอาด มืด สว่าง เร็ว ช้า เก่า ใหม่, 2 adjectives of quantity มาก น้อย, 8 adjectives of sense ร้อน เย็น แฉง นุ่ม หนัก เบา ดีใจ เสียใจ, and 2 adjectives of distance ใกล้ ไกล. The 6 prepositions were: บน ใต้ ข้างหน้า ข้างหลัง ใน นอก. Subjects were tested individually by the researcher at their school. They were shown the pictures and asked to complete sentences that examiner spoke by producing adjectives or prepositions that represented the picture. The results of this study show that successful production ability increases with age. One hundred percent of the subjects were able to produce more adjectives and prepositions as their ages increased. For the 4:0-4:5 age group, the order of adjectives and prepositions that children produced with respects to highest and lowest percentages were: ใหญ่-เล็ก (100%), ข้างหน้า-

ข้างหลัง (98.3%), ร้อน-เย็น-บน (96.7%), หน้า (95%), ชวน,มาก,น้อย (93.3%), น้อย (91.7%),เร็ว (90%), ยาว (88.3%), มีด,ช้า,แข็ง (86.7%), ไกล (80%), สว่าง (65%), สูง ,สะอาด (60%), สั้น (58.3%), หอม (45%), คีใจ (43.3%), ได้ (40%), ใกล้ (36.7%), เก่า,เบา (35%), สกปรก,ใหม่ (33.3%), เคี้ยว (26.7%), ลึก (25%), กว้าง (11.7%),แคบ (5.0%), หนา (1.7%), Children in these group could not produce adjectives บาง คืบ เสียใจ For the 4:6-4:11 age group, the order of adjective and preposition that children produced with respect to the highest to lowest percentages were:ใหญ่-เล็ก,ร้อน-เย็น ใน,หน้า (100%), ข้างหน้า-ข้างหลัง, นอก,เร็ว (98.3%), ช้า, ชวน (96.7%), ยาว,มาก-น้อย,แข็ง-นิ่ม (95%), มีด(93.3%), ไกล (88.3%), บน (86.7%), สว่าง (80.0%), หอม (78.3%), สั้น (73.3%), สูง (61.7%), คีใจ (56.7%), สะอาด (53.3%), ใหม่,เบา (50.0%), ใกล้ เก่า (48.3%), สกปรก,ได้ (38.3%), เคี้ยว ลึก (23.3%), กว้าง (15%), เสียใจ (13.3%), คืบ,แคบ (5.0%), หนา (1.7%), Children in these groups could not produced the adjective บาง. For the 5:0-5:5 age-group, the orders of adjectives and prepositions that children produced with respect to lowest percentages were: ใหญ่-เล็ก, ร้อน-เย็น, ใน-นอก, ข้างหน้า-ข้างหลัง, หน้า, เร็ว, ช้า, ชวน, มาก-น้อย, แข็ง, ไกล (100%), ยาว-มีด (98.3%), นุ่ม บน (96.7%), สว่าง (91.7%), สั้น (85.0%), สะอาด (81.7%), หอม (80.0%), สูง (78.3%), คีใจ (71.7,) เคี้ยว (36.7%), กว้าง (28.3%), แคบ (13.3%), เสียใจ (8.3%), หนา-บาง (5.0%), คืบ (3.3%). For the 5:6-5:11 age-group, the order of adjective and preposition that children produced with respect to highest to lowest percentages were: ใหญ่-เล็ก, ร้อน-เย็น, ใน-นอก, ข้างหน้า-ข้างหลัง, หน้า, เร็ว,

ช้า, มาก-น้อย, โกล,ขาว-มืด, สว่าง, and นุ่ม (100%) ช้วน,แข็ง, and บน (98.3%), สั้น (93.3%), ผอม (91.7%), สะอาด, and สูง (83.3%) ใหม่, and เก่า (81.7%) คีใจ (80.0%) โกล (73.3%), สกปรก, and เบา (70.0%), กว้าง (53.3%),ได้ (51.7%), ลึก (46.7%), เคี้ยว (38.3%), แคบ (21.7%), เสียใจ (15.0%), บาง (6.7%), หยา (3.3%), and คื่น (1.7%). For the 6:0-6:5 age-group, the order of adjective and preposition that children produced with respect to highest to lowest percentages were: โหญ-เล็ก, ร้อน-เย็น, ใน-นอก, ข้างหน้า-ข้างหลัง, หนัก, เร็ว, ช้วน, มาก-น้อย, แข็ง-นิ่ม, ขาว, and บน (100%), โกล, สว่าง, and ช้า (98.3%), สะอาด, ผอม มืด (96.7%) สั้น (95.0%) ใหม่, คีใจ, เบา (91.7%) เก่า (90.0%), โกล (81.7%), สูง, สกปรก (66.7%), กว้าง (58.3%), ลึก, ได้ (55%), เคี้ยว (50.0%), แคบ (26.7%), เสียใจ (23.3%), คื่น (6.7%), หยา-บาง (5.0%). For the 6:0-6:11 age-group, the order of adjective and preposition that children produced with respect to highest to lowest percentages were: โหญ-เล็ก, ขาว-สั้น, มืด-สว่าง, เร็ว-ช้า, มาก-น้อย, ร้อน-เย็น, แข็ง-นิ่ม, ข้างหน้า-ข้างหลัง, ใน-นอก, สูง, สะอาด, ช้วน, หนัก, โกล, บน (100%), ผอม, เก่า, ใหม่ (98.3%),เบา (96.7%), คีใจ (93.3%),โกล (91.7%), เคี้ยว (83.3%), กว้าง (81.7%), ลึก, ได้ (80.0%),สกปรก (78.3%), แคบ (63.3%), เสียใจ (45.0%), คื่น (33.3%), หยา-บาง (18.3%).

These studies indicated that expressive language ability of children developed increasingly with age. Children's development of vocabulary in age range 2 to 3 years increased rapidly, and their rate of development gradually decreased after they were 5 years old (74,75). During the school years, children's semantic knowledge becomes better organized and hierarchically arranged. This permits them to use words more

precisely and think about them differently than they did at younger ages (35,37). While vocabulary growth occurs prior to and throughout the school years, semantic system development consists of increases in the number of concepts and words that a child knows and the child has worked out within and between the conceptual and linguistic systems. Thus, semantic development consists of learning not only what individual words mean, but also how they are interrelated. These interrelationships are referred to as a “semantic network” (75). The formation of semantic networks is evident in younger children. They seek links, relationships, and conceptual wholes in everything they experience. As a result, they add to their vocabularies not only words that will give them new communication possibilities, but also synonyms that do not increase their communicative abilities. Other semantic links are evident in learning appropriate use of words by preschool children. So, during this period, children increased the size of their vocabulary and the specificity of their word definition (76).

Word definition

The ability to define words with accuracy, clarity, and precision is associated closely with language development in school-age children (77,78,79). Word definition requires an individual to reflect on the lexicon (77). One aspect of later semantic development is to provide a definition of a word which involved metalinguistic skill. The children’s development process means that they are able to define words as being semantically unique by including different types of information and using different approaches to organize it (7,75). A child’s ability to define words depends upon the accumulation of, or the ability to learn, word meanings. Meaning increases in two directions: vertical and horizontal (15,19,80). Vertical meaning involves learning as a

number of homonym which means each word has different meanings e.g. can (nouns) and can (auxiliary verb) which have same spelling and pronunciation but different meaning. Children gradually consolidate the various meanings into a single word. Ultimately, children learn one-word terms that had meaning not previously related (a single word had various meanings that changed following grammar or context of the word). Horizontal meaning involves learning the word meaning which includes a meaning from initial acquisition and gradually develops other meanings by experience until the whole meaning of a word becomes clear. For example, using the word “a ball”, children initially learned the meaning that “it’s round”. Later on, children gradually learned by perception the functions of things such as ‘it bounces, play ball, and kick ball’. Finally, children gradually learned the other meanings which are abstract or adult-type meaning such as “it’s toy”. Both horizontal and vertical growths occur during the school years. So, children in this period learn the meaning of many words that have multiple meanings (19). The child’s ability to define words may progress in two ways (81). First, the child progresses conceptually from definitions based on individual experience to more socially shared meaning. Second, he moves syntactically from single-word action definitions to sentences expressing complex relationships. This shift in form occurs at around second grade. Similar shifts in definition content occur throughout grade school (7). For example, during the preschool years (age 3 to 5 years), children’s word definitions are highly concrete consisting primarily of descriptions of a referent’s function or appearance, personal, and incidental (79) (e.g. knife: “when you’re cutting carrots”; bicycle: “it’s got wheels, a chain, and handlebars”). Though the elementary school years (after 6 years), children give more abstract responses involving synonyms, explanations, and

descriptions of categorical relationships (e.g. knife: "Something you could cut with. A saw is like a knife. It could also be a weapon."). This advance reflects the older child's ability to deal with word meanings on an entirely verbal plane as well as movement from word meanings based largely on personal experience to ones that reflect more general, socially shared information (37,81,82). The developmental progression in word definition occurs among children aged 5 to 11 years (75). A 5-year-old defines a word narrowly in terms of sentence meaning (7). At age 7, children's definitions tend to be simple, concrete, bound, reflect personally relevant information and often focus on perceptual and functional social information (83). An 11-year-old abstracts and synthesizes meaning to form a definition (7). Word definitions of children have many forms: a) concrete (feature or appearance) or descriptive-e.g., watermelon: red, green, and round, b) functional-e.g. watermelon: to eat, and c) categorical or abstract or superordinate e.g., watermelon: fruit. The content of verbal definitions varies with the age of children (75,83,84,85,86). In many studies, the researchers had found qualitative differences between the type (or content of response verbal) of definitions which were used by younger and older children. Younger children define words by using mainly functional and concrete (or descriptive) definitions whereas older children more frequently define abstractly (84). In other words, these definitions are replaced first by function or concrete form and then by abstract response as the child gets older. There are 3 definition strategies of children: the perceptual features of the objects, the perceptual function of the objects, and the created prototypes (12,14,26,87).

2.2.1 The perceptual features of the objects

The children group object words into categories based on their perceptual features (e.g. size, shape, color) of the objects (26). Clark (1973) suggested that an

object in the environment consisted of a number of features and characteristics that a child perceives. The child constructs categories using the perceptual features of the object. For example, the child may initially define dog as “something that has four legs and fur”. Later, other features may be added to the definition, such as “barks”, “wags tail” and “has no horns”. The child presumably constructs a mental list of components that define the object. When encountering a new example, the child compares its features with those on the list and, if they match, extends the category to include the new object. At first, the small number of components used to define a category will lead the child to overextend frequently. But, by systematically refining the category feature by feature, the child gradually establishes accurate boundaries for the object category (26,87).

2.2.2 The perceptual function of the objects

Children group object words into categories; based on the function of the object (26). Nelson (1974) stated that children's categories are based on an object's function. In other words, children base their word concepts on active or functional characteristics of the object (88). The children's definitions of objects are based on what they do with the object. For example, children have a variety of experiences with a cup: drinking from it, dropping it, spilling milk out of it, and seeing mother wash it. As they learn the sound sequence for the word “cup”, that word becomes an additional property of the object. When they begin to speak the word “cup”, they are likely to use it to designate any item that meets their concept of the referent—anything that one can drink from, drop, spill from, or see washed (14). Nelson additionally suggested that children's early explorations of object functions through direct manipulation provided

the foundation for meaning development; the conceptual aspects of a child's experience appear to be related to early semantic language development (88).

2.2.3. The created prototypes

Children create prototypes as the basis for semantic concepts. The development of lexical categories involves a different type of comparison process. The child compares the example with a prototype, or general model of the object (21) and develops a prototype that provides a mechanism for comparison (87).

Objects often can be categorized at several different levels. The most general level, called the superordinate level, includes broad categories such as animal. At the basic level are somewhat more specific categories, like bird. Research with both adults and children has shown that basic-level categories generally are the easiest to learn and use. Children's first semantic categories are at this level. Basic-level categories are composed of even more specific subordinate-level examples, such as robin, owl and ostrich. Within any basic-category, such as bird, some examples of the object, such as a robin, are considered typical, whereas others, such as an ostrich, are non-typical. As children begin to form a category for an object (usually at the basic level), they appear to quickly develop a prototype of the object. For example, for most children, the initial prototype of a bird is a small, feathered, two-legged creature with a beak. When children encounter an unfamiliar object, they presumably compare it with the prototype. If it matches closely, they extend the category to the new object. If not, they begin to form a new category (26). A super ordinate is a word or phrase that subsumes, but is more general than, the category or class denoted by the test word (e.g. "animal is super ordinate to dog). Children do not use these terms in definitions until they are aware that a concept may be referred to by more than one label. Children

under age 7 typically produce super ordinates of lowest quality. An intermediate level of semantic quality to refer to super ordinates that have been used somewhat in appropriately (e.g. tool for umbrella). Finally, super ordinates of highest quality are not too general, appropriate, and adult-like. These high-quality terms are usually present in 10- year- old children's definitions (83).

In summary, children's vocabulary knowledge is highly correlated with general semantic ability. A relationship may exist between stored word knowledge and comprehension of discourse. Throughout the school years, the child becomes better at deducing word meaning from context. They can add new words to their vocabulary simply by being given a definition. Word definition gradually improves during the school age and adolescent years, with changes occurring in both content and form. The studies on word definition in children are the following:

Al-issa (82) studied the development of word definition in 201 children aged 5 to 10 years. They were divided into 6 age groups, and each group differed by 1-year intervals. Thirty words were used in this study. They were: soldier, dog, orange, white, chair, window, ten, house, doctor, river, salt, cheese, land, bread, woman, shirt, butter, beans, rice, knife, iron, sheep, John, cat, radio, water, moon, rain, sugar, shop. The subjects were asked to define each word. The definitions of the subjects were classified into three categories: a) concrete or descriptive (e.g. orange: yellow), b) functional (e.g. orange: to eat), and c) abstract or categorical (e.g. orange: fruit). The results showed that the functional response were the most frequent in children aged 5-9 years old. At age 10, abstract response becomes the most frequent of the three categories. The proportion of both concrete and functional responses tends to decrease with age. Abstract responses show the opposite trend; i.e., they tend to increase with

age. It should be noted that although functional and concrete definitions decrease with age, all through the age range, functional responses occur more often than concrete ones. This study demonstrated that after the age of five years, there was a gradual development of word definition proceeding from a functional and concrete level to a higher level of abstraction. The researcher concluded that, as age increased, the number of concrete and functional definitions decreased and the number of abstract definitions increased, with abstract definitions becoming predominant at age 10.

Swart & Hall (84) studied the development of relational concepts and word definition of 20 children aged 5 to 11 years. The subjects were divided into 4 age groups, and each group differed by 2 years. The subjects were tested with four tasks: eight sets of questions on right discrimination, six sets of question on kinship relationships, six sets of questions on judgment of comparison, (these three tasks were used to study the relational concepts), and 10 word definitions. Three categories were used to classify each subject's word definitions: concrete, functional, and abstract definition. The results showed that children aged 5 to 7 years were able to consider relational concepts which focused on functional definitions whereas older children (ages nine to eleven), who were most able to consider relational concepts, produced a majority of abstract definitions. The researchers summarized the result of comparisons between relational concepts and word definitions that, in general, functional definitions coincided with lower levels of thinking and abstract definitions with the highest level predominantly at age 11.

Anglin (31) studied noun definitions of children, age 2:8-6:7. The subjects were asked to define words which consisted of 12 nouns. They were: dog, collie, animal, rose, flower, plant, Volkswagen, car, vehicle, apple, fruit, and food. The

results showed that children described both perceptual features (or descriptives) and functional definitions in their responses. The subjects gave definitions to those nouns according to their own experiences. For example, for “dog”, the child stated that “it was brown and white” because he had seen a brown and white dog at a park, or “food” because the child stated that “to eat or eat it” because he ate food everyday. The results of this study showed that most of the children defined nouns in the form of functional definitions.

Wehren De Lisi and Arnold (85) investigated the development of noun definitions of 100 children and adults: The children subjects were kindergarten, two, four, and six graders and the adult subjects were college students. The subjects were divided into 5 groups. There were 20 subjects in each group. They were grouped by grade level. Mean ages of the subjects were 5:2, 7:4, 9:4, 11:6, and 26:11 (years:months). Subjects were asked to define the following fifteen nouns: ball, bed, book, box, chair, clock, coat, cup, hat, house, pail, shirt, spoon, table, and tree. All of these stimulus items were names of concrete objects which were chosen from Thorndike and Horge’s frequency of production list. Half of the subjects at each grade level defined these nouns relative to objects and half defined the nouns without reference to objects. In this study, the definitions were classified into 3 types: concrete refers to an object’s descriptive, perceptual attributes, e.g. “book”-“made out of paper”, functional refers to an object’s use or an action it could perform e.g. “book”-“read”, and a combination of these two types e.g. “book”-“read out of; has pages, words and pictures on pages”. The results showed that in kindergarten and grade I, their responses had more functional definitions than concrete definitions and combination of definitions. For grades two, four, and six, the results showed that their responses had

more functional definitions than a combination of definitions and concrete definitions. The results also showed that there was a shift from functional to a combination definitions with increasing age and concrete definitions were infrequent for all grades. The researchers concluded that a developmental progression in word definitions among children aged five to eleven and college students began with an emphasis on personal experience and moved toward information of a more general, socially shared nature.

Kikas (86) studied the development of word definitions of 109 children aged 5-12 years. The subjects were divided into 5 aged groups: 5-6 years, 7-8 years, 9-10 years, 11 years, and 11-12 years. The subjects were asked to define words by answering questions: "What is x?" Twenty-six words were used in this study. There were orange, blueberry, apple, bicycle, airplane, bat, bee, winter, the sun, the earth, river, lake, eye, water, lawn, weed, air, square, melting, ice, liquid, day, minute, meter, weighing, and measuring. The responses were organized according to the most widespread classification of definition: 1) descriptive definitions (external features of an object are described, the concept is specified, an example is given, or a concrete situation is described in connection with the object), 2) functional definitions (the function of an object is given), and 3) abstract, conceptual or semantic definitions (more exactly by specific differences or those that have a good prototype). The results showed that children aged 5-6 years produced more descriptive definitions than functional definitions, and more functional definitions than abstract definitions. Children aged 7-8 years produced more descriptive definitions than abstract definitions and more abstract definitions than functional definitions. Children aged 9-10, 11 and 11-12 produced more abstract definitions than descriptive definitions, and more descriptive definitions than functional definitions. Also, the results showed that

abstract definitions began to predominate in the 9-10 year olds, with more descriptive definitions than functional definitions. The researcher concluded that there were qualitative differences between the types of definition used by younger and older children which were attributed to deference in their conceptual thinking. Younger children defined words nonabstractly (using mainly functional and descriptive definitions), whereas children aged nine and older more frequently defined abstractly.

Skwarchuk, and Anglin (83) investigated developmental changes in the expression of superordinates in word definitions of 96 children in grades 1,3, and 5. The subjects were divided into 3 groups by grade level. The mean age of each group was: 6 years 8 months in grade 1, 8 years 8 months in grade 3, and 10 years 8 months in grade 5. The subjects were asked to provide oral definitions for all the words ordered from simplest to most difficult. One hundred and ninety six words were used in this study. They were composed of 111 (56.6%) nouns, 24 (12.3%) verbs, 53 (27.0%) adjectives, 7(3.6%) adverbs, 1 (0.5%) interjection, and 4 morphologically defined word types (i.e. compound, root, inflected, and derived words). The children were asked "What does the word..... mean ?" and subsequently, "Can you tell me anything more about what the word..... means?". The results showed that superordination increased significantly and changed qualitatively with age, but across grades children produced greater proportions of superordinates for nouns than adjectives and verbs and for compound and root words than inflected and derived words. The older children produced more superordinates and tended to place superordinates correctly within conventional forms compared with younger children. The researchers concluded that these findings might have occurred because older children have a greater knowledge of words and concepts in their lexicon and are better

organized than younger children. Older children have more advanced metalinguistic knowledge about the conventional use of superordinates in definitions than younger children.

3. Factors related to semantic development

The development of semantics has been widely studied in the child (89). This study focused on the comprehension of word and word definitions of children.

In many studies, researchers reported that there were relationships between the semantic abilities of a child and many factors such as the child's age, and gender. These relationships include the following:

3.1 Relationships between semantic abilities of children and their age

Some studies reported that semantic development depended on the child's maturity. On the other hand, semantic development of children increased with age. Studies that investigated the relationship between semantic abilities and age were divided into 2 groups: 1) studies that found there were significant differences between children's semantic abilities and their age. 2) studies that found no significant differences between children's semantic abilities and their age.

1. Some studies reported that there were significant differences between semantic abilities of children and their age.

Carrow (41) studied the auditory comprehension of language of 159 children aged 2;10-7;9 (as described previously on page 10). The results showed that there were significant increases in auditory comprehension relative to language scores at each six-month interval for younger children, while older children had significant

increases only at each twelve-month interval. It is to be noted that the greatest development in language comprehension occurred between the ages of 2;0-4;9 years.

Carrow (42) studied auditory comprehension of language in 200 children aged 3 to 7 years. (as described previously on page 10). The results showed that older children had better comprehension of language (including vocabulary, structure, and grammatical aspects of language) than younger children.

Clark (58) studied auditory comprehension of prepositions of 70 children aged 1;6 to 5;0. (as described previously in page 25). The results showed that older children had better comprehension of the three preposition (in, on, under) than younger children.

Bang (53) studied auditory comprehension of preposition of 80 children aged 2;6 to 5;0.(as described previously on page 25). The results showed that older children had better comprehension of the three prepositions than younger children.

Bartlett (54) studied auditory comprehension of adjectives of 120 children aged 3 to 5 years.(as described previously on page 20). The results showed that older children had a better comprehension of adjectives than younger children.

Washington and Naremore (57) studied auditory comprehension and expression of spatial prepositions of 80 children aged 3 to 4;11.(as described previously on page 26) The results showed that there were significant differences in test scores relative to age. The researchers concluded that older children performed better than younger children.

Pumiamorn (47) studied the comprehension and production of nouns of 151 children aged 3 to 4 years.(as described previously on page 13) The results showed that older children had better comprehension of nouns than younger children.

Panthong (48) studied auditory comprehension of Thai numeral classifier in 200 Thai children aged 3:0 to 4:11.(as described previously in page 14) The results showed that there were significantly different increases in auditory comprehension of language scores at each six-month relative to interval age groups. She concluded that the ability pertaining to language comprehension of children increased with age.

Hanchumpon (49) studied auditory comprehension of Thai numeral classifiers in 200 Thai children aged 5:0 to 6:11. (as described previously on page 15). The results showed that there was a significant difference in comprehension of nouns scores between older and younger children. She concluded that older children had better comprehension of nouns than younger children and their ability in language comprehension of nouns increased with age.

Ketudat (62) studied auditory comprehension of Thai numeral classifiers in 350 Thai children aged 3:0 to 7:11. (as described previously on page 30). The results showed that there were significant differences between the age groups relative to comprehension of the numeral classifiers tested. In addition, older children could comprehend numeral classifiers better than younger children in all age groups.

Ariyasoponwong (56) studied the auditory comprehension ability of certain adjectives in the comparative and superlative degree of 400 children Thai aged 3 to 4 years 11 months. (as described previously on page23). The results showed that there were significant differences between the age groups relative to comprehension of the adjectives tested in the comparative and superlative degree.

Krisanachantr (73) investigated the production ability of adjective and preposition antonym pairs in 360 Thai children aged 4 years to 6 years 11 months. (as described previously on page 40) She found that there were significant differences in

children's production ability relative to age-groups. Older children had significantly higher scores on production of adjective and preposition antonym pairs than younger children.

Wilainam (72) investigated the production ability of verbs in 320 Thai children aged 3 years to 4 years 11 months (as described previously on page 37). The results showed that there were significant difference in children's production ability between the 3:0-3:5, 3:6-3:11, and 4:0-4:5 age-groups. Older age-groups had more production ability than younger age-groups.

For children in the 4:0-4:5 and 4:5-4:11 age-groups, non significant differences relative to children's production ability were found.

2. Some studies reported that there were non significant differences between semantic abilities of children and their age.

Utairatanakit (46) studied word comprehension of 195 Thai students in Prathom suksa One aged 5:2-6:11. (as described previously on page 12) The results showed that a non significant difference in word comprehension between the older and younger children.

Panyapawakul (55) studied auditory comprehension of adjectives of 150 children age 3:6 to 4:11. (as described previously on page22) The results showed that there were non significant differences among three age groups relative to comprehension of some prepositions which related to referent objects.

Some studies reported that there were relationship between word definition and the age of children (82,85,86). They reported that there were qualitative changes with age in the kinds of information children included in their definition. (79) The

many studies which have shown relationships between word definition and ages of children include the following:

Al-Issa (82) studied the development of word definition in 201 children aged 5 to 10 years . (as described previously on page 48) The results showed that there were relationships between word definition and children's age. However, the proportion of both concrete and functional responses decreased with age, but abstract responses increased with age. In addition, it was reported that, after the age of five, there was a gradual development word definition progressing from functional and concrete definitions to abstract definitions.

Wehren De Lisi, and Arnold (85) investigated the development of noun definition of 100 grade school children (composed of kindergarten, grades two, four and six) and adult college students (as described previously on page 50) The results showed that there was a shift from functional to combinatorial definitions (combinatorial refers to a combination between concrete and function definitions) with increasing age. Furthermore, age changes was related to the forms of the definitions subjects produced. Younger children's responses were more functional and concrete definitions rather than combinatorial definitions. Older children responses were more functional and combinatorial definitions rather than concrete definitions. The researchers suggested that, with increasing age, children learned to define words using more complex forms. They concluded that a developmental progression in word definition among children aged five to eleven and college students existed that began with an emphasis on personal experience and moved toward information of a more general, socially shared nature.

Kikas (86) studied the development of word definition of 109 children aged 5-12 years. The subject were divided into 5 age groups: 5-6, 7-8, 9-10, 11, and 11-12. (as described previously on page 51). The results showed that there were qualitative differences between the type of definitions that were used by younger and older children. Moreover, the younger children (age 5-6 years) produced more descriptive and functional definitions than abstract definitions. The older children (age 9-12 years) had performed better than the younger children relative to type of definition.

More than a few researchers suggested that the semantic development of children, which increased with age, was influenced by: a) maturity: semantic development of children depended on the maturity level of children. Thus, semantic abilities of children tended to increase as the children grew older (39,48,49,58), b) experience: increases in the semantic development of children related to their experiences. Therefore semantic abilities of children tended to increase while the experiences of children advanced. Especially during their of period schooling, children had gained experiences through both school and family. In school children, obtained new information from their teachers and playing together with their friends. At home, children learned and obtained information from adults and especially parents who talked with them frequently. Furthermore, children obtained new information from playing, reading, and watching educational television programs. These experiences of children helped to support their semantic ability advancement (15,48,49).

3.2 Relationships between semantic abilities of children and their gender

The studies on relationships between semantic development of children and their gender were divided into 2 groups: 1) studies that found significant differences in

semantic abilities of boys and girls, 2) studies that found non significant differences in semantic abilities of boys and girls.

1. Some studies which showed that there were significant differences in semantic abilities of boys and girls:

Templin (90) conducted a longitudinal study of comprehension and vocabulary production in 60 children aged 3 to 8 years. The Ammon Full-Range Picture Vocabulary Test was used in this study for assessing comprehension of vocabulary in preschool children. The Seashore-Eckerson Test was used to assess comprehension of vocabulary in school-age children. The researcher tested children every 6 months when children were aged 3 to 5 years and every year when children were aged 5 to 8 years. One hour to two hours and thirty minutes were used to test in each session. The results showed that girls had higher comprehension ability scores than boys.

Carrow (41) studied auditory comprehension of language in 200 children aged 3 to 7 years. (as described previously on page 10). The results showed that girls had mean scores of comprehension ability significantly higher than boys.

Ketudat (62) studied auditory comprehension of Thai numeral classifiers in 350 Thai children aged 3:0-7:11 (as described previously on page 30). The results showed that girls aged 7 years to 7 years 11 months were significantly better able in comprehension (for an inanimate category) than boys of the same age.

McCarthy (66) studied vocabulary development of 140 children aged 1.6 to 4.6. The subjects were divided into 4 age groups, and each group differed by 6 month intervals. (as described on page 32). The results showed that in children's earlier development at around 18 months to 24 months of age, the girls more rapidly produced

many more categories of words than boys. However, at 36 months of age, the boys could produce as many categories of words as well as girls.

2. Some studies which showed non significant differences in semantic abilities between boys and girls:

Utairatanakit (46) studied word comprehension of 195 Thai pupil in Prathom suksa One, age 5:2-6:11. (as described previously on page 12). The result demonstrated that there were non significant difference in word comprehension between boys and girls.

Pantong (48) studied the auditory comprehension of language in 200 children aged 3:0-4:11 by using The Thai modification Test for Auditory Comprehension of Language (Panthong and Hanchumpon, 1987), (as described previously on page 14). The results showed that there were non significant differences in children's semantic abilities scores between boys and girls in any of the four age groups.

Hanchumpon (49) studied the auditory comprehension of language in 200 children aged 5:0-6:11 using The Thai modification Test for Auditory Comprehension of Language (Panthong and Hanchumpon, 1987), (as described previously on page 15). The results showed that there were non significant differences in children's semantic abilities score between boys and girls in any of the four age groups.

Ariyasoponwong (56) studied the auditory comprehension ability of some adjectives in the comparative and superlative degree in 400 children Thai aged 3 to 4 years 11 months. (as described previously on page 23). The results present showed that there were non significant differences between males and females between each age groups in comprehension of the adjectives tested in the comparative and superlative degree.

Ketudat (62) studied the ability of auditory comprehension of Thai numeral classifiers in 350 Thai children aged 3:0-7:11 (as discussed previously on page 30). The results showed that there were non significant differences between boys and girls in comprehension of words from each category.

Smith(32) studied vocabulary development in 88 children aged 2 to 5 years. The subjects were divided into 4 age-groups, and each group differed by a 1 year interval. (as described previously on page 31). The results showed that there were non significant differences in vocabulary development found between boys and girls. But the boys had slightly higher production categories of words than girls.

Na Nakorn (71) studied the speech samples in a naturalistic context with 30 children aged 5:0-5:11. (as described in page 37) The results showed that there were non significant differences between boys and girls in using words from each category except for nouns which boys were able to use significantly in greater number than girls

Wilainam (72) investigated the production ability of verbs in 320 Thai children aged 3 years to 4 years 11 months. (as described previously on page 37) The results showed that there were non significant differences in children's production ability found between boys and girls.

Kosapanyatam (73) investigated the production ability of verbs among children aged 3 years to 4 years. The subjects were children selected from kindergarten school in Chonburi Province. They were equal in gender, 85 boys and 86 girls. (as described previously on page 39). The results showed that there were non significant differences between the ability in using verbs between boys and girls.

Krisanachantr (73) investigated the production ability of adjective and preposition antonym pairs in 360 Thai children aged 4 years to 6 years 11 months. (as

described previously on page 40). She found that there were non significant differences in children's production ability between boys and girls.

Several studies have shown girls to be more advanced in semantic ability than boys. (41,62,66,89). Also, girls sometimes demonstrated word-learning skill that boys of the same age did not. Thus, gender difference could reflect different maturation levels of girls and boys, as infants, girls are physically more mature than boys. There are also structural differences between male and female brains that might affect semantic development (27,91). Furthermore, some studies indicated that mothers talked more to use baby girl than to baby boys, and played with girls using more language abilities than with boys (27,41,66). At present, many studies reported that gender difference was not an influence on semantic ability. Quite a few researchers found that there were no significant difference in semantic abilities of children between boys and girls (31,46,48,49,56,62). They demonstrated that both boys and girls had learning and experience from their environment which supported their semantic ability relative to school (high technology of educational equipment), mass media (information from newspapers, educational television programs). These things helped to develop comparable abilities in semantic development of boys and girls. Before age 3 years, girl had tended to develop semantic ability more than boys. More over, after age 5 years, results showed that there were little or no differences in semantic ability between boys and girls (48,49).



CHAPTER III

MATERIAL AND METHOD

This chapter describes the Thai Semantic Development Test for Children, information concerning the subjects, test materials, procedures used in this study (construction of the test, test administration, evaluation of test's validity and reliability), and data analysis.

1. SUBJECTS

Six hundred and fifty children aged between 3 years to 7 years 11 months in both private and public schools in the Bangkok metropolitan area were the subjects in this study. They were divided into 2 groups:

1.1 The subjects used in the pilot study.

One hundred and fifty subjects in the pilot study were selected by a multistage sampling method as follows:

1.1.1 One district was selected from 38 districts.

1.1.2 One public school and one private school were selected from the chosen district.

1.1.3 Seventy-five students were selected from the public school and seventy-five students were selected from the private school. They were divided into 5 age groups according to the following age-ranges: 3:0-3:11, 4:0-4:11, 5:0-5:11, 6:0-6:11, 7:0-7:11 (years: months). Each age group consisted of 15 students in

public school and 15 students in private school, which corresponded to an about equal ratio of males to females. A list of the participating schools is contained in Appendix B

1.2 The subjects used in the main research study

Five hundred subjects in the main research study were selected by a multistage sampling method as follows:

1.2.1 Six districts were selected from 38 districts.

1.2.2 Six public schools and six private schools were chosen from the six selected districts.

1.2.3 Two hundred and fifty students were selected from public schools and two hundred and fifty students were selected from private schools. They were divided into 5 age group according to the following age-ranges: 3:0-3:11, 4:0-4:11, 5:0-5:11, 6:0-6:11, 7:0-7:11 (years:months). Each age group consisted of 50 students in public school and 50 students in private school, which corresponded to an about equal ratio of males to females. A list of the participating schools is contained in Appendix B.

Characteristics of the subjects

All subjects selected had relatively normal auditory acuity, intelligence, and health. The hearing screening was done by observing behavioral signs in the child as suggested by R.F. DuBose, 1983 (91). These behavioral signs are: failure to respond when spoken to, failure to understand directions or simple questions, looking puzzled or asking for word or sentence repetition, cocking their head to one side and studying

a speaker’s face, articulation problems, voice problems, and a preference for high-or low-pitched sounds. To evaluate the child’s intelligence, he or she was asked to draw geometric forms as suggested by Illingworth (1980). The list of geometric forms and age-ranges that children can usually draw is contained in Table 1

Table 1 Illingworth’s list of geometric forms and age-range that children can draw

Tests	Age range
Copies a circle, imitates a cross	3 years
Copies a cross	3 years
Copies a square	4 years
Copies a triangle	5 years

Illingworth RS, The Development of the Infant and Young child: Normal and Abnormal 7th ED. New York Churchill Living Stone 1980 P. 23

A child who could not pass each of these criteria was excluded from this study. Accordingly, that child would be replaced by another randomly selected child from the same group. In case the selected child was absent on the testing day, he or she was dropped and replaced with another randomly selected child.

2. Test materials

2.1 Thai Semantic Development Test for Children

2.1.1 Picture book

2.1.2 Test and examiner’s manual

2.2 Record form consisting of 2 books (Appendix C)

Book I Intelligence Test

Book II Thai Semantic Development Test

: Section I Demographic information

: Section II Subtest of the Thai Semantic Development Test

: Section III Scoring table

2.3 Tape recorder and cassette tape

Tape recorder : Sony type CFS-B5S

Audio tape : Sony type 3C-60ZX

3. Procedures

3.1 Construction of the test

3.1.1 Selecting words

3.1.2 Constructing test items

3.1.3 Designing pictures

3.1.4 Item tryout and analysis

3.1.5 Assembling the test

3.1.6 Content of the test

3.2 Test administration

3.3 Evaluation of test validity and reliability

3.1 Construction of the test

The Thai Semantic Development Test for Children is divided into 3 subtests namely: (a) picture vocabulary (PV), (b) relation vocabulary (RV), and (c) oral vocabulary (OV.).

3.1.1 Selecting words

The content for each subtest was obtained from four sources (in Appendix D):

- Master's Degree theses: 16 books
- Standardized test: 6 tests
- Basic word lists from the Department of Academics, Ministry of Education (68)
- Thai children's books that are included in curriculums for kindergarten and primary education in Thailand

The selection of words in each subtest corresponded to the criterion that each word appears more than twice in 4 sources. A total of 500 words were chosen. These words were classified into 5 category: nouns, verbs, adjectives, prepositions, and numeral classifiers (shown in Appendix E).

3.1.2 Constructing test items

The following are the criteria used in test construction:

Subtest I : Picture Vocabulary (PV)

The PV subtest was designed to measure a subject's ability to understand the meaning of each word that was spoken by the examiner. The subject was required to point to one of four pictures that best represented the meaning of a word spoken by the examiner. Each item in this subtest was deliberately selected according to a ratio taken from these studies: Suthijinda C. (69), The Ministry of Education of Thailand (68), Paisalpanumart K. (70), Na Nakorn S.(71). The ratios of words were: 52% of the items represented nouns, 22 % verbs, 14% adjectives, 6%

propositions, and 6% classifiers. A total of 50 words were chosen.

These 50 items were tested in the pilot study (item analyses). The items for the final version of this subtest were selected strictly according to the results of the item analysis conducted. The Picture Vocabulary subtest had 30 total items.

Subtest II : Relation Vocabulary (RV)

The RV subtest was designed to measure the subject's ability to understand and orally express the relationships between two words. In this subtest, no pictures were used in the format; the subject must understand the meanings of spoken words, recognize their semantic category, and express their relationship. Each item in this in this subtest was deliberately selected according to the ratio taken from the Wechsler Intelligence Scale for Children-Revised: WISC-R similarities subtest. The ratios of pair-words were 93.76 % of the word pairs in the items represented nouns, and 6.24 % represented verbs. A total of 50 words pairs were selected.

The 50 items in this subtest were used and tested in the pilot study. The items used in the final version of this subtest were selected strictly according to the results of the item analyses conducted. The remaining 30 items constituted the Relation Vocabulary subtest.

Subtest III : Oral Vocabulary (OV)

This subtest measured the subject's ability to provide oral definitions of common Thai words that were spoken by the examiner. Each item in this subtest was deliberately selected according to the ratio taken from these studies: Suthijinda C. (69), The Ministry of Education of Thailand (68), Paisalpanumart K. (70), Na Nakorn S.(71). The ratios of words were: 52% of the items represented nouns, 22%

verbs, 4% adjectives, 6% propositions, and 6% numeral classifiers. A total of 50 words were selected.

Fifty items in this subtest were used and tested in the pilot study. The items used in the final version of this subtest were selected strictly according to the results of the item analyses and 30 items were selected for the Oral Vocabulary subtest.

3.1.3 Content of the test

Subtest I : Picture Vocabulary (PV.)

คำสั่งในการทดสอบ

แสดงภาพตัวอย่าง ก. ให้เด็กดูและพูดว่า “หนูดูภาพเหล่านี้ซิคะ” พร้อมชี้ภาพให้เด็กดูทีละภาพ จากนั้นพูดหรือสั่งว่า “หนูชี้ไอศกรีมให้ครูดูซิคะ” (ต้องแน่ใจว่าไม่มีการนำหรือแนะให้เด็กรู้คำตอบ) ถ้าเด็กสับสนไม่เข้าใจหรือตอบผิด ผู้ทดสอบต้องอธิบายแต่ละภาพให้เด็กฟังพร้อมทั้งชี้ให้เด็กชี้ตามที่ละภาพ เช่น “ลองดูอีกครั้งนะคะ หนูฟังครูพร้อมกับชี้ตามครูทีละภาพ ภาพนี้คือไม้บรรทัด ภาพนี้คือไอศกรีม ภาพนี้เป็นแก้วน้ำ ส่วนภาพนี้คือส้ม” จากนั้นผู้ทดสอบลองสั่งใหม่อีกครั้ง โดยพูดว่า “ทีนี้หนูลองชี้ภาพ.....ให้ครูดูซิคะ” และเมื่อเด็กสามารถชี้หรือตอบได้ถูกต้องให้ดำเนินการทดสอบในข้อที่ 1 ต่อไป พร้อม พูดว่า “หนูชี้ภาพ.....ให้ครูดูซิคะ”

ในกรณีที่เด็กตอบไม่ถูกอีก ให้ผู้ทดสอบเฉลยหรือบอกคำตอบที่ถูกโดยชี้ภาพที่ถูกให้เด็กดู จากนั้นให้ดำเนินการทดสอบในข้อที่ 1 ต่อไป โดยไม่ต้องมีการอธิบายหรือทำตัวอย่างให้ดูอีก

การให้คะแนน

ถ้าตอบถูกให้ 1 คะแนน และคำตอบที่ผิดจะได้ 0 คะแนน ผู้ทดสอบต้องบันทึกคำตอบแต่ละข้อลงในแบบบันทึกและ ตรวจให้คะแนนโดยพิจารณาจากคู่มือการทดสอบ

ข้อคำถาม	คำตอบที่ได้	คะแนนที่ได้
1. สะพาน		
2. ผลไม้		
3. สีแดง		
4. ผู้ชาย		
5. คินสอ		
6. มะละกอ		

7. จักรยาน		
8. ชาวนา		
9. ผัก		
10. หมอ		
11. สีนํ้าเงิน		
12. พวกเขา		
13. ช่างก่อสร้าง		
14. ชาวประมง		
15. สอง		
16. ห้า		
17. พาหนะ		
18. ที่ทำการไปรษณีย์		
19. ลูกอม		
20. แมลง		
21. อนุสาวรีย์		
22. ฤดูหนาว		
23.. ปลาฉลาม		
24. ใบตอง		
25. โรงพยาบาล		
26. ครู		
27. กิน		
28. กระ โคค		
29. ผลัก		
30. ปลุก		
31. รับ		
34. หลบ		
35. พิการ		
36. ทะเลาะ		

37. เดินไป		
38. นุ่ม		
39. เย็น		
40. ต่างกัน		
41. ครึ่งลูก		
42. เท่ากัน		
43. หนา		
44. ใหญ่ที่สุด		
45. คั่นที่สุด		
46. ซ้างใน		
47. ได้		
48. หนึ่งผล		
49. หนึ่งคู่		
50. หนึ่งไขลง		
รวมคะแนน		

Subtest II : Relation Vocabulary (RV.)

คำชี้แจงในการทดสอบ

ผู้ทดสอบพูดคำถามแต่ละข้อในลักษณะดังนี้ “—และ— เหมือนกันอย่างไร” เช่น ผู้ทดสอบพูดว่า “หนูลองอธิบายให้ครูฟังว่ารองเท้ากับถุงเท้าเหมือนกันอย่างไร (คำตอบที่ถูกต้องคือ “เป็นสิ่งที่ต้องใช้เป็นคู่หรือมี 2 ข้าง หรือ เป็น สิ่งที่เขาไว้สวมใส่ที่เท้า หรือเป็นเครื่องแต่งกาย”) ในกรณีที่เด็กตอบคลุมเครือไม่ชัดเจน ไม่ถูกต้องหรือไม่สมบูรณ์ ผู้ทดสอบจะต้องพูดกระตุ้นว่า “ไหนหนูลองอธิบายเพิ่มเติมอีกสักหน่อยซิคะว่ารองเท้าและถุงเท้าเหมือนกันอย่างไร” เทคนิคนี้ผู้ทดสอบจะใช้ได้เพียงสองครั้งเท่านั้นต่อหนึ่งข้อคำถาม.

การให้คะแนน

ผู้ทดสอบต้องบันทึกคำตอบแต่ละข้อลงในแบบบันทึกและตรวจให้คะแนนโดยพิจารณาจากคู่มือการทดสอบ โดยที่ถ้าตอบถูกให้ 1 คะแนน และคำตอบที่ผิดจะได้ 0 คะแนน

ข้อคำถาม	คำตอบที่ได้	คะแนนที่ได้
1. ดินสอ-ปากกา		
2. ส้ม – แดงโม		
3. หมา – แมว		
4. ล้อรถ – ลูกบอล		
5. นม - น้ำ		
6. ผักชี - ผักบุ้ง		
7. โต๊ะ – ตู้		
8. พระอาทิตย์ - พระจันทร์		
9. กุหลาบ – มะลิ		
10. หนังสือ – หนังสือพิมพ์		
11. มីด – กรรไกร		
12. เตาอบ – เตาแก๊ส		
13. คะน้ำ – ดันหอม		
14. จักรยาน - มอเตอร์ไซด์		
15. ไอศกรีม - น้ำแข็ง		
16. เลื้อ – กางเกง		
17. เทียนไข – ตะเกียง		
18. แตร – กลอง		
19. บาท – สลึง		

20. ตู้เย็น — เครื่องปรับอากาศ		
21. โซฟา - เก้าอี้		
22. ดิ้นสั๊ก — ดิ้นสน		
23. ม้าหมุน — ไม้ลื่น		
24. ขาว - แดง		
25. กล้อง — ถัง		
26. หนึ่ง — สี่		
27. มดแดง — ตั๊กแตน		
28. กระดุม — จีบ		
29. จมูก — หู		
30. เหนือ — ตะวันออก		
31. กุ้ง - ปลา		
32. สถานีตำรวจ- ที่ทำการไปรษณีย์		
33. กลัวย - เงาะ		
34. ร้านค้า - ตลาด		
35. เบียร์ — สุรา		
36. ไหว้ - คำนับ		
37. ล้างน้ำ - อาบน้ำ		
38. มือ - เท้า		
39. โทรทัศน์ — วิทยุ		
40. โกรธ — สนุก		
41. ภูเขา — ทะเล		
42. ไก่ทอด — ไข่ดาว		
43. เป็ด — จิ้งจอก		
44. รถยนต์ — เรือยนต์		
45. ตำรวจ — ทหาร		
46. ถ่าน — ไม้		
47. กษัตริย์ - ประธานาธิบดี		
48. หมอ — พยาบาล		
49. เด็กผู้ชาย — เด็กผู้หญิง		
50. หม้อ - กะทะ		
รวมคะแนน		

Subtest III : Oral Vocabulary (OV.)

คำสั่งในการทดสอบ

ผู้ทดสอบต้องอธิบายให้เด็กฟังว่า “ ครูจะพูดคำๆหนึ่งให้หนูฟัง จากนั้นให้หนูบอกหรืออธิบายความหมายของคำนั้นว่าเป็นอย่างไร ตัวอย่างเช่น ถ้าครูพูดว่า ‘สุนัขคืออะไร’ หนูจะต้องตอบว่า ‘มันเป็นสัตว์หรือมันมีขาสี่ขาหรือเห่าได้’ เอาละ! ทีนี้หนูลองดูนะค่ะ หนูลองตอบครูดูซิค่ะว่า ‘ไก่คืออะไร’ จากนั้นบันทึกคำตอบที่ได้และดำเนินการทดสอบต่อไป โดยที่คำถามแต่ละข้อจะมีลักษณะดังนี้คือ “_____ คืออะไร” และในกรณีที่คำตอบที่ได้คลุมเครือ ไม่ชัดเจน ไม่ถูกต้องหรือไม่สมบูรณ์ ให้ผู้ทดสอบว่า “ ไหนหนูลองอธิบายเพิ่มเติมอีกสักหน่อยซิค่ะ” ซึ่งเทคนิคนี้ผู้ทดสอบจะใช้ได้เพียงสองครั้งเท่านั้นต่อหนึ่งข้อคำถาม

การให้คะแนน

ผู้ทดสอบต้องบันทึกคำตอบแต่ละข้อลงในแบบบันทึก และตรวจให้คะแนน โดยพิจารณาจากคู่มือการทดสอบ ถ้าตอบถูกต้องตามเกณฑ์ในแต่ละข้อให้ 1 คะแนน แต่ถ้าข้อคำถามไหนตอบผิดหรือไม่ถูกต้องตามที่กำหนดจะได้ 0 คะแนน

ข้อคำถาม	คำตอบที่ได้	คะแนนที่ได้
1. . ไก่		
2. ส้ม		
3. บอล		
4. หู		
5. ปาก		
6. เตี้ย		
7. น้ำ		
8. คำ		
9. นาฬิกา		
10. ไม้บรรทัด		
11. แกงจืด		
12. หม้อ		
13. ดอกบัว		
14. สบู่		
15. แม่น้ำ		
16. รถไฟ		
17. พริก		
18. ป่าไม้		
19. สี		

20. ดำรวจ		
21. ทอง		
22. โรงพยาบาล		
23. กาแฟ		
24. กษัตริย์		
25. พัดลม		
26. ผีเสื้อ		
27. ซอ		
28. กิน		
29. กอด		
30. เตะ		
31. พักผ่อน		
32. ขากจน		
33. เทียว		
34. เลี้ยงใจ		
35. สนุกสนาน		
36. ประหยัด		
37. พิการ		
38. ป่วย		
39. มาก		
40. สะอาด		
41. ผอม		
42. มีด		
43. ใหม่		
44. เหมือน		
45. ว่างเปล่า		
46. ต่างกัน		
47. ระหว่ง		
48. ข้างหลัง		
49. หนึ่งคู่		
50. หนึ่งโหล		
รวมคะแนน		

3.1.4 Designing vocabulary subtest picture

The Picture Vocabulary subtest was presented in 10 x 12 inch colored-drawing pictures. There were 30 items in this subtest. Each item consisted of 4 pictures presented on one page. The pictures were arranged systematically as shown in figure 1.

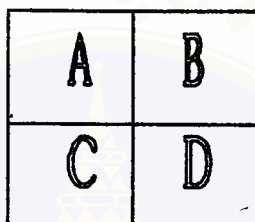


Figure: placement of pictures in the Picture Vocabulary subtest.

3.1.5 Item tryout and analysis

The Thai Semantic Development Test for Children was administered to 150 children. Item analysis was conducted which included measurements of item discrimination and item difficulty.

Item discrimination refers to “the degree to which an item differentiates correctly among test takers in the behavior that the test is designed to measure”. Anastasi (1990). The 50% Rule technique was used to determine item discrimination. The numbers of subjects responding to each item were compared in contrasting criterion groups: separate upper and lower groups. They were expressed as percentages. The difference between these two percentages provided an index of item discrimination. Anastasi suggested that statistically significant coefficients of .2 could be considered acceptable. For the Thai Semantic

Development Test, a value of .2 was selected to serve as the minimum level of acceptability for items on the subtests.

An index of item discrimination is $D = U - L$, where U is the percentage of subjects in the upper group who responded correctly to the item, and L is the percentage of subjects in the lower group who responded correctly to the item.

Item difficulty is defined in terms of the percentages of examinees who responded correctly to a given item (Anastasi, 1990). It was planned to identify items that were too easy or too difficult and to arrange items in an easy-to-difficult order. Anastasi (1990) suggested that average difficulty should approximate 50 % and have a fairly large dispersion between 20-80%. For the Thai Semantic development Test, acceptable items were distributed between 20 % and 80 %. An index of item difficulty is the percentage (p) of subjects who selected the correct answer.

3.1.6 Assembling the test

Based on the item discrimination and item difficulty statistical analysis, the items that did not satisfy the criteria described above were deleted from the test. There were 47 items deleted. There were 14 items deleted for the PV subtest which included items No. 2, 3, 5, 7, 9, 14, 15, 17, 18, 19, 26, 27, 33, and 44. There were 17 items deleted for the RV subtest which included items No. 7, 8, 11, 14, 17, 23, 27, 28, 29, 32, 39, 40, 41, 42, 45, 47, and 49. There were 16 items deleted for the OV subtest which included items No. 15, 19, 21, 24, 26, 27, 29, 30, 33, 34, 35, 40, 41, 43, 44, 47, and 48.

The satisfactory items (which have discrimination levels between .20–1.0 and difficulty levels between .20–.80) were grouped according to age range. In each age-group, these items were arranged in an easy-to-difficult order. They were: at age

3 years, there were 10 items: 6,28,4,29,38,11,36,32,47, and 22, for PV subtest. For the RV subtest, there were 3 items: 1,16, and 2, and for the OV subtest, there were 5 items: 6,1,5,14, and 3. At age 4 years, there were 11 items: 39,1,25,8,30,24,13,46,37,10, and 16 for the PV subtest. For the RV subtest, there were 4 items: 21,20,5, and 3, and for the OV subtest, there were 5 items: 4,2,11,12, and 20. At age 5 years, there were 6 items: 21,20,31,42,43, and 40 for the PV subtest. For the RV subtest, there were 9 items: 4,6,15,48,33,10,19,25, and 24, and for the OV subtest, there were 6 items: 17,10,9,25,22, and 45. At age 6 years, there were 5 items: 34,45,48,23, and 49 for the PV subtest. For the RV subtest, there were 7 items: 43,34,13,38,44,37, and 31, and for the OV subtest, there were 7 items: 31,32,8,16,38,13, and 23. At age 7 years, there were 4 items: 12,35,41, and 50 for the PV subtest. For the RV subtest, there were 10 items: 26, 9,22,50, 30, 35, 12,36,18, and 46, and for the OV subtest, there were 10 items: 36,39,28,7,37,42,46,18,50, and 26. The total items for the entire test is in Appendix C.

3.2 Test administration

The Thai Semantic Development Test for Children aged 3-8 years was administered to 500 children by two examiners who are graduate students majoring in communication disorders. They were well-trained to administer this test. The subjects were tested individually and their responses were recorded in written form and on both video and audio tape. The test results were analyzed statistically.

Administration procedures

The examiners explained the task requirements and used training items in the test manual to insure that the subjects understood the tasks and would produce a

clear response. The examiners corrected any mistakes made by the subjects during the training phase and demonstrated the correct response. After completing the training items, the examiners started testing with the first item of each subtest after explaining how to follow directions in the test manual. Also, the examiners were very careful not to indicate in any way whether the subject's answer was correct. Testing stopped after the child missed (or incorrectly answered) all items in their age-range instrument.

Specific wordings for testing directions were contained in the test manual.

3.3 Evaluation of test validity and reliability

3.3.1 Test validity

- Content validity: Three speech-language pathologists who have at least 5 years experience in speech-language tests development evaluated this test. They evaluated content validity, pictures, and the instructions on testing and scoring criteria. Accordingly, the initial version of the test was revised before being used in this study

- Construct validity: construct validity was obtained from the basic constructs within the scope of the Thai Semantic Development Test for children.

3.3.2 Test reliability:

The Kuder Richardson Formula (KR-20) was used to evaluate the test's reliability.

4. Data Analysis

The collected data was analyzed by using a Statistical Processing for Social Sciences software (SPSS), version 10.00

1. The 50% Rule technique (high and low group) was used to determine discrimination levels of all items and the computed percentages were used to determine item difficulty levels.

2. The Kuder Richardson Formula (KR-20) was used to determine reliability of the overall test and each subtest.

3. Raw scores were converted to normalized Z-scores and percentile ranks.

4. A One-way ANOVA was used to compare the semantics abilities of children relative to different age groups, and Tukey's HSD test was used for post-hoc testing of significant differences

5. A two independent sample t-test was used to compare the semantic abilities of children relative to gender.

CHAPTER IV

RESULTS

The Thai Semantic Development Test for children aged 3-7:11 years old was constructed and administered to 150 subjects in a pilot study and to 500 subjects in the main research study. The subjects were divided into 5 age-groups: 3:0-3:11, 4:0-4:11, 5:0-5:11, 6:0-6:11, 7:0-7:11 years:months. The results of this study are presented in 6 sections:

- 4.1 The overall Thai Semantic Development Test
- 4.2 The difficulty and discrimination values of each item
- 4.3 Validity of the Thai Semantic Development Test for Children
- 4.4 Reliability coefficients for the Thai Semantic Development Test for Children
- 4.5 Standard scores computed from the subjects' scores on the Thai Semantic Development Test for Children
- 4.6 Relationships found between the semantic abilities of children and their age, and gender.

4.1 The overall Thai Semantic Development Test

According to the test construction procedure, the overall Thai Semantic Development Test for Children Aged 3-7:11 years consisted of 3 subtests: (a) Subtest I, Picture Vocabulary (PV), was designed to measure a child's ability to understand the meaning of each word that was spoken by the examiner. (b) Subtest II, Relational Vocabulary (RV), was designed to measure a child's ability to understand and orally express the relationship between two words, and (c) Subtest III, Oral Vocabulary (OV),

was designed to measure a child’s ability to give oral definitions to common Thai words that were spoken by the examiner. There were 36 items in Subtest I, 33 items in Subtest II, and 34 items in Subtest III. One hundred and three items comprised the overall test.

4.2 Difficulty and discrimination values of each item.

According to the pilot study, the test was administered to 150 children in age-range 3-7:11 years who were divided into group consisting of thirty children in 5 age-groups: 3:0-3:11, 4:0-4:11, 5:0-5:11, 6:0-6:11, 7:0-7:11 years:months. The raw scores that were obtained from the pilot study were computed for each subject.

The difficulty and discrimination levels of each item, which were obtained from the pilot study, are contained in Appendices F1-F3.

The satisfactory items for each subtest were grouped according to age-range and arranged in easy-to-difficult order, and are contained in Table 2

Table 2 Difficulty (P) and discrimination (D) values of satisfactory items for the Thai Semantic Development Test at five age-ranges

Age - Range	Subtest I			Subtest II			Subtest III		
	Item	P	D	Item	P	D	Item	P	D
3:0-3:11	6	.800	.400	1	.567	.333	6	.700	.333
	28	.633	.333	16	.467	.533	1	.600	.533
	4	.600	.533	2	.467	.400	5	.600	.533
	29	.533	.400				14	.533	.533
	38	.533	.267				3	.400	.600
	36	.500	.467						
	11	.500	.333						
	32	.433	.467						
	47	.433	.333						
	22	.400	.400						
4:0-4:11	39	.667	.400	21	.600	.400	4	.600	.667
	1	.633	.467	20	.467	.533	2	.600	.400
	25	.633	.467	5	.467	.400	11	.567	.333

Continued:

Age - Range	Subtest I			Subtest II			Subtest III		
	Item	P	D	Item	P	D	Item	P	D
	8	.600	.533	3	.400	.533	12	.533	.400
	30	.567	.467						
	24	.533	.267						
	13	.533	.667						
	46	.500	.867						
	37	.467	.267						
	10	.400	.267						
	16	.400	.400						
5:0-5:11	21	.667	.26	4	.633	.600	17	.533	.533
	20	.633	.467	6	.500	.600	10	.533	.400
	31	.633	.333	15	.500	.333	9	.500	.467
	42	.633	.600	48	.467	.400	25	.467	.400
	43	.467	.533	33	.433	.600	22	.433	.600
	40	.400	.267	10	.400	.533	45	.433	.600
				19	.400	.400			
				25	.400	.400			
				24	.400	.600			
6:0-6:11	34	.800	.267	43	.700	.400	31	.700	.467
	45	.700	.467	34	.677	.533	32	.700	.333
	48	.633	.600	13	.500	.600	8	.667	.533
	23	.633	.200	38	.500	.333	16	.633	.200
	49	.633	.600	44	.467	.400	38	.400	.600
				37	.400	.533	13	.467	.400
				31	.400	.400	23	.333	.400
7:0-7:11	12	.633	.200	26	.700	.267	49	.700	.467
	35	.533	.267	9	.533	.400	36	.567	.600
	41	.433	.200	22	.500	.600	39	.467	.400
	50	.333	.533	50	.467	.533	28	.467	.533
				30	.467	.400	7	.433	.600
				35	.467	.400	37	.433	.467
				12	.433	.400	42	.433	.467
				36	.433	.467	46	.433	.333
				18	.400	.467	18	.367	.500
				46	.400	.467	50	.333	.533

Table 2 contains the difficulty and discrimination levels of all of the satisfactory items for each subtest at the selected five age-ranges.

In Subtest I, there were 50 items whose difficulty and discrimination levels of corresponded to the following results: there were 10 items with difficulty levels between .400-.800 and discrimination levels between .267-.533 in the age range 3 to 3:11 years. There were 11 items with difficulty levels between .400-.667 and

discrimination levels between .267-.533 in age range 4 to 4:11 years. There were 6 items with difficulty levels between .400-.667 and discrimination levels between .267-.667 in age range 5 to 5:11 years. There were 4 items with difficulty levels between .633-.800 and discrimination levels between .267-.600 in age range 6 to 6:11 years. There were 4 items with difficulty levels between .333-.633 and discrimination levels between .200-.533 in age range 7 to 7:11 years.

In Subtest II, there were 50 items whose difficulty and discrimination values corresponded to the following results: There were 3 items with difficulty levels between .467-.567 and discrimination levels between .333-.533 in age range 3 to 3:11 years. There were 4 items with difficulty levels between .400-.600 and discrimination levels between .400-.533 in age range 4 to 4:11 years. There were 9 items with difficulty levels between .300-.633 and discrimination levels between .333-.600 in age range 5 to 5:11 years. There were 7 items with difficulty levels between .400-.700 and discrimination levels between .333-.600 in age range 6 to 6:11 years. There were 10 items with difficulty levels between .400-.700 and discrimination levels between .267-.600 in age range 7 to 7:11 years.

In Subtest III, there were 50 items whose difficulty and discrimination values corresponded to the following results: there were 5 items with difficulty levels between .400-.700 and discrimination levels between .333-.600 in age range 3 to 3:11 years. There were 5 items with difficulty levels between .400-.600 and discrimination levels between .333-.667 in age range 4 to 4:11 years. There were 6 items with difficulty levels between .433-.533 and discrimination levels between .400-.600 in age range 5 to 5:11 years. There were 7 items with difficulty levels between .333-.700 and discrimination levels between .200-.600 in age range 6 to 6:11 years. There were 10

items with difficulty levels between .333 -.567 and discrimination levels between .333-.600 in age range 7 to 7:11 years.

4.3 Validity of the Thai Semantic Development Test

Qualitative evidence for content validity and construct validity was used to assess the validity of the test. For content validity, The Thai Semantic Development Test was evaluated by three speech-language pathologists who had at least 5 years experience in speech-language development. The content of each item for the three subtests, the pictures that represented item content for Subtest I, and the instructions for the test and scoring criteria were all evaluated. The test was revised as advised by the panel of speech-language pathologists. The overall Thai Semantic Development Test was used after the three speech-language pathologists had reached a consensus agreement on each item and other aspects of content.

For determining construct validity, the basic constructs within the scores for the Thai Semantic Development Test for Children are as the following:

4.3.1 The Thai Semantic Development Test for Children was designed to measure semantic abilities of children in three different domains: comprehension, organization, and expression

4.3.2 The Thai Semantic Development for Children was designed to measure semantic abilities of children aged between 3-7:11 years.

4.4 Reliability coefficients of the Thai Semantic Development Test

The raw scores from the 3 subtests of semantic abilities for children all age-ranges were calculated by the Kuder Richardson Formula (KR-20). The reliability values for the 3 subtests and the overall test are contained in Table 3

Table 3 Reliability coefficients for the Thai Semantic Development Test

Subtest	Reliability coefficient
I	.955
II	.930
III	.960
overall	.978

In Table 3, the results showed that all of the reliability coefficients for the overall test and each subtest exceeded .80. For Subtest I, the reliability coefficient was 0.955, for Subtest II was 0.930, and for Subtest III was 0.960. The overall reliability coefficient for all three subtests was 0.978. The magnitude of these coefficients indicates that the Thai Semantic Development Test was a sufficiently reliable test.

4.5 Standard scores computed from the subjects' scores on the Thai Semantic Development Test for Children

According to the research study design, the test was administered to 500 children in age-ranges 3 to 7:11 years who were divided into 5 age groups: 3:0-3:11, 4:0-4:11, 5:0-5:11, 6:0-6:11, 7:0-7:11 years:months. One hundred children were included in each group. The raw scores on each subtest that were obtained from the main research study were calculated at each one-year interval and converted to standard scores (Z-score normalization) and percentile ranks for each interval.

Standard scores and percentile ranks computed for the subtests are contained in Appendices G1-G5. Z-scores were used to find norm-referenced score of the Thai children tested. To give an example of interpreting Z scores, suppose A child aged 3:7 years received raw scores of 15, 7, and 2 on the Subtest I, II, and III, respectively. When raw scores were converted to Z scores, the child scores became 1.07, 1.82, and -1.07 respectively. The first standard score meant that the child's raw score on subtest I was 1.07 units of deviation from the mean of his/her age group. Similarly, on Subtest II, the child's score was 1.82 units of deviation from the mean, and on Subtest III, the child's score was -1.07 units of from the mean deviation. As an example of comparing one person's score to someone else's, suppose that child A and child B, whose ages were 4:5 and 4:7 years, received raw scores of 27 and 23 on Subtest I respectively. The children's corresponding Z-scores were 1.53 and .82 respectively. It could be explained that child A received a normalized score of 1.53 units from the mean of the group and had a higher raw score than the child B who received a normalized score of .82 units from the mean of the group.

To give an example for interpreting percentile rank, suppose a child aged 5:8 years received a raw score 26 on Subtest I. His/her raw score was then converted to percentile rank. A percentile rank of 68 was computed for the child's score. This meant that 68% of the normative group received test scores lower than this child and 32% received scores higher than him/her.

Normative data for the subtests are contained in Appendices G1-G5.

4.6 Relationships between semantic abilities of children and their age and gender.

4.6.1 Relationship between semantic abilities of children and their age

The raw scores of semantic abilities in 3 subtests of one hundred children at five age-ranges were calculated. The age-group means and standard deviations are shown in Table 4

Table 4 Means and standard deviations of semantic abilities score for the Thai Semantic Development Test at five age-ranges

Age-range	N	Subtest I		Subtest II		Subtest III	
		Mean	S.D.	Mean	S.D.	Mean	S.D.
3:0-3:11	100	9.92	4.73	2.60	2.41	4.86	2.67
4:0-4:11	100	18.43	5.60	6.99	4.39	9.20	2.75
5:0-5:11	100	23.21	5.20	11.88	6.25	15.25	4.36
6:0-6:11	100	28.76	3.07	12.39	6.06	19.66	4.91
7:0-7:11	100	31.13	2.89	23.51	5.75	23.97	5.13

Table 4 contains the means and standard deviations of semantic abilities for the three subtests grouped in five age-ranges.

In Subtest I, children in the 7:0-7:11 age-range had the highest mean of semantic abilities scores while children in the 3:0-3:11 age-range had the lowest mean score. Children in the 6:0-6:11 age-range had a higher mean score than children in the 5:0-5:11, 4:0-4:11 and 3:0-3:11 age-ranges respectively. Children in the 5:0-5:11 age-range had a higher mean score than children in the 4:0-4:11 and 3:0-3:11 age-range, respectively. Children in the 4:0-4:11 age-range had a higher mean score than children in the 3:0-3:11 age-range.

In Subtest II, children in the 7:0-7:11 age-range had the highest mean of semantic abilities score while children in the 3:0-3:11 age-range had the lowest mean score. Children in the 6:0-6:11 age-range had a higher mean score than children in the

5:0-5:11, 4:0-4:11 and 3:0-3:11 age-range respectively. Children in the 5:0-5:11 age-range had higher mean score than children in the 4:0-4:11 and 3:0-3:11 age-ranges respectively. Children in the 4:0-4:11 age-range had a higher mean score than children in the 3:0-3:11 age-range.

In Subtest III, children in the 7:0-7:11 age-range had the highest mean of semantic abilities score, while children in the 3:0-3:11 age-range had the lowest mean score. Children in the 6:0-6:11 age-range had a higher mean score than children in the 5:0-5:11, 4:0-4:11 and 3:0-3:11 age-ranges respectively. Children in the 5:0-5:11 age-range had a higher mean score than children in the 4:0-4:11 and 3:0-3:11 age-ranges respectively. Children in the 4:0-4:11 age-range had a higher mean score than children in the 3:0-3:11 age-range.

Using the mean scores of children in the five age-ranges from Table 4, an analysis of variance (ANOVA) for semantic abilities scores in Subtest I of children relative to the five age-ranges was conducted shown the analysis results are summarized in Table 5

Table 5 Analysis of Variance for semantic abilities scores in Subtest I for the Thai Semantic Development Test of children at five age-ranges

Source of variation	SS	df	MS	P-value
Between Group	29016.140	4	7254.035	.000*
Within Group	9746.810	495	19.691	
Total	38762.950			

* The mean difference is significant at the .01 level

From Table 5, the ANOVA test was conducted to examine the differences in Subtest I mean scores relative to all age-ranges. The results showed that there may be

number significant differences in Subtest I group means across the five age-ranges. These results indicated that the semantic abilities of children relative to Subtest I in each group could be different. Therefore, Tukey’s HSD Post-Hoc method was used to identify which pairs of mean differences mean were statistically significant as shown in Table 6

Table 6 Means and mean differences of semantic ability scores for Subtest I by age-range.

Age-range	Mean	3:0-3:11	4:0-4:11	5:0-5:11	6:0-6:11	7:0-7:11
3:0-3:11	9.9200					
4:0-4:11	18.430	8.5100*				
5:0-5:11	23.8100	13.8900*	5.3800*			
6:0-6:11	28.7600	18.8400*	10.3300*	4.9500*		
7:0-7:11	31.1300	21.2100*	12.7000*	7.3200*	2.3700*	

* The mean difference is significant at the .01 level

Table 6, contains the mean differences of semantic abilities scores for Subtest I of children between five age-ranges at a .01 level of significance. These results showed that there were significant difference found between age-range 3:0-3:11, 4:0-4:11, 5:0-5:11, 6:0-6:11, and 7:0-7:11 years:months. This meant that older children (higher age-ranges) had significantly higher semantic ability scores than the younger children in all other age-ranges.

Using the mean scores of children in the five age-ranges in Table 4, an analysis of variance (ANOVA) for semantic abilities scores in Subtest II of children relative to five age-ranges was conducted. The analysis results are summarized in Table 7

Table 7 Analysis of Variance for semantic abilities scores in Subtest II for the Thai Semantic Development Test of children by age-range

Source of variation	SS	df	MS	P-value
Between Group	29501.928	4	7375.482	.000*
Within Group	13369.080	495	27.008	
Total	42871.008	499		

* The mean difference is significant at the .01 level

From Table 7, the ANOVA test was conducted to examine the differences in Subtest II mean scores relative to age-ranges. The results showed that there may be a number significant differences in Subtest II group means across the five age - ranges. These results indicated that the semantic abilities of children relative to Subtest II in each group could be different. Therefore, Tukey’s HSD Post- Hoc method was used to identify which pairs of mean differences were statistically significant as shown in Table 8

Table 8 Means and mean differences of semantic ability scores for Subtest II by age-range.

Age-range	Mean	3:0-3:11	4:0-4:11	5:0-5:11	6:0-6:11	7:0-7:11
3:0-3:11	2.6000					
4:0-4:11	6.9900	4.3900*				
5:0-5:11	11.6900	9.0900*	4.7000*			
6:0-6:11	18.3900	15.7900*	11.4000*	6.7000*		
7:0-7:11	23.9700	21.3700*	16.9800*	12.2800*		

* The mean difference is significant at the .01 level

Table 8 contains the mean differences of semantic abilities scores for Subtest II of children between five age-ranges at a .01 level of significance. These results showed that there were significant difference found between age-range 3:0-3:11, 4:0-4:11, 5:0-5:11, 6:0-6:11, and 7:0-7:11 years:months. This meant that older children (higher age-

ranges) had significantly higher semantic ability scores than younger children in all other age-ranges.

Using the mean and standard deviation scores of children in the five age-ranges in Table 4, an analysis of variance (ANOVA) for semantic abilities scores in Subtest III of children relative to five age-ranges was conducted. The analysis results are summarized and shown in Table 9

Table 9 Analysis of Variance for semantic abilities scores in Subtest III for the Thai Semantic Development Test of children by five age-ranges.

Source of variation	SS	df	MS	P-value
Between Group	23188.152	4	5797.038	.000*
Within Group	8951.950	495	18.085	
Total	32140.102	499		

*The mean difference is significant at the .01 level

From Table 9, the ANOVA test was conducted to examine the differences in Subtest III mean scores relative to age-range. The results showed that there may be a number of significant differences in Subtest III group means across the five age-ranges. These results indicated that the semantic abilities of children relative to Subtest III in each group could be different. Therefore, Tukey’s HSD Post-Hoc method was used to identify which pairs of mean differences were statistically significant as shown in Table 10.



Table 10 Means and mean differences of semantic ability scores for Subtest III by age-range.

Age-range	Mean	3:0-3:11	4:0-4:11	5:0-5:11	6:0-6:11	7:0-7:11
3:0-3:11	4.8600					
4:0-4:11	9.8000	4.9400*				
5:0-5:11	15.2600	10.4000*	5.4600*			
6:11-6:11	19.6800	14.8200*	9.8800*	4.4200*		
7:0-7:11	23.9700	19.1100*	14.1700*	8.7100*	4.2900*	

* The mean difference is significant at the .01 level

Table 10 contains the mean differences of semantic abilities scores for Subtest III of children between five age-ranges at a .01 levels of significance. These results showed that there were significant difference found between age-ranges 3:0-3:11, 4:0-4:11, 5:0-5:11, 6:0-6:11, and 7:0-7:11 years:months. This meant that older children (higher age-ranges) had significantly higher semantic abilities scores than younger children in all other age-ranges.

4.5.2 Relationships between semantic abilities of children and gender

The raw scores from Subtest I of semantic abilities of children (separated by gender) at five age-ranges were computed by the two independent sample t-tests method. The mean and standard deviations computed for each age group are contained in Table 11

Table 11 Means and standard deviations of semantic abilities scores for Subtest I for the Thai Semantic Development Test between boys and girls at five age-ranges

Age-Range	Boy		Girl		P-value
	Mean	S.D.	Mean	S.D.	
3:0-3:11	9.68	4.39	10.16	5.07	.499
4:0-4:11	18.445	5.53	18.42	5.71	.882
5:0-5:11	23.92	5.14	23.70	5.30	.966
6:0-6:11	28.88	3.08	28.64	3.10	.952
7:0-7:11	31.02	3.22	31.24	2.54	.185

Table 11 contains the different mean scores and their standard deviations of boys and girls for Subtest I at five age-ranges.

In Subtest I, at age-range 3.0-3.11, and 7.0-7.11, boys had a lower mean score than girls. The mean differences were .48 and .22, respectively. In age-ranges 4.0-4.11, 5.0-5.11, and 6.0-6.11, boys had higher mean scores than girls. The mean differences were .02, .22, and .24, respectively.

As a result of analyzing the differences in children’s semantic abilities subtest scores relatives to gender in five age-ranges at a .01 level of significance, the results showed that there were non significant differences found between boys’ mean scores and girls’ mean scores for Subtest I at all age-ranges.

The raw scores from Subtest II of the semantic abilities of children (separated by gender) at five age-ranges were calculated by a two independent sample t-test method. The computed means and standard deviations are contained in Table 12

Table 12 Means and standard deviations of semantic abilities scores for Subtest II for the Thai Semantic Development Test between boys and girls at five age-ranges

Age-Range	Boy		Girl		P-value
	Mean	S.D.	Mean	S.D.	
3:0-3:11	2.44	2.03	2.76	2.75	.180
4:0-4:11	7.06	4.69	6.92	4.11	.943
5:0-5:11	15.58	4.56	14.92	4.17	.380
6:0-6:11	18.42	5.78	18.36	6.38	.229
7:0-7:11	23.40	5.92	23.62	5.63	.654

Table 12 contains the differences between mean scores of boys and girls relative to Subtest II in five age-ranges.

In Subtest II, at age-range 3.0-3.11, and 7.0-7.11, boys had lower mean scores than girls. The mean differences were .32 and .22, respectively. In age-ranges 4.0-4.11,5.0-5.11, and 6.0-6.11, boys had higher mean scores than girls. The mean differences were .14, .66, and .06, respectively.

As a result of analyzing the differences in children’s semantic abilities subtest scores relative to gender in five age-ranges at a .01 level of significance, the results showed that there were non significant differences found between boys’ mean scores and girls’ mean scores for Subtest II at all age-range.

The raw scores from Subtest III of the semantic abilities of children (separated by gender) at five age-ranges were computed by the two independent sample t-test method. The mean and standard deviations computed for each age group are contained in Table 13

Table 13 Means and standard deviations of semantic abilities scores in for Subtest III for the Thai Semantic Development test between boys and girls at five age-ranges

Age-Range	Boy		Girl		P-value
	Mean	S.D.	Mean	S.D.	
3:0-3:11	4.56	2.63	5.16	2.70	.351
4:0-4:11	9.48	4.28	10.12	3.15	.096
5:0-5:11	11.90	6.65	11.48	7.12	.809
6:0-6:11	20.08	5.08	19.24	.475	.656
7:0-7:11	24.44	5.20	23.50	5.07	.800

Table 13 contains the different mean scores and their standard deviations of boys and girls in Subtest III at five age-ranges.

In Subtest III, at age-range 3.0-3.11, and 7.0-7.11, boys had lower mean scores than girls. The mean differences were .60 and .64, respectively. In age-ranges 4.0-4.11,5.0-5.11, and 6.0-6.11, boys had higher mean scores than girls. The mean differences were .42,.84, and .94, respectively.

As a result of analyzing the differences in children’s semantic abilities subtest scores relative to gender in five age-range at a .01 level of significance, the results showed that there were non significant differences found between boys’ mean scores and girls’ mean scores for Subtest III at all age-range.

CHAPTER V

DISCUSSION AND CONCLUSION

The Thai Semantic Development Test for Children was constructed and administered to 150 subjects whose aged 3 years to 7 years 11 months in a pilot study. A quantitative analysis of each item was conducted, and unsatisfactory items were deleted. The satisfactory items were grouped according to age-range and arranged in easy-to-difficult order for each age-range. The overall test was then administered to 500 subjects in the main research study. The results of this study are discussed as follows:

5.1 Content of each item in the Thai Semantic Development Test for Children

5.2 Standard scores and percentile rank on the Thai Semantic Development Test for 500 subjects

5.3 Relationships between the semantic abilities of children and their age and gender

5.1 Content of Each Item for the Thai Semantic Development Test for Children

According to the difficulty and discrimination levels of each item in the pilot study version that are contained in Appendices G1-G3, unsatisfactory items were deleted. Satisfactory items were then arranged in an easy-to-difficult order. They are contained in Table 2. The difficulty and discrimination value of each item can correspond to content validity of the test. The items are discussed as follows:

5.1.1 Content of the unsatisfactory items

They were 47 items deleted: 14 items for Subtest I, 17 items for Subtest II and 16 items for Subtest III. These items were deleted because their difficulty and discrimination levels did not pass the item selection criteria establish. These criteria are described as follows:

- For difficulty values (P), items whose levels were more than .80 or less than .20 for all age-range were deleted because these items were too easy or too difficult for children in all age-range respectively.
- For discrimination values (D), items whose levels were less than .20 for all age-range were deleted because these items could not differentiate properly among test takers.
- It was noted that if either difficulty or discrimination levels were unacceptable in each age-range, this item was deleted from the appropriate age-range. If they were unacceptable for all age-ranges, these items were also deleted.

According to the criteria above, the content of unsatisfactory items is discussed as follows:

In Subtest I, the fourteen deleted items were: No.2,3,5,7,9,14,15,17,18,19,26, 27, 33, and 44. Items No.2,3,5,7,9,14,15,17,18,19, and 26 represented nouns while items No.27, 33 represented verbs, and item No.44 represented adjectives. The criteria used in item analysis are as the following:

Items which represented nouns

The following items were deleted: items No.2 “ผลไม้”, No.3 “สีแดง”, No.5 “ดินสอ”, No.7 “จักรยาน”, No.9 “ผัก”, No.19 “ลูกอม”, and No.26 “ครู”. These words were too easy for the subjects because many studies revealed that children age 3 years could already

comprehend them (41,42,46,47,48,50). The words “กินสอ จักรยาน ลูกอม” were frequently used, had meaning by itself, could see clearly, and touch (24,40,14,26). The word “สีแดง” was one of basic colors which children could perceive rapidly and see clearly. Therefore children could comprehend “สีแดง” before they understood other colors (11,38,47).

Although the two words “ผลไม้ ผัก” were broad in category, children could comprehend them earlier. It might be due to their familiarity with them in their daily lives (47). Parents and teachers often tell them to eat fruits and vegetables for their health. Vocabulary about fruits and vegetables was taught earlier as a primary vocabulary. In the Thai language, the word “ครู” was also a pronoun which the teacher used in the first person (98). Therefore, primary school children were very familiar with this word, even though the word “ครู” was eventually categorized as an occupation.

The following items were deleted: No.14 “ชาวประมง”, No.15 “ตอง”, No.17 “พาหนะ” and No. 18 “ที่ทำการไปรษณีย์” because their discrimination values were unacceptable for all age-ranges. These items could not differentiate properly among test takers. Children in the low scoring group comprehended these items as well as children in the high-scoring group.

Items which represented verbs

Item No.27 “กิน” was deleted because it was too easy for subjects in all age-ranges. Many studies showed that this word was comprehended by children age 3 to 4 years old (41,42,43,45,48,49) because it was a verb that was frequently used and children could see clearly movement or action (72).

Item no.33 “กราบ” was deleted because its discrimination value was unacceptable.

This item could not differentiate properly among test takers. Children in the low scoring group comprehended this item as well as children in the high scoring group.

Items which represented adjectives

Item No.44 “ใหญ่ที่สุด” was deleted because its difficulty value was unacceptable.

This item was too easy for the subjects in all age-ranges. Many studies showed that children aged 3 to 4 years could comprehend this word (24,42,48, 49,56) because they could comprehend adjectives that were positive in meaning. It might be that positive meaning words are easy to comprehend and clearly distinguish meaning in the environment rather than negative words (24).

In Subtest II, the seventeen items deleted were: No.7,8,11,14,17,23,27,28,29, 32,39,40,41,42,45,47, and 49. Items No.7,8,11,14,17,23,27,28,29,32,39,41,42,45,47, and 49 represented nouns while item No.40 represented a verb.

Items which represented nouns

The following items were deleted: No.7 “ไต่-ตุ้”, No. 28 “กระดุม-ชิป”, No.32 “สถานีตำรวจ-ที่ทำการไปรษณีย์”, No.39 “โทรทัศน์-วิทยุ”, and No.41 “ภูเขา-ทะเล” because both their difficulty and discrimination levels were unacceptable in all age-ranges. These words were too difficulty for children and could not differentiate properly among test takers. Children in the low scoring group did not comprehend these items as well as children in the high scoring group.

The following items were deleted: No.11 “มีค-กรรไกร”, No.14 “จักรยาน-มอเตอร์ไซด์”, and No.17 “เทียนไข-ตะเกียง” because both their difficulty and discrimination values were unacceptable in 3:0-3:11, 4:0-4:11, 6:0-6:11 and 7:0-7:11 age-ranges. Although, their difficulty levels were acceptable in the 5:0-5:11 age-range, these items had the lowest difficulty and discrimination levels. This subtest was already contained better difficulty and discrimination level items.

The following items were deleted: No.23 “ผ้าห่ม-ไม้กลิ้ง”, No.27 “มดแดง-ตั๊กแตน”, No.29 “จุก-หู”, No.42 “ไก่ทอด-ไข่ดาว”, No. 45 “ตำรวจ-ที่ทำการไปรษณีย์”, No. 47 “กษัตริย์-ประธานาธิบดี”, and No.49 “เด็กผู้หญิง-เด็กผู้ชาย” because both their difficulty and discrimination values were unacceptable at 3:0-3:11, 4:0-4:11, 5:0-5:11 and 6:0-6:11 years:months. Although, their difficulty and discrimination levels were acceptable in the 7:0-7:11 age-range, these items had the lowest difficulty and discrimination levels. This subtest already contained with better difficulty and discrimination values.

Item No.8 “พระอาทิตย์-พระจันทร์” was deleted because its discrimination level was unacceptable for the 5:0-5:11, 6:0-6:11, and 7:0-7:11 age-ranges. This item could not differentiate properly among test takers. Children in the low scoring group comprehended this item as well as children in the high scoring group.

Items which represented verbs

Items No.40 “โกรธ-สนุก” was deleted because both its difficulty and discrimination levels were unacceptable in all age-ranges. This item was too difficult for children and so could not differentiate among test takers.

In Subtest III, the sixteen items deleted were: No.15,19,21,24,27,29,30,33,34,35, 40,41,43,44,47 and 48. Items No.15,19,21,24,27, represented nouns, Items No.29, 30,33,34 and 35 represented verbs, Items No.40,41,43, and 44 represented adjectives, Item No.47, and 48 represented prepositions.

Items which represented nouns:

Item No. 15 “แม่น้ำ”, No. 21 “ทอง” and No. 27 “ขอ” were deleted because both their difficulty and discrimination levels were unacceptable all age-ranges. These items were too difficult for children in all age-range to define and could not differentiate among test takers. Children in the low scoring group could not define these words similarly to children in the high scoring group.

Item No. 19 “สี่” was deleted because it was too difficult for children in the 3:0-3:11, 4:0-4:11, 5:0-5:11, and 6:0-6:11 age-ranges to define. Although both its difficulty and discrimination levels were acceptable in the 7:0-7:11 age-ranges, this item had the lowest difficulty and discrimination levels. This subtest was already contained better difficulty and discrimination values.

Item No. 24 “กษัตริย์” was deleted because it was too difficult for children in the 3:0-3:11, 4:0-4:11, and 5:0-5:11 age-ranges to define. Although both its difficulty and discrimination levels were acceptable in the 6:0-6:11 and 7:0-7:11 age-ranges, there were enough items that were grouped in these age-ranges and all of them had better difficulty and discrimination levels than this item.

Items which represented verbs

Items No.33 “เที่ยว” was deleted because both its difficulty and discrimination

levels were unacceptable in all age-ranges. This item was too difficult for children in all age-ranges to define.

Item No.29 “กอด” was deleted because it was too difficult for children in the 3:0-3:11, 4:0-4:11, and 5:0-5:11 age-ranges to define and could not differentiate among test takers. Although both its difficulty and discrimination values were acceptable in the 6:0-6:11 and 7:0-7:11 age-ranges, this item had the lowest difficulty and discrimination levels. This subtest already contained better difficulty and discrimination level items.

Item No.30 “เตะ” was deleted because it was too difficult for children in the 3:0-3:11, 4:0-4:11, 5:0-5:11 and 6:0-6:11 age-ranges to define and could not differentiate among test takers. Although both its difficulty and discrimination values were acceptable in the 7:0-7:11 age-range, this item had the lowest difficulty and discrimination level items. This subtest was already filled in with better difficulty and discrimination values.

Item No.34 “เลิใจ” was deleted because it was too difficult for children in the 3:0-3:11, 4:0-4:11, and 5:0-5:11 age-ranges to define and could not differentiate among test takers. Although both its difficulty and discrimination values were acceptable in the 3:0-3:11, 4:0-4:11 age-ranges, this item had the lowest difficulty and discrimination levels. This subtest already contained better difficulty and discrimination level items.

Item No.35 “สนุกสนาน” was deleted because it was too difficult for children in the 3:0-3:11, 4:0-4:11, 5:0-5:11, and 7:0-7:11 age-ranges to define and so could not differentiate among test taker. Although, its difficulty value was accepted in the 6:0-6:11 age-range, its discrimination value was unacceptable. This item could not differentiate properly among test taker. Children in the low scoring group could define this word as well as children in the high scoring group.

Items which represented adjectives:

Items No.41 “ทอน” and No.44 “เหม็น” were deleted because both of their difficulty

and discrimination levels were unacceptable in all age-range. These items were too difficult for children in all age-range to define and could not differentiate among test taker.

Item No.40 “สะอาด” was deleted because it was too difficult for children in the 3:0-3:11, 4:0-4:11, 5:0-5:11 and 6:0-6:11 age-ranges to define and could not differentiate among test takers. Although its difficulty and discrimination levels were acceptable in the 7:0-7:11 age-range, this item had the lowest difficulty and discrimination levels. This subtest already contained better difficulty and discrimination level items.

Item No.43 “ไหน” was deleted because it was too difficult for children in the 3:0-3:11, 4:0-4:11, 5:0-5:11 age-range, and too easy for children in the 7:0-7:11 age-range. Also, it could not differentiate properly among test takers. Although its difficulty and discrimination levels were accepted in the 6:0-6:11 age-range, this item had the lowest difficulty and discrimination levels. This subtest already contained better difficulty and discrimination level items.

Item which represented prepositions:

Items No.47 “ระหว่าง”, No.48 “ข้างหลัง” were deleted because both their difficulty and discrimination levels were unacceptable. These items were too difficult for children in all age-ranges to define.

5.1.2 Content of satisfactory items

One hundred and three satisfactory items comprised the entire test, and there were 36 such items in Subtest I, 33 items in Subtest II, and 34 items in Subtest III. The difficulty levels and the discrimination levels were assumed to classify which items were

suitable for each age-range (see Appendices G1-G3) and the number of items in each age-range. These criteria are the following:

1. Difficulty values (P)

- Difficulty levels less than .20 were unacceptable and indicated that the item was too difficult for children at the age-range it was meant for..

- Difficulty levels between .20-.80 were acceptable and indicated that the item was not too difficult or too easy for children in the age-range it was meant for.

- Difficulty levels more than .80 were unacceptable and indicated that the item was too difficult for children in the age-range it was meant for.

2. Discrimination values (D)

- Discrimination levels more than .20 were acceptable and indicated that the item could differentiate properly among test takers.

- Discrimination levels less than .20 were unacceptable and indicated that the item could not differentiate properly among test takers.

3. In case the difficulty and discrimination levels of an item was acceptable in more than one age-range, the best age-range was selected according the better difficulty level (the better difficulty levels refers the to levels near .50). In cases of difficulty levels of equal magnitude, the better discrimination value was considered and determined which item would be selected.

The content of satisfactory items is discussed as follows:

In Subtest I, there were 36 satisfactory items. Fifteen items represented nouns that were contained in this age-range. They were items No.1,4,6,8,10,11, 12,13,16,20, 21,22,23,24, and 25. Nine items which represented verbs were No.28,29,30,31,32, 34,35,36, and 37; seven items that represented adjectives were No.38, 39,40,41, 42,43,

and 45; two items that represented prepositions were No.46, and 47, and three items that represented numeral classifiers were items No.48,49,50.

Items which represented nouns:

Items No.4 “ผู้ชาย”, No.6 “มะละกอ”, No.11 “สีน้ำเงิน”, and No.22 “ฤดูหนาว”, were grouped for children in the 3:0-3:11 age-range because both of their difficulty and discrimination levels were acceptable.

Items No.1 “สะพาน”, No.8 “ชาวนา”, No.10 “หม้อ”, No.13 “ช่างก่อสร้าง”, No.16 “ฟ้า”, No. 24 “ใบตอง”, and No.25 “โรงพยาบาล” were grouped for children in the 4:0-4:11 age-range because both their difficulty and discrimination levels were acceptable.

Items No.20 “แมลง” and No.21 “อนุสาวรีย์” were grouped for children in the age-range because both their difficulty and discrimination levels were acceptable.

Item No.23 “ปลาวาฬ” was included for children in the 6:0-6:11 age-range because both its difficulty and discrimination levels were acceptable.

Item No.12 “พวงแหวน” was included for children in the 7:0-7:11 age-range because both its difficulty and discrimination levels were acceptable.

Items which represented verbs:

Items No. 28 “กระโดด”, No.29 “ผลัก”, No.32 “เสียใจ”, No.34 “หลบ”, and No.36 “ทะเลาะ” were grouped for children in the 3:0-3:11 age-range because both their difficulty and discrimination levels were acceptable.

Items No.30 “ปลุก”, and No.37 “เดินไป” were grouped for children in the 4:0-4:11 age-range because both their difficulty and discrimination levels were acceptable.

Item No.31 “รับ” was included for children in the 5:0-5:11 age-range because both its difficulty and discrimination levels were acceptable.

Items represented adjectives:

Item No.38 “นุ่ม” was included for children in the 3:0-3:11 age-range because both its difficulty and discrimination levels were acceptable.

Item No.39 “เย็น” was included for children in the 4:0-4:11 age-range because both its difficulty and discrimination levels were acceptable.

Items No.40 “ต่างกัน”, No.42 “เท่ากัน”, and No.43 “หนา” were grouped for children in the 5:0-5:11 age-range because both their difficulty and discrimination levels were acceptable.

Item No.45 “ดื่นที่สุด” was included for children in the 6:0-6:11 age-range because both its difficulty and discrimination levels were acceptable.

Item No.41 “ครึ่งลูก” was included for children in the 7:0-7:11 age-range because both its difficulty and discrimination levels were acceptable.

Items which represented prepositions:

Items No.47 “ใต้” was included for children in the 3:0-3:11 age-range because both its difficulty and discrimination levels were acceptable.

Item No.46 “ข้างใน” was included for children in the 4:0-4:11 because both its difficulty and discrimination levels were acceptable.

Items which represented numeral classifiers:

Items No.48 “หนึ่งผล”, and No.49 “หนึ่งตุ” were grouped for children in the 6:0-6:11 age-range because both their difficulty and discrimination levels were acceptable.

Item No.50 “หนึ่งโหล” was included for children in the 7:0-7:11 age-range because both its difficulty and discrimination levels were acceptable.

In Subtest II, there were 33 satisfactory items and thirty-one items represented nouns that were contained in the five age-ranges. They were items No.1,2,4,3,4,5,6,9, 10,12,13,15,16,18,19,20,21,22,24,25,26,30,31,33,34,35,38,43,44,46,48,and,50 and items No.37, and 36 represented verbs.

Item which represented nouns:

Items No.1 “ดินสอ-ปากกา”, No.2 “ส้ม-แดงโม”, and No.16 “เสื้อ-กางเกง” and were grouped in the 3:0-3:11 age-range because both their difficulty and discrimination levels were acceptable.

Items No.3 “หมา-แมว”, No.5 “นม-น้ำ”, No.20 “แอร์-ตู้เย็น”, and No.21 “โซฟา-เก้าอี้”, were grouped in the 4:0-4:11 age-range because both their difficulty and discrimination levels were acceptable.

Items No.4 “สัตว์-ลูกบอล”, No.6 “ผัก-ผัก”, No.10 “หนังสือ-หนังสือพิมพ์” , No.15

“ไอศกรีม-น้ำแข็ง”, No.19 “บาท-สลึง”, No.24 “ขาว-แดง”, No.25 “กลอง-กัง”, No.33 “กล้วย-เงาะ”, No.48 “หมอ-พยาบาล”, and were grouped in the 5:0-5:11 age-range because both their difficulty and discrimination levels were acceptable.

Items No.13 “ตะน้ำ-คันหอม”, No.31 “กุ้ง-ปลา”, No.34 “ร้านค้า-ตลาด”, No.38 “มือ-เท้า”, No.43 “เปล-ชิงช้า”, No.44 “รถยนต์-เรือยนต์”, and were grouped in the 6:0-6:11 age-range because both their difficulty and discrimination levels were acceptable.

Items No.9 “กุหลาบ-มะลิ”, No.12 “เตาอบ-เตาแก๊ส”, No.18 “เมตร-กลอง”, No.22 “คันสีก-คันสน”, No.26 “หนึ่ง-สี่”, No.30 “เหนือ-ตะวันออก”, No.35 “เบียร์-สุรา”, No.46 “ถ่าน-ไม้”, and No.50 “หม้อ-กระทะ”, were grouped in the 7:0-7:11 age range because both their difficulty and discrimination levels were acceptable.

Items which represented verbs:

Item No.37 “ล้างน้ำ-อาบน้ำ” was included in the 6:0-6:11 age-range because both of its difficulty and discrimination levels were acceptable.

Item No.36 “ไหว้-คำนับ” was include in the 7:0-7:11 age-range because both its difficulty and discrimination levels were acceptable.

In subtest III, there were 34 satisfactory items of which twenty-two items represented nouns. They were items No.1,2,3,4,5,6,7,8,9,10,11,12,13,14,16,17,18,20,

22,23,25 and 26. Six items represented verb which were items No.28, 31, 32, 36,37 and 38. Four items represented adjectives which were items No.39,42,45 and 46, and two items represented numeral classifier which were items No.49, and 50.

Items which represented nouns:

Items No.6 “เตี๋ย”, No.1 “ไถ”, No.5 “ปาก”, No.14 “หญ่”, No.3 “บอล” were grouped in the 3:0-3:11 age-range because both their difficulty and discrimination levels were acceptable.

Items No.4 “หู”, No.2 “ส้ม”, No.11 “แกงจืด”, No.12 “หม้อ”, and No.20 “ตำรวจ” were grouped in the 4:0-4:11 age-range because both their No.22

Items No.9 “นาฬิกา”, Items No.9 “นาฬิกา” No.10 “ไม้บรรทัด”, No.17, “พริก”, No.22 “โรงพยาบาล”, and No.25 “พัดลม” were grouped in the 5:0-5:11 age-range because both their difficulty and discrimination levels were acceptable.

Items No.8 “คำ”, No.16 “รถไฟ”, No.13 “ดอกบัว”, and No.23 “กาแฟ” were grouped in the 6:0-6:11 age-range because both their difficulty and discrimination levels were acceptable.

Items No.7 “น้ำ”, No.18 “ป่าไม้”, and No.26 “ผีเสื้อ” were grouped in the 7:0-7:11 age-range because both their difficulty and discrimination levels were acceptable.

Items which represented verbs:

Items No.31 “พักผ่อน”, No.32 “ตากงน”, and No.38 “ป่วย” were grouped in the 6:0-6:11 age-range because both their difficulty and discrimination levels were acceptable.

Items No.36 “ประหลาด”, No.28 “กิน”, and No.37 “พิการ” were grouped in the 7:0-7:11 age-range because both their difficulty and discrimination levels were acceptable.

Items which represented adjectives:

Item No.45 “ว่างเปล่า” was included in the 5:0-5:11 age-range because both its difficulty and discrimination levels were acceptable.

Items No.39 “มาก”, No.42 “มีด”, and No.46 “ต่างกัน” were grouped in the 7:0-7:11 age-range because both their difficulty and discrimination levels were acceptable.

Items which represented numeral classifiers:

Items No. 49 “หนึ่งคู่”, and No.50 “หนึ่งโหล” were grouped in the 7:0-7:11 age-range because both their difficulty and discrimination levels were acceptable.

5.2 Standard scores and percentile ranks of the semantic abilities of subjects

Raw scores of the 500 subjects in the main research were converted to standard scores (Z-scores) and percentile ranks. The results showed the progression of these standard scores and percentile rank in one-year intervals of age for these 500 subjects.

5.3 Relationships between semantic abilities of children and their age and gender

5.3.1 Relationships between semantic abilities of children and their age

According to the results of this study, there were significant relationships found between the semantic abilities of children and their age. Older children had significantly

more semantic abilities than younger children. On the other hand, semantic abilities of children usually increased with age.

The results from this study were similar to results from some other studies. (41,42, 47,48, 49,53,54, 56,57,62). Children's semantic abilities were influenced by: (a) maturity, and (b) experience. Thus, semantic abilities of children tended to increase as the children grew older (39,48,49,58), (b) increases in semantic development of children related to their experiences. During primary school, children received experiences from both school and family. In school, children obtained new information from their teacher and through playing with their friends. At home, children learned and obtained information from adults especially parents who talked with them frequently. Furthermore, children obtained new information from playing, reading, and watching educational television programs. These experiences of children had help to support their semantic ability development (15,48,49).

5.3.2 Relationship between semantic abilities of children and their gender

In this study, the results showed that there were no significant relationships found between the semantic abilities of boys and girls in all age-range. This result was in accordance with several studies: Utairatanahit (46) , Pantong (48) , Hanchumpong (49) , Ariyasoponwong (57) , Ketudat (62) which found no significant relationships between the auditory comprehension abilities of vocabulary of boys and girls. They also stated that, in the reported many studies presented that gender difference was not an influence on semantic ability. So, many researchers found non significant differences in semantic abilities of children relative to gender (31,46,48,49,58,62). They reported that both boys and girls obtained learning and experience from their environment, which supported their

further semantic ability development such as through school (high technology educational equipment), mass media (information from newspapers, radio, educational television programs). These environments helped to develop comparable ability in language development of boys and girls (31,48,49,58,62).

Conclusion

This study used a specially constructed Thai Semantic Development Test for Children aged 3-7:11 years old in Bangkok Metropolitan area to gather and analyze semantic abilities of the selected groups of children. The conclusions of this study are the following:

1. The Thai Semantic Development Test for Children was designed to measure semantic abilities of children aged 3 years to 7 years 11 months in three different domains: comprehension, organization and expression. This test was composed of three subtests: Subtest I-Picture Vocabulary, Subtest II-Relational Vocabulary, and Subtest III-Oral Vocabulary. The overall test was administered to 150 subjects in a pilot study to pretest item each test. Quantitative analysis of each item was conducted, and unsatisfactory items were deleted. Satisfactory items were grouped according to age-range and arranged in an easy-to-difficult order for each age-range. The overall test was then administered to 500 subjects in the main research study.

2. The validity of the test pertained to content validity which was evaluated by three speech-language pathologists who had at least 5 years experience in speech-language development testing. They evaluated the content of items, the content validity of pictures, instructions for the test, and scoring criteria. Moreover, this test considered construct validity because the basic construct of the test was its scope relative to semantic ability of

children aged 3 to 7 years 11 months and covered three domains: comprehension, organization, and expression. Accordingly, the Thai Semantic Development Test for children was assumed to have sufficient validity pending further analysis.

3. The reliability coefficients for the Thai Semantic Development Test were analyzed by using Kuder Richardson KR-20 reliability analysis. The reliability coefficients for Subtests I, II, III were .955, .930 and .960 respectively. The overall reliability coefficient for all three subtests was .978. The magnitude of these coefficients indicated that the Thai Semantic Development Test was a sufficient reliable test.

The subjects' raw scores were analyzed and then converted to normative scores (Z-score normalization and percentile ranks). The Z-score normalization and percentile ranks were used to present and interpret test norms from this study which could provide clinicians with a guide for comparing the semantic performances in children with others of their age group. The Thai Semantic Development Test for children should be used as a clinical procedure for testing children's semantic abilities and for planning appropriate remedial intervention. The chart of derived normative scores could probably be best used to compare a specific child's rate of progress with that of normally developing children.

There were significant differences found between semantic abilities of children and their age. Older children had significantly higher semantic ability scores than younger children. Children's semantic ability scores increased with age.

There were no significant differences found between the semantic abilities of children and their gender.

Recommendation

Recommendations for the further study are as follows

1. Several kinds of reliability such as test-retest reliability, and split-half reliability should be examined and compared.
2. Validity of the overall test and its subtests should be reevaluated by techniques such as factor analysis and criterion-referenced comparisons.
3. Potential relationships between semantic ability scores and group difference such as learning disabilities children, mentally retarded children, and family background (e.g. order of birth, number of siblings) should be examined. This should also include an analysis of potential relationships relative to subtest semantic ability scores and group differences.

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APPENDIX A1

Words production list of children aged 5 to 8 years old (Ministry of Education, 1965)

Category	Words
Nouns (175 words)	- Occupations: หมอ คน ตำรวจ พระ ครู เด็ก นักเรียน แม่ค้า ทหาร ชวนา ในหลวง พระราชินี พระเจ้าอยู่หัว ผู้ชาย ผู้หญิง - Relatives: พ่อ แม่ พี่ น้อง दा เพื่อน ลุง ปู่ น้า ยาย ลูก ย่า อา และป้า - Body parts: มือ ขา ปาก ตัว दा จมูก นม เท้า หน้า หู ฟัน นิ้ว นิ้ว คอ แขน ต้น หลัง หัวเข่า สะดือ คับ หัว และผม - Articles of clothing and parts of the house: กางเกง เสื้อ เสื้อผ้า ผ้า หมวก เสื้อกันหนาว หมอน ผ้าห่ม มุ้ง เติง และที่นอน - Flowers: ดอกไม้ ดอกเข็ม กุหลาบ และมะลิ - Fruits: ถั่วฝักยาว แตงโม มะพร้าว ส้ม เงาะ มะละกอ ชมพู น้อยหน่า ฝรั่ง มะม่วง ลำไย ละมุด ส้มโอ ขนุน มะขาม ลำดวน องุ่น และมะขม - Plants: ผัก พริก มะเขือ ผักกาด หัวไชเท้า ผักบุ้ง กระบี่ กะหล่ำปลี ผักชี และถั่ว - Foods: ไข่ ข้าว น้ำ ขนม ขนมนึ่ง น้ำปลา น้ำตาล ชา ถั่วเขียว ข้าวสาร น้ำส้ม และแกง - Animals: ไก่ หมู กระต่าย ปลา หมา แมว นก เต่า หมี ปู ปลาทุบ เป็ด ช้าง เสือ ลิง วัว งู จระเข้ ควาย นกแก้ว ม้า สิงโต กวาง หมาป่า และกิ้ง - Objects: หนังสือ แปร่ง ช้อน จาน ชาม โทรทัศน์ โต๊ะ ของเล่น ตุ๊กตา ร่ม ประตู่ กระเป๋า ตู้ ถ้วย วิทยุ กระป๋อง หม้อ ช้อน เตา การ์ตูน รูป ตู้เย็น สมุด ทับทิม ถุง ตะกร้า และมีด - Vehicles: รถ เรือ รถไฟ และรถยนต์ - Place: โรงเรียน บ้าน วัด ตลาด ครุฑ ห้อง โรงพยาบาล ถนน สวนสัตว์ นา ดิน ฝน และป่า
Verbs and other words	วิ่ง มี ก็ ไป กิน ใส่ ขาเล่น ให้ ชอบ มา ดัง ซื่อ อยู่ ได้ นอน เลี้ยง ดู เดิน รัก อาบน้ำ ฟัง นั่ง คืบ ร้องไห้ เขียน จิตตา กระโดด ไม่ เก็บ กัด พาย ร้อน หิวน ไหว้ เห็น บิน เทียว ดู ดี สอน ตัด ต้ม ยิง อ่าน กวาด ไล่ เปิด มัด ตก กราบ จับ ปลูก หา ขี่ พา ขุด เจอ คิด รู้ และรู้จัก

APPENDIX A2

Words production list of children aged 3-7 years old (Suthajinda, 1973)

Category	Words
Nouns- Pronouns (610 words)	- Animals: หมา ไก่ ปลา กระต่าย หมี ม้า ปลาทุ กิง กวาง เต่า เสือ ช้าง ม้า ลาย แกะ หมู ลูกเจี๊ยบ แพะ เป็ด ควาย แมว ลูกไก่ นกฮูก จิงโจ้ กระรอก ปลาช่อน หนู นก ลา งู กา ค้างคาว หอย ะนี กบ ผีง สิงโต นกอินทรี กุ้ง ค้างคาว แมงมุม -Fruits: มะพร้าว เงาะ องุ่น น้อยหน่า มังคุด ส้ม มะม่วง ทุเรียน กลั้วชมพู พุทรา ละมุด ลำไย แดงโม อ้อย ลิ้นจี่ สับปะรด มะละกอ ขุน ฝรั่ง มันแกว มะปราง ชมพู่มะเหมี่ยว ลิ้นจี่ ระกำ มะไฟ ส้มเกลี้ยง มะเฟือง กลั้วหอม ฝรั่ง -Food: ข้าว น้ำ แกง ขนมน น้ำพริก ไข่ ถั่ว อาหาร น้ำปลา ไข่เจียว ข้าวโพด ขนมนึ่ง ก้วยเตี๋ย แกงส้ม แกงเผ็ด น้ำแข็ง เส้นหมี่ แกงจืด กานฟ ตั้งฉ่าย ขนมน จีบ ปลาทอด น้ำข้าว น้ำแกง หอยทอด นม เต้าหู้ ไข่เค็ม โจ๊ก ข้าวเหนียว เนย ไข่แดง ข้าวต้ม ผักคอง ไข่ดาว - Plants: ผัก มัน พริก กระเทียม หญา มะเขือ แดงกวา แดง คั่นกล้วย มะนาว ใบไม้ พัก ผักกระเจด ฟาง ต้นยาง หัวหอม ผักบุ้ง ใบกระถิน ต้นตาล ต้น พุทรา บวบ หน่อไม้ ผักคะน้า ใบตอง ลูกมะกรูด จาก ใบมะพร้าว มะขาม ลูก มะม่วง ต้นมะม่วง ผักชี มะเขือขาว ใบตอง หน่อไม้ ผักคะน้า มะระ ตำลึง สาเก ใบกระเทียม เห็ด ใบตาล ไม้ไผ่ มะเขือเทศ ถั่วขาว ดอกแค - Flowers: ดอกบัว ดอกชมพู - Articles of clothing: ผ้า เสื้อ รองเท้า ผ้าถุง กางเกง กระโปรง เสื้อผ้า ผ้า ขนหนู กางเกงขาขาว ถุงเท้า ผ้าถุง ผ้าห่ม ผ้าอ้อม ผ้าคลุม ผ้าปู ผ้าชั้น - Parts of the house: บ้าน หมอน โต๊ะ บันได เติง ที่นอน เก้าอี้ พูก ร้ว เพล ที่นั่ง ผ้าปูโต๊ะ ตู้ พื้น หน้าต่าง ประตู ผ้าห่ม หลังคาบ้าน ขาโต๊ะ ลูกกรง อ่างน้ำ ตู้กับข้าว กระดาน ผ้าคลุมเตียง เมาะ ฝาบ้าน ขอบรั้ว ใต้ถุน ราวบันได Vehicles: เรือ รถไฟ รถ รถเครื่อง รถยนต์ รถเก๋ง รถจักรยาน เครื่องบิน รถ 2 ล้อ รถสองแถว เรือหางยาว รถแข่ง รถตำรวจ รถบรรทุก รถจักรยานยนต์ เรือ ใบเรือช้าง

Category	Words
Nouns- Pronouns (Cont.)	- Relatives: ลูก พี่ คุณแม่ คุณพ่อลุง ป้า น้องสามี - Occupations: แม่ค้า คนขายของ พระ คนขับรถ คุณครู นักเรียน คนขายผลไม้ - Body parts: มือ หลัง หน้า ปาก ขา ตา คอ ผม ฟัน แขน กระดูก จมูก หัวหู เลือด - Place: โรงเรียน ตลาด ถนน ร้าน ทางรถไฟ สะพาน ป่า แม่น้ำ ศาลา สวน คลอง เมืองนอก จังหวัด สนาม ทาง ทะเล ท่าเรือ บ้านนอก วัด ร้านขนม บ่อ ลำน้ำ น้ำตก อุโมงค์ บ่อน้ำ - Objects: ตุ๊กตา ที่ลิ้น ชิงช้า อ่างอิง ร่ม ช้อน โถง แข่ง ของเล่น กิโย รูปกระป๋อง แป้ง โทรศัพท์ ไม้โยก ที่รดน้ำ ของขวัญ ขวด เส้า ส้อม ที่ต่อกระดิก ไม้หมุน วิตุ อ่าง หม้อข้าว หม้อข้าว ที่ต้มน้ำ เบ็ด ชิงช้าสวรรค์ ยากระเช้า ภาพ ลูกถือ รองเท้าแตะ รองเท้าแตะ ช้อนส้อม ห่วงยาง กระดาษ กระดาษ ไฟ กระป๋องน้ำ โทรศัพท์ กระดิ่ง ที่ใส่ผ้า สายพาน กระบอก หุ่นไล่กา เบาะ ถิ่นชัก ที่หมุน บันไดเลื่อนฝอย น้ำมัน ไม้โยก สมุด กำไล หน้ากาก ถ้วยน้ำปลา ถาด ทอง เคียว ไฟฉาย มีด บัตร ไม้ดัด แวนดา หมัด งานข้าว เขียง ถ้วยอาหาร สายรอบ ถังน้ำ นวม ไม้คาน ท่อนไม้ ชูบ ไม้รวก ไม้ขอนเงิน แม่เหล็ก หุ่นกระบอก กัดอง ลูกโป่งโป่ง เข็ม ขนกำอิ๊ ไบพัดครก กุญแจ ขง จดหมาย หางเสือ หลอด ถัง - Color: ฟ้า ส้ม น้ำตาล ขาว เหลือง แดง - Numbers: สอง สาม หนึ่ง สี่ โหล ห้า แปด หก เก้า เจ็ด - Pronouns: เขา นี่ มัน นั้น อะไร โน่น พวกนี้ ใคร เข้าของเรา - Etc. ผี บาง เคียว แสงแดด งาน กระจุก อัน ฝ่ลือก แอบ บก ราง หิน น้ำฝน ก็ คอ สลึง สิว ความสะอาด สดางค์ เวลา บ้านไม้ วง เริง คลับ ที่ป็น เช่น ช่อ พระอาทิตย์ วันเกิด ทาง เมื่อ คน เด็ก ผู้หญิง ผู้ชาย เพื่อน ผู้ใหญ่

Continued

Category	Words
Verbs (217 words)	มี เล่น นั่ง ขาย กิน ใส่ ทำ เอา รู้ ไป มา เป็น ให้ ถือ อยู่ ไว้ ดู กำลัง อยู่ รด ได้ พาย ตก ทาน หมด ขึ้น จะ ทา ชอบ ซื่อ เรียกว่า อาบน้ำ ลง หก อุ้ม ปลูก นอนเรียก ต้อง พา เห็น ตึก จับ มอง ปะ เท รู้จัก ว่า ดี ล้าง กลัว เห็น บอก ออก รวด โกรธ อยาก จำ ต่อ เดิน ชั่ง ไข่ ชี ยิง แก้วง ขึ้น เลี้ยง หยิบ อ่าน ดู เกาะ กลับ จ้ม ตั้ง จืด ดิด วัง วาง เข้า ตก หมุน ตาม ฉีก ฟัง เขียน เก็บ ลื่น ก้น จัด มอง โรย ภู สร้าง นุ่ง ขับ ปิด ทราบ คือ กวาด ก่อ รอ จบ เคย ชัก บีบ กาง ล้ม ตัก เช็ด ความ ปัก ว่ายนํ้า หุง เผา แปรง หล่น ไถ ปล่อย คำ เสรีจ หุบ เตะ โบก หา ยก ตาย กระดก แฉะ ลุด ขึ้น เหนื่อย ผัด รอง โยกแยก ขอม หัน ผลัก ถัก ตื่น แฉว เท้า ทิ้ง หิว ตก ใจ หาย บวช สะพาย ห้าม บ่น กระตุก งอน สาด ถูก อย่า ดัน ฐู เมื่อข ดัก พุด เปื้อ แก่ง เจ็บ ชัด ขว้าง หล่น สอน ถอด กระตุกกระดิก ฟุ้ง คลุม รีด หนี หมุน ฟิง กด ไล่ คืบ รับประทาน หุบ ท่วม เข็ม กวด วิต หงาย พับ แห่ แก้ว โปะ คด มุง เสียด จอด เข็บ แล่น เจอะ ไช ยัง หชุด สวม ร้อง ผ่า ปั่น ล้วง คว่า ข่ม แข่ง หยอด กลับ ถูบ จ้อง นึก ปลุก งง ว่าช ชัก บาน เขี้ยว คือ ขี้โกง บิด แดก บาน
Adjectives (130 words)	บน หลาก ขาว เขอะเขะ อร่อย ใหญ่ โต เขอะ เหมือน เล็ก และะ ดี ข้างล่าง เล็ก มาก สวย ข้างบน เร็ว เต็ม ทุก ใหม่ หลัง แะ แดง คล้าย อ้วน หนัก ร้อน ลาย ไกล กลาง นั้น แข็ง เหล่ บ้าง อาจ โยกแยก ล่าง บ่อย หมด แน่น หน้อย และะ เทอะ ใน ก่อน หก ข้างใน ข้างนอก สกปรก แรง ชุ่น สุก สุกท่าย หนา หอม คิบ
Etc. (60 words)	ก็ ที่ ใน กลับ ตรง หรือ ออ ของ อู๊ย เออ อี แต่ เอี้ย หี เพราะ สือ หา มั่ง ตั้ง อู๊ว ถ้า เอ๊ะ ละ เอ่อ เกี่ยวกับ นอก ตุม จืดจืด อู๊ว แต่ว่า สำหรับ สือ เอี้ย อ้าว กู๊ๆ ตุม แด็บคุบๆ จู๊ค เอ ชั่วๆ สะฮะ อีบ อือม อือ ปัทโธ่ เอื้อ วะ โอ้โฮ เรอะ เจ็บๆ อู๊ฮู ดีๆ โอ้ยโฮย ตาม โอย หว่า ฮีฮี หือ สะไม แล้ว นี้ ครับ ไข่ เคย เคย ด้วย ค่ะ ไม แล้ว นี้ ครับ ไข่ เคย เคย ด้วย ค่ะ ชิ เปล่า เคยๆ นะกว่า นั้นเอง ขาวๆ เหลวๆ ทั้งนั้น แะ แะ นาน ทิหลัง หือ แะ โน่น เหลือก โส แะ ยังจั้น ใจ

APPENDIX B

List of schools in pilot study:

- | | |
|-----------------------|----------|
| 1. โรงเรียนอานวยศิลป์ | เขตพญาไท |
| 2. โรงเรียนกิ่งเพชร | เขตพญาไท |

List of schools in main research study:

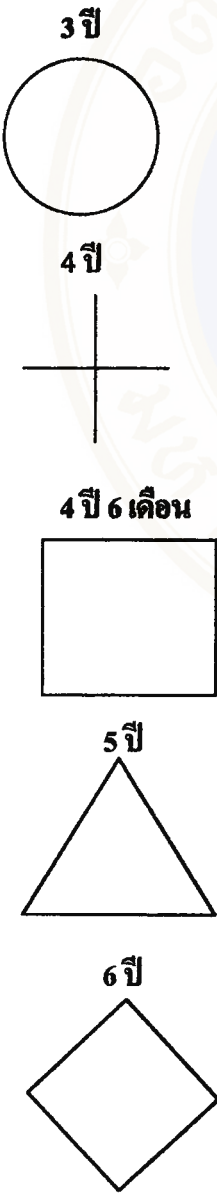
- | | |
|--------------------------------|---------------|
| 1. โรงเรียนชาลีสมุทร | เขตดอนเมือง |
| 2. โรงเรียนวัดหลักสี่ | เขตดอนเมือง |
| 3. โรงเรียนถนนอมพฤฒา | เขตลาดพร้าว |
| 4. โรงเรียนวัดลาดพร้าว | เขตลาดพร้าว |
| 5. โรงเรียนวชิรธรรมสาริต | เขตพระโขนง |
| 6. โรงเรียนวัดธรรมมงคล | เขตพระโขนง |
| 7. โรงเรียนสรรพวุฒวิทยา | เขตบางนา |
| 8. โรงเรียนวัดผ่องพลอยอุปถัมภ์ | เขตบางนา |
| 9. โรงเรียนเทพกาญจนา | เขตบางกอกน้อย |
| 10. โรงเรียนวัดคงมุลเหล็ก | เขตบางกอกน้อย |
| 11. โรงเรียนคาราทร | เขตจตุจักร |
| 12. โรงเรียนวัดเสมียนนารี | เขตจตุจักร |

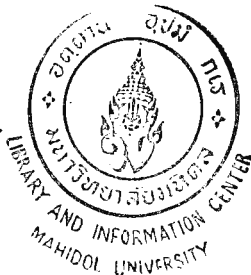
APPENDIX C

แบบทดสอบชุดที่ 1

การประเมินความสามารถทางสติปัญญาเพื่อการคัดกรองกลุ่มตัวอย่าง

คำสั่ง ให้นักเรียนวาดรูปตามตัวอย่าง โดยเริ่มที่อายุจริงของนักเรียน เช่น อายุ 3 ขวบ ให้เริ่มวาดรูปตาม แบบ คือ รูปวงกลม ซึ่งเป็นระดับที่เด็กอายุ 3 ขวบทำได้ ถ้าเด็กวาดตามแบบได้ให้วาดตามแบบในระดับต่อไปอีก 1 ภาพ หลังจากนั้นจึงยุติการวาดตามแบบแล้วจึงทำการทดสอบด้านภาษาต่อไป แต่ถ้าวาดตามแบบในระดับอายุที่เริ่มต้นไม่ได้ให้ยุติการทดสอบ





แบบทดสอบชุดที่ 2

การทดสอบพัฒนาการด้านคำศัพท์ของเด็ก (The Thai Semantic Development Test for Children)

ตอนที่ 1 ข้อมูลทั่วไป

ชื่อ — นามสกุล เพศ ☐ อายุ
โรงเรียน ชั้น

ตอนที่ 2 แบบทดสอบย่อยในแต่ละด้าน 3 ด้าน ได้แก่

แบบทดสอบย่อยด้านที่ 1 การฟังเข้าใจคำศัพท์
(SUBTEST I: PICTURE VOCABULARY PV.)

แบบทดสอบย่อยด้านที่ 2 การบอกความสัมพันธ์ทางความหมายของคำ 2 คำ
(SUBTEST II: RELATIONAL VOCABULARY RV.)

แบบทดสอบย่อยด้านที่ 3 การให้นิยามคำศัพท์
(SUBTEST III: ORAL VOCABULARY OV.)

แบบทดสอบย่อยด้านที่ 1 การฟังเข้าใจคำศัพท์
(Subtest I Picture Vocabulary : PV)

คำสั่งในการทดสอบ

แสดงภาพตัวอย่าง ก. ให้เด็กดูและพูดว่า “หนูดูภาพเหล่านี้ซิคะ” พร้อมชี้ภาพให้เด็กดูทีละภาพ จากนั้นพูดหรือสั่งว่า “หนูชี้ไอศกรีมให้ครูดูซิคะ”(ต้องแน่ใจว่าไม่มีการนำหรือแนะให้เด็กรู้คำตอบ) ถ้าเด็กสับสนไม่เข้าใจหรือตอบผิด ผู้ทดสอบต้องอธิบายแต่ละภาพให้เด็กฟังพร้อมทั้งให้เด็กชี้ตามที่ละภาพ เช่น “ลองดูอีกครั้งนะค่ะ หนูฟังครูพร้อมกับชี้ตามครูทีละภาพ ภาพนี้คือไม้บรรทัด ภาพนี้คือไอศกรีม ภาพนี้เป็นแก้วน้ำ ส่วนภาพนี้ คือ ส้ม ” จากนั้นผู้ทดสอบลองสั่งใหม่อีกครั้ง โดยพูดว่า “ทีนี้หนูลองชี้ภาพ ให้ครูดูซิคะ” และเมื่อเด็กสามารถชี้หรือตอบได้ถูกต้องให้ดำเนินการทดสอบในข้อที่ 1 ต่อไป พร้อมพูดว่า”หนูชี้ภาพ....ให้ครูดูซิคะ” ในกรณีที่เด็กตอบไม่ถูกต้อง ให้ผู้ทดสอบเฉลยหรือบอกคำตอบที่ถูก โดยชี้ภาพที่ถูกให้เด็กดู จากนั้นให้ดำเนินการทดสอบในข้อที่ 1 ต่อไป โดยไม่ต้องมีการอธิบายหรือทำตัวอย่างให้ดูอีก

การให้คะแนน

ถ้าตอบถูกให้ 1 คะแนนและคำตอบที่ผิดจะได้ 0 คะแนน ผู้ทดสอบต้องบันทึกคำตอบแต่ละข้อลงในแบบบันทึก และตรวจให้คะแนนโดยพิจารณาจากคู่มือการทดสอบ

หยุดทดสอบ เมื่อเด็กตอบผิด 5 ข้อติดกัน

	ข้อที่	คำตอบ	คะแนน
3 ขวบ	1. มะละกอ		
	2. กระโถด		
	3. ผู้ชาย		
	4. ผลัก		
	5. นุ่ม		
	6. สีนํ้าเงิน		
	7. ทะเลาะ		
	8. เสียใจ		
	9. ใต้		
	10. ฤดูหนาว		
	11. เย็น		

4 ขวบ	12. สะพาน		
	13. โรงพยาบาล		
	14. ขาวนา		
	15. ปลุก		
	16. ใบตอง		
	17. ช่างก่อสร้าง		
	18. ช้างใน		
	19. เดินไป		
	20. หมอ		
	21. ห้า		
5 ขวบ	22. อนุสาวรีย์		
	23. แมลง		
	24. รับ		
	25. เท่ากัน		
	26. หนา		
	27. ต่างกัน		
6 ขวบ	28. หลบ		
	29. ดิ้นที่สุด		
	30. หนึ่งผล		
	31. ปลาฉลาม		
	32. หนึ่งคู่		
7 ขวบ	33. พวกเขา		
	34. พิจาร		
	35. ครึ่งลูก		
	36. หนึ่งโหล		
รวมคะแนน			

แบบทดสอบย่อยด้านที่ 2 การบอกความสัมพันธ์ทางความหมายของคำ 2 คำ
(Subtest II Relational Vocabulary : RV)

คำสั่งในการทดสอบ

ผู้ทดสอบพูดคำถามแต่ละข้อในลักษณะดังนี้ “—และ—เหมือนกันอย่างไร” เช่น ผู้ทดสอบพูดว่า “หนูลองอธิบายให้ครูฟังว่าคำถามแต่ละข้อในลักษณะดังนี้ “—และ—เหมือนกันอย่างไร” เช่น ผู้ทดสอบพูดว่า “หนูลองอธิบายให้ครูฟังว่า “รองเท้ายากับถุงเท้าเหมือนกันอย่างไร” (คำตอบที่ถูกคือ “เป็นสิ่งที่ต้องใช้เป็นคู่หรือมี 2 ข้าง หรือ เป็น สิ่งที่เขาไว้สวมใส่ที่เท้า หรือเป็นเครื่องแต่งกาย”) ในกรณีที่เด็กตอบคลุมเครือไม่ชัดเจน ไม่ถูกต้องหรือไม่สมบูรณ์ ผู้ทดสอบจะต้องพูดกระตุ้นว่า “ไหนหนูลองอธิบายเพิ่มเติมอีกสักหน่อยซิคะว่ารองเท้าและถุงเท้าเหมือนกันอย่างไร” เทคนิคนี้ผู้ทดสอบใช้ได้เพียงหนึ่งครั้งเท่านั้นต่อหนึ่งข้อคำถาม

การให้คะแนน

ผู้ทดสอบจะต้องบันทึกคำตอบแต่ละข้อลงในแบบบันทึก และตรวจให้คะแนนโดยพิจารณาจากคู่มือการทดสอบ โดยที่ถ้าตอบถูกให้ 1 คะแนน และถ้าตอบผิดจะได้ 0 คะแนน

	ข้อที่	คำตอบ	คะแนน
3 ขวบ	1. ดินสอกับปากกา		
	2. เสื้อกับกางเกง		
	3. สัมกับแดงโม		
4 ขวบ	4. โซฟากับเก้าอี้		
	5. ตู้เย็นกับแอร์		
	6. นมกับน้ำ		
	7. หมากับแมว		
5 ขวบ	8. ล้อรถกับลูกบอล		
	9. ผักชีกับผักบุ้ง		
	10. ไอศกรีมกับน้ำแข็ง		
	11. หมอกับ พยาบาล		
	12. กล้วยกับเงาะ		
	13. หนังสือกับหนังสือพิมพ์		
	14. บาทกับสลึง		

	15. กล้องกับถัง		
	16. ขาวกับแดง		
6 ขวบ	17. เปลกับชิงช้า		
	18. ร้านค้ากับตลาด		
	19. คะน้ำกับคันหอม		
	20. มือกับเท้า		
	21. รอยชงค์กับเรือชนด์		
	22. ล้างน้ำกับอาบน้ำ		
	23. กุ้งกับปลา		
7 ขวบ	24. หนึ่งกับสี่		
	25. กุหลาบกับมะลิ		
	26. ดิ้นสั๊กกับดิ้นสน		
	27. หม้อกับกระทะ		
	28. เหนือกับตะวันออก		
	29. เป็ชร์กับสุรา		
	30. เตาอบกับเตาแก๊ส		
	31. ไหว้กับคำนับ		
	32. แตรกับกลอง		
	33. ถ่านกับไม้		
รวมคะแนน			

แบบทดสอบย่อยด้านที่ 3 การให้นิยามคำศัพท์
(Subtest III Oral Vocabulary : RV)

คำสั่งในการทดสอบ

ผู้ทดสอบต้องอธิบายให้เด็กฟังว่า “ ครูจะพูดคำหนึ่งให้หนูฟัง จากนั้นให้หนูบอกหรืออธิบายความหมายของคำนั้นว่าเป็นอย่างไร ตัวอย่างเช่น ถ้าครูพูดว่า “ สุนัขคืออะไร ” หนูต้องตอบว่า “ มันเป็นสัตว์ มันมีขาสี่ขา เหาได้ ” เอาล่ะ? ทีนี้หนูลองดูนะค่ะ หนูลองตอบครูดูซิค่ะว่า “ ไก่คืออะไร ” จากนั้นบันทึกคำตอบที่ได้และดำเนินการทดสอบต่อไป โดยที่คำถามแต่ละข้อจะมีลักษณะดังนี้คือ “ คืออะไร ” และในกรณีที่คำตอบที่ได้คลุมเครือ ไม่ชัดเจน ไม่ถูกต้องหรือไม่สมบูรณ์ ให้ผู้ทดสอบถามว่า “ ไหนหนูลองอธิบายเพิ่มเติมอีกสักหน่อยซิค่ะ ” ซึ่งเทคนิคนี้ผู้ทดสอบจะใช้ได้เพียงสองครั้งต่อหนึ่งข้อคำถามเท่านั้น

การให้คะแนน

ผู้ทดสอบต้องบันทึกคำตอบแต่ละข้อลงในแบบบันทึก และตรวจให้คะแนน โดยพิจารณาจากคู่มือการทดสอบ ถ้าตอบถูกต้องตามเกณฑ์ในแต่ละข้อให้ 1 คะแนน แต่ถ้าข้อคำถามไหนตอบผิดหรือไม่ถูกต้องตามกำหนดจะได้ 0 คะแนน

	ข้อที่	คำตอบ	คะแนน
3ขวบ	1. เติง		
	2. ไก่		
	3. ปาก		
	4. สุนัข		
	5. บอล		
4ขวบ	6. หู		
	7. ส้ม		
	8. แกงจืด		
	9. หม้อ		
	10. ตำรวจ		

	ข้อที่	คำตอบ	คะแนน
5 ขวบ	11. พริก		
	12.. ไม้บรรทัด		
	13. นาฬิกา		
	14. พัดลม		
	15. โรงพยาบาล		
	16. ว้างเปล่า		
6 ขวบ	17. พักผ่อน		
	18. ชากจน		
	19. ดำ		
	20. รถไฟ		
	21. ป่วย		
	22. ดอกบัว		
	23. กาแฟ		
7 ขวบ	24. 1 คู่		
	25. ประหยัด		
	26. มาก		
	27. กิน		
	28. น้ำ		
	29. พิการ		
	30. มีด		
	31. ต่างกัน		
	32. ป่าไม้		
	33. 1 โหล		
	34. ผีเสื้อ		
รวมคะแนน			

ตอนที่ 3 ตารางบันทึกคะแนน

ข้อทดสอบย่อยด้าน	RAW SCORE	STANDARD SCORE	PERCENTILE RANK
SUBTEST I : PICTURE VOCABULARY(PV.)			
SUBTEST II : RELATIONAL VOCABULARY (RV.)			
SUBTEST III : ORAL VOCABULARY (OV.)			
รวม			

APPENDIX D

List of sources in selecting words

1. Master's Degree theses:

Utairatanahit D., 1966 (46), Phetthongkam S., 1973 (92), Wicharuk S., 1973 (93), Isarangkul Na Ayutaya Ch., 1977(94), Sunthajan Ph., 1977 (95), Suthijinda C., 1979 (69), Limpicharean Ch., 1984 (96), Phaisanphanumad K., 1986 (27), Phumiamorn B., 1986 (47), Punthong L., 1987(48), Harnchumpol W., 1987(49), Prathanee B., 1990 (50), Cosapanyatam C., 1991 (73), Na NaKorn S., 1994(71), Ketudat R., 1995 (62), Tumningan BB. 1996 (97).

2. Standardized tests:

- The Wechler Intelligence Scale for Children-Revised: WISC-R (similarities subtest)
- The Stanford-Binet Form L-M (similarities : two things subtest)
- The Test for Auditory Comprehension of Language (English)
- The Boehm Test of Basic Concepts-(Revised)
- The Test of Language Development : Primary--Third Edition: TOLD-P:3 (subtests of semantic domain)
- The Peabody Picture Vocabulary Test--Revised : PPVT-R

3. Basic word lists from the Department of Academics, Ministry of Education (68)

4. Thai children's books that are included in curriculums for kindergarten and primary education in Thailand:

4.1 แบบเรียนภาษาไทยเบื้องต้น สำหรับเด็กชั้นอนุบาล 1 ของสุดา ทศานนท์

4.2 แบบเรียนภาษาไทยเบื้องต้น เล่ม 1,2 สำหรับเด็กชั้นอนุบาล 2 ของสุดา ทศานนท์

4.3 แบบเรียนภาษาไทยเบื้องต้น เล่ม 3,4 สำหรับเด็กชั้นอนุบาล 3 ของสุดา ทศานนท์

4.4 หนังสือแบบเรียนภาษาไทย ชุดพื้นฐานภาษา ชั้นประถมศึกษาปีที่ 1 เล่ม 1,2 ตามหลัก

สูตรประถมศึกษา พุทธศักราช 2521 (ฉบับปรับปรุง พุทธศักราช 2533) ของกรมวิชา

การ กระทรวงศึกษาธิการ

4.5 หนังสือแบบเรียนภาษาไทย ชุดพื้นฐานภาษา ชั้นประถมศึกษาปีที่ 2 เล่ม 1,2 ตามหลักสูตร

ประถมศึกษา พุทธศักราช 2521 (ฉบับปรับปรุง พุทธศักราช 2533) ของกรมวิชาการ

กระทรวงศึกษาธิการ

APPENDIX E

List of words in each category from selected words

Category	500 words
Nouns	หมา แมว ปลา นก ปู เสือ เป็ด ไก่ ผีเสื้อ มดแดง ตั๊กแตน กระต่าย ลิง ช้าง ม้า วัว กบ เต่า ควาย กุ้ง แมลง หงู หมี ชีราฟ สิงโต ปลาทุ ปลาหวา ปลาโลมา ปลาหมึก หอย งู ปลาดาว จระเข้ หู ตา จมูก ปาก ผม มือ เท้า สอก เข่า นิ้ว หาง ส้ม กลัวย องุ่น แดงโม เงาะ มะม่วง มะละกอ สับปะรด ฝรั่ง แอปเปิ้ล ชมพู มังคุด ต้นไม้ ผลไม้ ดอกไม้ ต้น สัก ป่าไม้ ใบตอง ผัก แดงกวา ต้นหอม ผักชี ผักบุ้ง คื่นห่าน พริก มะลิ กุหลาบ บัว เฟื่องฟ้า กลัวยไม้ ขนุน นม น้ำ ชา เบียร์ สุรา ก๋วยเตี๋ยว กาแฟ ปากกา ดินสอ ไม้ เกาอี้ กรรไกร ปืน มีด หมอน เสื้อ เตาอบ เตาแก๊ส หม้อ กระทะ เติง ตู้ เทียนไข ตะเกียง ช้อน จาน ชาม แก้ว ขวด ถ้วย ตู้เย็น เตาไรต์ กระทง ม้านั่ง โซฟา ล้อรถ ลูก บอล ตุ๊กตา ลูกโป่ง แอร์ พัดลม กล้อง ถัง หน้าต่าง ประตู ภูเขา เขื่อน เหล็ก ถ่าน ไม้ หนังสือ หนังสือพิมพ์ เสื้อ กางเกง รองเท้า ถุงเท้า กระดุม ชิป โทรศัพท์ วิทยุ นาฬิกา ไม้บรรทัด ขาถลบ สบู่ แปรง ขันน้ำ ไม้กวาด ร่ม รง กระดาษ จักรยาน มอเตอร์ไซด์ รถ เรือ รถไฟ เครื่องบิน วัว ชานพาหนะ พาหนะ เกวียน ไสกริม น้ำแข็ง ลูกอม ข้าว ไก่ทอด ไข่ดาว ไอศกรีม ข้าวต้ม แองกีส แองเคิล ผักผัก ผักเผ็ด ข้าวผัด บ้าน โรง เรียน โรงพยาบาล สถานีตำรวจ ที่ทำการไปรษณีย์ ตลาด ร้านค้า อนุสาวรีย์ เครื่อง ดนตรี กลอง แตร ขอ ขิม ระนาด เปี่ สะพาน ถนน ทางม้าลาย ดึก บาท สลึง ทอง เพชร ไข่มุก เงิน สดางค์ วงกลม สามเหลี่ยม สี่เหลี่ยม ดาว ม้าหมุน ไม้ลั่น เปล ชิงช้า กระดานหก ของเล่น ฤดูร้อน ฤดูหนาว ฤดูฝน ขาว ดำ แดง เขียว เหลือง น้ำเงิน น้ำ ตาล ม่วง ฟ้า ชมพู ส้ม หนึ่ง สอง สาม สี่ ห้า หก เจ็ด แปด เก้า สิบ กลางวัน กลางคืน เช้า เย็น เหนือ ใต้ ตะวันออก ตะวันตก พระอาทิตย์ พระจันทร์ รุ่ง ภูเขา ทะเล พุงนา แม่น้ำ ลำคลอง หมอ โรงพยาบาล ตำรวจ ทหาร ครู นักเรียน ขาวนา ขาวสวน ขาว ประมง ข่างก่อสร้าง ข่างทาสี พ่อ แม่ ลูก ปู่ ย่า ตา ยาย ลุง ป้า น้า อา หลาน เด็ก พระ ผู้ชาย ผู้หญิง กษัตริย์ นายกรัฐมนตรี ประธานาธิบดี พวกเขา พวกเรา พวกมัน คน นัก ร้อง นักดนตรี นักกีฬา

Category	500 Words
Verbs	กิน คืบ ดูด ดู นั่ง นอน เล่น เดิน วิ่ง กอด เตะ ต่อย อุ้ม เคาะ ตื่น หลับ หล่น จี่ เคี้ยว ตก ทุบ จับมือ ขึ้น ชี ฟัง หกล้ม เขียน อ่าน กัด ตี ดึง ไป ตัด แตะ ทิ้ง ฉีก ใส่ เปิด ปิด ถือ เป่า กระโดด หลบ เดิน ถอด ผูก อ้ม ผลัก ตบมือ อาบน้ำ กวาด แปรงฟัน ล้าง เช็ด หวีผม สระผม คลาน กราบ ไหว้ คำนับ ป้อน ก้ม ดม ให้ รับ หลบ พิการ ทะเลาะ ว่ายน้ำ ปีน ข้าม บิน เท้า เคาะ ชน ทา ปูกล ร้องไห้ ดีใจ เสียใจ หัวเราะ ตกใจ เส่ร้า สนุกสนาน โกรธ เทียว มัด พักผ่อน ขากจน รวบ ซื้อ ขาย เกา ถู รดน้ำ รีดผ้า ตาก บุด ไข ห่ม เหยียบ ใส ดัก จาม ขโมย ชก หั่น ตอก คาน สอน เรียน ไล่ หยิบ สูด ถ่ายรูป ร้องเพลง ประหัด ขอบ เกลียด รัก เก็บ พูด หายใจ จิ้ม แขนว ลาก เข็น ขึง วาด บาด ลอย ชี ป่วย
Adjectives	ใหญ่ เล็ก ล้วน ขาว สูง เตี้ย อ้วน ผอม หนัก เบา แข็ง นุ่ม กว้าง แคบ หนา บาง ร้อน เย็น ช้า เร็ว มาก น้อย แห้ง เปียก ไกล ใกล้ มือ สว่าง เต็ม ว่างเปล่า ใหม่ เก่า ตื่น ลึก ซ้าย ขวา สะอาด สกปรก เท่ากัน เหมือนกัน แตกต่างกัน ขึ้น ลง เข้า ออก ดี เลว ชนะ แพ้ ล้น สวย หล่อ เหม็น หอม
Prepositions	ข้างใน ข้างนอก บน ใต้(ล่าง) ข้างหน้า ข้างหลัง ข้าม มุม ระหว่าง ตรงกลาง รอบ ข้าง
Numeral classifiers	ผล ตัว คู่ ข้าง อัน ก้อน ดอก แท่ง เล่ม ใบ ชิ้น ผู่ เส้น เม็ด กลุ่ม โขลง โหล

APPENDIX F1

Discrimination (D) and difficulty (P) levels of each item in subtest I by age group

Years: Months Item	3-3:11(y:m)		4-4:11(y:m)		5-5:11(y:m)		6-6:11(y:m)		7-7:11(y:m)	
	D	P	D	P	D	P	D	P	D	P
1	-0.067	0.500	0.467	0.633	0	1	0	1	0	1
2	0.133	0.733	0.133	0.833	0	1	0	1	0	1
3	0.133	0.867	0.067	0.967	0	1	0	1	0	1
4	0.533	0.600	0.133	0.967	0	1	0	1	0	1
5	0.133	0.933	0	1	0	1	0	1	0	1
6	0.400	0.800	0.067	0.967	0	1	0	1	0	1
7	0.067	0.900	0.067	0.967	0	1	0	1	0	1
8	0.267	0.467	0.533	0.600	0.200	0.900	0.133	0.933	0	1
9	0.333	0.867	0.067	0.967	0	1	0	1	0	1
10	0.333	0.233	0.267	0.400	0.267	0.800	0.067	0.933	0	1
11	0.333	0.500	0.133	0.800	0.200	0.900	0	1	0	1
12	0	0.067	0.333	0.300	0.867	0.233	0.400	0.467	0.200	0.633
13	0	0.467	0.867	0.533	0.333	0.867	0.067	0.900	0.133	0.933
14	0.067	0.333	0.067	0.433	0.133	0.667	0.133	0.833	0	1
15	0.133	0.333	0.133	0.733	0.067	0.967	0	1	0	1
16	0.067	0.033	0.400	0.400	0.133	0.800	0	0.933	0	1
17	-0.267	0.467	0.133	0.600	-0.067	0.633	0.133	0.900	-0.133	0.833
18	0.067	0.400	0.133	0.600	0.200	0.833	0.133	0.933	0	1
19	0.333	0.833	0.067	0.967	0.067	0.967	0	1	0	1
20	0	0.400	0.533	0.267	0.467	0.633	0.433	0.600	0.533	0.733
21	0.467	0.433	0.133	0.500	0.267	0.667	0.067	0.700	0.133	0.733
22	0.400	0.400	0.333	0.367	0.133	0.867	0.067	0.900	0.133	0.933
23	0.200	0.300	0.400	0.400	0.200	0.633	0.200	0.633	0.133	0.867
24	0.267	0.267	0.267	0.533	0.200	0.833	-0.067	0.767	0	0.733
25	0.133	0.633	0.467	0.633	0.067	0.900	0.067	0.967	0.067	0.967
26	0.133	0.700	0.267	0.867	0	1	0	1	0	1
27	0.133	0.933	0.067	0.967	0	1	0	1	0	1
28	0.333	0.633	0.333	0.767	0.133	0.933	0	1	0.133	0.933
29	0.400	0.533	0.533	0.667	0.133	0.933	0	1	0.067	0.967
30	0.333	0.367	0.467	0.567	0.133	0.733	0.133	0.933	0	0.933
31	0.267	0.200	0.533	0.333	0.333	0.633	0.067	0.900	0.067	0.967
32	0.467	0.433	0.300	0.700	0.200	0.833	0	0.867	0	0.867
33	-0.467	0.500	0.133	0.533	0.133	0.867	0.267	0.800	0	0.867
34	0.133	0.133	0.267	0.267	-0.200	0.767	0.267	0.800	0.133	0.800
35	0	0.067	0.067	0.067	0.067	0.433	-0.067	0.433	0.267	0.533
36	0.467	0.500	0.733	0.633	0.200	0.900	0.067	0.967	0	1
37	0.267	0.267	0.267	0.467	0.067	0.633	0.200	0.767	0.067	0.833
38	0.267	0.533	0.400	0.667	0.133	0.933	0.067	0.967	0	1

continued

Years: Months Item	3-3:11(y:m)		4-4:11(y:m)		5-5:11(y:m)		6-6:11(y:m)		7-7:11(y:m)	
	D	P	D	P	D	P	D	P	D	P
39	0.200	0.367	0.400	0.667	0.400	0.800	0.067	0.967	0.067	0.967
40	0.467	0.233	0.133	0.200	0.267	0.400	0.133	0.933	0.067	0.900
41	0.133	0.067	0.267	0.133	0.067	0.167	0.067	0.433	0.200	0.433
42	0.400	0.200	0.333	0.300	0.6	0.633	0.133	0.933	0.200	0.933
43	0.133	0.067	0.067	0.167	0.533	0.467	0.333	0.767	0.067	0.967
44	0.200	0.833	0	0.867	0	1	0.067	0.967	0	1
45	0.133	0.067	0.333	0.200	0.267	0.367	0.467	0.700	0.067	0.833
46	0.333	0.300	0.867	0.500	-0.067	0.967	0.200	0.900	0	0.933
47	0.333	0.433	0.400	0.733	0	1	0.067	0.900	0	1
48	0.067	0.033	0.133	0.133	0.467	0.300	0.600	0.633	0.200	0.833
49	0	0	0.133	0.133	0	0	0.467	0.300	0.133	0.800
50	0	0	0.133	0.133	0.267	0.133	0.200	0.200	0.533	0.333

APPENDIX F2

Discrimination (D) and difficulty (P) levels of each item in subtest II by age-group

Years: Months Item	3-3:11(y:m)		4-4:11(y:m)		5-5:11(y:m)		6-6:11(y:m)		7-7:11(y:m)	
	D	P	D	P	D	P	D	P	D	P
1	0.333	0.567	0.267	0.767	0.400	0.800	0.133	0.867	0.067	0.967
2	0.400	0.467	0.467	0.500	0.467	0.700	-0.133	0.733	0.267	0.733
3	0.267	0.167	0.533	0.400	0.533	0.667	0.067	0.900	0.333	0.767
4	0.067	0.233	0.200	0.167	0.600	0.633	0.067	0.833	0.267	0.867
5	0.333	0.233	0.400	0.467	0.267	0.600	0.267	0.667	0.133	0.667
6	0.267	0.133	0.333	0.167	0.600	0.500	0.267	0.667	0.267	0.800
7	0.067	0.033	0	0	0	0	-0.067	0.100	0.333	0.167
8	0.333	0.233	0.400	0.200	0.133	0.367	0.133	0.533	0.133	0.400
9	0.133	0.033	0.267	0.133	0.533	0.333	0.467	0.367	0.400	0.533
10	0.200	0.067	0.267	0.200	0.533	0.400	0.133	0.533	0	0.933
11	0.267	0.167	0.167	0.067	0.333	0.233	0.067	0.300	-0.067	0.167
12	0.200	0.133	0.067	0.033	0.267	0.200	0.133	0.400	0.467	0.433
13	0.267	0.100	0.667	0.100	0.400	0.333	0.600	0.500	0.467	0.700
14	0.200	0.133	0.133	0.133	0.333	0.300	0.067	0.433	0.133	0.533
15	0.200	0.233	0.400	0.400	0.333	0.500	-0.067	0.700	0	0.800
16	0.533	0.467	0.400	0.733	0.200	0.867	0.200	0.833	0.067	0.967
17	0.200	0.033	0.033	0.067	0.333	0.300	0.700	0.200	0.067	0.700
18	0	0	0	0	0.067	0.100	0.600	0.367	0.667	0.400
19	0.267	0.167	0.467	0.300	0.400	0.400	0.333	0.833	0.133	0.833
20	0.267	0.133	0.533	0.467	0.533	0.733	0.267	0.800	0.067	0.967
21	0.267	0.200	0.400	0.600	0.267	0.533	0.067	0.633	0.133	0.933
22	0	0	0.067	0.033	0.400	0.200	0.400	0.200	0.600	0.500
23	0.067	0.033	0.333	0.167	0.200	0.100	0.333	0.233	0.533	0.300
24	0.133	0.067	0.067	0.033	0.600	0.400	0.133	0.800	0.200	0.833
25	0.200	0.100	0.267	0.200	0.400	0.400	0.067	0.700	0.067	0.833
26	0	0	0.2	0.1	0.667	0.333	0.267	0.367	0.267	0.700
27	0	0	0	0	0.667	0.133	-0.067	0.233	0.333	0.367
28	0	0	0	0	0.133	0.067	0.200	0.167	0.067	0.033
29	0	0	0	0	0	0	0.033	0.167	0.467	0.267
30	0	0	0	0	0.033	0.067	0.267	0.133	0.400	0.467
31	0	0	0.067	0.033	0.467	0.233	0.400	0.400	0.467	0.500
32	0	0	0.000	0.000	-0.067	0.033	0.200	0.100	0.133	0.133
33	0.133	0.67	0.333	0.167	0.600	0.433	0.800	0	0.400	0.733
34	0.200	0.100	0.267	0	0.333	0.367	0.533	0.667	0	0.867
35	0.067	0.033	0.067	0.067	0.333	0.233	0.267	0.267	0.400	0.467
36	0.067	0.333	0	0.100	0	0	0.067	0.033	0.467	0.433
37	0	0	0	0.033	0.133	0.067	0.533	0.4	0.267	0.400

Continued

Years: Months Item	3-3:11(y:m)		4-4:11(y:m)		5-5:11(y:m)		6-6:11(y:m)		7-7:11(y:m)	
	D	P	D	P	D	P	D	P	D	P
38	0	0	0.067	0.033	0.533	0.267	0.333	0.500	0.200	0.367
39	0	0	0	0	0	0	0.067	0.033	0.133	0.333
40	0	0	0	0	0	0	-0.067	0.033	0.267	0.133
41	0	0	0	0	0	0	0	0	0.067	0.167
42	0	0	0	0	0	0	-0.067	0.500	0.400	0.333
43	0	0	0.267	0.167	0.200	0.233	0.400	0.700	0.133	0.667
44	0	0	0	0	0.333	0.067	0.400	0.467	0.200	0.600
45	0	0	0	0	0.067	0.033	0.133	0.067	0.333	0.233
46	0	0	0.067	0.333	0	0.067	0.267	0.233	0.267	0.400
47	0	0	0	0	0.033	0.067	0.267	0.100	0.200	0.233
48	0	0	0.333	0.200	0.500	0.467	0.267	0.667	0.133	0.800
49	0	0	0	0	0.167	0.200	0.267	0.167	0.267	0.333
50	0.067	0	0	0	0.333	0.167	0.200	0.167	0.533	0.467



APPENDIX F 3

Discrimination (D) and difficulty (P) levels of each item in subtest II by age-group

Years: Months Item	3-3:11(y:m)		4-4:11(y:m)		5-5:11(y:m)		6-6:11(y:m)		7-7:11(y:m)	
	D	P	D	P	D	P	D	P	D	P
1	0.533	0.600	0.067	0.867	0.067	0.9	0.067	0.967	0.067	0.967
2	0.400	0.400	0.400	0.600	0.200	0.833	0.067	0.967	-0.067	0.967
3	0.600	0.400	0.900	0.200	0.067	0.900	0	1	0	1
4	0.533	0.333	0.067	0.600	0.200	0.900	0	1	0	1
5	0.533	0.600	0.533	0.067	0.067	0.967	0	1	0	1
6	0.333	0.700	0.400	0.800	0.067	0.967	0	1	0	1
7	0	0	0	0	0.133	0.067	0.133	0.267	0.600	0.433
8	0	0.067	0.067	0.100	0.333	0.200	0.533	0.667	0.333	0.600
9	0.067	0.100	0.267	0.133	0.467	0.500	-0.067	0.767	0.100	0.767
10	0.067	0.033	0.067	0.233	0.400	0.533	0.333	0.833	0	1
11	0.467	0.433	0.333	0.567	0	0.867	0	0.800	0	1
12	0.333	0.433	0.400	0.533	0.067	0.633	0	0.933	0	1
13	0.067	0.100	0.200	0.233	0.400	0.200	0.400	0.467	0.600	0.433
14	0.533	0.533	0.267	0.733	-0.067	0.833	0.067	0.967	0	1
15	0	0	0	0	-0.067	0.033	0	0	-0.067	0.033
16	0	0.267	0.333	0.067	0.200	0.167	0.200	0.633	0.133	0.733
17	0.067	0.433	0.133	0.267	0.533	0.533	0.333	0.633	0.400	0.733
18	0	0	0	0	0	0	0.267	0.200	0.467	0.367
19	0.133	0.433	0.133	0.067	0	0.500	0.100	0.700	0.333	0.767
20	0.400	0.267	0.400	0.467	0.133	0.800	0.067	0.767	0.067	0.900
21	0	0	0.067	0.033	0	0	0.200	0.100	0	0.200
22	0.333	0.033	0.133	0.067	0.600	0.433	0.067	0.500	0.533	0.800
23	0	0.067	0	0	0.133	0.067	0.400	0.333	0.333	0.300
24	0	0	0	0	0.067	0.033	0.333	0.233	0.467	0.333
25	0.133	0.267	0.133	0.333	0.400	0.467	0.133	0.800	0	0.867
26	0	0	0	0	0.067	0.033	0.067	0.033	0.533	0.333
27	0	0	0	0	0.133	0.067	0.067	0.033	0.133	0.333
28	0	0	0	0	0.067	0.033	0.200	0.233	0.533	0.467
29	0.033	0.067	0.067	0.033	0.067	0.033	0.400	0.267	0.333	0.300
30	0.533	0.067	0	0	0	0	0	0.200	0.467	0.300
31	0.333	0.167	0.600	0.367	-0.133	0.533	0.467	0.700	0.200	0.833
32	0.133	0.067	0.067	0.033	0	0.267	0.333	0.700	0.400	0.667
33	0	0	0	0	0.067	0.033	0.067	0.033	0.067	0.033
34	0.467	0.333	0.467	0.367	0.067	0.233	0.133	0.400	0.067	0.433
35	0	0	0	0	0	0	0.133	0.200	0.133	0.133
36	0	0	0	0	0.067	0.033	0.400	0.200	0.600	0.567

Continued

Years: Months Item	3-3:11(y:m)		4-4:11(y:m)		5-5:11(y:m)		6-6:11(y:m)		7-7:11(y:m)	
	D	P	D	P	D	P	D	P	D	P
37	0.033	0.067	0.200	0.100	0.267	0.200	-0.067	0.433	0.467	0.433
38	0.033	0.067	0.133	0.067	0	0.267	0.400	0.600	0.600	0.633
39	0	0	0	0.033	0.200	0.100	0.467	0.367	0.400	0.467
40	0	0	0	0	0.200	0.100	0	0.133	0.400	0.267
41	0	0	0	0	0	0	0.067	0.100	0.200	0.100
42	0	0	0	0	0.133	0.067	0.267	0.267	0.467	0.433
43	0	0	0	0	0	0	0.267	0.267	0.067	0.100
44	0	0	0	0	0	0	0.067	0.033	0	0
45	0.067	0.133	0.133	0.067	0.600	0.433	0	0.00	0.267	0.767
46	0	0	0.067	0.033	0	0	0.200	0.367	0.333	0.433
47	0	0	0	0	0	0	0	0	0	0.067
48	0	0	0	0	0	0	0	0	0	0.067
49	0	0	0.133	0.067	0.133	0.067	0.200	0.300	0.467	0.700

APPENDIX G1

Normative scores on the Thai Semantic Development for children aged 3:0-3:11 years:months.

SUBTEST I			SUBTEST II			SUBTEST III		
RAW SCORE	Z-SCORE	PERCENTILE RANK	RAW SCORE	Z-SCORE	PERCENTILE RANK	RAW SCORE	Z-SCORE	PERCENTILE RANK
22	2.55	99	13	4.31	99	12	2.67	99
19	1.92	97	10	3.07	98	10	1.93	98
18	1.70	95	9	2.65	97	9	1.55	95
17	1.49	94	8	2.24	96	8	1.18	90
16	1.28	93	7	1.82	93	7	0.80	83
15	1.07	91	6	1.41	92	6	0.43	66
14	0.86	84	5	1.08	90	5	0.05	50
13	0.65	78	4	0.58	86	4	-0.32	48
12	0.44	66	3	0.17	72	3	-0.70	34
11	0.22	62	2	-0.25	52	2	-1.07	20
10	0.01	53	1	-0.66	34	1	-1.45	10
9	-0.19	40	0	-1.08	1	0	-1.82	1
8	-0.40	33	-	-	-	-	-	-
7	-0.61	26	-	-	-	-	-	-
6	-0.82	24	-	-	-	-	-	-
5	-1.04	22	-	-	-	-	-	-
4	-1.25	17	-	-	-	-	-	-
3	-1.46	10	-	-	-	-	-	-
2	-1.67	5	-	-	-	-	-	-
1	-1.99	3	-	-	-	-	-	-
0	-2.09	1	-	-	-	-	-	-

APPENDIX G2

Normative scores on the Thai Semantic Development for children aged 4:0-4:11 years:months.

SUBTEST I			SUBTEST II			SUBTEST III		
RAW SCORE	Z-SCORE	PERCEN-TILE RANK	RAW SCORE	Z-SCORE	PERCEN-TILE RANK	RAW SCORE	Z-SCORE	PERCEN-TILE RANK
31	2.24	99	27	4.56	99	21	2.98	99
30	2.06	98	22	3.42	98	19	2.45	98
29	1.88	97	21	3.19	97	18	2.18	97
28	1.71	96	18	2.51	96	17	1.91	95
27	1.53	93	15	1.82	95	16	1.65	94
26	1.35	89	13	1.37	94	15	1.38	92
25	1.17	87	12	1.14	93	14	1.11	88
24	0.99	85	11	0.91	90	13	0.85	83
23	0.81	79	10	0.68	84	12	0.58	76
22	0.63	77	9	0.45	77	11	0.31	68
21	0.45	71	8	0.23	70	10	0.09	63
20	0.28	64	7	0.002	60	9	-0.21	53
19	0.10	60	6	-0.22	52	8	-0.47	39
18	-0.07	47	5	-0.45	43	7	-0.74	24
17	-0.25	42	4	-0.68	30	6	-1.01	14
16	-0.43	33	3	-0.90	18	5	-1.27	9
15	-0.61	30	2	-1.13	7	4	-1.27	5
14	-0.79	25	1	-1.36	2	3	-1.54	3
13	-0.97	20	0	-1.59	1	2	-1.81	2
12	-1.014	16	-	-	-	0	-2.61	1
11	-1.32	12	-	-	-	-	-	-
10	-1.50	8	-	-	-	-	-	-
9	-1.68	6	-	-	-	-	-	-
8	-1.86	1	-	-	-	-	-	-

APPENDIX G3

Normative scores on the Thai Semantic Development for children aged 5:0-5:11 years:months.

SUBTEST I			SUBTEST II			SUBTEST III		
RAW SCORE	Z-SCORE	PERCENTILE RANK	RAW SCORE	Z-SCORE	PERCENTILE RANK	RAW SCORE	Z-SCORE	PERCENTILE RANK
34	1.95	99	33	3.10	99	23	1.76	94
33	1.76	98	27	2.23	98	22	1.54	92
32	1.57	96	26	2.08	97	21	1.31	90
31	1.38	93	25	1.94	96	20	1.08	84
30	1.19	89	24	1.79	95	19	0.85	79
29	0.99	87	23	1.65	94	18	0.62	76
28	0.80	81	22	1.50	92	17	0.39	70
27	0.61	75	21	1.35	89	16	0.16	64
26	0.42	68	20	1.21	87	15	-0.06	53
25	0.02	60	19	1.06	85	14	-0.29	49
24	0.36	50	18	0.92	83	13	-0.51	31
23	-0.15	45	17	0.77	76	12	-0.74	22
22	-0.34	33	16	0.62	73	11	-0.97	19
21	-0.54	28	15	0.48	71	10	-1.20	13
19	-0.92	20	14	0.33	67	9	-1.43	5
18	-1.11	14	13	0.19	63	4	-2.57	2
17	-1.30	12	12	0.04	60	3	-2.80	1
16	-1.50	7	11	0.10	55	-	-	-
15	-1.69	6	10	0.24	46	-	-	-
13	-2.07	5	9	0.39	41	-	-	-
12	-2.27	4	8	0.53	36	-	-	-
11	-2.46	3	7	0.68	29	-	-	-
10	-2.65	1	6	0.83	23	-	-	-
-	-	-	5	0.97	17	-	-	-
-	-	-	4	-1.12	13	-	-	-
-	-	-	3	-1.27	11	-	-	-
-	-	-	2	-1.41	6	-	-	-
-	-	-	0	-1.71	1	-	-	-

APPENDIX G4

Normative scores on the Thai Semantic Development for children aged 6:0-6:11 years:months.

SUBTEST I			SUBTEST II			SUBTEST III		
RAW SCORE	Z-SCORE	PERCENTILE RANK	RAW SCORE	Z-SCORE	PERCENTILE RANK	RAW SCORE	Z-SCORE	PERCENTILE RANK
36	2.35	99	30	1.91	99	34	2.94	99
34	1.70	98	29	1.75	97	33	2.73	98
33	1.38	97	28	1.42	96	30	2.11	97
32	1.05	90	27	1.25	95	28	1.70	96
31	0.72	78	26	1.09	91	27	1.50	94
30	0.40	72	25	0.92	90	26	1.29	92
29	0.07	59	24	0.76	83	25	1.09	87
28	-0.24	37	23	0.59	77	24	0.88	85
27	-0.57	28	22	0.43	72	23	0.68	77
26	-0.89	18	20	0.26	57	22	0.47	73
25	-1.22	12	21	0.10	65	21	0.27	61
24	-1.55	10	19	-0.06	57	20	0.06	54
23	-1.87	7	18	-0.22	53	19	-0.13	43
21	-2.52	3	17	-0.39	43	18	-0.34	41
20	-2.85	1	16	-0.55	34	17	-0.55	33
-	-	-	15	-0.72	25	16	-0.75	25
-	-	-	14	-0.72	22	15	-0.96	19
-	-	-	13	-0.89	20	14	-1.16	17
-	-	-	12	-1.95	18	13	-1.37	15
-	-	-	11	-1.22	14	12	-1.57	5
-	-	-	10	-1.38	11	11	-1.78	1
-	-	-	8	-1.71	8	-	-	-
-	-	-	7	-1.88	5	-	-	-
-	-	-	6	-2.04	4	-	-	-
-	-	-	5	-2.21	2	-	-	-
-	-	-	4	-2.37	1	-	-	-

APPENDIX G5

Normative scores on the Thai Semantic Development for children aged 7:0-7:11 years:months.

SUBTEST I			SUBTEST II			SUBTEST III		
RAW SCORE	Z-SCORE	PERCENTILE RANK	RAW SCORE	Z-SCORE	PERCENTILE RANK	RAW SCORE	Z-SCORE	PERCENTILE RANK
36	1.68	99	33	1.57	99	33	1.75	99
35	1.34	96	32	1.39	94	32	1.56	94
34	0.99	92	31	1.22	92	31	1.36	92
33	0.64	78	30	1.04	84	30	1.17	83
32	0.30	65	29	0.87	81	29	0.98	81
31	-0.04	47	28	0.70	74	28	0.78	74
30	-0.39	34	27	0.52	72	27	0.59	72
29	-0.73	14	26	0.53	65	26	0.39	65
28	-1.08	13	25	0.17	58	25	0.20	58
27	-1.43	9	24	0.005	56	24	0.005	56
26	-1.77	7	23	-0.16	50	23	-0.18	50
25	-2.12	4	22	-0.34	41	22	-0.38	41
24	-2.46	3	21	-0.51	35	21	-0.57	35
22	-3.16	2	20	-0.69	25	20	-0.77	25
21	-3.50	1	19	-0.86	22	19	-0.96	22
-	-	-	18	-1.03	17	18	-1.16	17
-	-	-	17	-1.21	9	17	-1.35	9
-	-	-	16	-1.38	5	16	-1.55	5
-	-	-	15	-1.56	3	15	-1.74	3
-	-	-	14	-1.73	2	14	-1.94	2
-	-	-	13	-1.90	1	13	-2.13	1

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