International journal of child development and mental health
ISSN: 2286 - 7481; E-ISSN: 2586-887X *Vol. 7 No. 2 July – December 2019 (33-40)*

Psychometric Properties of the Language Development Test for Thai Children Aged 5 to 7 Years Old

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This article was "partially" presented at The 7th Child Development and Mental Health (CDMH) International Forum "Mental Health in a Changing World: The New Challenges" held July 25th, 2019. in Chiang Mai, Thailand

Received: 31 July 2019
Revised: 30 September 2019
Accepted: 18 November 2019

Abstract

The purpose of this research was to develop the Language Development Test for Thai Children aged 5 to 7 years old and to investigate the validity and reliability of the test. This research was divided into three phases: The first phase was to develop the test and to investigate its content validity by 5 experts. The second phase was to try out the test in 15 typical children. The third phase was to test construct validity using a known group method, and to test reliability using internal consistency. In this phase, the test was evaluated with children aged 5-7 years old who were divided into two groups, typical and delayed language development groups. Each group had 90 children who were separated into three age subgroups: 5, 6 and 7 years old. Research results found that the test had content validity. Statistical analysis results, using Mann-Whitney U, revealed that the typical groups had significant differences from the delayed language development groups at the 0.01 level. Typical subjects had higher test scores than delayed language development subjects. The Kuder-Richardson Formula 20 testing results also indicated that there was a high level of reliability (KR-20 = 0.97-0.99). Therefore, it can be concluded that the test had psychometric properties and is suitable for evaluating language development of Thai children aged 5-7 years old.

Keywords: Language development test, Reliability, Validity

Introduction

Children's language development will generally develop in a hierarchy. During the first year of life, children have a change in sound production by transitioning from a crying noise to cooing, and then from a babbling stage until becoming the first word. In addition, children also express their understanding via responding to voice, recognizing their own names, understanding a few words, and following some simple commands (Hoff, 2005). Children at the ages of two to four years old have the highest language development rate of any other stage of life. Vocabulary is the skill most developed at this stage. Children learn words by linking sounds that they hear with other information in the environment until it becomes a concept. When it happens repeatedly, children understand the word and start to use it to communicate when they are ready. Word types that children can understand and speak are in the following

order, starting with nouns, verbs, adjectives, adverbs, prepositions and others (Ministry of Public Health. Department of Mental Health. Rajanukul Institute, 2003; Prathanee, 2011). At the same time, children also learn how to combine words into phrases or sentences.

Children aged 3-4 years old, will develop in grammar and sentence complexity. They begin to tell short stories and have complete language elements by the age of four. After that, language development during ages 5-7 will develop continually in all aspects. Children learn to produce more difficult sounds, have more vocabulary, and can understand and use more complex sentences. During this stage of life, children's language development is comparable to adults' ability. The school environment is a key influencer of language development (Hoff, 2005; Prathanee, 2011). Children will interact more with friends and teachers. The language they use with their peers is very different from the mode they use to talk to their parents, by using slang, funny words, comparative and indirect speech. They also learn a new language, reading and writing (Gleason, 2005; Hoff, 2005). It is observed that reading and writing skills are related to the children's language development (Roseberry-McKibbin & Hegde, 2006). Children with delayed language development have a high risk of having reading problems later. They have lower competency in word level spelling, letter identification, reading comprehension and reading accuracy than other children of the same age (Aguilar-Mediavilla, Buil-Legaz, Pérez-Castelló, Rigo-Carratalà, & Adrover -Roig, 2014; Bleses, Makransky, Dale, Højen, & Ari, 2016; Buil - Legaz, Aguilar - Mediavilla, & Rodriguez - Ferreiro, 2015; Larkin, Williams, & Blaggan, 2013; St Clair, Durkin, Conti -Ramsden, & Pickles, 2010). Some parents, concerned about their children's language development at school, suspected that it caused their children to have learning problems. Therefore, they took their children to a doctor or other expert to evaluate their language development and to get treatment (Roseberry -McKibbin & Hegde, 2006). It is important to assess language development among children from birth to the seventh year, to identify problems and to plan speech therapy. A standardized test is one method that is appropriate and widely used by speech and language pathologists for evaluating children's language development. Most language development tests will assess language elements in terms of morphology, syntax and semantics. (Roseberry-McKibbin & Hegde, 2006; Shipley & McAfee, 2015; Prathanee, 2014).

Each child language development test is suitable for different uses, depending on the child's age and the components of language to be evaluated. Tests were diversified across different countries and flourished with the divergence of languages and cultures (Prathanee, 2014). In some countries, there are many language development tests applicable to children from the very first years of their lives until the adolescent period. These tests are both single dimensional and multiple dimensional tests. In Thailand, there are many language development tests used by speech and language pathologists to test children's language development, but about two-thirds are single dimensional tests. Results yielded from this test type have the limitation of not receiving more complete language development information from a single test (Shipley & McAfee,2015; Prathanee, 2014). The remaining tests are multiple dimensional tests which are almost all applied to children under 5 years old, such as, the Thai adaptation of the Receptive-Expressive Emergent Language Test (reel-3) , the Thai speech and language test for children between 1 and 2 years of age, and the Thai speech and language test for children aged 2½ to 4 years (Lattanan, 2010; Prathanee, Lorwatanapongsa, Makarabhirom, & Wattanawongsawang, 2010; Prathanee, Pongjanyakul, & Chano, 2008).

There is only one test used to assess children aged between 2-9 years old, but it is just a screening test and has not been standardized (Prathanee, 2014). Under this

scenario, it requires several times of testing using different single dimensional tests to obtain enough data about language development among children aged 5 to 7 years old, which is comparable to adults' skills. The task is time-consuming and complicated to perform. To overcome the above limitations, the researcher is interested in conducting a multiple dimensional language development test to gauge language development information, including morphology, syntax and semantic skills for Thai children aged 5 to 7 years old. In addition, the psychometric properties of the test will be assessed in both validity and reliability to assure its efficiency for clinical use by speech and language pathologists in the diagnosis of children's language impairment. Test results will be used as guidelines to help children and families to stimulate children's language and, especially, to reduce the risk of future reading problems.

Objectives

This research aimed to develop a language development test for Thai children aged 5 to 7 years old and to evaluate the psychometric properties for both validity and reliability.

Method

Participants

The participants were 180 children, aged five to seven years old, who were divided into two groups; typical, and delayed language development. Each group of ninety participants consisted of children from three age subgroups, namely, five, six and seven year olds. The simple random sampling method was used to recruit children for the typical group. The participants of this group met the following selection requirements;

1.) Enrolled in the first semester of the 2018 education year at Anubaan Chiang Mai School,

2.) Capable of understanding and speaking the Central Thai dialect,

3.) Obtaining parental consent to participate in the research.

Participants were excluded from the research if; 1.) they failed the screening speech and language development test for children aged 2 to 9 years old, or, 2.) they couldn't complete the test.

Participants in the delayed language development group had been diagnosed by physicians as having a disorder that may affect the child's language development, such as autism, hearing impairment, a low intellectual level, or had a history of delayed language development. Similar to the typical group, participants in this group needed to have their parents' consent to take part in the research, which was conducted from September to November, 2018 at five different places;

1.) Speech therapy clinic, Faculty of Associated Medical Sciences of Chiang Mai University,

2.) Speech therapy clinic, Rajanagarindra Institute for Child Development, Chiang Mai,

3.) Special Education Centre, Education Region 8, Chiang Mai,

4.) Srisangwan Chiang Mai School, and

5.) Kawila-anukul School. Children who were unable to finish the test were excluded from the research.

Procedures

The research was divided into three phases as discussed below.

Phase1: The development of a language development test for Thai children aged five to seven years old.

The researcher created a language development test for testing the aspects of morphology, syntax, and semantics in Thai children aged 5-7 years old. This test was a criterion-referenced test and was divided into 3 age subgroups of five, six and seven year olds. Each child was tested in receptive and expressive skills. Receptive skill was tested by asking participants to follow a command to point at one picture out of four picture possibilities related to the given instruction sentence. In expressive skill testing, participants had to respond by answering questions, repeating sentences, completing sentences,

and saying a word or sentence from the picture. The items used in this test were developed by reviewing related literature and selecting content from two of the four following sources (1.) books about the language developmental hierarchy of Thai children, (2.) thirteen related research topics, (3.) a list of basic Thai words used for primary school students and a report on basic Thai words for primary school grades 1-3, and (4) the Fundamental Thai course book for primary school first graders. After development of the test, content validity was assessed by five experts who serve as speech and language pathologists, have at least five years' experience, and master's degrees or higher. Results were analyzed by finding the Index of Concurrent (IOC). Test items that had IOC values higher than or equal to 0.5, were kept in the test, while items with IOC values less than 0.5 were improved or cut from the test (Maton, 2014). Before application to children in the second and third phases, this research was approved by the human ethics research committee of the Faculty of Associated Medical Sciences, Chiang Mai University, and the ethics committee of Rajanagarindra Institute for Child Development, Chiang Mai.

Phase2: Trial Testing.

The developed test was trialled on 15 normal language developed children aged 5 to 7 years with the same qualifications as the typical group, consisting of 5 children in each age range. Then the test was improved again according to the results.

Phase3: Evaluation of the construct validity test with the known group method and evaluation of internal consistency reliability.

Assessment of language development of all participants in both groups with the developed test. The construct validity test was performed using the known group method. Based on this method, the scores from the two groups of participants were compared using the Mann-Whitney U Test. Internal consistency reliability was evaluated using Kuder-Richardson Formula 20; KR-20 after the test was proven to have construct validity.

Results

The language development test that was developed in the first phase consisted of 87 test items, of which 36 items were for the Five Year Old Age subgroup, while 29 and 22 items were for the Six and Seven Year Old Age subgroups, respectively. A correct answer was given a score of one point and an incorrect answer was given zero points. The children passed this test only after completing all the test items correctly. After that, the developed test was evaluated for content validity. It was observed that 75 test items had an IOC score of between 0.6-1.0, which experts agree is suitable for using to assess a child's language development. This set of items was retained and underwent minor adjustments based on the experts' advice on some items. Another 12 items had IOC scores lower than 0.5. Eight of them were cut from the test because experts commented that they were too easy or too difficult. For example, the test item of sentence understanding "When do we see a doctor?" for children aged 5 years and the item "Identifying members of objects, animals, and fruits categories" for children aged 6 years. The other 4 items were adjusted based on experts' suggestions and were kept as usable test items after improvement, such as the test items for speaking vocabulary, "calling" and "falling", in children aged 7 years, in which experts commented that the test images were unclear and did not reflect the tested words. Therefore, 79 test items remained.

In the second phase, the test developed in the first phase was trialed on 15 children with normal language development. It was observed that the test was convenient to use and took about 10 to 15 minutes to complete. Correction and instruction adjustments were needed for 14 test items which were confusing, and many children could not do them correctly. Therefore, the researcher provided additional explanations and prompted the participants to respond. Moreover, the researcher decided to cut 11 test items from the test. There were 9 test items which fifty percent of the children could not

answer correctly. Another test item, "Telling three names of animals, things, and fruits", co-existed in the tests used for both the 5 and 6 year old subgroups. All students in both subgroups could answer this question. Consequently, this topic was deleted from the test for the 6 year old subgroup but was kept for the 5 year olds subgroup test. The last cut item was testing understanding of the word "disable", which was originally placed in the test for the 7 year olds group. The ethics committee from Rajanagarindra Institute of Child Development advised that the word "disable" be omitted, since the term can be sensitive for children with impairment. Results during pilot usage found that most participants couldn't pass the test criteria which required them to get 100 percent. After test items were removed, overall scores of participants were spread between 82.14 - 100 percent. This range of scores provided a baseline for language evaluation among 5 to 7 year old children, and a score of 80 percent was the cut off point for passing this test.

After that, in the third phase, the modified test was administered to two groups of participants, 90 children from the typical group and another 90 children from the delayed language development group, in order to evaluate their language development skills. The typical group was 53.33 percent female and 46.67 percent male. The average ages for the 5, 6, and 7 year old subgroups were; 5;6, 6;5, and 7;5 years old, respectively. The group with delayed language development was 31.11 percent female and 68.89 percent male. The average ages for the 5, 6, and 7 year old subgroups were; 5;7, 6;7, and 7;7 years old, respectively. The disorders of most children across the three age subgroups were diagnosed as; autism (33.33-56.67 %), followed by cerebral palsy, intellectual disability, and global developmental delay. Results of language development scores from the two participant groups are shown in Table 1.

Table 1: Language development test scores of participants.

Subgroup age (years)	Testing skill (full score)	Delayed language development group scores			Typical group scores		
		min	max	$\bar{X}$± SD	min	max	$\bar{X}$± SD
5	reception (13)	0	11	3.23 ± 3.42	12	13	12.77 ± 0.43
	expression (15)	0	11	2.63 ± 3.85	13	15	14.60 ± 0.62
	total (28)	0	20	5.87 ± 6.64	25	28	27.37 ± 0.81
6	reception (13)	0	11	4.93 ± 3.74	11	13	12.23 ± 0.68
	expression (10)	0	6	1.97 ± 2.24	9	10	9.73 ± 0.45
	total (23)	0	16	6.90 ± 5.45	20	23	21.97 ± 0.89
7	reception (5)	0	5	1.40 ± 1.57	4	5	4.87 ± 0.35
	expression (12)	0	8	1.27 ± 1.91	10	12	11.47 ± 0.63
	total (17)	0	11	2.67 ± 3.16	15	17	16.33 ± 0.76

Table 1 shows that language development total scores of the typical groups, for the age groups 5 to 7 years old, had averages of 27.37, 21.97 and 16.33, respectively. The average total scores were rated at 5.87, 6.90 and 2.67 for the delayed language development group. These average scores were used for a construct validity test. The Mann-Whitney U Test was used to analyze the statistical difference of language performance from the two groups because the data is non normal distribution and is obtained from small samples, as per the results shown in Table 2.

Table 2: Comparison of scores between the delayed language development group and the typical group using the Mann-Whitney U Test.

Subgroup age (years)	Testing skill	Mean Rank		Z	Asymp. Sig (2-tailed)
		Delayed language development group	Typical group		
5	reception	15.50	45.50	-6.87	.00*
	expression	15.50	45.50	-6.87	.00*
	total	15.50	45.50	-6.75	.00*
6	reception	15.63	45.37	-6.68	.00*
	expression	15.50	45.50	-6.89	.00*
	total	15.50	45.50	-6.70	.00*
7	reception	16.20	44.80	-6.71	.00*
	expression	15.50	45.50	-6.84	.00*
	total	15.50	45.50	-6.76	.00*

* $p < 0.01$

Analysis results, using SPSS 17.0, showed that the typical group in all three age subgroups (5, 6, and 7 years old) had significant differences from the delayed language development groups at the 0.01 level in receptive skill, expressive skill, and total score. The scores from both groups were also used to evaluate internal consistency reliability using the Kuder-Richardson Formula 20 (KR-20). The results are reported in Table 3.

Table 3: The result of internal consistency reliability

Subgroup age (years)	KR-20 values	Reliability interpretation
5	0.99	high
6	0.97	high
7	0.98	high

It was observed that the language development test for Thai children, aged 5 to 7 years old, possessed a KR-20 of 0.99, 0.97, and 0.98, which shows that the test has a high level of reliability (Salvucci, Walter, Conley, Fink, & Saba, 1997).

Discussion

The language development test for Thai children aged 5-7 years old, that was developed in Phase 1, consisted of 87 test items. After investigating content validity, most items passed the test criteria. Of the 12 items that did not pass, 8 items were cut and only 4 items were improved. As a result, these test items had appropriate validity for evaluating language development in morphology, syntax and semantics. It should be explained that the creation of test items was based on many related pieces of literature, including: books about language development, previous research, the basic word list for Thai primary school students, and the fundamental Thai course book for first graders. Test item contents were validated and corrected by experts who have experience in this field. Results from the second phase of trial testing in 15 normal language development children showed that the test was easy to administer and took about 10-15 minutes to complete. All of the

children taking part in the experiment were able to complete the test. Likewise, the researcher considered improving the text of some items to make them clearer and eliminated 11 items, as more than half of the children could not do them correctly. Finally, there were only 68 test items remaining. This step is in accordance with the process of test or instrument development. The conclusion of the trial ensured that children could understand the instructions and were tested with this assessment.

Phase 3 involved the evaluation of the test's construct validity via the known group method and the test's internal consistency reliability. It was revealed that the average score from the typical groups had a significant difference from the delayed language development groups of 0.01. The result was based on the theory that children with normal language development had higher skills than children with delayed language development. Therefore, it indicates that this test can separate both groups of children from each other, and can identify whether children have problems in language development or not. The reliability of the test scores was rated at a high level of reliability (KR20 = 0.97-0.99) in the three age subgroups (Salvucci, Walter, Conley, Fink, & Saba, 1997). These results verify that the language development test for Thai children aged 5 to 7 years old has psychometric properties in both validity and reliability and is appropriate for using to evaluate language development in the areas of morphology, syntax, and semantic elements among Thai children from 5 to 7 years old. The information obtained from this test about children's language development can be used to guide in-depth language evaluation or used to plan treatment and monitoring of a child's language development. It was observed that some children could not do all of the test items correctly and they were free to produce their own answer to test expression skills. Although scoring criteria are set, the actual test may depend on the consideration of the test administrators. Therefore, it is recommended to inspect the difficulty index and discrimination power in each test item and to test inter-observer reliability in the next study. Since this research was to develop and investigate test psychometric properties, future studies should be conducted with larger and more diverse samples to gain more information which will be more accurate in finding the norms score.

Acknowledgements

This research would be far from completion without the tremendous support and research funding from the Faculty of Associated Medical Sciences of Chiang Mai University. Moreover, the researcher would like to thank participants, parents, and the director of Anubaan Chiang Mai School, the director of the Special Education Department in Chiang Mai Educational Region 8, the director of Kawila Anukul School, the director of Srisangwan Chiang Mai School, the director of Rajanagarindra Institute for Child Development and all officers who assisted during data collection.

References

Aguilar-Mediavilla, E., Buil-Legaz, L., Pérez -Castelló, J. A., Rigo-Carratalà, E., & Adrover -Roig, D. (2014). Early preschool processing abilities predict subsequent reading outcomes in bilingual Spanish-Catalan children with Specific Language Impairment (SLI). *Journal of Communication Disorders, 50*, 19-35.

Bleses, D., Makransky, G., Dale, P. S., Højen, A., & Ari, B. A. (2016). Early productive vocabulary predicts academic achievement 10 years later. *Applied Psycholinguistics, 37*(6), 1461-1476.

Buil-Legaz, L., Aguilar-Mediavilla, E., & Rodríguez-Ferreiro, J. (2015). Reading skills in young adolescents with a history of Specific Language Impairment: The role of early semantic capacity. *Journal of communication disorders, 58*, 14-20.

Gleason, J. B. (2005). *The development of language (6th ed.).* Boston : Pearson/Allyn and Bacon.v

Hoff, E. (2005). *Language development (3rd ed.).* Belmont, CA: Wadsworth/Thomson Learning.

Larkin, R. F., Williams, G. J., & Blaggan, S. (2013). Delay or deficit? Spelling processes in children with specific language impairment. *Journal of communication disorders, 46* (5-6), 401-412.

Lattanan, P. (2010). *Receptive and expressive language of Thai children from birth to 36 months by using a Thai adaptation of the receptive-expressive emergent language Test (reel-3). (Master's thesis).* Mahidol University, Faculty of Graduate studies, Communication Disorders. (In Thai)

Maton, T. (2014). *Research methology in public health.* Faculty of Public Health, Ramkham haeng University Sukhothai campus. (In Thai)

Prathanee, B. (2011). *Autism: Speech therapy and treatment in an interdisciplinary approach.* Khon Kaen: Khon Kaen university printing house. (In Thai)

Prathanee, B. (2014). *Assessment and treatment of speech and language development problems. In B. Prathanee (Ed.), Cleft lip and cleft palate: Speech problems and treatment in an interdisciplinary approach. (pp. 303 -66).* Khon Kaen: Khon Kaen university printing house. (In Thai)

Prathanee, B., Lorwatanapongsa, P., Makarabhirom, K., & Wattanawongsawang, W. (2010). Thai speech and language norms for children 2 1/2 to 4 years of age. *Journal of the Medical Association of Thailand = Chotmaihet thang phaet, 93*(4), 7-15.

Prathanee, B., Pongjanyakul, A., & Chano, J. (2008). Thai Speech and Language Test for children between 1 and 2 years of age. *Inter national journal of language & communication disorders, 43*(1), 125-140.

Ministry of Public Health. Department of Mental Health. Rajanukul Institute. (2003). *Basic speech therapy guidelines.* Bangkok: Rajanukul Institute. (In Thai)

Roseberry-McKibbin, C., & Hegde, M. N. (2006). *An advanced review of speech-language pathology: Preparation for praxis and comprehensive examination.* PRO-ED, Inc. 8700 Shoal Creek Blvd, Austin, TX 78757.

Salvucci, S., Walter, E., Conley, V., Fink, S., & Saba, M. (1997). *Measurement Error Studies at the National Center for Education Statistics,* NCES measurement error programs.

Shipley, K. G., & McAfee, J. G. (2015). *Assessment in Speech-Language Pathology: A Resource Manual (5th ed.).* Cengage Learning.

St Clair, M. C., Durkin, K., Conti-Ramsden, G., & Pickles, A. (2010). Growth of reading skills in children with a history of specific language impairment: the role of autistic sympto matology and language-related abilities. *The British journal of developmental psychology, 28*(1), 109-131