

**THE EFFECT OF LANGUAGE AND CULTURAL
ENVIRONMENT ON INTELLIGENCE TEST PERFORMANCE
OF HILL TRIBE STUDENTS**

RUDCHADAPORN ENIJA

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OF THE REQUIREMENTS FOR
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Thesis
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OF HILL TRIBE STUDENTS**

Rudchadaporn Enija

.....
Ms. Rudchadaporn Enija,
Candidate

Sudsabuy Chulakadabba

.....
Assoc. Prof. Sudsabuy Chulakadabba,
M.D., Dip(Psychiatry)
Major advisor

Chirdsak Kowasint

.....
Assoc. Prof. Chirdsak Kowasint,
Ed.D.(Reserch and curriculum
development)
Co-advisor

K. Sukhatunga

.....
Assoc. Prof. Kanokrat Sukhatunga,
M.Ed. (Guidance), M.Sc. (Clinical
Psychology)
Co-advisor

B. Mahaisavariya

.....
Prof. Banchong Mahaisavariya,
M.D., Dip Thai Board of Orthopedics
Dean
Faculty of Graduate Studies
Mahidol University

S. Phattha

.....
Assoc. Prof. Sucheera Phattharayuttawat,
Ph.D. (Psychology)
Program Director
Master of Science Program in
Clinical Psychology
Faculty of Medicine, Siriraj Hospital
Mahidol University

Thesis
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for the degree of Master of Science (Clinical Psychology)

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Rudchadaporn E-nija
.....
Ms. Rudchadaporn Enija,
Candidate

S. Phattha
.....
Assoc. Prof. Sucheera Phattharayuttawat,
Ph.D. (Psychology)
Chair

Sudsabuy Chulakadabba
.....
Assoc. Prof. Sudsabuy Chulakadabba,
M.D., Dip(Psychiatry)
Member

Chirdsak Kowasint
.....
Assoc. Prof. Chirdsak Kowasint,
Ed.D.(Reserch and curriculum
development)
Member

Raviwan Nivatphand
.....
Asst.Prof. Raviwan Nivatphand,
M.D.,
Member

K. Sukhatunga
.....
Assoc. Prof. Kanokrat Sukhatunga,
M.Ed. (Guidance), M.Sc. (Clinical
Psychology)
Member

B. Mahaisavariya
.....
Prof. Banchong Mahaisavariya,
M.D., Dip Thai Board of Orthopedics
Dean
Faculty of Graduate Studies
Mahidol University

T. Kulthanan
.....
Prof. Teerawat Kulthanan,
M.D., F.I.M.S., F.R.C.S.T., F.I.C.S.
Dean
Faculty of Medicine, Siriraj Hospital
Mahidol University

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Rudchadaporn Enija

THE EFFECT OF LANGUAGE AND CULTURAL ENVIRONMENT ON INTELLIGENCE TEST PERFORMANCE OF HILL TRIBE STUDENTS

RUDCHADAPORN ENIJA 5136583 SICP/M

M.Sc. (CLINICAL PSYCHOLOGY)

THESIS ADVISORY COMMITTEE: SU DSABUY CHULAKADABBA, M.D., Dip. (PSYCHOLOGY), CHIRDSAK KOWASINT, Ed.D. (RESEARCH AND CURRICULUM DEVELOPMENT), KANOKRAT SUKHATUNGA, M.Ed., M.Sc.

ABSTRACT

This paper aimed to study the effects of language and cultural differences on Thai hill tribe students' intelligence test performances. WASI-T was used to investigate the cultural bias in this test item. The population of this research was hill tribe students who were studying in grades 1-6 at Suksanaree Anusorn2 School in Mae-Ai District, Chiangmai Province. Structured questionnaire was designed to collect personal information and level of Thai literacy efficiency. CPM, an intelligence test with low cultural bias, was used in order to recruit students who had average IQ scores to be samples in this research.

Cultural biases were found in Verbal part: both vocabulary and similarities subtests of WASI-T. It was suggested that inappropriate usage and learning skills of the Thai language among these hill tribe students contributed to lower IQ scores than they were capable of achieving. These findings implied that the appropriate IQ test for hill tribe students should be liberated from cultural bias and less dependent on the verbal part. Moreover, teaching activities should allow these students to improve their Thai usage skills in order to understand and communicate like other students in Thailand.

KEY WORDS: HILL TRIBE STUDENTS / EFFECT OF LANGUAGE AND CULTURAL DIFFERENCES / ADMINISTRATION BIAS / INSTRUMENT BIAS / ITEM BIAS

77 pages

ผลของภาษาและวัฒนธรรมต่อการทำแบบทดสอบเชาวน์ปัญญาของเด็กนักเรียนชาวไทยภูเขา
THE EFFECT OF LANGUAGE AND CULTURAL ENVIRONMENT ON INTELLIGENCE
TEST PERFORMANCE OF HILL TRIBE STUDENTS

รัชฎาภรณ์ อินิจา 5136583 SICP/M

วท.ม. (จิตวิทยาคลินิก)

คณะกรรมการที่ปรึกษาวิทยานิพนธ์: สุธสบาย จุลกัทัพพะ, อ.ว., เชิดศักดิ์ โฆวาสินธุ์, กศ.ด.,
กนกรัตน์ สุชะตุงคะ, กศ.ม., วท.ม.

บทคัดย่อ

การวิจัยเพื่อศึกษาผลของความแตกต่างทางด้านภาษาและวัฒนธรรมต่อการทำแบบทดสอบเชาวน์ปัญญา ของเด็กนักเรียนชาวไทยภูเขาที่กำลังศึกษาอยู่ชั้นประถมศึกษาปีที่ 1-6 โรงเรียนศึกษานารีอนุสรณ์ 2 อ.แม่เมาะ จ.เชียงใหม่ โดยใช้แบบสัมภาษณ์แบบมีโครงสร้างสำรวจข้อมูลส่วนบุคคลและข้อมูลการใช้ภาษาไทย และ WASI-T ใช้เป็นเครื่องมือสำรวจอคติด้านวัฒนธรรมในข้อคำถามโดยใช้แบบทดสอบ CPM ซึ่งเป็นแบบทดสอบเชาวน์ปัญญาที่ลอคอคติทางวัฒนธรรมแล้วคัดกรองให้ได้นักเรียนที่มีระดับเชาวน์ปัญญาอยู่ในเกณฑ์เฉลี่ยมาเป็นกลุ่มตัวอย่าง

การศึกษาในแบบทดสอบย่อยที่เป็นส่วนของภาษาทั้งสองชุดคือการรู้จักคำศัพท์ (Vocabulary) และ การรู้จักคำอุปมาอุปมัย (Similarities) พบอคติทางวัฒนธรรมมีผล แสดงว่า ประสิทธิภาพในการใช้ภาษาไทย ทักษะการเรียนรู้ภาษาไทยที่ไม่เหมาะสมส่งผลต่อคะแนนการวัดทางเชาวน์ปัญญา ทำให้เด็กนักเรียนชาวไทยภูเขาได้คะแนนน้อยกว่าที่ควรจะเป็น ดังนั้นในการเลือกใช้แบบทดสอบเชาวน์ปัญญากับเด็กนักเรียนที่มีสิ่งแวดล้อมและวัฒนธรรมเฉพาะกลุ่ม เช่นชาวไทยภูเขาควรเลือกใช้ชนิดที่ลอคอคติทางภาษาและวัฒนธรรมนอกจากนั้นควรจัดกิจกรรมการเรียนการสอนที่เปิดโอกาสให้เด็กนักเรียนชาวไทยภูเขาได้พัฒนาทักษะด้านภาษาไทยให้สอดคล้องกับที่จะสามารถเข้าใจและสื่อสารได้เช่นเดียวกับนักเรียนที่อื่นในประเทศ

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CHAPTER I

INTRODUCTION

The Background and the Importance of the Research

The Constitution of The Kingdom of Thailand (B.E. 2540) and the National Education Act (B.E. 2542) mentioned that the government must provide the twelve-year basic education for every citizen equally, thoroughly, and effectively without charge. Although tribesmen are a minority of Thai citizen, they also have the rights. Therefore, hill tribe children, when reach school ages, must receive the compulsory education according to the National Education Act. By doing this (1) there are more hill tribe students in the school under the supervision of Office of The Basic Education Commission (OBEC) and other agencies. According to the Guideline on Education Provision regarding the Core Curriculum of Basic Education, it is important to consider the learning process that help students reach their developments and full-capacities, with concerning individual and brain-development differences. Thus, teachers must design the teaching plan in accordance with students' capacities and contexts. (2) From this reason, there are learning-capacity assessments in order to design proper and effective teaching plan for the learners. Intelligence testing is one of the assessments that enable to evaluate students' cognitive abilities. This can be seen from hill tribe students who study the core curriculum and attain such assessment. Normally, conducting intelligence testing with people from different races and languages preferably use nonverbal test whose cultural biases were eliminated. However, intelligence tests comprising both verbal and non-verbal parts are more practical because they can point out the weakness, strength, and pattern of cognitive process of the subject which are useful for developing proper teaching plan effectively. Thus, the researcher uses Wechsler Abbreviated Scale of Intelligence-Thai version (WASI -T) to assess the cognitive abilities among hill tribe students. The WASI was created to assess intelligence in short period with high validity and reliability .It has verbal part that measures language comprehension and ability gained

from environment, culture, and experience while the non-verbal indicates ability of abstract thinking, spatial relation, and eye-hand coordination. Subtests in non-verbal part have no cultural biases and can assess general intelligence, including weakness and strength in studying very well. Hence, it is appropriate to use this intelligence test for children's learning grouping. Therefore if the Wechsler Abbreviated Scale of Intelligence-Thai version (WASI -T) could be use to assess the cognitive abilities among hill tribe students it will be practically useful to find their weakness and strength for effective teaching plan .However, the study of Razani , Murcia , Tabares and Wong about the effect of culture on WASI test performance in ethnically diverse individuals who speak English fluently indicated that cultural differences affected the verbal parts' scores. Then they recommended that when interpret the scores of these children, we must consider cultural factors as well. (3) This is related to the study which Redwine tested Hmong (Asian group) children by C-TONI. He also found that the Pictorial Nonverbal Intelligence Quotient (PNIQ), which relied on language skill and cultural comprehension, was also affected. (4) Thus, using WASI-T with Thai hill tribe students, though study in Thai program and enable to read, write, and speak Thai, may have problems in doing the test already adapted to Thai society and culture because of cultural differences and Thai as their second language. Therefore it is necessary to examine item bias by conducting content analysis with test performance and characteristics of the answers for using as a guideline or consideration in choosing intelligence test contained both verbal and nonverbal parts for learning grouping with hill tribe students properly.

Research Statement

Whether cultural and language differences affect intelligence test, though being adjusted to Thai society and culture, performed by Thai hill tribe students- who can speak, read, and write Thai- or not.

Objectives of the Research

This research aims to study the effect of language and cultural differences among Thai hill tribe students on causing administration, instrument, and item biases of intelligence test comprised of both verbal and nonverbal parts.

Benefits of the Research

1. To prove that Thai hill tribe students have language and cultural limitations when performing verbal part in intelligence test. Thus, when conducting intelligence test with them, choosing cultural-bias eliminated test is more preferable than one with verbal part.

2. To suggest learning activities that allow Thai hill tribe students improve their language skills in all levels.

The Delimitations

This research focuses on effect of language and cultural differences when conducting WASI-T that have both verbal and nonverbal parts with Thai hill tribe children by notifying bias within the test from item difficulty analysis. Then evaluate those results by content analysis under research frameworks in terms of administration, instrument, and item biases.

The Definitions of Terms

Thai hill tribe students refer to Thai hill tribe students whose societies and cultures are different from lowlands students'. Besides, they have their own spoken and written languages and use Thai as a second language.

Effect of language and cultural differences refers to cultural bias that may occur when using test developed in a culture with people from different cultures and the score is lower than it should.

Administration bias refers to bias from communication. Test administrator may explain the instruction ambiguously or hard to understand, or use words that guide to the right answers during testing. Moreover, the administrator and the subject may have different cultural backgrounds that cause communicative problems. This bias also includes environmental factors while testing such as privacy, room space, temperature, and illumination.

Instrument bias refers to bias from testing tools. People from different cultures are familiar with stimulus in the test differently. For example, types of numbers in the test (Arabic VS Roman numeral), pencil, play dough, or cube. Subject who is more familiar with the stimuli can get higher score.

Item bias refers to bias from language and cultural differences that impacts learning opportunities or familiarity with items. Subject who is more familiar with the questions can do higher score.

CHAPTER II

LITERATURE REVIEW

This study on the effect of language and cultural differences on intelligence test performance among Thai hill tribe students are based on various documents and researches in the following topics:

Effect of Culture on Human Behaviors

Thai Tribesmen

Intelligence and its Test Development

Intelligence Assessment between People from Different Cultures

Effect of Culture on Human Behaviors

Human is a social animal that is different from the rest as it has more complex brain. Thus, it has more capacity to learn. It learns to cope with problems and adjusts itself to environment nearby by trial-and-error method. The way of life and self-adjustment through learning process has been transferred from one generation to another. This transfer is culture (5-7). Social anthropologists define culture as behavior that human learns during adjusting itself to problems (6) and uses for responding to its basic needs. The first one is biological need whose responses help human survives. It combined with dwelling, food, clothes, and medicine. Cultures responding to this need are man-made technologies such as hunting tools, production (e.g. house, clothes, and medicine) etc. The second is psychological need that human use for coping with uncontrollable problems like fear, illness, death, or mysteries. Cultures for this need are belief systems and religions. The last one is social need. As a social animal, human must communicate with each other for survival. Their interactions start from their births, when they all cannot take care of themselves and rely on parents or family, until the end of their lives. Cultures fulfilling this need are social order, socialization, and languages (8). These become pattern of behaviors that people in the society must

learn for survival. These learning to self-adjustment vary from each environmental and social condition. That is why human from different regions have different cultures. It is obvious that social and cultural factors strongly affect to thoughts, feelings, mentalities, and perception process of the individual. Human learns to define things according to its previous experiences and environments. Behaviors are culture learned through socialization and become pattern of life, religious beliefs, values, and attitudes (6, 7). These learning would never happen if language, an important tool for passing culture down to another generation, does not exist. Human uses language for communicating with others within its society, exhibiting thoughts, feelings, and experiences and each culture has its own language due to its social context (9, 10).

Language and Cross-Cultural Communication

Language is a sign created by a group of people within each society for communication. It is a media to express thoughts in the form of words like food, music, animal etc. Words represent meaning that all members within that society understand as the same thing (8, 11). Language is full of cultural biases. Meaning in the language will reflect beliefs, values, learning and perception processes of people within the culture. Thus, in order to comprehend meaning of each word, one must understand social rules, physical and social environments of that society (12) because some words do not appear in other languages. For example, Rod Nam Dam Hua and Loy Krathong are shown only in Thai language. Besides, some words have many definitions depend on content of the message (7, 13) such as Dao, Ai, Sio etc. So it is easier to communicate with people within the same culture since they have similar experiences. Thus, cross-cultural communication can cause trouble if the message receiver does not understand social and cultural structure of the sender well enough (9). This can also occur when using intelligence test developed in a culture with people from different languages and cultures and cultural bias occurred may deviate test performance because of different language experiences and perception process.

Thai Tribesmen

Tribesmen are a minority group in Thailand that live on highlands in northern and western regions. It comprises of different tribes such as Karen, Hmong, Mien, Akha, Lahu, Lisu, Lua, Kha Tin, Khamu, and Mlabri. Each tribe has its own unique rites, traditions, language, culture, and way of life that completely differ from Thai lowlands people (14, 15). Tribes can be categorized into two groups due to its origin. The first one is Sino-Tibetan Language group who migrated from the north to the northern region of Thailand for a hundred years, namely Karen, Hmong, Mien, Akha Lahu, and Lisu. Another is Austro-Asiatic Language group that moved from the south to the north such as Lua, Kha Tin, Khamu, and Mlabri who currently live near Thai-Laos border (16).

General Characteristics

Tribesmen live on high hills, scattered into small groups by kinship system with strong engagement. They have village chief for contacting with state agencies and keeping members in order and the exorcist or guru for performing rites, and contacting with spirits or gods. All controversies are judged by the village chief due to the tribe's custom. The wrongdoer will be fined for minor offense or exiled from the village for the major one (14-16). Their societies are conservative and simple-living. Most of them are farmers who cultivate rice, corn, cabbage, coffee, flowering plants, banana, taro, and farm animals for food and sacrifice. Tribesmen prefer to have many children because they can be economic labors for their families in the future. All members have to earn a living and this leads to children's absenteeism in order to help their parents in farms, causing low academic achievement (17-19). Thus, socioeconomic status becomes one of factors having impacts on intelligence. As mentioned above, children in family with low socioeconomic status and lots of children will not receive proper developmental stimulation sufficiently and will later affect their intelligence. Besides, tribesmen do not concern much about education and their children already learn social expectations, resulting in intelligence test performance. Some researchers found that children raised in the education-competition oriented society have better IQ test score than those raised in the society less

concerning about education. This might lead to cultural bias that affects Thai hill tribe students' motivations in performing intelligence test as well.

Language

Though tribesmen currently contact with the world outside, learn Thai culture and language through media like radio and television, they still preserve their traditional cultures, especially their unique languages. Tribesmen do not have written language. Their language structures consist of alphabets, vowels, tone marks, and non-final consonants. Languages of the tribesmen are different from Thai language in terms of words, meanings, first consonants, vowels, some tone marks, and clusters, (e.g. r, l, w) (14, 16). This is why they cannot pronounce Thai language correctly. In most cases, they speak Lahu with people from other tribes and speak Thai with lowlanders. Nowadays most tribesmen can speak Thai (20). As having their own languages and talking to each other by Lahu, their children do not practice Thai much in daily lives and this results in unfamiliarity and difficulty in expressing meaning of Thai words when performing verbal part of intelligence test.

Religions and Beliefs

Tribesmen' traditions and cultures are diverse but they have one thing in common, they believe in superstition. They believe that spirits are in everything. Guardian spirits of the houses or villages are good spirits protecting villagers from illness or accidents while forest and storm spirits are evils. Even natural phenomena like thunder or raining are thought to be created by spirits' powers. This belief has enormous impacts on their living, everything they do, they must perform rites in order to ask spirits for permission or blessing first. For example, hunting, birth giving, wedding, and starting cultivation or fishery etc. The crucial events they must make offerings to spirits are New Year ceremony, playing on the swing rite, and sacrificing ancestor spirits rite. If spirits bring soul out, one will get sick. Therefore, the exorcist must perform the offering to call one's soul back (23, 29). These traditions are longstanding and passed down to their descendants. Although they are more open to the world outside, they preserve their rules strictly for good lucks (22-24). In case of violation, misfortunes occur and they must beg for pardon from the spirits. This

strictness helps them survive difficulties (21). Their pattern of cognitive process is created by enculturation. Some studies reported that in societies with low technology, their living rely heavily on nature. People persist in customs and traditions strictly. Their thinking processes mostly focus on concrete rather than abstract thinking which contrast with people in high-technology societies. This may have an impact on conducting intelligence test since its items are created for measuring ability in abstract thinking (25)

Education Provision for Tribesmen

Thai government has a policy to provide education for tribesmen for national security purpose, aim to help them enable to read and write Thai language, and develop allegiance to the nation among them (1) by assigning the following agencies to proceed (26):

1. Office of the Basic Education Commission is the main agent in providing basic education for hill tribe students by using core curriculum. Its subjects for skills are Thai language and mathematics, whereas subjects for life experiences education are handicraft education, agriculture, working experiences, and subjects enhancing allegiance to the kingdom and good citizenship under the democracy - 80% of the contents are from the core curriculum and the remains are designed by each school according to rural cultures (17). Schools for tribesmen under OBEC are presented in many forms: 1) ordinary school 2) branch school whose number of students are less than the criteria so it is supervised and supported by the host school 3) ordinary school providing dormitory for students whose houses are too far to travel back-and-forth and (4) self-sufficient school providing integrated education, dormitory and school farm for food and sale.

2. Bureau of Special Education, Ministry of Education provides two types of boarding schools for full basic education that are 1) educational welfare school for hill tribe students only and 2) school established in the area that tribesmen live vastly which also open for the underprivileged lowlands students.

3. Department of Public Welfare is in-charge of establishing pre-school care centers and helping hill tribe students in many ways such as selecting poor

students with excellent academic performance to live in its foster homes and study in boarding schools under Bureau of Special Education.

4. The Border Patrol Police Bureau uses the same curriculum as OBEC's but develops some additional activities or projects such as the agriculture for school lunch project, vocational training for student project, school cooperative promotion project etc. Most teachers are border patrol polices with the assistance of few civilians who are permanent employees. If its school has enough students, has permanent building, and lacks security problem, the bureau will collaborate with OBEC for transfer to be under OBEC's supervision.

The reason of increasing numbers of hill tribe students is that the government had a policy to promote educational development among them so they are more accessible to education. Thus, in order to design learning process that promotes them to develop spontaneously and reach their full capacities, teacher must concern their contexts. Intelligence testing is one of the cognitive ability assessments. Normally, nonverbal tests with cultural-bias eliminated are preferably used in assessing intelligence among people from diverse languages. But since tests with both verbal and non-verbal parts are more useful in terms of indicating weakness, strength, and pattern of cognitive process of the subject which help develop the more effective and appropriate teaching plan, the researcher decides to use Wechsler Abbreviated Scale of Intelligence-Thai version (WASI-T) for evaluating cognitive abilities among hill tribe students due to its advantages mentioned above.

Hill Tribe Students and Learning Thai Language

Each tribe has its own culture, religion, and language that differ from lowlanders. Tribesmen use their own languages for contacting each other so they rarely use Thai. And when hill tribe students learn Thai as a second language, they learn it with difficulties because of the influence of their own languages. Research on problem in using Thai language among hill tribe students showed that most of them had difficulties in speaking and writing, rather than listening and reading (26). They had problems with word selection, sentence combination, meaning expression, and choosing improper register. This is because they did not comprehend Thai, got used to their own languages, and had few experiences in using Thai (27). Moreover, they

pronounced Thai unclearly because they just used similar sounds in their own languages when they had no exact sounds similar to Thai words (20). All these problems may affect their performances in doing the verbal part of the intelligence test.

Lahu Tribesmen

Lahu tribesmen are among Sino-Tibetan Language group that emigrated across borders in the areas of Mae Chan, Chiang Saen and Chiang Khong districts, Chiang Rai province, and Fang district, Chiang Mai province. They live on highlands and avoid chaos. Most of them earn livings by cultivating rice and corn. Lahu is an isolating language without final consonant. Lahu people are very strict on rightness, customs, and traditions. Everyone answers to the questions of life like their ancestors. What vastly influence on their living, thoughts, and beliefs are God and spirits. For them, there is God, named Gue Sa, who created world and humanity. And this harmonizes with Christianity's belief so it is easy to evangelize them. Their belief in God and spirits is reflected in the form of longstanding rites such as New Year ceremony. Most of them take baths only on New Year day because they afraid that spirits protecting natural water resources will haunt them and will make them sick. This is why their houses are quite far from water resources (28). New Year is a good day so everyone must not misbehave, otherwise it shows disrespect to God and holy spirits. Besides, there is eating new harvested rice rite that enormously influence on them because quantities of the rice are up to God. Thus they must worship God for his permission to harvest rice. Another tradition is making merit for hearten which is village merit. The exorcist will perform this rite. A pig is slaughtered to sacrifice guardian spirit of the house. There are wrist binding, blessing, and dancing ceremonies for worship God for villagers' well living and good health. They have a village chief for looking after members and contacting with state agencies. All controversies are judged by the chief due to the tribe's custom. The wrongdoer will be fined or exiled from the village. The exorcist or guru, called as Pu Jarn, who know all the rites, will perform the ceremonies and contact with spirits or God. Pu Jarn has an authority to veto the chief's decision. It is obvious that Pu Jarn is more influential to the villagers than the chief (15).

We may say that belief in God and spirits play an important role on thoughts and behaviors of Lahu people in earning, living, or even sickness. Although today Lahu people contact lowlanders more, still they hold their custom tightly. This leads to development of pattern of thinking process that is concrete and lacks abstract thinking development which contrasts to lowlanders'. This may result in unfamiliarity of intelligence test performance which mostly stress on abstract thinking.

Intelligence and its Test Development

Intelligence

Intelligence refers to human's overall abilities in daily lives such as ability of thinking process, abstract reasoning, problem solving, understanding new things and ability to learn which lead to abilities improvement under culture's role (29-31), that is 1) problem solving skill and ability to define the problems 2) language skill such as communicative skill or reading skill and 3) social ability or social skill that help individual contact or interact with others effectively (32-34). This general intelligence is necessary for classifying gifted or deficient persons (35) in order to design teaching plan suiting them. Therefore the selected intelligence test should be able to assess this intelligence very well. The most favorite intelligence test that enables to assess general intelligence is Wechsler Intelligence scale (34, 36).

Factors related to Intelligence

Study on human intelligence revealed that there were many factors that made their intelligences different. The classical psychologists believed that human intelligence differences were due to heredity gained from their ancestors. However, more recent study suggested additional factors such as environment, race, culture, gender, and age as described below.

Environment

Environment is essential for developing individual's intelligence ability from conception to adulthood. Starting with health factor; in the society with good

health services and its people took care of their own health, people had higher intelligence scores (37). This is similar to studies on nutritional factor that food had impacts on children's learning. Many researches indicated that children who gained sufficient nutrition in their early years had better cognitive developments than those with malnutrition because these nutrition resulted in brain' size and more effective work of neuron (29, 38, 39). Another important factor is socioeconomic status of parents such as social status, education, and income. Parents with better status can respond to children' basic needs sufficiently so children' developments are stimulated properly. They get stimulation toys, computers, books, better education opportunities etc. and these will promote children' learning and cognitive development than those who lack (40, 41). Research on minority in United States revealed that among minority itself, children - whose parents had higher education, social status, and income – had higher academic achievements (41). Besides, family with lower socioeconomic status tended to have more children because they could be labors for their families. These children gained less supervisions and developmental stimulations. Moreover, with inadequate income, they lacked proper intelligent developments (42). When comparing intelligences between children in rural area and children in town, the latter had higher intelligence score because township environment help them access other intelligence-promoting factors easier (29, 36, 43).

Culture

Since human learn to adjust themselves to their environments through cultural process, culture is important to their cognitive processes, perceptions and defining things. Intelligence is also gained from enculturation due to each society's socialization which is distinct from others due to its environmental factor (44-46). For example, in developed societies which are full of technologies, their enculturation stress on education. So people' cognitive processes are shaped to think abstractly. They are motivated and expected to have achievements at school. Thus when assessing them with intelligence test, they have higher scores. In contrast, living in the underdeveloped societies depends heavily on nature. These societies do not concern much about education and their people are not expected to have academic achievements respectively. In contrast, they consider that skills in taking advantages

from nature and surrounding environments, such as hunting, farming, or using herbs, are more useful to their livings and these skills cannot be measured by intelligence test. Besides, their thinking processes are shaped to focus mainly on physical object. Therefore when measured with intelligence test, their scores are low (47-50). This leads to the conclusion that enculturation affects intelligence abilities measured by intelligence test.

Gender

Studies on intelligence differences between men and women revealed no significances. But what makes them different is the characteristics of their thinking processes; men are good at spatial relation, target-direct, motor skill, and mathematical reasoning, whereas women are good at perceptual speed, verbal fluency, mathematical calculation, and fine motor (31,51). This may be a result from different rearing attitudes towards boys and girls. For instance, better spatial relation among men may result from playing video games or boy toys that made them more familiar with shapes and structures than women (52). Another is biological factor. Sex hormone such as estrogen in female enhance them to do delicate tasks better than male (31).

This can be seen that genetics, gender, environment, and enculturation affect intelligence. Genetic factor determines capacity of individual's learning while other environmental factors develop it.

Intelligence involves in all societies, fields, and lives. In educational field, it helps prepare proper teaching plan while clinical field use it for diagnosis and intervention for appropriate treatment, including more understanding of patients. With various benefits, the intelligence test development begins.

Intelligence Test Development

Human' intelligence differences have been systematically and continuously studied and developed. It was found in the early period that language development could be used as a criterion in intelligence assessment. As people with mental retardation tended to have deficit in neurological classification, some tests were invented. However, these tests had limitations on validities and then were not widely used (53, 54). In 1905, Alfred Binet and Theodore Simon had developed the first

assessing tool called Binet-Simon intelligence scale in order to prepare education for children with cognitive limitations aged 3-11 yrs. It could measure abilities in reasoning and decision making. Later many intelligence tests were invented. Currently they are divided into two types as follows:

Type of Intelligence Test

Verbal and Performance Test

The most favorite tests in this group are Wechsler Intelligence Scale and Stanford – Binet test. They are individual tests that the administrators must be well trained and practiced in using them (54). Doing the verbal part relies on language knowledge and comprehension. Its result indicates to abilities of abstract thinking, level of education, word recognition, and language usage while performance part relates to problem solving and controlling. Its score implies to ability of perceptual-motor skill, working under time-specific, and visual-spatial information. Using test measuring both parts can unveil strength and weakness of the subject including cognitive process in various aspects very well (34).

Nonverbal Test

Nonverbal tests are invented to assess intelligence among those with language, auditory, or dyslexia disorders. Most tests comprise of pictures, geometric figures, or symbols (55). But since it is less complex due to less test processes, it can be conducted in group. Besides, excluding of verbal part makes it cultural-bias eliminated which can be used with diverse ethnic groups. Its scores can be inferred to general intelligence and suits to classify intelligence levels. The examples of these tests are the Army Beta, Raven's Progressive Matrices and TONI-3 etc. (30).

Though nonverbal tests are appropriate for classifying intelligence levels and are cultural-bias eliminated, verbal and performance tests are still more useful because they enable to indicate strength, weakness, and cognitive process of the subject that help prepare more effective teaching plan. Thus verbal and performance tests are the best choice for assessing intelligence. WASI is among them with high

validity and reliability and use less time conducting. Thus it is one of the most appropriate tests to screen children for preparing effective teaching plan.

Wechsler Intelligence Scale

The first edition of Wechsler Intelligence Scale was invented by David Wechsler in 1939 to measure both verbal and performance abilities that were Comprehension, Arithmetic, Digit Span, Similarity, and Vocabulary from Stanford-Binet's; Picture Arrangement, and Koh's Block Design from the Army Group Examination; Information, Comprehension from the Army Alpha; Digit Symbol-Coding from the Army Beta; Picture Completion from Healy's ; Picture Completion, and Object Assembly from the Pinther-Paterson Test. All these subtests were combined as Wechsler-Bellevue Intelligence Scale (56). Wechsler Adult Intelligence Scale (WAIS) has been developed continuously in terms of standard score, item analysis, and addition of some subtests to evaluate thinking and neuropsychology more effective until it becomes Wechsler Adult Intelligence Scale-4th edition (WAIS-IV) today. In addition, Wechsler Intelligence Scale for Children (WISC) use with children aged between 5 years 0 month to 15 years old was created in 1949 and has been developed continuously in standard score and addition of some subtest and becomes the WISC-IV nowadays. In 1967, Wechsler Preschool and Primary Scale of Intelligence (WPPSI) was constructed for assessing intelligence among children aged between 4 yrs to 6 yrs 6 months with similar but simpler items to WAIS's and WISC's. It was revised to WPPSI-R in 1989 and became WPPSI-III in 2002 (34, 57).

Though intelligence tests in Wechsler Intelligence Scale group are widely used for research and clinical purposes, psychologists and researchers still need faster and higher-validity tool to screen people with intelligence deficits. They all agree that short forms of Wechsler Intelligence Scale are the best choices (58). Those short forms are described as follows.

Best two and three subtest short form (59)

Subtests from WAIS-III and WISC-III often used here are Vocabulary and Block design because they can measure general intelligence and can represent language and performance abilities very well. Both subtests take 20 minutes to

conduct and have correlation coefficient with the complete form at .90. But if three-subtest short form is needed, another subtests should be selected from Similarities, Information, Comprehension, Picture Arrangement, or Picture Comprehension subtests whose correlation coefficient are not less than .90 as well.

Best four subtest short form

The distinction between best two and best four subtest short form is the latter can notify the malfunction of thinking process. The best four subtests comprise of Vocabulary, Arithmetic, Block Design, and Picture Arrangement. The first three subtests assess auditory attention and effectiveness of sense of reality while Picture Arrangement assesses the ability to manage data and sequence of social situations. Above all, these four subtests can assess neuropsychology. When comparing with WAIS-III and WISC-III, this short form has correlation coefficient at .93 to .95.

This can be seen that some subtests of WAIS-III and WISC-III can assess intelligence and reliably correlate with the complete form. However, short forms still need to refer the standard score with the complete form. Thus Wechsler Abbreviated Scale of Intelligence (WASI) was invented in 1999 for using as a short intelligence test in reliable clinical, educational, and research work. Besides, its standard score is referred from the same group as of WASI-III and WMS-III, so it can be compared with these two tests directly.

Wechsler Abbreviated Scale of Intelligence (58)

Wechsler Abbreviated Scale of Intelligence is an individual test used among subject aged between 6-89 years old. It comprises of 4 subtests, namely Vocabulary, Similarities, Block Design, and Matrix Reasoning. The first two measure verbal ability while the others assess performance ability. Its scoring is as of the complete form that is VIQ, PIQ, and FSIQ. It takes 30 minutes to conduct. If time is limited or the subject cannot do the test that long, only two subtests are needed; Vocabulary for language and Block Design for performance, and time is reduced to 15 minutes. WASI was created to assess intelligence in short period with high accuracy. Since it can measure general intelligence, it is used for screening people with mental retardation or genius in order to prepare proper teaching plan for them. But in case of

the complete intelligence score, legal reference, or diagnosis, using the complete form is a must.

Subtest of WASI

WASI comprises of 4 subtests, namely Vocabulary, Similarities, Block Design, and Matrix Reasoning that can assess general intelligence very well. Each subtest is similar to WAIS-III's and WISC-III's. Though the items are different, they are comparable except for WAIS-III's Matrix Reasoning. Details of each subtest in WASI are described below.

Vocabulary

It contains 42 items. Item 1-4 are pictures while item 5-42 are words which require the subject to explain meaning of each word. This subtest measures language development, word knowledge, general verbal intelligence, and long-term memory which reflect educational level, environmental learning, and individual's culture.

Similarities

Item 1-4 are pictures while item 5-22 need the subject to tell similarities between two words. This subtest assesses logical abstract reasoning, verbal concept formation or conceptual thinking, distinguishing essential from nonessential details, and associative ability combined with language facility.

Block Design

The subject is required to take blocks that have all white sides, all red sides, and red and white sides and arrange them according to each of 13 patterns under limited period. This is for assessing perceptual organization, spatial visualization, and abstract conceptualization. Besides, it is cultural-bias eliminated.

Matrix Reasoning

The subject must complete the missing part of each of 35 geometric patterns from provided choices. This subtest evaluates visual-spatial reasoning, abstract reasoning, visual organization, and simultaneous processing of visual-spatial information. This subtest is also cultural-bias eliminated.

Wechsler Abbreviated Scale of Intelligence-Thai Version (WASI-T) (60, 75)

WASI-T was developed by Clinical Psychology Division, Department of Psychiatry, Faculty of Medicine, Siriraj Hospital, Mahidol University. The researchers saw that WASI was interesting and practically useful so they translated WASI into Thai, including modifying items within Vocabulary and Similarities subtests to Thai beliefs and culture. Reliabilities of WASI-T among children (aged 6-16 yrs.) in 4 subtests were between .69-.92; VIQ =.95, PIQ =.92, FSIQ-4 =.94, and FSIQ-2 =.93. For adults (aged 17-70 yrs.), reliabilities of 4 subtests were between .74-.94; VIQ =.92, PIQ =.94, FSIQ-4 =.94, and FSIQ-2 =.92. When included two groups (aged 6-70 yr.) together, reliabilities of 4 subtests were between .79-.95; VIQ =.96, PIQ =.94, FSIQ-4 =.96, and FSIQ-2 =.95 which were high (15). When comparing with its original, WASI-T had construct validity with WASI (11). Thus WASI-T becomes a standardized alternative for screening intelligence in order to design teaching plan in short period or in case of lots of subjects.

According to international standard, a test selected for assessing individual' attributes should be standardized, and enable to predict or measure each attribute accurately according to diagnostic criteria.

Standardized Test Invention

Psychological characteristics are internal attributes that are unable to observe or measure directly from behaviors expressed. Therefore creating standardized test for measuring psychological characteristics must rely on theories explaining causes of each behavior. Intelligence test is alike, it must base on intelligence theory in order to know characters of what measured and scope down the questions. Directions of the questions should base on experiences and theoretical constructions and the answers must indicate specific characteristics of what measured (61). Considerations in psychological testing are validity and reliability. Validity consists of two types 1) content validity refers to test's validity that enables to be a good representative of the content of test items that cover all characteristics of what measured. 2) construct validity refers to the ability of the test to measure attributes of the individual in accordance with theory used to describe the behavior correctly and properly.

Reliability is the indication to consistency of measuring or how much it can preserve its status. If a test consists of the above characteristics, it enables to predict or measure behaviors with standard due to definition of psychological testing (62). First, validity and reliability will become the error of measurement of the test. Second, standardization by fair testing concerns test selection, rights and accountability of the test administrator, and test administration with subjects from different languages and cultures. Unfair testing occurs when subjects cannot use their knowledge doing the test fairly due to cultural bias in the test. Then subjects' attributes are distorted and limit their opportunities in many aspects (63).

From all above processes, it can be concluded that intelligence test is developed under behavior pattern of people in a society, both based theories and constructed items. Thus using the test in different cultures with different behavior patterns may lead to bias within the test; subjects in the same culture as the test developed may do higher scores than those from different cultures because they are more familiar with characteristic of the test or items.

Intelligence Assessment with People from Different Cultures

After studied general intelligence, Hebb divided intelligent components into two. The first one was Intelligence A which referred to hereditary ability that indicated capacity to learn of the individual, whereas Intelligence B referred to learned ability of the individual through culture and environment. Later, Vernon added Intelligence C which was individual's ability to do intelligence test. Currently, it still cannot identify factors causing Intelligence C but cultural factors such as language, contents of the items, and motivation in doing the test are mentioned. We may conclude from these factors that ability to do intelligence test relies on knowledge and comprehension on language and culture. Thus using a test developed in a culture with people from different cultures may lead to cultural bias (64, 65). This kind of bias has been discussed since the first intelligence test had been used. When using the intelligence test with children from various social statuses, Binet and Simon found that children from higher social status always did higher scores than those from the lower

one. Though they did not find out the causes, Binet said that language, cultural background, and experiences learned from environment were main medias for intelligence testing (54). Thus we may conclude that bias within the test is a mistake occurred in individual or group's intelligence testing system. This mistake leads to unreliability of that test and we cannot use its score for judging the individual according to the diagnostic criteria (25). These biases can be described by standardized test invention principle as follows:

1. Construct Bias

This bias means tools created in a socio-cultural background cannot be used for assessing people from different background with the same diagnostic criteria. This is a result of theoretical background gained from studies on a culture. When applying the theory with different cultures, it may explain only some aspects of those cultures due to different beliefs and thinking so it cannot cover all aspects and may cause cultural bias. Besides, they have different behaviors and perceive social expectation differently. Thus when creating items, they cannot explain things completely or correctly and will also lead to cultural bias. Finally when translating the test for using with other cultures, some items may be cut due to prevention from cultural bias and then the number of items is too small to explain behaviors or things precisely (43, 55). If we use statistics explaining construct bias, it has an impact on construct validity, that is, the test is unable to measure individual's attributes properly because there are different behaviors between groups and theories supporting the test are not congruent (54).

2. Method Bias (64, 65)

Method bias, which occurs during testing process only, divided into 3 types as follows:

2.1 Sample bias is a kind of cultural bias caused by different characteristics between people from different social and cultural backgrounds such as social expectation, educational system, experience in doing the test, or language usage skill. All these factors affect test performance. For example, subjects from

achievement-oriented societies can perform the test better than the non achievement-oriented one because their motivations are different.

2.2 Administration bias occurs during test administration, mainly on communication. For instance, test administrator may explain the instruction ambiguously or hard to understand, or use words that guide to the correct answers during testing. Moreover, the administrator and the subject may have different cultural backgrounds and attitudes that cause communicative problems. This bias also includes environment factors while testing such as privacy, room space, temperature, and illumination.

2.3 Instrument bias is occurred by testing tool, that is, people in each culture are familiar with stimulus in the test differently. For example, types of numbers in the test (Arabic VS Roman numeral), pencil, play dough, or cube. Subject who is more familiar with the stimuli can do higher score (53). There was a study showing that children who got used to language used in the test administration and testing tool did higher scores than those who were unfamiliar. Factors causing this difference were culture, race, and social status.

3. Item Bias

Most biases within the test are from language and cultural differences, especially from test items created by relying on theories or diagnosis criteria. Elles defined cultural bias in test item as individual differences on opportunities to learn or familiarities with various items (54). One who is familiar with the item will do better score than those who are not (25). For instance, contents of the items are not universal for all cultures (64) and item translation may lead to unequal meaning between the source language and the target language due to their difficulties and usages since people tend to give meanings to things differently due to their beliefs (65). The bias testing is that if people from one group get better scores than another significantly, bias is found (66).

When using the test with people from different languages and cultures from the based culture one, all 3 biases mentioned above will result in error of measurement and thus the score cannot be used for judging or evaluating individual' attributes correctly (54, 66).

Consideration on cultural bias is needed with testing people from different cultures.

Here the researcher see that though hill tribe students differ from lowlands students in language and culture but they study Thai program at school and learn Thai culture and social environment through educational system and medias. Thus it is interesting to know whether bias within the test is found or not when they do the test modified with Thai lowlands culture.

Research Framework

Literature review suggests that cultural bias during testing is caused by different language and cultural environments among subjects and cultural background of the test invented. Hill tribe students have different languages, cultures, and environments from lowland students. The researcher believes that language and cultural differences will affect intelligence test performance among hill tribe students though the test has been adapted to Thai language and culture.

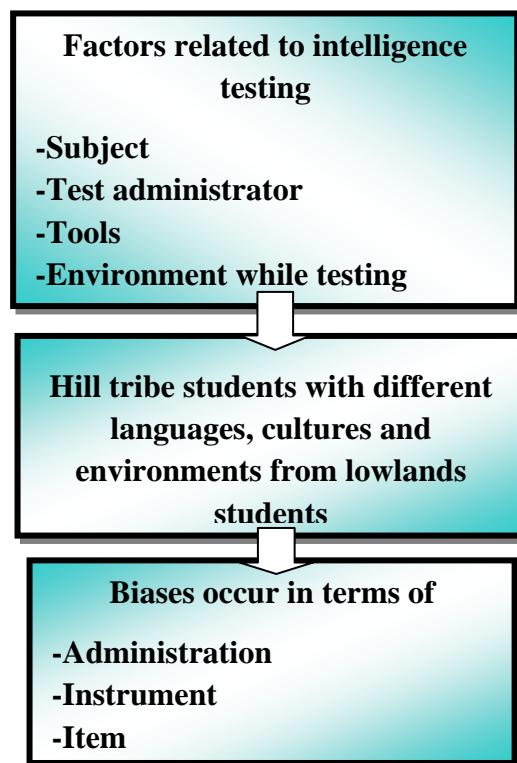


Figure 1 Research Framework

CHAPTER III

METHODOLOGY

This was a survey research for studying effect of language and cultural differences on bias within the test of WASI-T which included both verbal and nonverbal parts among Thai hill tribe students from Suksanaree Anusorn 2 School, Mae-Ai district, Chiang Mai province detailed as follows:

Environment

Suksanaree Anusorn 2 School – Ban Mae Salak was located at Moo 6, Tambon Mae Na Wang, Mae-Ai district, Chiang Mai province and was under supervision of Office of Basic Commission. 7 teachers provided pre-school and primary educations for 159 hill tribe students detailed as follows:

Tribe	No. of Students	Percentage
Chinese	29	18
Lahu	79	50
Akha	18	11
Mien	5	3
Shan	25	16
Lisu	3	2

The school was located at the borders between Chiang Mai and Chiang Rai provinces. Most students were Lahu, Akha, Chinese, Mien, Palong, and Shan respectively. Most of them lived far from school and must walk for 4 – 6 kilometers. These communities located in remote areas and had different languages and cultures up to their tribes. Most parents were uneducated, illiterate, and wagers or farmers. They had no lands and no part-time jobs so their incomes were uncertain.

Most students used Thai common language only when speaking with teachers at school, whereas talking to friends and families in their own dialects.

Population and Sample Group

Population

Population in this research was Thai hill tribe students from various tribes with different languages and cultures. They had their own written and spoken languages and used Thai as a second language.

Study Group

The researcher employed purposive sampling method with Lahu students who were studying at Suksanaree Anusorn 2 School since Lahu was the biggest tribe and number of Lahu students was more than half of all hill tribe students. Criteria for selecting samples were as follows:

1. Lahu students, both male and female, who were studying in Grade 1-6
2. Not being sensory deficits
3. Screened by Colored Progressive Matrices (CPM) and ranked as average group

Reference Group

The researcher selected reference group from Thai lowlands students who were studying Grade 1-6 at Ban Wiang Fang School, Fang district, Chiang Mai province where used the core curriculum as well as Suksanaree Anusorn 2 School's. Criteria for selecting samples were as follows:

1. Not being sensory deficits
2. Screened by CPM and ranked as average group

Research Tools

1. Oral Questionnaire for Personal Information consisted of

Part 1 General Information such as gender, age, educational level , GPA, religion or belief, occupation, parents' average incomes per year, and number of siblings.

Part 2 Students' Thai usages such as languages used with father, mother, siblings, and friends; language used in daily life, evaluation of abilities in reading, writing, and speaking Thai among Thai hill tribe students. For all hill tribe students and Thai lowlands students in Grade1-3, the researcher read the items out loud and the students answered while Thai lowlands students in Grade 4-6 read the items in mind and answered the questions by themselves.

2. WASI-T was translated and developed from Wechsler Abbreviated Scale of Intelligence (WASI) by Clinical Psychology Division, Department of Psychiatry, Faculty of Medicine, Siriraj Hospital, Mahidol University. This Thai version was similar to the original one, except for adjusting some items in Vocabulary to match with Thai society and culture. It took 30 minutes and comprised of 3 parts - verbal part (VIQ), performance part (PIQ), and full scale IQ (FSIQ) score – and 4 subtests as follows:

2.1 Vocabulary: Item 1-4 were pictures that required the subject to tell what he/she saw while item 5-42 were words which required the subject to explain meaning of each word.

2.2 Similarities: Item 1-4 were pictures needed the subject to select a picture in the below row which was most similar to a picture in the above row while item 5-22 needed the subject to tell similarities between two words.

2.3 Block Design: The subject was required to take blocks that had all white sides, all red sides, and red-and-white sides and arranged them according to each of 13 patterns under limited period.

2.4 Matrix Reasoning: The subject must complete the missing part of each of 35 geometric patterns from 5 choices.

3. Colored Progressive Matrices (CPM) was a language and cultural-bias eliminated test and was used for screening intelligence levels among samples

before testing WASI-T with them. The test comprised of 5 forms that were A, B, C, D, and E. Each of them consisted of 12 geometric patterns that the subject must select the missing part from the alternatives provided.

4. Stop watch

5. Recorder

Data Collection

This study was a survey research which aimed to study the effect of language and cultural differences on causing bias within the intelligence test that consisted both verbal and nonverbal parts among Thai hill tribe students by calculating item difficulty of each item in verbal part. The researcher selected samples of Thai hill tribe students whose intelligence scores were average when testing in group with CPM. Then, the appointment for testing WASI-T with study group was set. The researcher read the questions by Thai common language and the students answered individually. At the same time, the researcher observed behaviors of each student during the test and recorded both in written and by recorder in terms of students' understandings of test items, communication problems during testing, familiarities with test tools, environmental factors effecting test performances, including enquiries, knowledge, and comprehensions towards each item after finishing the test.

The researcher selected reference group from Thai lowlands students whose intelligence scores were average when testing in group with CPM. Then, the appointment for testing WASI-T with reference group was set. The researcher read the questions by Thai common language and the Grade 1-3 students answered individually while students in Grade 4-6 read the questions in mind and answered by themselves. Then the researcher conducted WASI-T with each student individually by Thai common language.

Statistics for Data Analysis

The researcher divided data analysis into two steps as follows:

Step 1

Performed data analysis by Statistic Package for The Social Science (SPSS)

1. Described characteristics of personal information by descriptive statistics such as frequency distribution, percentage, and mean
2. Calculated item difficulty
3. Tested the statistics for critical ratio and frequency distribution

$$CR = \frac{p_1 - p_2}{\sqrt{\frac{p_1(100-p_1)}{n_1-1} + \frac{p_2(100-p_2)}{n_2-1}}}$$

while

p_1 = Item difficulty of Thai hill tribe students

p_2 = Item difficulty of Thai lowlands students

n_1 = Population of Thai hill tribe students

n_2 = Population of Thai lowlands students

If any questions differ from others significantly, it has item bias.

Step 2

1. Conducted content analysis with the items which had item bias in terms of language and cultural differences from data gained from observation recorded during the test and enquiring the students after finishing the test.
2. Concluded the data analysis under this research framework.

CHAPTER IV

RESULTS

This research aimed to study the effect of language and cultural environment on Thai hill tribe students' intelligence test performances in both verbal and nonverbal parts. Its results were presented in the following three parts:

- Part 1: Personal information, Thai usage information and IQ scores from CPM and WASI-T among Thai hill tribe and lowlands students
- Part 2: Item difficulty of WASI-T among Thai hill tribe and lowlands students
- Part 3: Characteristics of the answers and behaviors expression of Thai hill tribe students during testing Vocabulary and Similarities of WASI-T

Part 1: Personal Information, Thai Usage Information and IQ Scores from CPM and WASI-T among Thai Hill Tribe and Lowlands Students

Table 1 below demonstrated personal information of both study and reference groups in terms of gender, age, education, religion, father's occupation, mother's occupation, family's average income per year, number of siblings, parents' attitudes towards education, and Thai usage information.

Table 1 Personal Information and Thai Usage Information of Thai Hill Tribe Students and Thai Lowlands Students

Demographic Data	Thai Hill Tribe Students		Thai Lowlands Students	
	N=25		N=40	
	Persons	Percentage	Persons	Percentage
Gender				
Male	10	40	16	40
Female	15	60	24	60
Age (yrs.)				
7	2	8	7	17.5
8	4	16	8	20
9	1	4	7	17.5
10	6	24	8	20
11	8	32	6	15
12	4	16	4	10
Grade				
1	2	8	6	15
2	1	4	6	15
3	3	12	7	17.5
4	6	24	7	17.5
5	7	28	7	17.5
6	6	24	7	17.5
Religion				
Buddhism	22	88	3	7.5
Christianity	3	12	37	92.5

Table 1 Personal Information and Thai Usage Information of Thai Hill Tribe Students and Thai Lowlands Students (cont.)

Demographic Data	Thai Hill Tribe Students		Thai Lowlands Students	
	N=25		N=40	
	Persons	Percentage	Persons	Percentage
Lived with				
Mother	4	16	4	10
Parents	14	56	32	80
Others	7	28	4	10
Father's Occupation				
Wageworker	10	40	16	40
Farmer	13	52	11	27.5
Merchant	0	0	5	1.5
State Enterprise	0	0	1	2.5
Employee	0	0	1	2.5
Government Official	0	0	6	6
Business Employee	2	8	0	0
Others				
Mother's Occupation	12	48	17	42.5
Wageworker	3	12	7	7.5
Farmer	1	4	14	35
Merchant	0	0	2	2
Business Employee	9	36	0	0
Housewife				
Family's Average				
income/year (baht)	6	24	0	0
50,000-70,000	15	60	15	37.5
70,001-90,000	4	16	25	62.5
90,001 upwards				

Table 1 Personal Information and Thai Usage Information of Thai Hill Tribe Students and Thai Lowlands Students (cont.)

Demographic Data	Thai Hill Tribe Students		Thai Lowlands Students	
	N=25		N=40	
	Persons	Percentage	Persons	Percentage
Number of Siblings				
1	1	4	12	30
2	3	12	24	60
3	8	32	4	10
4	3	12	0	0
5	6	24	0	0
6	2	8	0	0
7	2	8	0	0
Student is a Child				
Number				
1	4	16	26	65
2	5	20	12	30
3	8	32	2	5
4	5	20	0	0
6	2	8	0	0
7	1	4	0	0

Table 1 Personal Information and Thai Usage Information of Thai Hill Tribe Students and Thai Lowlands Students (cont.)

Demographic Data	Thai Hill Tribe		Thai Lowlands	
	Students		Students	
	N=25		N=40	
	Persons	Percentage	Persons	Percentage
Parents' Attitudes towards				
Education				
(could select more than 1 item)				
1.Education was necessary for communicating with lowlanders	11	44	0	0
2.Education was important for earning a living	24	96	40	100
3.Education was important for gaining respects from others in the society	11	44	34	85
4.Education helped access public services easier	14	56	16	40
5.Education could develop the community				
Thai Usage Information				
Language used with Father				
Thai	3	12	40	100
Lahu	21	84	0	0
Lahu	1	4	0	0
Shan				
Language used with Mother				
Thai	2	8	40	100
Lahu	23	92	0	0

Table 1 Personal Information and Thai Usage Information of Thai Hill Tribe Students and Thai Lowlands Students (cont.)

Demographic Data	Thai Hill Tribe		Thai Lowlands	
	Students		Students	
	N=25		N=40	
	Persons	Percentage	Persons	Percentage
Language used with Siblings				
Thai	4	16	40	100
Lahu	21	84	0	0
Language used with Friends				
Thai	6	24	40	100
Lahu	19	76	0	0
Literacy in Daily Life				
Thai	7	28	40	100
Lahu	17	68	0	0
Shan	1	4	0	0
Ability to Speak Thai				
Fluent	2	8	40	100
Good	3	12	0	0
Fair	17	68	0	0
Poor	3	12	0	0
Ability to Write Thai				
Fluent	0	0	9	22.5
Good	4	16	27	67.5
Fair	15	60	4	10
Poor	6	24	0	0
Ability to Read Thai				
Fluent	1	4	14	35
Good	3	12	24	60
Fair	11	44	2	5
Poor	10	40	0	0

Table 1 Personal Information and Thai Usage Information of Thai Hill Tribe Students and Thai Lowlands Students (cont.)

Demographic Data	Thai Hill Tribe		Thai Lowlands	
	Students		Students	
	N=25		N=40	
	Persons	Percentage	Persons	Percentage
Ability to Listen Thai				
Fluent	0	0	40	100
Good	16	64	0	0
Fair	8	32	0	0
Poor	1	4	0	0
Media to Practice Thai (could select more than 1 item)				
Television	21	84	40	100
Radio	10	40	28	70
Internet	0	0	22	55
Newspaper	14	56	23	60
Others (Story Books, Cartoon, etc.)	8	32	26	62.5
IQ from CPM Testing				
Mild Mental retardation	0	0	0	0
Borderline	0	0	0	0
Average	25	100	40	100
High Average	0	0	0	0

Samples from both groups were boy and girl aged between 7-12 years old and were studying in Grade 1-6. Their religions were different, most hill tribe students were Christian while most lowlands students were Buddhist. Concerning family perspective, more than half of them lived with their parents. Most of their fathers were

farmers or wageworkers while mothers were wageworkers and housewives who had no incomes which were quite different from lowlands students whose all parents earned incomes from being wageworkers, farmers, merchants, business employees, state enterprise employees, and government officials. That was why the family's average income per year of both groups were different; hill tribe students' were between 70,001-90,000 baht while lowlands students' were 90,001 baht upwards. However, all parents' attitudes towards education went in the same direction. Most saw that education was important to future occupations and incomes. There were no parents who thought education was unimportant or did not support their children on education. For language perspective, hill tribe students were more literate in Lahu than Thai in their daily lives. In contrast, lowlands students were more familiar with Thai than other languages. When evaluating their own abilities in Thai usage, most hill tribe students ranked their speaking, reading, and writing skills as fair and listening as good while lowlands students ranked their speaking and listening skills as fluent and more than half ranked their reading and writing skills as good. For Thai usage in daily life, both groups received news from television, radio, and newspaper in the comparable rate respectively. However, using internet found in lowlands students only. After testing with CPM, which was cultural-bias eliminated, selected IQ of both groups average level which implied that their IQ were similar and they suited to participate this study.

Considering IQ scores from WASI-T which consisted both verbal and nonverbal parts, the results were varied according to the average IQ score shown in the following figure.

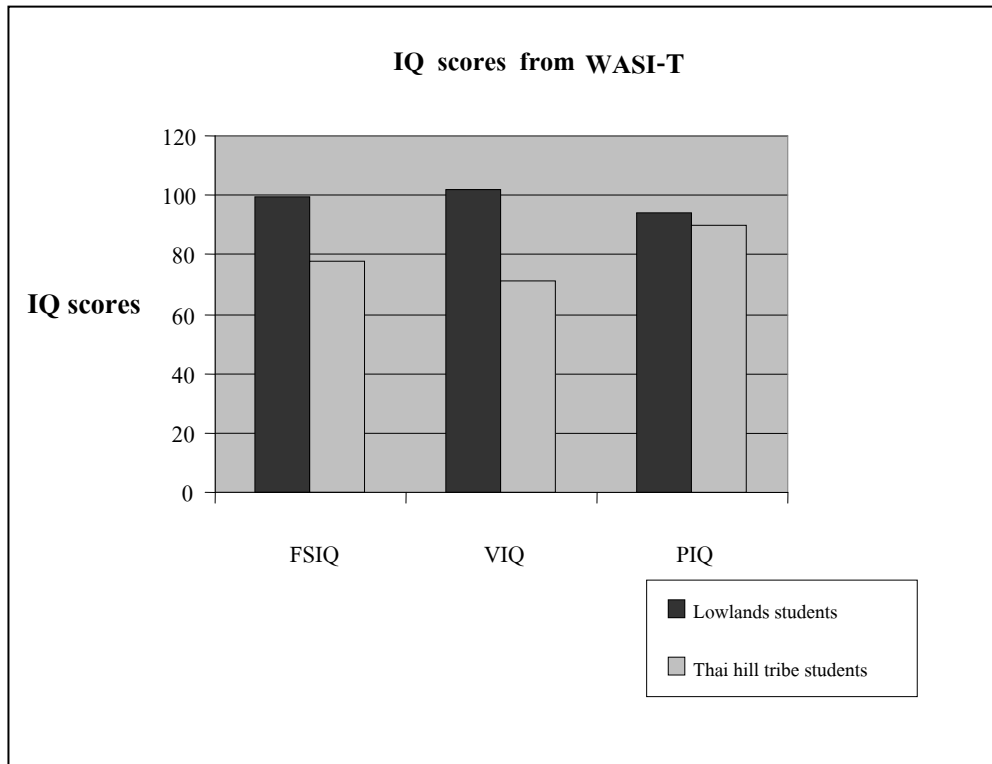


Figure 2 Comparison of IQ Scores when Testing with WASI-T between Thai Hill Tribe and Lowlands Students

According to Figure 2, FSIQ of the hill tribes was 77 (borderline) while the lowlands' was 99 (Average). When considering VIQ among both groups, the hill tribes' was 71 (Borderline), whereas the lowlands' was 101 (Average). For PIQ, the hill tribes' was 89.84 (actually it was ranked as low average but when rounding the decimal up, it became average) when the lowlands' was 94 (Average).

Thus, considering performance part of the WASI-T only, IQ of both groups were ranked as average and this correlated with the CPM scores.

This finding could be implied that FSIQ was lower than it should because of low VIQ. This related to the concept of this research that Thai skills were different between hill tribe and lowlands students and also affected intelligence test performance though the test had been modified to suit Thai lowlands' society and culture.

Table 2 Intelligence Quotient of Thai Hill Tribe Students when assessed by WASI-T (n=25)

Intelligence Quotient	WASI-T		
	FSIQ	VIQ	PIQ
	%	%	%
50-69 (Mild Mental Retardation)	16	48	-
70-79 (Borderline)	52	32	16
80-89 (Low Average)	20	12	44
90-109 (Average)	12	8	32
110-119 (High Average)	-	-	8

According to Table 2, FSIQ classified these students as mild mental retarded for 16%, borderline 52%, and low average plus average 32%. For VIQ, about half of all students (48%) were mild mental retarded and most of all (92%) were under average. However, their PIQ were higher significantly and had no mild mental retarded, those classified as 'high average' were 8% of all hill tribe students.

Part 2: Item Difficulty of WASI-T between Thai Hill Tribe and Lowlands Students

Language had an impact on intelligence test performance of Thai hill tribe students and made their scores lower than they should be as illustrated in Table 2. Thus the researcher compared item difficulties of the Vocabulary and Similarities items between Thai hill tribe and lowlands students. These item difficulties were calculated from percentage or ratio of the correct answerers in each item in order to study item bias. Differences between their item difficulties were shown in Table 3-4 below.

Table 3 Comparison of Item Difficulties of Vocabulary Subtest in WASI-T between Thai Hill Tribe and Lowlands Students

Item No.	Item Difficulties		Critical Ratio (Z)
	Thai Hill Tribe	Thai Lowlands	
	Students	Students	
1	100	100	0
2	56	90	-3.032*
3	72	80	-0.715
4	92	100	-1.444
5	96	97.5	-0.318
6	100	100	0
7	84	100	-2.139*
8	96	100	1
9	88	100	-1.809*
10	80	85	-0.501
11	88	92.5	-2.862*
12	92	100	-1.444
13	40	85	-3.90*
14	92	100	-0.905
15	0	60	-7.643*
16	96	100	-1
17	100	100	0
18	0	15	-2.6237*
19	40	85	-3.906*
20	76	90	-1.127
21	0	35	-4.58*
22	80	67.5	0.910
23	0	12.5	-2.36*
24	12	57.5	-4.405*

Table 3 Comparison of Item Difficulties of Vocabulary Subtest in WASI-T between Thai Hill Tribe and Lowlands Students (cont.)

Item No.	Item Difficulties		Critical Ratio (Z)
	Thai Hill Tribe Students	Thai Lowlands Students	
25	44	67.5	-1.654
26	56	70	-1.119
27	0	100	0
28	0	25	-3.605*
29	32	27.5	-0.378
30	0	10	-2.08*
31	0	0	0
32	0	0	0
33	52.5	69.2	-1.116
34	0	0	0
35	0	75	-8.487*
36	0	50	-4.899*
37	0	0	0
38	0	75	-8.49*

*p< .01

According to Table 3, item number 2,7,11,13,15,18,19,21,23,24,28,30,35, 36, and 38 were difficult with significance level at .01.

Table 4 Comparison of Item Difficulties of Similarities Subtest in WASI-T between Thai Hill Tribe and Lowlands Students

Item No.	Item Difficulties		Critical Ratio (Z)
	Thai Hill Tribe Students	Thai Lowlands Students	
1	100	100	0
2	92	100	-1.444
3	96	100	1
4	88	92.5	-0.572
5	44	92.5	-4.419*
6	4	40	-4.088*
7	56	97.5	-3.977*
8	52	97.5	-4.33*
9	24	50	-2.197*
10	40	92.5	-3.907*
11	84	92.5	-0.988
12	44	87.5	-3.805*
13	0	20	-3.123*
14	48	85	-3.164*
15	0	10	-2.08*
16	4	57.5	-6.032*
17	0	20	-3.123*
18	48	85	-3.165*
19	0	27.5	-3.846*
20	12	32.5	-2.047*
21	0	28	-3.054*
22	0	4	-1
23	0	0	0

Table 4 Comparison of Item Difficulties of Similarities Subtest in WASI-T between Thai Hill Tribe and Lowlands Students (cont.)

Item No.	Item Difficulties		Critical Ratio (Z)
	Thai Hill Tribe	Thai Lowlands	
	Students	Students	
24	0	8	-1.446
25	0	0	0
26	0	0	0

*p< .01

Comparison of item difficulties of Similarities subtest in WASI-T between Thai hill tribe and lowlands students indicated that item difficulties of item number 5-10 and 12-21 were difficult significantly at .01.

According to Table 3 and 4, there were cultural biases in Vocabulary for 16 items from all 38 items, and in Similarities for 16 items from 26 items. This could be explained by characteristics of the answers and behavior expression during testing mentioned in part 3.

Part 3: Characteristics of the Answers and Behavior Expression during Testing with WASI-T among Thai Hill Tribe Students

Considerations on characteristics of the answers together with behavior expression during testing among Thai hill tribe students for explaining effect of language differences on the test' cultural biases were summarized in Table 5 below.

Table 5 Characteristics of the Answers of Thai Hill Tribe Students in the Items whose Item Difficulties in Vocabulary Subtest were Different from the Lowlands’

The researcher categorized groups of answers’ characteristics from Thai hill tribe students in the item whose item difficulties in Vocabulary were different from scoring criteria of this subtest as follows:

Item No.	Total No. of Students		Characteristics of The Answer	Persons
	who Answered Incorrectly	(N=25)		
2	11		- the answer was obviously wrong or indicated that the subject did not understand the word e.g. telling that it was a picture of spoon or nail	4
			- the answer was not totally wrong but it was ambiguous or could sense a little concept of the meaning and when inquiring, they could not explain any further e.g. telling that it was used for making clay	1
			- they have not known or seen it before	6
7	4		- the answer was obviously wrong or indicated that the subject did not understand that word e.g. it contained water inside and was used for light the fire for cooking, or it was flammable	2
			- the answer was not totally wrong but it was ambiguous or could sense a little concept of the meaning and when inquiring, they could not explain any further	2

Table 5 Characteristics of the Answers of Thai Hill Tribe Students in the Items whose Item Difficulties in Vocabulary Subtest were Different from the Lowlands' (cont.)

Item No.	Total No. of Students		Characteristics of The Answer	Persons
	who Answered Incorrectly	(N=25)		
8	3		- the answer was not totally wrong but it was ambiguous or could sense a little concept of the meaning and when inquiring, they could not explain any further e.g. it could have an offspring, or it provided food for its offspring	1
			-they knew the word but had difficulty in explaining it in Thai and preferred to explain in Lahu	2
11	3		- the answer was not totally wrong but it was ambiguous or could sense a little concept of the meaning and when inquiring, they could not explain any further e.g. it could be seen	1
			-they knew the word but had difficulty in explaining it in Thai and preferred to explain in Lahu	2
13	15		- the answer was obviously wrong or indicated that the subject did not understand that word e.g. vegetable soup, or eggs stewed in the gravy	1

Table 5 Characteristics of the Answers of Thai Hill Tribe Students in the Items whose Item Difficulties in Vocabulary Subtest were Different from the Lowlands' (cont.)

Item No.	Total No. of Students		Characteristics of The Answer	Persons
	who Answered Incorrectly (N=25)			
13. (Continue)			- the answer was not totally wrong but it was ambiguous or could sense a little concept of the meaning and when inquiring, they could not explain any further e.g. ate it for being wise, did the dishes after dining, it was food for nighttime, or it was nutritious food	13
			-they knew the word but had difficulty in explaining it in Thai and preferred to explain in Lahu	1
15	25		- the answer was obviously wrong or indicated that the subject did not understand that word e.g. took rest when feeling hot, or rested in the cooler place to relieve the exhaustion and made us feel cooler	16
			- they have not known or seen it before	9
18	25		- the answer was obviously wrong or indicated that the subject did not understand that word e.g. infant, new-born baby, or transformed into rabbit	6

Table 5 Characteristics of the Answers of Thai Hill Tribe Students in the Items whose Item Difficulties in Vocabulary Subtest were Different from the Lowlands' (cont.)

Item No.	Total No. of Students		Characteristics of The Answer	Persons
	who Answered Incorrectly (N=25)			
18 (Continue)			- the answer was not totally wrong but it was ambiguous or could sense a little concept of the meaning and when inquiring, they could not explain any further e.g. forming, sculpting, decoration, or drawing a picture	6
			- they have not known or seen it before	11
			-they knew the word but had difficulty in explaining it	2
19	15		- they have not known or seen it before	15
21	25		- the answer was obviously wrong or indicated that the subject did not understand that word e.g. education made us wiser	1
			- the answer was not totally wrong but it was ambiguous or could sense a little concept of the meaning and when inquiring, they could not explain any further e.g. we had to blame many things, or blaming the wrongdoer.	3

Table 5 Characteristics of the Answers of Thai Hill Tribe Students in the Items whose Item Difficulties in Vocabulary Subtest were Different from the Lowlands' (cont.)

Item No.	Total No. of Students who Answered Incorrectly (N=25)	Characteristics of The Answer	Persons
23	25	- they have not known or seen it before -they knew the word but had difficulty in explaining it - the answer was obviously wrong or indicated that the subject did not understand that word e.g. we did good thing collecting objects, or it was an object	19 2 3
24	22	- they have not known or seen it before -they knew the word but had difficulty in explaining it - the answer was obviously wrong or indicated that the subject did not understand that word e.g. wanted to be an actor in order to know how to act, or it was an informing - the answer was not totally wrong but it was ambiguous or could sense a little concept of the meaning and when inquiring, they could not explain any further e.g. it was an entertainment, when a drama was shot	21 1 3 3

Table 5 Characteristics of the Answers of Thai Hill Tribe Students in the Items whose Item Difficulties in Vocabulary Subtest were Different from the Lowlands' (cont.)

Item No.	Total No. of Students who Answered Incorrectly (N=25)	Characteristics of The Answer	Persons
28	25	<p>then its behind-the-scene would be shown in 'See San Ban Terng', or it was a movie</p> <p>- they have not known or seen it before</p> <p>-they knew the word but had difficulty in explaining it</p> <p>- the answer was not totally wrong but it was ambiguous or could sense a little concept of the meaning and when inquiring, they could not explain any further e.g. it was a Thai tradition, it was a Songkran festival, or it was a Loy Krathong festival</p>	<p>13</p> <p>3</p> <p>10</p>
30	25	<p>- they have not known or seen it before</p> <p>-they knew the word but had difficulty in explaining it</p> <p>- the answer was obviously wrong or indicated that the subject did not understand that word e.g. when we fell, no one helped us</p>	<p>9</p> <p>6</p> <p>1</p>

Table 5 Characteristics of the Answers of Thai Hill Tribe Students in the Items whose Item Difficulties in Vocabulary Subtest were Different from the Lowlands' (cont.)

Item No.	Total No. of Students who Answered Incorrectly (N=25)	Characteristics of The Answer	Persons
		- the answer was not totally wrong but it was ambiguous or could sense a little concept of the meaning and when inquiring, they could not explain any further e.g. when we got up, we hurriedly go to school	1
		- they have not known or seen it before	23
35	25	- they have not known or seen it before	25
36	25	before	25
38	25	- they have not known or seen it before	25
		- they have not known or seen it before	

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Table 6 Characteristics of the Answers of Thai Hill Tribe Students in the Items whose Item Difficulties in Similarities Subtest was Different from the Lowlands'

The researcher categorized groups of answers' characteristics from Thai hill tribe students in the items whose item difficulties in Similarities were different from scoring criteria of this subtest as follows:

Item No.	Total No. of Students		Characteristics of The Answer	Persons
	who Answered Incorrectly	(N=25)		
5	14		- the answer was abstract but incorrect e.g. they were alphabets	1
			- the answer represented the complete difference or irrelevance between both words	13
6	24		- the answer was abstract but incorrect e.g. they had the same figure, or they had the same shape	4
			- the answer was concrete and incorrect e.g. they were curves, they were cameras, or they were lines	7
			- the answer represented the complete difference or irrelevance between both words	13
7	11		- the answer was abstract but incorrect e.g. they had the same favor	1
			- the answer was concrete and incorrect e.g. their leaves were similar, they were sharp, they were round, or they had seeds	7

Table 6 Characteristics of the Answers of Thai Hill Tribe Students in the Items whose Item Difficulties in Similarities Subtest was Different from the Lowlands' (cont.)

Item No.	Total No. of Students who Answered Incorrectly (N=25)	Characteristics of The Answer	Persons
7 (Continue)		- the answer represented the complete difference or irrelevance between both words	3
8	12	- the answer was concrete and incorrect e.g. they had the same shape, they had hairs, or they had the same color	11
		- the answer represented the complete difference or irrelevance between both words	1
9	19	- the answer was concrete and incorrect e.g. they had wheels, they had engines, they had speed, or they had seats	17
		- the answer represented the complete difference or irrelevance between both words	2
10	10	- the answer was concrete and incorrect e.g. they had necks, or they had arms	4
		- the subject did not know a word	1
		- the subject did not know both words	2
		- the answer represented the complete difference or irrelevance between both words	2

Table 6 Characteristics of the Answers of Thai Hill Tribe Students in the Items whose Item Difficulties in Similarities Subtest was Different from the Lowlands' (cont.)

Item No.	Total No. of Students who Answered Incorrectly (N=25)	Characteristics of The Answer	Persons
12	14	- the answer was concrete and incorrect e.g. they were round, they were white, or they were washable	7
		- the answer was abstract but incorrect e.g. they were made from iron	2
		- the subject did not know 'bowl'	2
		- the subject did not know both words	1
		- the answer represented the complete difference or irrelevance between both words	2
13	25	- the answer was abstract but incorrect e.g. they were words.	1
		- the answer represented the complete difference or irrelevance between both words	24
14	13	- the answer was concrete and incorrect e.g. they were square	2
		- the answer represented the complete difference or irrelevance between both words	11
15	11	- the answer was concrete and incorrect e.g. they had the same figure	1
		- the subject did not know a word	1

Table 6 Characteristics of the Answers of Thai Hill Tribe Students in the Items whose Item Difficulties in Similarities Subtest was Different from the Lowlands' (cont.)

Total No. of Students who			
Item No.	Answered Incorrectly (N=25)	Characteristics of The Answer	Persons
15 (Continue)		- the subject did not know both words	12
		- the answer represented the complete difference or irrelevance between both words	11
16	24	- the answer was concrete and incorrect e.g. they were on the same line, they were movable, they were on arm, or they were round	10
17	25	- the subject did not know a word	3
		- the subject did not know both words	2
		- the answer represented the complete difference or irrelevance between both words	9
		- the answer was concrete and incorrect e.g. running made us exhausted and sitting was the same, or we must make a move	2
		- the answer was an abstract but incorrect e.g. they were similar	1
		- the answer represented the complete difference or irrelevance between both words	22

Table 6 Characteristics of the Answers of Thai Hill Tribe Students in the Items whose Item Difficulties in Similarities Subtest was Different from the Lowlands' (cont.)

Total No. of Students			
who			
Item No.	Answered Incorrectly (N=25)	Characteristics of The Answer	Persons
18	13	- the answer was concrete and incorrect e.g. they had navels or the same habit.	2
		- the answer represented the complete difference or irrelevance between both words	11
19	25	- the answer was concrete and incorrect e.g. they were white, they were blue, or they were rain	5
		- the subject did not know a word	13
		-the answer represented the complete difference or irrelevance between both words	7
20	22	- the answer was concrete and incorrect e.g. their petals looked like bird's wing, The flower looked like bird's head,they had the same color, or when the wind blew, the flower moved like a bird flew	11
		- the answer was abstract but incorrect e.g. they had the same shape	1
		- the answer represented the complete difference or irrelevance between both words	10

Table 6 Characteristics of the Answers of Thai Hill Tribe Students in the Items whose Item Difficulties in Similarities Subtest was Different from the Lowlands' (cont.)

Item No.	Total No. of Students who Answered Incorrectly (N=25)	Characteristics of The Answer	Persons
21	25	-the answer represented the complete difference or irrelevance between both words	25

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Table 7 Behaviors Expression of Thai Hill Tribe Students during Testing WASI-T

The following behaviors were observed and recorded by the researcher during testing Vocabulary, Similarities, Block Design, and Matrix Reasoning subtests

Behaviors Expression during Testing	Persons	Percentage
Vocabulary		
1.Thai hill tribe students had difficulties in understanding the test instruction (the researcher must repeat the instruction, or the subject answered like previous answers)		
Yes	2	8
No	23	92
2. In explaining word meanings, the subject used words		
Appropriately	5	20
Inappropriately (used the wrong meanings, used a word that was not proper to the sentence, combined the sentence incorrectly,or their explanations were unclear)	20	80

Table 7 Behaviors Expression of Thai Hill Tribe Students during Testing WASI-T
(cont.)

Behaviors Expression during Testing	Persons	Percentage
3. Characteristics of the answers from Thai hill tribe students (could select more than 1 item)		
Gave clear and straightforward explanations	5	11.1
Gave meanings by associating with their own experiences	22	48.9
Made gestures while giving explanations e.g. pointing etc.	8	17.8
Others (gave short explanations with no essences and could not explain more)	10	22.2
4. The subject had difficulties in explaining the meanings (They knew what it was but had difficulties in telling the meaning. They might took time thinking before answering, or telling that they knew but could not explain)		
Yes	21	84
No	4	16
5. Qualities of the answers		
Direct and concise	3	12
Ambiguous	11	44
Ponderous	5	20
Others (e.g. gave short explanations and could not explain more, or their answers during inquiry period indicated that they did not understand the word)	6	24
6. The subject pronounced Thai		
clearly	2	8
unclearly	23	92

Table 7 Behaviors Expression of Thai Hill Tribe Students during Testing WASI-T
(cont.)

Behaviors Expression during Testing	Persons	Percentage
Similarities		
1. Thai hill tribe students had difficulties in understanding the test instruction (the researcher must repeat the instruction)		
Yes	5	20
No	20	80
2. The subject knew and understood meaning of each word in each item		
Yes	0	0
No	25	100
3. The subject had difficulties in selecting words explaining their own thoughts (used the wrong meanings, or took time thinking before answering)		
Yes	22	88
No	3	12
Block Design		
1. Thai hill tribe students had difficulties in understanding the test instruction (the researcher must repeat the instruction)		
Yes	2	8
No	23	92
2. Behaviors during testing		
did the test hurriedly and carelessly	5	20
did the test carefully	20	80

Table 7 Behaviors Expression of Thai Hill Tribe Students during Testing WASI-T
(cont.)

Behaviors Expression during Testing	Persons	Percentage
3. Attempt to do the test		
Stopped doing the test when they could not place the blocks like its pattern though time remained	5	20
Felt uncomfortable when could not place the blocks like its pattern	1	4
Tried to complete the task though time ran out	19	76
4. The subject planned before placing the blocks		
Yes	1	4
No	24	96
5. Attempt to place the blocks on the pattern		
Yes	1	4
No	24	9
6. The subject thought that white areas in the patterns were empty spaces for the picture arrangement tasks		
Yes	4	16
No	21	84
7. The subject told that their blocks looked like its pattern though it was not		
Yes	7	28
No	18	72
8. They had difficulties in using fine motor muscle (hands shook, or could not pick the blocks easily)		
Yes	2	8
No	23	92

Table 7 Behaviors Expression of Thai Hill Tribe Students during Testing WASI-T
(cont.)

Behaviors Expression during Testing	Persons	Percentage
Matrix Reasoning		
1.Thai hill tribe students had difficulties in understanding the test instruction (the researcher must repeat the instruction)		
Yes	1	4
No	24	96
2.Characteristics of giving answers		
answered quickly	15	30
answered slowly	10	20
answered carefully	17	34
answered carelessly	8	16
3. Answered by response set		
Yes	0	0
No	25	100

When considering behaviors expressed during the test and characteristics of the answers in terms of administration bias, it was found that most Thai hill tribe students had no difficulties in understanding the test instruction and did not need the researcher to repeat it, or used the same answer as the previous ones in every subtest. For instrument bias in nonverbal subtest such as Block Design, most Thai hill tribe students understood the procedure. Only few students tried to place the blocks on the patterns, thought that the white areas in the patterns were spaces for placing the blocks, or told that their block placements were similar to the patterns though actually they were wrong. Besides, they had no difficulties in using fine motor muscle observed from hand shaking or picking the blocks. About Matrix Reasoning, there was no one answering like response set. In Vocabulary, most Thai hill tribe students had difficulties in explaining words. Though they knew the word, they still had difficulties in explaining its meaning in Thai. According to Similarities, most Thai hill tribe

students had difficulties in selecting words to express their thoughts. In addition, most of their answers were concrete and incorrect by indicating other attributes that did not match the pair or explaining that both words were completely different or irrelevant. For item bias in Vocabulary, the most difficult words for them were vacation, occasional, faith, and privacy accordingly. Thai hill tribe students told that they had not known or heard these words and therefore could not explain its meaning. According to Similarities, most Thai hill tribe students had difficulties in word selection for expressing their own thoughts. All of them did not know or understand all the words in each item, especially the word 'smooth and rough' (48%) and the word 'vapor' (52%).

CHAPTER V

DISCUSSION AND CONCLUSION

This research aimed to study the effect of language and cultural differences on intelligence test performances which consisted both verbal and nonverbal parts among Thai hill tribe students. The study group was 25 Thai hill tribe students studying grade 1-6 at Suksanaree Anusorn 2 School while the reference group was 40 Thai lowlands students studying in the same grades at Ban Wiang Fang School. Both school employed the core curriculum of the Ministry of Education. There were two research tools: 1) questionnaire for personal and Thai usage information and 2) WASI-T. Data were analyzed by descriptive statistics comparing the differences among item difficulties and the content analysis was conducted on Vocabulary and Similarities subtests.

Findings in Summary

1. Administration Bias

More than half of Thai hill tribe students (64%) evaluated their Thai listening skills as good, contrasting with speaking, reading, and writing skills which were ranked as fair. This was relevant to behavior expressed during testing that most of them (92% for Vocabulary, 80% for Similarities, 92% for Block Design, and 96% for Matrix Reasoning) had no difficulties in understanding the test instruction in every subtest and did not need the researcher to repeat it.

2. Instrument Bias

Thai hill tribe students were familiar with research tools and understood the procedure of the nonverbal part very well. In Block Design, 94% of all subjects understood the procedure of placing blocks and did it quickly. When doing Matrix Reasoning, all the subjects did not answer like response set and this could be implied

that they understood the test procedure. However, 84% of them had difficulties in explaining word meanings in Vocabulary though they had known or heard the word before, indicating that they were unfamiliar with answering in Thai. This related to most Thai skill assessments among Thai hill tribe students finding that their Thai speaking were fair. In Similarities which employed conceptualization abilities, 88% of them had difficulties in selecting words to express their own thoughts. Besides, most answers in this subtest were concrete and incorrect by indicating other attributes that did not match the pair or explaining that they were completely different or irrelevant. This revealed that they did not understand and were unfamiliar with the item needing conceptualization. Moreover, the researcher could test WASI-T with 3 Thai hill tribe students per day while with 4-5 lowlands students a day. This was because Thai hill tribe students took time in selecting words and had difficulties in explaining words in verbal part.

3. Item Bias

Most answers in Vocabulary showed that Thai hill tribe students had not known or heard the word before and this reflected their limited language experiences towards words in each item. All of them could not explain what had not been found in their daily lives such as 'vacation' which was obviously wrong answer (16 persons) and which had not been known or heard (9 persons). This also occurred with 'occasionally', 'faith', and 'privacy' which 25 of the students had never known or heard. For Similarities, they had difficulties in selecting words for expressing their own thoughts. Besides, all of them did not know or understand some words in each item, especially for 'smooth and rough' (48%) and 'vapor' (52%).

4. Average IQ Scores Gained from CPM and WASI-T between Thai Hill Tribe and Lowlands Students

When doing the nonverbal test CPM, all Thai hill tribe students were average. But when testing them with WASI-T which consisted of both verbal and nonverbal parts, they were mild mental retarded (16%), borderline (52%), and low average together with average (32%). However, their PIQ were obviously higher than

VIQ. Thus, it may be concluded that the FSIQ was lower than it should because of low VIQ. This could be seen from 15 item biases out of 38 items in Vocabulary and 14 item biases from 26 items in Similarities. These cultural biases were results of their limited experiences on Thai usage through their experiences and environments so they were unfamiliar with the items and the FSIQ erred.

Discussion

The Effect of Language and Cultural Differences on WASI-T Scores of Thai Hill Tribe Students

According to this research findings, the average IQ scores of Thai hill tribe students from the test that was nonverbal (CPM) and the test that had both verbal and nonverbal parts (WASI-T) were different; both hill tribe and lowlands students had average IQ scores (98 and 97 respectively) when testing with CPM but when testing with WASI, the average FSIQ of the hill tribe was 77 (borderline) and the lowlands' was 99 (average). But when considering VIQ, the hill tribe' was 71 (borderline) while the lowlands' was 101 (average). Besides, PIQ of the hill tribe' was 89.84 (average), whereas the lowlands' was 94 (average). This could be seen that their PIQ were at the same level and related to the scores gained from CPM. Therefore, we may conclude that what made FSIQ of WASI-T among Thai hill tribe students lower than it should was the low VIQ. This was in accordance with the research of Kalyani K. Sampath on the effect of bilingualism on WISC-III among innate Indian who used Tamil as native tongue and the minority who used Tamil as a second language. It was found that their PIQ were not significantly different but the VIQ were (67). In addition, Razani et al. studied the effects of culture on WASI test performance in ethnically diverse individuals in United States and found language and cultural differences impacted on VIQ (3). It also related to the study of Redwine on the limitation of using nonverbal intelligence test with children who employed English as a second language. It was found that though the test had no language biases, there were cultural differences affecting the Pictorial Nonverbal Intelligence Quotient (PNIQ) which needed cultural comprehension (4). This could be explained by many articles of the experts that

language was one of the symbols created by a group of people in each society for communicating. It was a medium for expressing thoughts in the form of words. Its meanings reflected beliefs, values, and learning and perception processes of people in that society. To comprehend meanings of each word, one must understand that society's social regulation, and physical and social environments (8, 11). It was easier to communicate with people in the same culture because the sender and the receiver had similar experiences. However, problem may occur with the cross-cultural communication if the receiver did not understand the socio-cultural structure of the sender well enough. It was similar to doing the verbal part of any intelligence test that the subject must understand language and culture which the test was invented on very well so the result of the test became valid and reliable.

In Vocabulary which required ability to explain word' meanings, most Thai hill tribe students ranked their Thai speaking ability as fair and had difficulties in explaining word' meanings though they had known or heard it before. It was relevant to the research of Dendow Chollawit which indicated that Thai hill tribe students had weaknesses in word selection and unclear thoughts in their writings for opinion (68) as a result of using their own languages in communicating with family and friends and used Thai only at school so they did not practice Thai often enough. Besides, their opportunities to know Thai words, sentences, and messages were limited and this obstructed their Thai skill development. This correlated with the study of Sumate Sugin that the learning process of the hill tribe students was slow because they used their own languages in daily lives and this environment obstructed Thai language learning (69). Therefore their lack of communicating in Thai made them unfamiliar with doing the test in Thai. When considering each item, all of them could not give the correct meaning of 'vacation'. Most answers to this item were obviously wrong indicating that they did not understand the word. For example, they told that vacation was taking a rest after working outdoor, taking a rest indoor, or being unknown to them accordingly. When inquiring their teachers, the researcher was informed that these students were unfamiliar and had no experiences to use this word because their parents were wageworkers and farmers so they thought vacation meant as mentioned above. Teachers also told that the 5 words all these students could not explain were difficult and had not been used in their daily lives or even in the lesson. And since they

had problems with listening, speaking, reading, and writing Thai, their teachers must adapt the lesson to their Thai background so they did not learn difficult words. This may be the weakness of the curriculum that did not study the minority's daily-life cultures and environments in order to prepare a proper curriculum, together with the good intention to help students of the teacher by using easier word. These made their Thai got worse and they could not learn or communicate well like lowlands students'. This was similar to the findings from Somsak Tachai's study on factors related to repeat classes among hill tribe students under the office of primary education, Mae Jam district, Chiang Mai province which found that Thai hill tribe children aged during 1-6 yrs. had never used Thai in daily lives. When they went to school studying Thai program, they had problems with all four language skills (27). In addition, Somyos Manyam examined the education provision for highlands communities and found that the problems were on language usage and incomprehension in studying in the curriculum that did not match Thai hill tribe students because the contents were far from their lives, and word were difficult and had not been used in daily lives (70). This was in accordance with the study of Detchai Khanmali on factors affecting low achievement, absenteeism, repetition and dropout of Hmong students in Srinehru School, Chiang Mai which indicated that the curriculum which was improper to their languages and living conditions caused them troubles on all Thai skills and later on other subjects (71) and also affected the understanding in Thai language compared with the lowlanders studying the same core curriculum. That was why item bias occurred when they did intelligence test modified to Thai lowlands culture. According to Similarities which required ability in abstract thinking, most answers were concrete and incorrect by indicating other attributes which did not match the pair or explaining that they were completely different or irrelevant. This implied that they lacked skills in abstract thinking development. Studies in factors relating to intelligence suggested that enculturation was a factor affecting thinking process. In low-technological society, living condition depended on nature, its people did not expect much about academic achievement, and their thinking processes were shaped to focus on concrete rather than abstract thinking. This contrasted to the high-technology one which stressed on education and abstract thinking (47-50). Thai hill tribe students lived close to the nature and did not compete with each other for academic achievement.

Therefore they were unfamiliar with abstract thinking. However, the subjects of this research aged between 7-12 yrs. and their thinking were concrete as mentioned in the Jean Piaget's model of intellectual development. So it is possible that their limited conceptualization is due to their normal development. Also, not knowing or understanding all Thai words, which were a second language for them, in each item caused them difficulties in word selection for expressing their own thoughts. This reflected their poor understanding in Thai words and also affected to their conceptualization which actually required deep language ability and understanding through their experiences and environments (72, 73). This related to Rutchanok Booid's research on the relations of vocabulary meaning comprehension, reading speed, and ability of concept formulation to Thai reading ability of students of primary grade 6 in Songkhla province which found that conceptualization related to reading ability and word meaning comprehension significantly (74).

Conclusion

This research revealed that Thai hill tribe students had no problems with listening and understanding to the test instruction. But causes of cultural bias in the verbal part of the intelligence test was that they lacked Thai culture experiences and comprehension and this impacted on Thai usage, from words, phrases, to registers, for communicating in their daily lives. Thus their IQ scores from the intelligence test including verbal part were lower than they should while the PIQ were stable. These findings pointed to the limitations of Thai usage among them. Thus in selecting intelligence test for using with Thai hill tribe students or the minority who have cultural and environmental differences, we must concern language and cultural factor as well. But above all, the education provision for them should also be reformed in order to enhance more chances for them to develop themselves which is the sustainable solution.

Limitations of the Research

This research conducted only on Lahu students because their population was larger than other tribes and the remains were in the proportion to each other. Moreover, when screened by CPM for the averaged IQ subjects, students who passed the test were only 25 instead of 40 as planned so the study group was small. Therefore using this research for reference must concern these two limitations.

Recommendations

1. The findings from this research suggested that Thai hill tribe students had few experiences in Thai usage and improper Thai learning skills. Thus it is more appropriate to test them with the cultural-bias eliminated intelligence test.

2. The teaching plan should provide more opportunities for them to practice Thai so that they can understand and communicate well like Thai students in other regions.

3. The results of this research related to other researches under this topic conducted with various ethnics and languages. Thus in using the test consisting of verbal part with them, its standard score should be calculated and the test administrator should speak the same language as the subjects' in order to eliminate cultural bias.

4. The findings suggest psychologists to develop intelligence tests consisted of verbal part for specific languages and cultures such as Thai tribesmen by concerning or using the words they are familiar with.

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APPENDIX

2 PRANNOK Rd. BANGKOKNOI
BANGKOK 10700



Tel. (662) 4196405-6
FAX (662) 4196405

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Certificate of Approval

COA no.Si 302/2010

Protocol Title : The impact of language and culture environment to intellectual test performance of the hill tribe students

Protocol number : 213/2553(EC2)

Principal Investigator/Affiliation : Miss Rudchadaporn E-nija / Department of Psychiatry
Faculty of Medicine Siriraj Hospital, Mahidol University

Research site : Faculty of Medicine Siriraj Hospital

Approval includes :

1. SIRB Submission Form
2. Proposal
3. Questionnaires
4. Participation Information Sheet for Parents of student < 18 years old
5. Informed Consent Form for Parents of student < 18 years old
6. Participation Information Sheet and Informed Consent Form for student < 18 years old
7. WASI-T
8. Investigator's curriculum vitae

Approval date : June 11, 2010

Expired date : June 10, 2011

This is to certify that Siriraj Institutional Review Board is in full Compliance with International Guidelines For Human Research Protection such as the Declaration of Helsinki, the Belmont Report, CIOMS Guidelines and the International Conference on Harmonization in Good Clinical Practice (ICH-GCP).

.....
(Prof. Jariya Lertakyamane, M.D.)

Chairperson

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(Clin. Prof. Teerawat Kulthanan, M.D.)

Dean of Faculty of Medicine Siriraj Hospital

June 14, 2010

date

June 18, 2010

date

Page 1 of 2

BIOGRAPHY

NAME	Ms. Rudchadaporn Enija
DATE OF BIRTH	Sep 6, 1984
PLACE OF BIRTH	Chiang Mai, Thailand
INSTITUTIONS ATTENDED	Chiang Mai University, 2003 – 2007 Bachelor of Science (PSYCHOLOGY) Mahidol University, 2008 – 2010 Master of Science (Clinical Psychology)
EMPLOYMENT ADDRESS	Division of Child and Adolescent Psychiatry. Department of Psychiatry. Faculty of Medicine, Siriraj Hospital Bangkok. Thailand E-mail: rudcha_enija@hotmail.com