

## CHAPTER II

### METHOD AND PROCEDURE

#### Subjects

The subjects in this study were 80 children, ranging in age from 4 to 15 years old and 20 adults from 20 to 21 years old. The 80 children were randomly selected from students in three private coeducational school in Bangkok-Thonburi. The 20 adults were university students, selected from volunteers in Faculty of Education at Chulalongkorn University. All the subjects were divided into 5 groups by age level, and each group had equal number of males and females.

The first school, from which the youngest subjects, 4 and 5 years old were chosen was a private kindergaten in Bangkok-Thonburi. The staff of this school consisted of a headmaster and 18 teachers all of whom had training at teachers colleges. In this school, there were three levels of kindergarten with children from ages 3 to 6. There were 4 rooms at each level, and 15-20 students in each room. Most of the subjects were chosen from level two. The other two private schools were an elementary school and a middle school, under the supervison of the same manager, and situated in Bangkok-Thonburi. The 7-8 years old and 10-11 years old subjects were chosen from the elementaty school and the 14-15 years old were selected from the middle school. The elementary school had 13 teachers and there were

12 classrooms with about 35 pupils in each class. The middle school had 15 teachers and there were 14 classrooms with 35-40 pupils per class.

The adults were second and third year students of the Faculty of Education in Chulalongkorn University.

All the subjects in this present study came from middle-class, nuclear families. Most of their parents had attended secondary school and their average income was 3500 bath per month. The details about educational level, family income, and type of family of the subjects' parents are presented in Appendix B. A summary of the subjects' characteristics is presented Table I.

Table I  
Summary of the Subjects' Mean Age and Education

Level	group age range	N	mean age	education mean year
Kindergarten	4-5	20	4.9	1.4
Elementary School	7-8	20	7.8	2.1
	10-11	20	10.6	4.3
Middle School	14-15	20	14.5	8.8
University	20-21	20	20.93	14.1

All the subjects in Bangkok-Thonburi used Thai language in their everyday life and in school, and the experimenter also used Thai language to communicate with the subjects during the experiment.

## Stimuli and Test Materials

Test materials used in this study were adapted from Hagen<sup>1</sup> as described by Wagner.<sup>2</sup> The stimuli consisted of a set of seven white stimulus cards. Each card was  $1\frac{1}{2}$  inches wide and 3 inches long, containing 2 pictures; a particular object and a particular animal pasted on each side of the card. These pictures of animals and objects were cut out from children's test books and were generally familiar to all subjects.

The pictures in these seven cards were pasted one above the other, three with the animals above, and four with the animals below. Each animal was paired with one object: house-fish, pig-shorts, dog-motocycle, hat-duck, tree-elephant, shirt-cat, turtle-airplane. There were fourteen sets of these seven stimulus cards, constructed and arranged in a fixed randomized order. Each set had its own separate test packet.

In addition, there were two big index cards, 4 inches wide, and 6 inches long. One card contained all seven animals in a circular design, and the other contained the objects. These two cards were used for pretest stimulus recognition prior to the testing. There were also two sets of seven cards. Each set consisted of a single

---

1 Hagen, loc. cit.

2 Wagner, op. cit., pp. 5-9

animal and object used as probe stimuli in the incidental memory task.

For the practice section, a smaller set of different stimuli were used. Each set consisted of 3 animals, and 3 objects and each animal paired with one object: car-house, skirt-crab, bird-chair. During the test, the experimenter used a white cloth as the testing surface by placing it on the table or desk top.

#### Procedure

The subjects were tested individually using the procedure adapted from Wagner<sup>3</sup> in an unused classroom, used as the testing room. Each subject was requested to join in a game to test the central and incidental memory with the same task stimuli. For half the subjects animals were the central stimuli; and for the other half objects were the central stimuli.

The central task consisted of locating a particular central stimulus among a series of seven cards that were presented briefly to the subject and turned up side down in front of the subject. After having tested the central memory for fourteen trials, the subject was tested for incidental memory by being asked to recognize which animals went with which objects, on the basis of information from the previously show animal-object pairing in the central memory task.

Everytime when the subject responded after each trial, the experimenter checked the recording form. The test materials and a copy of blank recording form are presented in Appendix C.

From the beginning of the experiment, the experimenter and the subject sat face to face on opposite sides of the table or desk. The instruction were as followed:-

" Good morning, sit down here, now we are going to play a game with some animals and objects which you know very well. Before we play the real game, let's play a practice game to see that you understand the game. Do you know these three animals and three objects? Well, tell me the names of them."

Every time the subjects named the animals and objects, the experimenter would repeat it.

"Now, the method of this game is to remember where each of these animals (objects) is, when I show you and put them down in front of you. You have to find out where the animal (object), which I show you is in the row, but don't turn up. I will tell you whether your answer is right or wrong. Remember that you have to remember only where the animals (objects) are. Don't worry about the objects (animals)".

The experimenter explained more when necessary. In the six practice trials, if the subject made fewer than three correct responses, he was supposed to drop from the experiment, but if the subject got three or more correct of responses, the experiment would ;

go on the real trial in central and incidental memory. For the present study, no subject was dropped since all met the above required criteria.

"Good, you are very smart, now you understand how to play the game, so we will begin the real game. It is like the practice game, but the pictures of animals and objects will be different, and there will be seven cards with various animals and objects, not just three. Now, tell me the name of all these animals and objects. Well, you know all these animals and objects to be used in the real game. As in the practice game, remember only where the animals (objects) are. If you can tell me correctly, I will give you a candy for each correct answer."

During the experiment, the animals and objects were presented in separate groups, where the central stimuli (e.g. animals) were always named first. Each set of cards was presented in a row from the subject's left to his right. The experimenter held each card in view for about 2 seconds, and then placed it face down. The stimulus cards in fourteen test trials were arranged in a random order, so each stimulus ( animals and objects ), and each serial position were tested twice, but in a different serial position each time.

In addition, each serial position was probed equally by two different stimuli (one animal or one object) in the central task. Also, at the beginning of the experiment, all subjects had to recognize and label all the objects and animals in the task.

After having finished the 14 central trials, the experimenter continued the incidental memory task as follows:

"Very good, let's play another game. Do you remember that each card you had seen had an animal and an object on it? I want you to tell me which of these objects (animals) went along with this animal (object). Try to think hard, and do as well as you can. I will tell you the correct answer and also give you a candy for each of your correct answer.

The experiments tested all 7 objects (animals) on the incidental memory task. Then, after this the subjects at age 10-11, 14-15 and 20-21 were asked to complete the questionnaire about his birthdate, education, number of members in the family, relationship of members, parents education, profession and the economics status of the family. For the subjects at age 4-5 and 7-8, the experimenter herself completed the questionnaire by asking all the informations from the subjects, the parents and the teachers. This questionnaire is presented in Appendix D.

#### Scoring Method

This study was assessed for central memory scores and incidental memory scores. The score for performance on the central memory was defined as the total number of animals (objects) correctly located on the 14 trials that the subject was asked to remember and number of correct responses for each serial position.

Performance on the incidental memory was defined as the number of correct pairing out of 7 animals (objects) pairs of the stimuli that was not mentioned in the directions of the game.

### Statistical Method

The following statistical computations were made:

#### Central Memory Task

1. Arithmetic mean, standard deviation, and proportion correct were calculated for the central memory task scores.
2. For central memory scores, a two ways analysis of variance (age x serial position) was computed to investigate the differences among age groups and serial positions, and to investigate the interaction between age and serial position.
3. A one way analysis of variance was computed for each group to explore the differences in performance on serial position scores for each age group.
4. T-tests were performed on central memory scores to compare differences between age groups.
5. T-tests were performed on central memory scores to compare the differences between the scores of males and females subjects.
6. T-tests were computed on central memory scores to compare relationship between primacy and recency, primacy and middle positions recency and middle positions.



### Incidental Memory Task

1. Arithmetic mean, standard deviation, and proportion correct were computed for incidental memory scores.
2. A one way analysis of variance was performed to compare differences among all age groups on incidental memory scores.
3. T-tests were performed on incidental memory scores to compare differences between age groups.
4. T-tests were performed to compare the differences in incidental memory scores between males and females.
5. Individual correlations were calculated to investigate the relation between central and incidental memory score for each age group.

The results of this study will now be discussed in greater detail in the following chapter.

ศูนย์วิทยทรัพยากร  
จุฬาลงกรณ์มหาวิทยาลัย