

CHAPTER I

INTRODUCTION

Usually, in everyday life, many things seem to be learned "incidentally" without instructions to learn as in the teaching-learning situation. Students often remember things that they are interested in even though teachers may not have asked them to learn. This is especially true of young children. As Klausmeier and Ripple pointed out "when students come to school and encounter teaching-learning situations, they have interests and needs that may, at times, divert their attention from the instructional objectives." Young children seem to have difficulty in discriminating between the relevant and irrelevant aspects of a situation, and attend to both in a restricted fashion. Older children are able to discriminate between relevant and irrelevant information. They concentrate on what they are expected to learn, and they can focus their attention selectively on what is expected of them.

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H.J. Klausmeier, and R.E. Ripple, "Focus Student Attention", Learning and Human Abilities: Educational Psychology, (3d ed; New York: Harper & Row, 1971), p.330.

Conceptual Definitions

Central Memory

Central memory or intentional learning or short-term memory is explained in ² Encyclopedia of Psychology as "the information that may be held for a short period of time (fifteen to thirty second)."³ Travers postulated that "short-term memory is some information stored for only a short time."⁴ Klausmeier and Ripple defined short-term memory as "an ability to recall the words or sentences of the last paragraph."⁵ Krech et al proposed that "short-term memory or intentional learning takes place when the learner has received instruction from the experimenter to learn the material or when there is an explicit mental set to learn."

In this study, central memory was defined as the learning that took place when the subjects were instructed to learn the relevant aspects of the test materials presented, and the terms central and short-term memory are used interchangeably.

² H.J. Eysensck, W. Arnold, and R. Meili, Encyclopedia of Psychology. Vol 2 (London: Search Press Limited, 1972), p. 252.

³ M.W. Travers, "Short-Term and Long-Term Storage of Information," Essentials of Learning, (New York: The Macmillam Company, 1968) pp. 320-321.

⁴ Klausmeier and Ripple, op. cit. p. 590.

⁵ David Krech, Richard S. Crutchfield, and Livson Norman, Elements of Psychology, (New York: Alfred A. Knoff Inc., 1970) p. 237.

Incidental Memory

Incidental learning is " the learning that takes place without formal instruction or intent to learn and without ascertainable motive." ⁶ According to Encyclopedic of Psychology ⁷ " learning is incidental when no instruction is given to learn the materials tested later." ⁸ Travers defined incidental learning as " learning occurring in a situation where there are no instructions to learn." ⁹ Krech et al 's postulation of the incidental memory was " the acquisition that takes place when the learner has received no instructions from the experimenter to learn the material." ¹⁰ Postman stated that " incidental learning refers to learning that occurs

⁶ Harace B. English and Champney A.V.A. English, A Comprehensive Dictionary of Psychological and Psychoanalytical Terms. (New York : David Mckay Inc., 1968), p. 185.

⁷ Eysenck, Arnold, and Meili, op. cit., p 359.

⁸ Travers, op. cit., pp. 157 - 159.

⁹ Krench et al, op. cit., p. 237.

¹⁰ L. Postman, " Short-Term Memory and Incidental Learning ", Categories of Human Learning, (Edited by A. Melton, New York : Academic Press, 1964), p. 185.

without intent to learn." McGeoch defined that incidental memory is "much of the learning which goes on with no overt instructions, but is influenced by implicit instructions and sets."

In this study, incidental memory was defined as the learning that occurred when the subjects learned the irrelevant parts of test materials with specific instruction not to concentrate on those materials.

Serial Position

Serial position, in this study, referred to the position of stimulus cards of the test materials presented to the subjects for the central and incidental memory performance. There were seven stimulus cards presented to each subject. Primacy represented the first stimulus card while recency represented the last stimulus card. The middle positions represented the average of the third, the fourth, and the fifth stimulus cards.

Review of Literature

The roles of short-term and incidental memory or central and incidental learning have been broadly investigated by researchers in United States, and the results of those studies have provided some useful information about selective attention and memory.

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Hagen conducted research on the development of selective attention through task on central and incidental learning. His research indicated that "short-term and incidental memory follow differing and distinct developmental functions." The subjects of his study were 160 middle-class children, 40 in each group, 22 boys and 18 girls, 7, 9, 11, and 13 years old in public schools in California. These subjects were tested individually by test materials. There were six white cards, each containing two black-line drawings, an animal and a household object familiar to all age groups. The central part of each stimulus was a picture of an animal, and the incidental part was a picture of a household object. The same animal was always paired with the same household object. For the central memory task, the subjects were asked to point to the location of the card presented, and for the incidental memory task, they were asked to match the household objects with the animals with which they had always appeared. The results showed that the central memory scores increased regularly as a function of age, but the incidental memory scores did not and actually declined at the oldest age level. Hagen also found the negative correlations between central and incidental memory scores at the oldest age level. This supported the hypothesis that older children are able to ignore more irrelevant task than younger children. Therefore, he concluded that "the ability to

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J.W. Hagen, "The Effect of Distraction on Selective Attention
Attention, Child Development, 38 (1967), 685 - 694.

focus attention on task-relevant cues increases with increasing age.

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Bernstein studied intentional learning against incidental learning by using paired associate learning, a procedure different from Hagen . The subjects were 120 boys ranging in ages from 7 to 12 divided into 5 groups. The test materials consisting of 6 animals-color pairs were presented to the subjects. After the initial presentation of the stimulus pairs, pictures of the animals with no color were presented. Then the subjects were given a color chart and they were told to match color with the animal with which it had been originally exposed.

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Bernstein found similar results as Hagen that intentional learning was superior to incidental learning, and the older children's learning was superior to younger children's.

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Another study by Maccoby and Hagen investigated central and

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A.L. Bernstein, "Variables Affecting Paired Association in Children", Dissertation Abstracts International, 31(January, 1971), p.4354-B

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Hagen, loc.cit.

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Ibid.

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E.E.Maccoby, and J.W. Hagen, "Effects of Distraction upon Central Versus Incidental Recall : Development Trends," Journal of Experimental Child Psychology. 2 (1965), 280-89.

incidental recall at different chronological ages using different test materials. The subjects in their study were in grades 1, 3, 5, and 7. The chronological age range of each grade was as follows : grade 1 ages 6 - 7; grade 3 ages 8 - 9; grade 5 ages 10 - 11; and grade 7 ages 12 - 13. The subjects were shown a set of cards bearing different colors and different pictures. After the children had learned to remember the positions of the cards by their color, incidental recall was tested by asking the children to locate cards bearing particular pictures. The findings of this research clearly substantiated the results of Hagen's study that the recall of central material increased regularly with age from six to thirteen years old, and the recall of incidental or irrelevant material did not increase between grades 1 and 5 (ages 6-11) and decreased between grades 5 and 7 (ages 11-13). The performance scores on the two memory tasks were independent. It cited that the older children could recall on central memory task better than the younger children. Maccoby and Hagen also suggested that " whereas recall on the first central learning task improved with age, incidental recall tended to be related to age in a curvilinear manner."

A curvilinear relation between incidental learning and chronological age also was found by Siegel and Stevenson. They

17 Hagen, loc.cit.

18 A.L. Siegel, and H.W. Stevenson, "Incidental Learning: A Developmental Study" Child Development, 37 (1966), 811-17.

investigated the incidental learning in 96 children between the ages of 7 and 14 and in 24 adults in middle-class American families. These subjects were presented individually on a three-part task. A standard three-choice successive discrimination problem was followed by a series of trials in which each discriminative stimulus was presented in a stimulus complex with 3 additional objects. The results of their study indicated an increase in incidental learning between ages 7 - 8 and 11 - 12, and a decrease between ages 11 - 12 and 13 - 14. They suggested that " the increasing incidental learning found between ages 7 and 12 might be attributable either to an increasing ability to learn and retain or to an increasing tendency to attend to the incidental stimuli," and " the decline in the amount of incidental learning ages 12 and 14 might be due to the tendency of the older children to disregard the irrelevant stimuli." Siegel and Stevenson have suggested a reason for the adults' incidental memory scores that " adults showed higher level of incidental learning than any age group of children, probably, because the task was so extremely simple for adults."

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Another research on incidental learning was conducted by Stevenson. He tested incidental learning of younger children between the age of 3 and 7 years. The children were asked to play a game in which they could unlock boxes and find prizes. At each end of a life-

sized Y-maze were two boxes, one locked with a padlock. The child was told to go to the open box, find a key, and open the lock of the second box to find a prize. In each open box was an assortment of objects, including on one side a small white purse, and on the other side a matchbox. Depending on the experimental condition, the key was on, under, or in the purse and the matchbox. After an equal number of experiences with each pair of boxes, the child was asked to find the purse or matchbox. The results of his study indicated that the amount of incidental learning increased with age.

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Recently, Hale and Piper studied the developmental trends in children's incidental learning by using 80 children in grade 3 (age 8), and grade 7 (age 12) in elementary and junior high school in Bucks County, Pennsylvania. The subjects were tested twice with 2 types of stimulus materials. The first materials consisted of six pairs of line drawings: an animal and a household object. The central part of each stimulus was a picture of an animal, and the incidental part was a picture of a household object. The second materials were six geometric figures of different colors whose central and incidental parts were shape and color, separately. The procedure used for central and incidental learning task

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G.A. Hale, and R.A. Piper, "Development Trends in Children's Incidental Learning : Some Critical Stimulus Differences," Developmental Psychology, 8 (1973), 325-35.

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was identical to that described by Hagen. In both experiment I and experiment II, the subjects were tested for the central and incidental memory with the same procedure, but with different test materials. In experiment I, the subjects were tested with the first test materials, but in experiment II, they were tested with the second test materials. The results of experiment I and experiment II were similar. The results for the central learning also substantiated the findings of the research reviewed above that central learning scores increased with age from 8 to 12 years old in both experiments, and the results for incidental learning scores were similar to those of Stevenson 's study that the incidental learning scores were found to increase markedly with age.

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Druker and Hagen investigated the role of perceptual discrimination in the development of ability to process information selectively. The subjects in their study were 240 children selected from grades 4, 6, and 8 of elementary schools in the Detroit, Michigan. The chronological age range was as follows: grade 4 ages 9 - 10; grade 6 ages 11 - 12; and grade 8 ages 13 - 14. Each subjects was tested individually by test materials and

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Hagen, loc. cit.

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Stevenson, loc.cit.

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J.F. Druker, and J.W. Hagen, " Developmental Trends in the Processing of Task-Relevant and Task-Irrelevant Information," Child Development, 40 (1969), 371-82.

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procedure described by Hagen . After the central-recall and incidental-recall task, a posttest questionnaire was given to each subject to obtain information about the subjects' manner of approaching the task and about the individual learning strategies. The examples of the questionnaires were: 1) where did the child look first when he saw the row of cards ? 2) did the child say anything to himself while he was looking at the cards? and so on. The results from questionnaire revealed that the older children were better able to employ rehearsal and encoding skills to focus their attention on relevant task than the younger children. The results of the central and incidental memory scores were similar to the results of the other studies that there was an increase in the central-recall scores as a function of age level, but the incidental-recall declined with age relative to the total amount of information processed.

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Kingsley and Hagen studied the effects of labeling in short-term memory by using test materials consisting of a set of 11 children playing cards with pictures of familiar animals. The subjects in their study were 28 children attending two different nursery schools, and 160 elementary pupils in grades 1, 2, 3, and 5 in a parochial school in Ann Arbor, Michigan. The subjects were

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Hagen, loc. cit.

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P.R. Kingsley, and J.W. Hagen, " Labeling Effects in Short-Term Memory" : Child Development, 39 (1968), 113-21.

tested individually in the situation defined as a game. They were given 16 trials involving presentation of pictures. On each trial the subjects were presented 8 of the 11 presentation cards. Then the experimenter presented a cue card identical to one of the 8 presentation cards, the subjects were asked to find the presentation card which match the cue card. Half of the subjects overtly labeled the stimuli, but the another half did not label. The results of this study revealed that "overt labeling facilitated short-term memory performance for subjects in the intermediate age range (grade 2 and 3; ages 7-9), but not for the youngest subjects (grade 1 ages 6 - 7), and the oldest subjects (grade 5, ages 10 - 11). The age effect was a results of the older subjects performing better than younger subjects in short-term memory task."

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Later on, Wheeler and Dusek investigated " the effects of attentional and cognitive factors on children's incidental learning. The subjects used in this study were 144 children, 24 boys and 24 girls from each of three grade levels: kindergarten, third and fifth. The age range of each grade was as follows: kindergarten, 5-6; grade third, 8 - 9; grade fifth, 10 - 11. They were presented two sets of eighth cards, each contained two drawing pictures : an animal and a household object . These test materials were similar to those

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R.J. Wheeler, and J.B. Dusek, " The Effects of Attentional and Cognitive Factors on Children's Incidental Learning". Child Development, 44 (1973), 253-58.

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 used by Druker and Hagen, and the procedure was also similar to
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 that used by Hagen. The results for central learning were "the
 subjects who verbally labeled the central stimuli learned more
 than subjects who did not, and central learning increased across
 grade levels from kindergarten to third and to fifth grade." This
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 was similar to the findings studied by Hagen, and by Maccoby and
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 Hagen. They also found that girls could perform on central
 memory task better than boys did, and the **central** scores were
 higher than incidental scores. For the incidental learning, they
 found that " the effects due to labeling and spacing conditions
 were both significant." In the labeling condition, "those who
 saw spatially separated stimuli had lower incidental scores, and
 the order of recall did not have significantly effect." Finally,
 " the mean central learning was found to be significantly greater
 than the mean incidental learning."

27 Druker, and Hagen, loc. cit.

28 Hagen, loc. cit.

29 Ibid.

30 Maccoby, and Hagen, loc. cit.



In conclusion, all the above studies revealed that usually central memory increased with age from age 5-6 to age 14-15, and incidental memory increased with age from age 5-6 to age 11-12 and then declined. It was also found that central memory scores were higher than the incidental memory scores. Thus, it could be concluded that older children could better concentrate their attention on relevant task and disregard irrelevant task than the younger children. The improvement in performance with age in central memory might be due to increased use of encoding strategies and verbal rehearsal of older children.

Most of the research reviewed above was done with middle-class American children. Few researchers have conducted study on central and incidental learning in other parts of the world. Recently, cultural and educational influences on cognitive development were the interesting points investigated by many researchers. Cole and his associates³¹ studied the effects of education and culture on learning in Liberia. The results of their study were: 1) both culture and education influenced memory development. 2) free recall increased with age and level of education.

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Cole M. et al. The Cultural Context of Learning and Thinking, (New York: Basic Book, 1971).

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Wagner also found similar trends in studying the short-term and incidental memory with urban and rural Mexicans. He studied the relative contributions of age, urban and rural setting, and formal education to the development of short-term and incidental memory. The subjects in his study were divided into five age groups (7-9, 10-12, 13-16, 20-21 and -27) chosen from two contrasting populations in Urban and Rural Yucatan, Mexico. All Urban subjects attended school in Merida, the capital of the State of Yucatan, while only the two younger Rural age groups attended school in Mayapan, and the older Rural subjects had little or no schooling.

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These subjects were tested individually by test materials adapted from Hagen to recall the position of the pictures, as relevant and irrelevant task. Wagner found that the performance of urban Mexicans was similar to that of Americans, while the Mexicans from a rural setting performed differently. He suggested that " age alone could not account for the development of either short-term or incidental memory, and education was more important than rural or urban setting both on short-term and incidental memory performance."

From the above research studies, it was obvious that researchers have attempted to investigate the development of central and incidental learning using various method. They have also attempted to

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D.A. Wagner, " The Development of Short-Term and Incidental Memory : A Cross Cultural Study," (Michigan : University of M Michigan, May, 1973), pp. 1-19.

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Hagen, loc.cit.

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investigated factors as education and urbanization that effect the development of short-term and incidental memory. Their results indicate that age, culture, and education influence the development of central and incidental memory.

Purpose of the Study

The purpose of this present study was to investigate the development of central and incidental memory among urban Thais, in other words, how well urban subjects of different age groups learn what they are asked to learn and how much incidental information do they obtain that they are not expected to learn. This study also explored the effects of serial position that is how often were the stimulus presented first, in the middle or at the end were remembered. Male subjects' central and incidental scores were compared to those of females to explore sex differences and to see if sex influenced the memory performance.

Significance of the Study

Usually, learning seems to be influenced by several perceptual processes : the ability to sample broadly from the stimuli in the environment, to discriminate relevant from irrelevant stimuli, and to respond selectively to those that are of current relevance. This is very important because if someone can separate relevant information from irrelevant information, he will know what is necessary for him to learn and he also can focus his attention only to the relevant information. Thus, the investigation about the development of

central and incidental memory would provide useful **informations** about children's ability to learn what they were asked to learn in order to direct the child's attention more effectively to the relevant information. So far no previous research has been conducted to investigate the development of central and incidental memory among Thais. Thus, the present study propose to investigate the development of these two types of memory among Thais.

Delimitation

This study investigated the relative contribution of age, sex and education to the development of short-term and incidental memory in an urban area in Thailand. The urban area chosen was Bangkok-Thonburi.* The subjects were selected from three private schools and from the most famous university in Bangkok-Thonburi. Thus, most of the subjects in this present study were from middle-class families. The materials and methods used in this study were adapted from Hagen,³⁴ as described by Wagner.³⁵ The subjects were given candy when they can recall the memory performance both on central and incidental

* A description of Bangkok-Thonburi is presented in appendix A.

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Ibid.

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Wagner, loc. cit.

memory correctly.*

Hypothesis

Based on the literature reviewed above, the following hypothesis were made :-

1. The central memory scores of urban Thais would increase with age from ages 4 - 5 to ages 20 - 21 .
2. The incidental memory scores of urban Thais would increase at ages 4 - 5 through ages 10 - 11 and then decline from ages 11 - 12 to ages 20 - 21 .
3. The urban Thai subjects would remember stimuli presented last more often than the stimuli presented first or in the middle.
4. There would not be any difference in the central and incidental scores of male and female subjects .
5. There would be no correlation between central and incidental memory scores .

* In this present study candy given to all age groups was used as the reinforcement to generate enthusiasm for participation. In fact, candy had little effect on the level of participation for the ages 14 - 15 and 20 - 21. They paid no attention to the candy. They said they were willing to join the "game", but they did not want any candy. However, for the younger children, candy had some effect on their participation in the experiment .

Contributions

This study would describe the development of central and incidental memory among Thais of various age groups in an urban area which will suggest useful ways in teaching young children.



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