

The Study on The Relationship Between Intelligence Quotient Obtained from the Coloured Progressive Matrices and Piaget's Theory on the Stages of Cognitive Development of Thai Children, Age 5–11 Years

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ABSTRACT

The purpose of this study was to investigate the relationship between the mark from the Coloured Progressive Matrices and the mark from Piagetian assessment of children, age 5–11 years and to bring the mark from the Coloured Progressive Matrices predicting cognitive development of Thai children. There were 280 subjects :- age 5–11 years, boys and girls from Samsean Kindergarden, Bangbao School and Phibolupathom School. The sample was requested to test individually with research fools. The results may be conculded as follows :

1. Children who have different age had meant of the mark from Coloured Progressive Matrices differently with statistical significance at 0.01 level
2. Children who have different age had meant the mark from Piagetian assessment differently with statistical significance at 0.01 level
3. The value of coefficient correlation between the mark from CPM and the mark from Piagetian assessent of children, age 7–11 years, had statistical significance at 0.01 level but children, age 5–6 years hadn't.
4. The mark from CPM could predict the mark from Piagetian assessment in children, age 7–11 years.

INTRODUCTION

One of the factor in child development is cognitive development because it controls child's behavior in many ways, for example, problem solving, achievement, adaptation and learning, etc. Children who are different stages of cognitive development have unequal ability to learn various things. Clinical psychologists and teachers ought to know cognitive development of children in order to teach them efficiently and our teaching does not disturb child's thought system. We can know cognitive development of children by using Piagetian assessment. Piagetian assessment is composed of many problems. But in this research, I'll use only 5

problems. They are conservation of length : 2 stic conservation of length : several sticks, conservation of number, class inclusion and Multiple correlation. Piagetian assessment has complex administration and interpretation. Furthermore, it takes a long time for testing and it can test only individuality. Clinicians who use this method must have more experience and skill. So we ought to find the way to bring other practical tests instead of Piagetian assessment. I decided to choose The Coloured Progressive Matrices because it can be used by individuality or group. Moreover, it takes a short time for testing and it's a Culture Fair test. If we can bring The Coloured Progressive

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Matrices instead of Piagetian assessment, it's very useful for clinician and the result from CPM can tell us two things : Intelligence Quotient and Cognitive Development. If there is a relationship between the mark from the Coloured Progressive Matrices and the mark from Piagetian assessment, we can use the mark from the Coloured Progressive Matrices to predict the mark from Piagetian assessment. When we know the mark from Piagetian assessment, we can know the stage of cognitive development of children.

OBJECTIVE OF THE STUDY

1. To study the relationship between the mark from the Coloured Progressive Matrices and the mark from Piagetian assessment in each age.

2. To bring the mark from The Coloured Progressive Matrices predicting cognitive development.

3. To gain more knowledge about The Coloured Progressive Matrices.

METHODS AND PROCEDURE

A. Sample and Sampling Technique

This study was designed for Thai children boys and girls age 5–11 years. All subjects were sampling by simple random technique from Samsean kindergarden, Bangbao School and Phibolupathum School. The amount of

Table 1 : Comparison of mean the Mark from CPM among group ages

| Source | df | SS | MS | F |
|---------------|------------|------|--------|--------|
| Between group | 6 | 9791 | 1631.8 | 76.6** |
| Within group | 273 | 5822 | 21.3 | |
| Total | 279 | | | |

N = 280 p < .01

Table 2 : Showed the coefficient correlation (r) between the mark from CPM and the mark from problem of conservation of length : 2 sticks and regression equation

| Age (year) | Coefficient correlation | Regression equation |
|------------|-------------------------|---------------------------|
| 5 | -0.006 | |
| 6 | -0.004 | |
| 7 | 0.858* | $\hat{y} = 1.29 + 0.24 x$ |
| 8 | 0.765* | $\hat{y} = 5.53 + 0.58 x$ |
| 9 | 0.932* | $\hat{y} = 4.58 + 0.52 x$ |
| 10 | 0.737* | $\hat{y} = 2.10 + 0.51 x$ |
| 11 | 0.862* | $\hat{y} = 1.32 + 0.67 x$ |

sample was 280 persons All subjects were requested to take the tests.

B. Variables

(1) Independent Variable
— Age (between 5–11 years)

(2) Dependent variable
— Intelligence Quotient (mark from CPM)
— Piaget's cognitive development (mark from Piagetian assessment)

C. Instrument

(1) The Coloured Progressive Matrices (CPM) which evaluated intelligence quotient of children. It was designed by L.C. Raven in 1938. CPM was non-verbal tests, consisted of 3 : problems and total score was 36 marks.

(2) Piagetian assessment. It consisted of

a. Conservation of length : 2 sticks (total score is 28 marks)

b. Conservation of length : several sticks (total score is 28 marks)

c. Conservation of number (total score is 2 marks)

Table 3 : Showed the coefficient correlation (r) between the mark from CPM and the mark from problem of conservation of length : several sticks and showed regression equation

| Age (year) | Coefficient correlation | Regression equation |
|------------|-------------------------|----------------------------|
| 5 | -0.029 | |
| 6 | -0.114 | |
| 7 | 0.937* | $\hat{y} = 11.28 + 0.27 x$ |
| 8 | 0.755* | $\hat{y} = 5.63 + 0.58 x$ |
| 9 | 0.961* | $\hat{y} = 6.70 + 0.40 x$ |
| 10 | 0.802* | $\hat{y} = 1.83 + 0.50 x$ |
| 11 | 0.784* | $\hat{y} = 6.30 + 0.46 x$ |

d. Class inclusion (total score is 3 marks)

e. Multiple correlation (total score in 3 marks)

D. Data Collection

Data collection were all done by the researcher. Data were collected in the following sequence :

(1) To make a good relationship with the child by talking together and interviewing his background : name, age and education

(2) To assess the child's intelligence by administering CPM by group and assess cognitive development by administering Piagetian assessment individuality with children.

(3) To record data on recording paper and scoring.

E. Analysis of Data

(1) F-test (Analysis of Variance) would be used for the comparison of mean differences of the mark from the Coloured Progressive Matrices and each problem of Piagetian assessment in each age

(2) Pearson-Product Moment Correla-

tion would be used to find the correlation coefficient.

(3) Find Regression equation by using the mark from the Coloured Progressive Matrices predict the mark from each problem of Piagetian assessment.

RESULTS

Mean of the mark from CPM depended upon a child's age. By Piagetian assessment it found that the children was in concrete operational stage and the mark from each problem of Piagetian assessment depended upon age level. Moreover, there was a relationship between the mark from The Colour Progressive Matrices and each problem of Piagetian Assessment in children, age 7 – 11 years. So we could use the mark from The Coloured Progressive Matrices predicting the mark from each problem of Piagetian assessment in children, age 7 – 11 years.

DISCUSSION AND SUMMARY

The results showed that old children could choose correct pattern from CPM more

Table 4 : Showed the coefficient correlation (r) between the mark from CPM and the mark from conservation of number and showed regression equation

| Age (year) | Coefficient correlation | Regression equation |
|------------|-------------------------|----------------------------|
| 5 | -0.028 | |
| 6 | -0.301 | |
| 7 | 0.872* | $\hat{y} = 0.03 + 0.004 X$ |
| 8 | 0.599** | $\hat{y} = 1.11 + 0.003 X$ |
| 9 | 0.890* | $\hat{y} = 0.02 + 0.045 x$ |
| 10 | 0.535* | $\hat{y} = 0.76 + 0.021 x$ |
| 11 | 0.727* | $\hat{y} = 1.74 + 0.009 x$ |

than young children. Moreover, the ability to think, perceive, find reason and classify similar figures from different figures of old children had developed. It showed that nature of problem in CPM concerned different ability of children to solve it. The result above accorded the research of Supa Malagul (1967) and Narongsak Thalapat (1975). When we considered the mark from each problem of Piagetian assessment, we found the mark would increase by a age. When the children were older, cognitive development would develop. The old children would get experience more than young children so they could think, perceive and learn environment more than young children too. This results accorded the research of Elkind (1963), Nyiti (1976), Lemss (1966) and Lovell K. & Ogilvie E. (1960). The value of coefficient correlation between the mark from CPM and the mark from each problem of Piagetian assessment of children, age 7–11 years had statistical significance at .01 level, but there were no significance in children, age 5–6 years. It showed that the scheme of children, age 5–6 years, was at pre-operational stage so raw score that they got was zero. We couldn't find the correlation between these marks. So we

Table 5 : Showed the coefficient correlation between the mark from CPM and the mark from class inclusion

| Age (year) | Coefficient correlation | Regression equation |
|------------|-------------------------|---------------------------|
| 5 | -0.068 | |
| 6 | 0.315 | |
| 7 | 0.449* | $\hat{y} = 0.76 + 0.01 x$ |
| 8 | 0.686* | $\hat{y} = 0.73 + 0.02 x$ |
| 9 | 0.972* | $\hat{y} = 0.33 + 0.02 x$ |
| 10 | 0.686* | $\hat{y} = 0.96 + 0.03 x$ |
| 11 | 0.593* | $\hat{y} = 1.78 + 0.01 x$ |

Table 6 : Showed the coefficient correlation between the mark from CPM and the mark from multiple correlation

| Age (year) | Coefficient correlation | Regression equation |
|------------|-------------------------|----------------------------|
| 5 | 0.061 | |
| 6 | 0.228 | |
| 7 | 0.682* | $\hat{y} = 0.25 + 0.02 x$ |
| 8 | 0.544* | $\hat{y} = 1.29 + 0.01 x$ |
| 9 | 0.783* | $\hat{y} = 0.71 + 0.08 x$ |
| 10 | 0.835* | $\hat{y} = 2.31 + 0.01 x$ |
| 11 | 0.935* | $\hat{y} = 2.24 + 0.001 x$ |

could use the mark from CPM predicting the mark from each problem of Piagetian assessment only in children, age 7–11 years.

IMPLICATION

The results from this study were useful if you followed these steps :

1. knew the mark of CPM
2. knew a child's age level
3. had a knowledge about cognitive development. Cognitive development could be classified into 4 stages :

- 3.1 Sensori-motor stage
- 3.2 Pre-operational stage
- 3.3 Concrete operational stage
- 3.4 Formal operational stage

4. Put the mark of CPM instead of x in regression equation according to age level and each of problem of Piagetian assessment. Calculate to find \hat{y}

5. Compare \hat{y} from No. 4 with criteria as follows in order to know cognitive development of children.

Problem of conservation of length : 2 sticks and several sticks

0–6 marks classified into non-conservational level

7-13 marks classified into transitional level

14-28 marks classified into conservational level

Problem of conservation of number

0 mark classified into non-conservational level

1 mark classified into transitional level

2 marks classified into conservational level

Problem of class inclusion

0 mark classified into non-conservational level

1 mark classified into transitional level

2-3 marks classified into conservational level

Problem of multiple correlation

0 mark classified into non-conservational level

1 mark classified into transitional level

2-3 marks classified into conservational level

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