The Raven's Colored Progressive Matrices Test: A normative Data for Gifted Students in Egypt Aged 10-17

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Abstract

Raven's Coloured Progressive Matrices test has been extensively used across a wide variety of settings in different countries all over the world as a fair culture measure of non-verbal intelligence. The objective of the present study is to extract norms of the test to identify gifted children in Egypt. The total number of the sample was 1200 students from Public schools in Baltim Edara . (100 students from grade four , primary , 100 from grade five, 100 from grade six, 200 students from grade one, preparatory , 200 from grade two , 150 from grade three, 150 students from grade one , secondary, 100 students from grade two, 100 from grade three). Number of females and males was equal. The principal findings of this study indicated that there were a significant effect of age on test scores was evidenced, where scores increased with age as expected. The findings also indicated there were no significant difference between the genders with regard to performance on the Raven's CPM.   Results of this study indicated that Raven's CPM was an effective means of selecting children who may be gifted. The higher level thinking skills demonstrated on this assessment suggest that these students may benefit from increased support and placement in gifted programs.

Key words ; Raven's Coloured Progressive Matrices test, normative Data, Gifted students

Introduction

Research investigating the effectiveness of nonverbal abilities tests has become increasingly popular with the growing recognition of the need for reduced-biased testing. Numerous studies have been conducted on the usefulness of these devices in selecting for students who are gifted (e.g., Karnes & McGinnis, 1994; Karnes & Whorton, 1988; Lewis, 1999; Mills, Ablard, & Brody, 1993; Mills & Tissot, 1995; Naglieri, & Ford, 2003; Shaunessy, Karnes, & Cobb, 2004; Stephens et al., 1999).

One form of nonverbal assessment that has been suggested by many researchers as an alternate or supplementary measure in identifying gifted students from culturally diverse backgrounds is the Raven's Standard Progressive Matrices (Karnes & Whorton, 1988; Mills & Tissot, 1995; Richert, 1987; Shaunessy et al., 2004; Stephens et al., 1999). The Raven's is generally regarded as a nonverbal measure of fluid intelligence (Mills & Tissot, 1995).

The Raven's Progressive Matrices (RPM) test1 is a standardized intelligence test that consists of visually presented, geometric-analogy-like problems in which a matrix of geometric figures is presented with one entry missing, and the correct missing entry must be selected from a set of answer choices. It is internationally recognized as a culture-fair or culture reduced test of non-verbal intelligence for young children (Raven et al., 1990). This easily administered, multiple-choice pencil and paper test has no time limit, and comprises three sets of twelve matrix designs arranged to "assess mental development up to a stage when a person is sufficiently able to reason by analogy to adopt this way of thinking as a consistent method of inference" (Raven et al., 1993, p. CPM2).

In this version of the Raven's Progressive Matrices however, each item is printed with a brightly coloured background, making the test more appealing for children.

The testee is shown a series of patterns with parts missing. The parts removed are of simple shape and have been placed below the matrix, among other similarly shaped pieces (although the figures on those pieces do not compete the pattern) (Martin & Wiechers, 1954). The problems are easy to begin with, but grow more difficult as the test proceeds "because the figures in the patterns to be completed remain simple but the relations between the figures

become increasing complex" (Martin and Wiechers, 1954, p.143). The testee can either point to the pattern piece s/he has selected or write its corresponding number on the record form (Lezak, 1995). The total score is the total number of matrices completed correctly, and the test is thus scored out of 36.

The test developers claim the test measures higher-level thought processes, including the ability to reason by analogy and the ability to become more efficient by learning from immediate experience (Raven et al., 1998). With the Raven's it is possible to learn from the easier items in order to improve performance on the more difficult items, yielding an index of intellectual efficiency that has many implications for identifying culturally diverse students who may be gifted (Mills & Tissot, 1995; Raven et al.,1998).

Although the test is supposed to measure only eductive ability, or the ability to extract and understand information from a complex situation (Raven, Raven, & Court 1998), the RPM's high level of correlation with other multidomain intelligence tests have given it a position of centrality in the space of psychometric measures (Snow, Kyllonen, & Marshalek 1984), and it is therefore often used as a test of general intelligence. Using the RPM as a measure of general intelligence, though it consists only of problems in a single, nonverbal format, stands in contrast to using broader tests like the Wechsler scales, which are comprised of subtests across several different verbal and nonverbal domains.

Mills and Tissot (1995) found the Raven's identified a significantly greater percentage of ethnically diverse students who were gifted, many of whom were low achieving students, than the School and College Ability Test, a more traditional measure of academic aptitude. Stephens et al. (1999) found that when compared with the Naglieri Nonverbal Abilities Test and the Culture-Fair Intelligence Test (CFIT, Cattell & Cattell, 1965); both nonverbal assessment devices, the Raven's identified the largest number of ethnically diverse students scoring at the 80th percentile or higher.

Shaunessy et al. (2004) reported similar results while Lewis (1999) found that the Raven's and CFIT revealed similar numbers of culturally different students although each test discovered some students the other did not. The results of these studies indicate that the Raven's Standard Progressive Matrices may be an effective means of screening ethnically diverse gifted students.

Although developed and normed on British and American populations, the Raven's Coloured Progressive Matrices test (CPM) is internationally recognised as a culture fair test of non-verbal intelligence for young children (Raven, Court and Raven, 1990). Nevertheless, no norms for the test was established in Egypt , so the primary objective of this study is to establish norms for the Raven's CPM test for gifted students in Egypt .

Methods

Participants

Sample selection was carried out in consultation with Edara staff , and after parents' permissions . Participants were students from 4th grade to in the primary schools to grade twelve (Secondary schools) . The total number of the sample was 1200 students from Public schools in Baaltim Edara . (100 students from grade four , primary , 100 from grade five, 100 from grade six, 200 students from grade one, preparatory , 200 from grade two , 150 from grade three, 150 students from grade one , secondary , 100 students from grade two, 100 from grade three). Number of females and males was equal.

The Instrument

The Raven's CPM test is a non-verbal test of intellectual ability and is regarded as being relatively free of accumulated knowledge. Raven's coloured progressive matrices test consists of 36 matrices divided equally into three sets (A, AB, B). In each matrix, there are six choices (answer alternatives). The matrices in set A depend on the child's ability to complete the missing parts. The matrices in set AB depend on the child's ability to perceive the relationships and relations between the matrices and the six answer alternatives. The matrices in set B depend on the development of the child's ability in abstract thinking. The correct answer is given one score whereas the wrong answer is given zero. Thus, the raw score on the coloured progressive matrices test ranges between zero and 36. The psychometric properties of the test are acceptable in most of the studies (Raven, Court & Raven 1990, 2002).

Procedures and Application of the Test

The test manual was obtained and translated into Arabic Language by the first author. The test application was in groups, where each sample of the students were tested in the Multi Media Room, with the help of a professional teacher in using and maintaining Multi Media. The students were sit in their desks , where they had the response sheets , and each Card of the sets were presented using the Projector . Students responded in their response sheets . The following steps were followed:

1- The participants were assured that the test was not part of the school curriculum, and would in no way affect their existing scholastic achievement test results.

2- The participants were asked whether there are any further questions, and these were addressed by the test administrator.

3- Thereafter, the record form was unveiled and participants were asked to fill in their birth date, gender, grade (where necessary, the test administrator or the class teacher provided assistance with this task).

4- The participants were informed that there was no time limit and were instructed to raise their hands as soon as they had finished, when either the test administrator or the class teacher made a note of the time taken to complete the test.

5- Finally, at the end of each testing session, the record forms were placed in an envelope on which was written: the grade; the class number; the number of pupils present at school on the day of testing; the number of pupils assigned to each class; the class teacher's name and finally, the time the test was started.

This study reported a Cronbach alpha (α) of 0.82 for the internal consistency. Also, this study reported r= 0.73 for the correlation between the scale and Mental Ability Test (Mosa, 1989).

Results

1. *Comparison of Scores across Grades*

The raw scores obtained by the sample on the Raven's CPM are compared across the grades. Although the normative data is ultimately to be presented by age group and in the form of a percentile rank, the mean scores and standard deviations for each of the grades were generated and have been presented in Table 1 . There is a steady increase in the mean CPM scores for each grade.

Table 1. *Means, Standard Deviations, Range and Minimum and Maximum Scores by Grade*

Grade	No.	Mean	SD	Range	Minimum Score	Maximum Score
Primary4	100	20	3.45	9	16	25
Primary5	100	23	4.62	8	18	26
Primary6	100	25	2.71	7	19	28
Prep.1	200	28	3.11	9	20	29
Prep.2	200	30	1.66	11	21	32
Prep.3	150	30	2.19	12	21	33
Secondary1	150	31	0.22	5	28	33
Sec.2	100	32	0.37	6	28	36
Sec.3	100	33	0.17	6	30	36

2.   *Comparison of Scores across Gender*

The mean score for the male participants in the sample was 26.99 (SD=9.13), whereas the mean score for the male participants in the sample was 28.932(SD=8.16). A t-test was conducted to check whether the difference in means scores between the genders is significant and the results are presented below in Table 2.

The table shows that t-value (-3.963) , which shows that the difference between the two sexes was not significant .

Table 2. *T-test Results for the Comparison of scores across Gender*

Group	N	Mean	Std. deviation	T	Sig.
Male	600	26.99	9.13	-3.963	No Sig
Female	600	28.932	8.16		

3.   *The Norms*

The smoothed norms for all the half-yearly interval age categories are presented in the form of percentile ranks in table 3.

Table 3. *Unsmoothed (Raw) Normative Data For gifted students in all grades*

Grades	Percentile 95	Points 90	85	80	75	70	65
	Smoothed	Norms					
4th primary	-	-	-	-	-	-	25
5th primary	-	-	-	-	-	26	-
6th primary	-	-	-	-	28	-	-
1st prep	-	-	-	29	-	-	-
2nd prep	-	-	32	-	-	-	-
3rd prep	-	33	-	-	-	-	-
1st second	-	33	-	-	-	-	-
2nd second	36	-	-	-	-	-	-
3rd second	36	-	-	-	-	-	-

Discussion

The principal findings of this study indicated that there were a significant effect of age on test scores was evidenced, where scores increased with age as expected. The findings also indicated there were no significant difference between the genders with regard to performance on the Raven's CPM.

Results of this study indicated that Raven's CPM was an effective means of selecting children who may be gifted. The higher level thinking skills demonstrated on this assessment suggest that these students may benefit from increased support and placement in gifted programs.

It is recommended that the Raven's CPM be considered as one of the methods employed by a district to select for children who would benefit from gifted programming.

Conclusion

It has been argued here that the Raven's CPM is a reliable and valid instrument for the assessment of non-verbal intelligence in Egyptian children , especially for identifying gifted ones . It is further argued that the CPM not only functions as a quick, cost-effective and accurate screening instrument, but it is also a valuable component in more in-depth diagnostic test batteries. The results of this study revealed the urgent need for the development of more appropriate local normative data for this test, particularly when it is being administered in gifted children.

It is argued here that process of assessing and placing children within the school curriculum will be significantly improved through the establishment of further more appropriate local normative data for this labour-saving screening instrument.

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