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A Normative Study of the Raven Coloured Progressive Matrices Test for Omani Children Aged 5-11 Years*

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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 for Omani children. The test was applied on an individual basis on a random sample of 1042 children from different age groups ranging from 5 to 11 years old. All of the estimated psychometric properties including validity, reliability, and norms indicate that the test could be practically utilized when applied in several situations. The study has a number of implications including that the Ministry of Education may use it to diagnose and detect those children with learning difficulties; the Ministry of Health may use it in hospitals to measure the IQ of certain patients in order to make medical decisions. In addition, researchers in psychological and social areas would be able to conduct studies aiming at measuring the intelligence of children.

ABSTRAK

Ujian matrik Raven's Coloured Progressive telah diguna pakai secara meluas dalam pelbagai situasi di pelbagai negara di seluruh dunia kerana ia adalah satu ukuran kecerdasan bukan verbal yang adil daripada segi budaya. Objektif

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kajian ini ialah untuk menghasilkan norma untuk ujian tersebut bagi pelajar di negara Oman. Kajian telah dijalankan secara rawak kepada 1042 pelajar daripada pelbagai umur, iaitu dari 5 hingga 11 tahun. Semua penggunaan psikometrik termasuk kesahan kebolehpercayaan dan norma yang dapat menunjukkan ujian adalah praktikal dan digunakan dalam pelbagai situasi. Kajian ini mempunyai pelbagai implikasi termasuk Kementerian Pelajaran dapat menggunakan ujian di hospital untuk mengukur IQ pesakit bagi membantu membuat keputusan pengkaji dalam bidang psikologikal dan sosial juga dapat menjalankan kajian mengukur kecerdasan kanak-kanak.

INTRODUCTION

Raven's Progressive Matrices test is designed to measure general intelligence, as first shown in Spearman's theory. The progressive matrices aim at measuring the ability of inference or the general factor "g", which is called by Spearman the ability to perceive the relationships and belongingness between abstract patterns. However, when Raven was developing the progressive matrices, he designed the items based on sensory judgments, which appeared to him as measuring the inferences, and hence, he did not rely on a direct interpretation of Spearman's theory. What makes the progressive appealing is their pure factoring along with their minimal cultural effects. A number of factor analyses of the test has pointed out that the only variable measured consistently by the test is the general factor of Spearman, and that the evidence is not strong that the ability of perceptions profoundly affect the test scores. It seems that the test measures the ability of abstract inferences independent of the information or facts already experienced by the individual. Therefore, the test is considered unique in its use of the Spearman principles in measuring the general factor, while having a lot of desirable characteristics, apart from being virtually culturally neutral test such as the simplicity of the instructions, the abstract and non-verbal content of the item, and the independence of the previously learned materials (Murphy & Davidshofer 1998). In general, Raven tests basically depend on a number of assumptions. Two of these are that: (a) an increase in mental development is associated with age development, and (b) differences in age are reflected in variation in mental abilities.

Tests that measure the general mental ability are considered to be indispensable tools for those working in the areas of education, mental health, and social care centers. But the preparation of these tests is not a common practice among researchers in developing countries. This is due to problems such as lack of finance as well as lack of technical and non-technical facilities. And so, researchers in these countries opt for the solution of standardization of tests developed in more developed countries, especially those of the Western world. Such standardizations will help in developing tests of international

standard and reputation, which in turn may help in comparing their norms with those established in other cultures.

The need for the standardization of intelligence tests plays a crucial role in the history of psychology, namely its recent history (Abu Hatab 1979; Kassin 2003). Like other third world countries, the Arab countries are in great need of standardized tests. There are many reasons behind this claim.

1. There is a paucity of standardized tests in most of the third world countries, including countries of the Arab world. In the Sultanate of Oman, at least two Western tests were standardized: the standard progressive matrices (Yahya, Ibrahim & Jalal 2003) and the emotional intelligence test (Al-Hinaie 2002). Possible reasons for the shortage of standardized tests are lack of funding, paucity of specialized experts in measurement and testing, and lack of awareness of the importance of using such tests.
2. The application of the tests may be needed in different contexts other than those indicated in Western culture research. However, their application in Western culture in evaluation, diagnosis, and categorization may also be useful everywhere.
3. Such attempts may encourage researchers to develop their own tests, and eventually scholars in the third world may manage to contribute to the development of psychology especially in psychological testing.
4. Like previous research elsewhere all over the world, the results of such standardized tests are expected not only to diagnose and pinpoint the problems, but also to suggest possible solutions when used for this particular purpose. Such tests are much needed in different walks of life, where decision-making is relevant, including but not limited to education, the military, health core delivery, industry, and politics.
5. There seems to be a great need for the standardization of universally recognized tests in our Arab world since the design and development of intelligence tests are costly.

There have been some disagreements during the 1960s about the validity of the concept of "culture fairness", and it has been asserted that it is impossible to develop a truly "culture fair" test (Jensen 1973). However, Jensen (1980) has argued at length that it is possible to look upon some nonverbal tests of intelligence as being what he refers to as "status free". Among these tests, he singles out Raven's progressive matrices (RPM) test as the most appropriate measure. In line with the 1960's outlook, Benson (2003) thinks that simply translating a Western test into the local language is not enough. Instead, it is critical to tailor each test to the needs and values of the culture in which it is to be used. The present study is concerned with this criticism because it refers to tests using language.

Kaplan and Saccuzzo (1997) mentioned that the progressive matrices reduce the effect of language and culture. For example, Mexican Americans and African

Americans obtain approximately 15 scores less than Caucasian Americans in Wechsler and Stanford-Binet tests, whereas this difference between the two groups does not exceed seven or eight scores when using the matrices. As such, it seems that the matrices shorten half of the bias in the test compared to Wechsler and Stanford-Binet tests.

Past studies, which were conducted in different cultures, are not only abundant and various; but also differ in many dimensions such as research methodology, the comparison between ethnic groups in the same society, or the comparison between the norms of a sample from a certain country and the norms established in a particular country being renowned for standardizing Raven's test. Table 1 summarizes the main psychometrics properties found in those studies.

As shown in Table 1, the presented studies were carried out in various cultures such as Australia, UAE, South Africa, Sudan, Iraq, Kuwait, Kenya, India, and Yemen. The size of the samples in these studies ranged from 618-5403 female and male children. Also, most of the studies were based on one year age difference, and only two were based on a half year age difference. In addition, test-retest, split-half and Cronbach's alpha methods were used as measures of reliability. Furthermore, the majority of the studies used concurrent validity (either relationship with other related tests or academic Achievement) and construct validity (age and gender differences). Moreover, most of the studies used percentile ranks to calculate norms in interpreting the Raven CPM raw scores, and that most of them applied the CPM test individually. Further, the presented studies show that the CPM has acceptable psychometric properties in different cultures which inspired the present researchers to normalize it in Omani culture.

This study is part of a strategic project at Sultan Qaboos University in the Sultanate of Oman. The main objective of the present study is to prepare tables of norms for the Raven Coloured Progressive Matrices test which could be used to interpret a raw score obtained by the Omani child. Although the psychometric properties (validity and reliability) of the test on Omani children aged 5-11 years were addressed in Kazem et al. (2007), they were readdressed in the present study as they were found to be relevant to the main objective of this study.

METHODOLOGY

SAMPLE OF STANDARDIZATION

A random sample of 1042 Omani children was selected for standardization from 70 schools in all regions of the Sultanate of Oman. Table 2 shows characteristics of the sample.

TABLE 1. Psychometric properties for Raven's coloured progressive matrix test as presented in previous studies

No	Researcher and year	Country	Sample size	Reliability	Validity	Norms
1	Al-Qurashi (1987)	Kuwait	2000 6-10.5 years	test-retest split-half	Concurrent: WISC-III, Portues test, non-verbal intelligence test. Construct: age differentiation	Percentile ranks
2	Al-Ani (1989)	Iraq	1000 6-12 years	test-retest	Concurrent: academic achievement	Percentile ranks
3	Barnabas, Kapur & Rao (1995)	India	828 7-11 years	—	—	Percentile ranks
4	Al-Heeti, Ganim, Zubaidi & Alnood (1995)	Yemen	1000 6-11 years	test-retest split-half	Construct: age differentiation, Gradual difficulty of the test groups	Percentile ranks
5	Eid (1999)	UAE	5403 6-11.5 years	Cronbach's alpha	Construct: age differentiation Concurrent: academic achievement, correlation between test sets.	Percentile ranks
6	Costenbader and Ngari (2001)	Kenya	1222 6-10 years	test-retest Cronbach's alpha	Construct: sex differentiation Concurrent: teacher rating	Percentile ranks
7	Linstrom (2002)	South Africa	2400 6-12 years	—	—	Percentile ranks
8	Cotton, Kiely, Crewther, Thomson, Laycock & Crewther (2005)	Australia	618 6-11 years	split-half internal consistency	Construct: age differentiation	Percentile ranks
9	Al-Khateeb, Mustaafa & Hussein (2006)	Sudan	1683 6-9 years	split-half Cronbach's alpha	Construct: age differentiation	Percentile ranks

TABLE 2. Standardization sample distributed by region, Child's gender, and age groups

No.	Region	Child's Gender	Age Groups 5(*)	6	7	8	9	10	11	Total	
1	Muscat	Males	11	10	11	11	13	15	15	86	168
		Females	11	10	11	11	12	13	14	82	
2	North Al Batinah	Males	14	12	14	14	15	17	18	104	204
		Females	13	12	13	13	15	17	17	100	
3	South Al Batinah	Males	9	8	9	9	10	11	12	68	134
		Females	8	8	9	9	10	11	11	66	
4	Ad Dakhliyah	Males	10	9	10	10	11	12	13	75	145
		Females	9	8	9	10	10	12	12	70	
5	South Ash Sharqiyah	Males	6	5	6	6	7	7	7	44	85
		Females	5	5	5	6	6	7	7	41	
6	North Ash Sharqiyah	Males	5	5	5	6	6	7	7	41	79
		Females	5	4	5	5	6	6	7	38	
7	North Adh Dhahirah	Males	2	2	2	2	2	2	2	14	28
		Females	2	2	2	2	2	2	2	14	
8	South Adh Dhahirah	Males	4	4	4	5	5	5	6	33	63
		Females	4	4	4	4	4	5	5	30	
9	Dhofar	Males	5	5	5	6	6	7	7	41	80
		Females	5	5	5	5	6	6	7	39	
10	Al Wusta	Males	2	2	2	2	2	2	2	14	28
		Females	2	2	2	2	2	2	2	14	
11	Musandam	Males	2	2	2	2	2	2	2	14	28
		Females	2	2	2	2	2	2	2	14	
Total			136	126	137	142	154	170	177	1042	

(*) These children were selected from government schools having preparation classes which are new in some government schools and equivalent to the kindergarten.

RESEARCH INSTRUMENTS

Raven's coloured progressive matrices test was used to achieve the goal of the research. To obtain indices of test validity, the Omani version of Otis Lennon test was used, and a teacher's checklist of the child's intelligence was designed.

Raven's Coloured Progressive Matrices Test. 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). In the Arab world, the test has been standardized in many countries including: the United Arab Emirates (Eid 1999), Sudan (Al-Khateeb et al. 2006), Iraq (Al-Ani 1989), Kuwait (Al-Qurashi 1987), and Yemen (Al-Heeti et al. 1995), and its psychometric properties were acceptable, too.

Otis Lennon Test. For the purpose of establishing the concurrent validity of the coloured progressive matrices test, the Omani version of the Otis Lennon test for general mental ability, the modified K version (Al-Shukri 2002) was used. The test consists of 80 items, divided into three sections by 20 items in each of the sections I and II, and 40 items in Section III. The correct answer is given a score of one, and the wrong answers are given zero. Thus, the raw score on the test ranges between zero and 80. The test is used to measure the intelligence of school children aged 7-10 years. The Omani version of the test has acceptable psychometric properties. The Cronbach's alpha reliability coefficient was .90, the stability coefficient after 14 days was .71, and the split-half coefficient was .82. The validity of the test was supported by several methods including item difficulty and discrimination indexes, concurrent validity, and discriminate validity.

Teacher's Checklist of the Student's Intelligence. For the purpose of verifying the concurrent validity of the coloured progressive matrices test and in light of the theoretical framework of the progressive matrices test, especially the assumptions of the Spearman's theory of intelligence, a teacher's checklist was developed to assess the intelligence of children. The checklist consists of 15 items on a 5-point rating scale (never, rarely, sometimes, often, always). The answers (never, rarely, sometimes, often, always) are given the scores (1, 2, 3, 4, 5), respectively. Thus, the raw score on the list ranges between 15 and 75. Teacher's rating depends on his/her observation of the child's behavior during teaching for a period of not less than six months. The content of the checklist's items was validated by three experts in educational psychology. Also, the item–total correlation was calculated, and the Pearson correlation coefficients ranged from .74 to .92. In terms of reliability, the Cronbach's alpha coefficient was .98 (Kazem et al. 2007).

APPLICATION OF THE TEST ON THE STANDARDIZATION SAMPLE

The research team obtained the approval of the Ministry of Education to apply the coloured progressive matrices test on school children. The application of the coloured progressive matrices test on the standardization sample was individually applied by some members of the team, and through the use of two

members having a master's degree in education from the Technical Office for Studies and Development at the Ministry of Education, and two graduate students in educational psychology, and one expert of the Adults Center who has a doctorate degree in measurement and evaluation. The application process lasted nearly three months.

RESULTS

DESCRIPTIVE STATISTICS

The research team found that it is suitable to calculate some important statistical indices such as: least score, highest score, the mean, the standard deviation, skewness, and kurtosis. Table 3 below includes a display of these statistical indices. As shown in Table 3, the skewness and kurtosis values were within acceptable range of normality. Also, the average CPM's test score tended to increase as age increases.

TABLE 3. Descriptive statistics of the standardization's sample (N = 1042) in the CPM

Age	Number	Least Score	Highest Score	Mean	SD	Skewness	Kurtosis
5	136	6	36	17.37	5.85	0.782	0.283
6	126	4	32	17.05	5.35	0.608	0.448
7	137	8	36	20.20	6.40	0.506	0.454 -
8	142	4	36	21.91	6.37	0.021 -	0.272 -
9	154	6	36	23.25	6.82	0.165 -	0.786 -
10	170	6	36	25.50	7.09	0.560 -	0.489 -
11	177	6	36	26.39	6.37	0.847 -	0.477

RELIABILITY INDICES

To address the reliability of the standardization sample's responses to the items in the test three methods were used:

Test-retest method. The Raven CPM test was administered to a subsample of 52 male and female children aged between 5-11 years in Muscat District, and the test was re-administered after a period ranged between 14-20 days. The correlation coefficient between the two administrations was 0.56.

Split-half method. The coefficient reliability of the split-half method was calculated for all children of the standardization sample and separately for each age group using Pearson correlation coefficients, and corrected by using Spearman-Brown equation. Table 4 shows the reliability of the split-half coefficients according to age categories. According to Table 4, the reliability coefficients ranged between 0.705- 0.858 with a median of 0.777.

TABLE 4. The reliability coefficients of the split-half according to age categories

Age group	*n*	Second Half		First Half		*r*	Reliability Coefficients
		M	*SD*	*M*	*SD*		
5	136	11.27	2.63	6.10	3.92	0.577	0.732
6	126	11.13	2.72	5.92	3.36	0.544	0.705
7	137	12.65	2.81	7.55	4.24	0.635	0.777
8	142	12.94	3.00	8.97	4.03	0.636	0.777
9	154	13.71	2.98	9.53	4.41	0.691	0.817
10	170	14.38	2.89	11.12	4.66	0.752	0.858
11	177	14.74	2.72	11.65	4.25	0.653	0.790

Cronbach's- alpha coefficient. Cronbach's alpha Coefficient was calculated for all children of the standardization sample and separately for each age category. Table 5 shows the results of alpha coefficients. As indicated by Table 5, the alpha Coefficients ranged between 0.81- 0.91 with a median of 0.88.

TABLE 5. The reliability of Cronbach's alpha coefficients according to age

Age group	*n*	Cronbach's alpha
5	136	0.85
6	126	0.81
7	137	0.88
8	142	0.87
9	154	0.90
10	170	0.91
11	177	0.89

VALIDITY INDICES

The researchers calculated the validity indices using the concurrent validity and the construct validity:

Concurrent Validity

Overall achievement. To test the assumption concerning relationship of intelligence to academic achievement, the relationship between the scores in the CPM test and the general academic achievement in four taught courses (Arabic Language, English Language, Mathematics, and Science) was calculated in this study. Pearson's correlation coefficient was found to be 0.405, and it was statistically significant at $p < 0.01$.

Otis-Linone test. To test the assumption concerning relationship of performance on the Raven CPM test and performance on other mental ability tests, the relationship between students' scores in the Raven CPM test and their scores on the Otis-Linone test was calculated in this study. Pearson's correlation coefficient was 0.641, and it was statistically significant at $p < 0.01$.

Teacher's ratings. To test the hypothesis regarding the relationship between performance on the Raven's CPM test and teachers' ratings of the child's intelligence, students' scores on the Raven's CPM test were correlated with their teachers' ratings of the intelligence. Pearson' correlation coefficient was found to be 0.412, and it was statistically significant at $p < 0.01$.

Construct Validity

Gradual difficulty of the test groups. A t-test for two correlated samples was performed for the scores of the two test groups (A) and (AB), and between the scores of the two test groups (AB) and (B) according to each age group. Table 6 shows the summary of the t-test results. As revealed by Table 6, all calculated t-values were statistically significant. This result confirms that the hypothesis regarding the differences between the scores of the children in group (A) and their scores in group (AB), and also between their scores in group (AB) and their scores in group (B).

TABLE 6. T-Test results comparing the subset scores of the Raven's CPM across age groups

Age	Subtest A		Subtest AB		Subtest B		*t*	
group	*M*	*SD*	*M*	*SD*	*M*	*M*	A vs. AB	AB vs. B
5	7.67	1.77	5.16	2.30	4.54	2.76	15.443 *	3.424 *
6	7.40	1.83	5.37	2.29	4.27	2.41	10.607*	5.654 *
7	8.38	1.76	6.47	2.72	5.35	2.91	10.247*	6.202 *
8	8.39	2.09	7.16	2.70	6.36	2.76	6.311*	4.040 *
9	8.81	2.05	7.86	2.79	6.58	2.98	5.040*	7.817 *
10	9.31	1.84	8.64	2.92	7.55	3.12	4.281*	7.031 *
11	9.44	1.92	9.03	2.59	7.92	2.85	2.579*	7.209 *

* $p < .01$.

Age Differentiation. To test the hypothesis which states that individuals show systematic progress in their scores in Raven's Matrices tests with increasing age, one-way ANOVA was used. The calculated "F" value was found to be statistically significant at $p < 0.001$, with an effect size of 0.224. Following this, Sheffee's test for multiple comparisons revealed statistically significant differences for all dual comparisons between each age group and its subsequent elder category (6 and 7), (7 and 8), (8 and 9), (9 and 10), (10 and 11), except for the first comparison between the categories (5 and 6) which was not statistically significant. This result is an indication of the availability of the construct validity in the test. Table 7 summarizes the ANOVA results; and Figure 1 shows a graph of the raw scores' means of the standardization sample according to age.

TABLE 7. One-way ANOVA results for the differences between age groups in Raven's CPM

Source of Variance	Sum of Squares	df	Mean of Squares	"F" value	Sig.	Effect size
Between groups	12185.56	6	2030.93	49.756	0.001	0.224
Within groups	42246.05	1035	40.817			

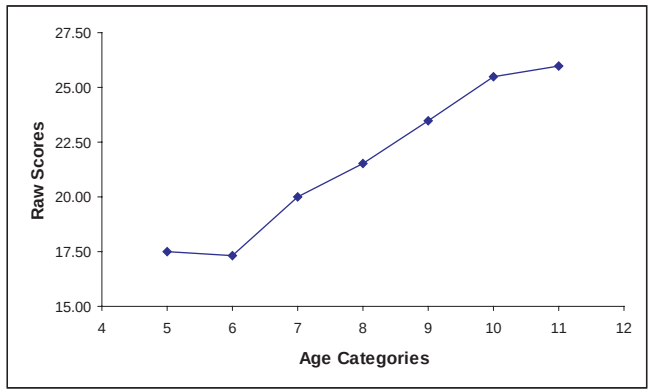

FIGURE 1. Mean scores in the CPM test for ages 5-11

Gender differences. To test the hypothesis concerning the invariance of the Raven's CPM test scores across gender, the "t" test for two independent samples was performed on the scores of males and females in each age category. It was found that all calculated "t" values were statistically insignificant, except for the 5– year category, where females outperformed males. Table 8 shows the "t" test results for the comparison of the Raven CPM test scores between the two gender groups according to each age category.

TABLE 8. Gender differences on Raven's CPM test performance for children aged 5-11 years

Age group	Boys			Girls			*t*
	n	*M*	*SD*	*n*	*M*	*SD*	
5	70	16.31	5.64	66	18.48	5.91	2.192*
6	64	17.14	5.22	62	16.95	5.52	0.197
7	70	19.50	6.44	67	20.93	6.33	1.306
8	73	21.32	6.47	69	22.54	6.25	1.143
9	79	23.05	7.05	75	23.45	6.60	0.365
10	87	25.75	6.72	83	25.24	7.50	0.464
11	91	26.23	6.15	86	26.56	6.62	0.341

*$p < .05$.

NORMS

Percentile ranks were extracted as norms for the raw scores of the standardization sample (n = 1042), as they are the most spread norms in intelligence tests in general) Nitko & Brookhart 2007), and particularly in the progressive matrices test (e.g Al-Khateeb et al. 2006; Al-Ani 1989; Eid 1999; Al-Qurashi 1987; Al-Heeti et al. 1995; Cotton et al. 2005; Costenbader & Ngari 2001; Linstrom 2002). Percentile ranks are also good indicators of the individual's relative position in his group. Furthermore, percentile ranks are used because they are easy to calculate and interpret (Anastasi & Urbina 1997). Table 9 shows the percentile ranks for each age group. The norms are available with the first author upon request.

DISCUSSION

Theoretically, most psychological phenomena, including intelligence, tend to be normally distributed in the population (Abu Hatab 1979). In the present study, the process of deducing statistical indices about the Raven's CPM test scores revealed that the Omani childrens' scores were nearly similar to the normal distribution. This, in turn, might be considered as the norm for judging the representation of the sample to the population from which the results are intended to generalize.

The estimated reliability coefficients of the standardization sample's responses in this study were high and acceptable in comparison with the previous studies (e.g. Al-Heeti et al. 1995; Al-Khateeb et al. 2006; Al-Qurashi 1987; Eid 1999). In addition, all calculated indices of the concurrent and construct validity in this study were found to be high and acceptable in comparison with previous studies in this area. Specifically, agreeing with past research (e.g. Al-Qurashi, 1987; Costenbader & Ngari 2001; Eid 1999), the present study found that the intelligence scores in Raven's CPM test correlated significantly with (a) scores

TABLE 9. Percentile ranks for each age group

Percentile ranks	Age group 5	6	7	8	9	10	11
5	9	10	11	12	12	12	14
10	11	12	12	13	13	14	17
15	12	12	13	15	14	16	20
20	12	12	14	16	15	19	23
25	12	13	15	17	17	21	23
30	13	13	15	18	19	22	24
35	13	14	16	19	20	23	25
40	14	14	17	20	21	23	25
45	15	15	18	21	22	25	26
50	15	16	19	21	23	26	27
55	16	16	20	22	24	27	28
60	17	17	21	23	25	28	28
65	18	18	22	24	26	29	29
70	19	18	23	25	27	30	30
75	21	19	24	26	28	31	30
80	22	20	25	27	29	32	31
85	23	22	26	28	30	33	32
90	26	25	29	29	32	33	33
95	28	27	33	32	34	34	34
99	36	36	36	36	36	36	36

on another mental ability test, (b) students' academic achievement, and (c) teachers' ratings of the students' intelligence; thereby providing evidence for concurrent validity of the Omani childrens' responses on Raven's CPM test.

In line with previous research (e.g. Abu Hatab 1979; Al-Heeti et al. 1995; Al-Khateeb & Al-Mutawakil 2001; Al-Khateeb et al. 2006; Al-Qurashi 1987; Eid 1999; Lynn 1994; Lynn, Allik, Pullman & Laidra 2004; Raven 2000; Schaie 1986), the current study showed (a) significant gradual difficulty of the Raven's CPM test groups (A, AB, and B), (b) significant differences in the Raven's CPM test performance with respect to age, and (c) non-significant differences in the Raven's CPM test performance with respect to gender. These findings provide sound evidence for the construct validity of the Omani children' responses on Raven's CPM test.

CONCLUSION

The present study provides normative data regarding the performance of Omani children aged 5-11 years on Raven's CPM. As in previous research, the study yielded reliable data and valid inferences could be made from them. For example, the Ministry of Education may use it to diagnose and detect those children with learning difficulties; the Ministry of Health may use it in hospitals to measure the IQ of certain patients in order to make medical decisions. This line of research could be extended to further investigate the psychometric properties of the CPM for Omani children with special needs.

REFERENCES

Abu Hatab, F. 1979. *Mental abilities*. Cairo, Egypt: Alangolo Almasria. (In Arabic).

Al-Ani, A. 1989. *Construction Iraqi norms of the Raven's coloured progressive matrices*. Unpublished Master thesis, Baghdad University, Iraq. (In Arabic).

Al-Heeti, K. N., Ganim, A., Al-Zubaidi, A. & Alnood, Y. 1995. *The standardization of Raven's coloured progressive matrices for basic education children between 6-11 years old in the Republic of Yemen*. Unpublished manuscript presented to the UNCIF. (in Arabic).

Al-Hinaie, T. Z. 2002. *The Psychometric properties of the emotional intelligence test in the Omani context*. Unpublished Master thesis, Sultan Qaboos University, Oman. (In Arabic).

Al-Khateeb, M. A. M. & Al-Mutawakil. 2001. *The standardization of Raven's coloured progressive matrices test for basic education students in the Khartoum City*. Khartoum: Sudan Press Company Limited. (In Arabic).

Al-Khateeb, M. A. M., Mustaafa, M. M. A. & Hussein, A. M. 2006. *User guied of Raven standard progressive matrices test in the Sudan's culture*. Khartoum: Money Press Company Limited. (In Arabic).

Al-Qurashi, A. 1987. *Raven's coloured progressive matrices test: user guide*. Kuwait: Dar Alqalam. (In Arabic).

Al-Shukri, H. A. S. 2002. *Standardization of Otis-Lennon Mental Ability Test, Elementary Level, Form K, in the Muscat's District Students*. Unpublished master's thesis, Sultan Qaboos University, Oman. (In Arabic).

Anastasi, A. & Urbina, S. 1997. *Psychological testing* (*7th ed.*). New Jersey: Prentice Hall.

Barnabas, I., P., Kapur, M. & Rao, S. 1995. Norm development and reliability of coloured progressive matrices test. *Journal of Personality and Clinical Studies*, 11 (1-2), 17-22.

Benson, F. 2003. Intelligence across cultures. *Monitor on Psychology*, 34 (2). Retrieved March 29, 2006, from http://www. apa. org/ monitor/2003/ intelligence. htm.

Costenbader, V. & Ngari, S. M. 2001. A Kenyan standardization of Raven's coloured progressive matrices. *School Psychology International*, 22(3), 258-268.

Cotton, S. M., Kiely, P. M., Crewther, D. P., Thomson, B., Laycock, R. & Crewther, S. G. 2005. A normative and reliability study for the Raven's Coloured Progressive Matrices for primary school aged children from Victoria, *Australia. Personality and Individual Differences*, 39, 647-659.

Eid, A. 1999. *The application manual for Raven's coloured progressive matrices*. Unpublished manuscript, Ministry of Education, United Arab Emirates. (In Arabic).

Jensen, A. R. 1973. *Educability and group differences*. New York: Free Press.

Jensen, A. R. 1980. *Bias in mental testing*. New York: Free Press.

Kaplan, R. M. & Saccuzzo, D. P. 1997. *Psychological testing: Principles, applications and issues* (*4th ed.*). Pacific Grove: Brooks/ Cole.

Kassin, S.2003. *Essentials of psychology. Upper Saddler River*, New Jersey: Prentice Hall.

Kazem, A. M., Alzubidi, A. S., Yousif, Y. H., Aljamali, F. A., Al-Mashhdany, S. I., Alkharusi, H. A., Al-Busaidi, O. B., Alsarmi, A. M., Al-Bulushi, S. S., Al-Bahrani, W. A. & Al-Fori, S. M. 2007. Psychometric Properties of Raven's Coloured Progressive Matrices for Omani Children Aged 5 through 11 Years. *Social Behavior and Personality, New Zealand,* 35(10), 1385-1398.

Linstrom, A. 2002. *Variance in coloured progressive matrices (CPM) scores with ethnicity, economics circumstances and living conditions in South Africa*. Paper presented at the 25th International Congress of Applied Psychology in Singapore.

Lynn, R.1994. Sex differences in intelligence and brain size: A paradox resoled. *Personality and Intelligence*, 20, 271-273.

Lynn, R., Allik, J., Pullman, H. & Laidra, K. 2004. Sex differences on the progressive matrices among adolescents: Some data from Estonia. *Personality and Individual Differences*, 36, 1249-1255.

Murphy, K. R. & Davidshofer, C. O. 1998. *Psychological testing: Principal and applications* (*4th ed.*). Upper Saddle River, New Jersey: Prentice Hall.

Nitko, A. J. & Brookhart, S. 2007. *Educational assessment of students*. New Jersey: Pearson Education, Inc., Upper Saddle River.

Raven, J. 2000. The Raven's Progressive Matrices: change and stability over culture and time. *Cognitive Psychology*, 41, 1-48.

Raven, J. C., Court, J. H. & Raven, J. 1990. *Manual for Raven's progressive matrices and vocabulary scales: American and international norms*. Oxford, England: Oxford Psychological Press.

Raven, J. C., Court, J. H. & Raven, J. 2002. *Raven's colored progressive matrices*. Austria: Dr. G. Schuhfried Ges M. B. H.

Schaie, K. W. 1986. The Seattle Longitudinal studies of adult intelligence, *Current Direction in Psychological Science*, 2, 171-175.

Yahya, A. M., Ibrahim, A. M. & Jalal, S. 2003. Standardization of Raven's Progressive Matrices Test in the Omani culture: Muscat region. *A Series of Psychological and Educational Studies-SQU*, 6, 35-58. (In Arabic).

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