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A Standardization of the Standard Progressive Matrices in Egypt

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Results are reported for intelligence in Egypt assessed with the Standard Progressive Matrices. This is one of the largest test standardizations in Egypt, with a sample of 7600 subjects aged 6 to 20 plus years. The sample obtained a British IQ of 89.25. The results are discussed in the context of other work about intelligence in Egypt.

Key Words: Intelligence; Standard Progressive Matrices; Egypt.

Three studies of intelligence in Egypt are reported by Lynn & Vanhanen (2012) in their compilation of IQs for all nations in the world, calculated in relation to a British mean of 100 and standard deviation of 15. The first of these studies reported results for a sample of 206 school children aged 6-10 years on the Draw-a-Man test, on which the Egyptian children obtained a British IQ of 86 (Dennis, 1957). The sample was from a public school in Port Said that school officials described as representative of the total Port Said school population. The second study reported results for a sample of 111 children aged 12-15 years on the Cattell Culture Fair test, on which the Egyptian children obtained a British IQ of 81 (Sadek, 1972). The third study reported results for a sample of 129 children aged 6-12 years on the Standard Progressive Matrices, on which the Egyptian children obtained a British IQ of 83 (Ahmed, 1989). All these results are based on quite small samples. The recalculated results of these and several additional studies are included in Table 1. We report here the results of yet another study of intelligence in Egypt based on a much larger sample. These results will be discussed in the broader context of intelligence and education in Egypt.

Table 1. *Summary of IQ studies in Egypt.*

#	Study year	Type[1]	N	Age	Birth cohort	Test[2]	IQ	Source
1	1955	sch	206	6-10	1945-1949	DAM	86	Dennis 1957
2	1970	sch	111	12-15	1955-1958	Cattell	81	Sadek 1972
3	1987	sch	129	6-12	1975-1981	SPM	83	Ahmed 1989
4	1986	stu	452	20-27	1959-1966	SPM	79.5	Abdel-Khalek 1988
5	1993	pop	110	7-10	1983-1986	CPM WISC-R	69 73	Wachs et al. 1995
6	1994	pop	155	18-44	1950-1976	SPM WAIS-R	<60 66	Wachs et al. 1996
7	1994-1995	pop	30	24-44	1950-1971	SPM	<65	Von der Lippe 1999
8	2010	sch	300	9-11	1999-2001	CPM	74.5	Eissa & Alsayed 2012
9	2000	stu	607 1540	20.5 avg.	1979-1980 avg.	APM	100.5 sci. 92 arts	Abdel-Khalek et al. 2015
10	2011-2013	sch	11284	5-10	2001-2008	CPM	85.5	Bakhiet & Lynn 2014
11	1986	sch stu	4255 1844	7-15 18-20+	1971-1979 19...-1968	SPM	89.5 89.3	This study

[1] sch = school-based study; pop = population-based study; stu = college or university students.

[2] DAM = Draw-a-Man test; Cattell = Cattell's Culture Fair test; SPM = Standard Progressive Matrices; CPM = Colored Progressive Matrices; APM = Advanced Progressive Matrices; WISC-R = Wechsler Intelligence Scale for Children – Revised; WAIS-R = Wechsler Adult Intelligence scale – Revised.

Method

The Standard Progressive Matrices was standardized in Egypt in 1986 by Saleh (1988) on a sample of 7600 children and adults aged 6 to 20 plus years. The sample came from schools in the southern provinces of Giza, Assiut, Sohag and Aswan. The results were published in Arabic.

Results

The results are summarized in Table 2. This gives the scores on the Standard Progressive Matrices for each age from 6 to 20 plus years, the British percentiles of these scores, and their British IQ equivalents. The British IQs for the 6 to 15 year-olds are taken from the 1979 British standardization sample given by Raven, Raven and Court (1998) and the 2007 British standardization of the SPM+

reported in Raven (2008). The SPM+ scores were converted to the corresponding SPM scores according to the conversion table in Raven, Raven and Court (1998, Table SPM3). The time-weighted average of the IQs according to the British1979 and 2007 standardizations was formed in order to compare the 1986 Egyptian scores with contemporaneous British norms. The British IQs for the 18- to 20-plus-year-olds are taken from the 1992 British standardization sample given by Raven, Raven & Court (1998). No Flynn effect correction is applied because the performance on the SPM remained more or less unchanged for teenagers and adults born after about 1960 (Raven, Raven and Court 1998, Figure SPM1). There are no British norms for age 16 and 17.

Because the older age groups in this study were presumably college and university students and therefore a relatively elite sample, IQs were calculated separately for the 7-15 age group and those aged 18 and above.

Table 2. *Scores on the Standard Progressive Matrices for the Egyptian sample*.

Age	N	SPM score	British PC	British IQ
6.0	478	11	-	
7.0	483	13	14	84
8.0	416	16	16	85
9.0	489	23	27	91
10.0	476	27	16	85
11.0	485	32	20	87
12.0	461	35	18	86
13.0	444	41	37	95
14.0	493	44	37	95
15.0	508	45	45	98
Mean				89.5
16.0	482	49	-	-
17.0	541	48	-	-
18.0	398	48	21	88
19.0	339	49	25	90
20 +	1107	49	25	90
Mean				89.3

Discussion

When comparing the results of this study with those of others in Egypt and elsewhere, we need to keep in mind that the subjects were children, adolescents and young adults who attended school at the age of testing. Therefore, they are representative of the general population in their respective birth cohorts only in

age groups in which almost every child is in school. Those who are not in school are likely to score substantially below schoolchildren on cognitive tests. The youngest children in the present study, aged 6-11, were born between 1975 and 1980. According to the Barro-Lee data set (www.barrolee.com), this birth cohort achieved an average total length of schooling of 8.53 years by the time they reached an age of 20-24 years, and 22.3% of the children never went to school at all. Therefore, even this youngest age group is not fully representative of all 6 to 11 year-olds in Egypt at that time, but only of those less than 77.7% who were enrolled in school.

In the cohorts who were 11-16 years old at the time of testing (born 1970-1975), average length of schooling was 7.29 years and 28.5% of all children never went to school. In the oldest group, assumed to be approximately 21-26 years old and born 1960-1965, average length of schooling was 5.39 years and 42.4% never went to school. Although we cannot determine the magnitude of the effect, the older age groups are increasingly unrepresentative of the total population in their birth cohort. The IQs listed in Table 2 are therefore overestimates of the average IQ in the country, especially in the older age groups.

The greater selectivity and lesser representativeness of the older age groups is the likely reason why IQ tends to rise with increasing age of the study subjects. This is different from some other studies in developing countries, which observed that IQ *declined* with increasing age, relative to British norms. This was observed, for example, in a Libyan study (Lynn, El-Ghmary Abdalla and Al-Shahomee, 2008), and in the Sudanese province of Darfur (Khaleefa et al, 2010). Such declining trends are attributed to the cumulative effects of poor-quality education and lack of intellectual stimulation.

The studies listed in Table 1 need to be interpreted in the context of a rapidly expanding school system that started from a low baseline and achieved universal primary schooling only in the 1990s. The two earliest studies, those by Dennis (1957) and Sadek (1972), report results from schoolchildren at a time when more than half of all children in Egypt never went to school, and the majority of even the younger generation were illiterate. Therefore, these studies are likely to overestimate the average intelligence of Egyptian children at the time.

On the other hand, the quality of school education tends to be low in countries at low levels of economic and cognitive development. For example, a study in India found that the average IQ of teachers was 79 (Tooley et al, 2010). A study in Sudan found that the average IQ of students in the study program for primary school teachers at the University of Khartoum was 65. This was by far the lowest IQ of any study program at the university (Khaleefa, Amer and Lynn, 2014). Therefore, there is a concern that many developing countries are in a low-level

equilibrium trap in which low teacher competence leads to poor quality of education, which perpetuates low intelligence. Low intelligence in turn impedes economic development, which leaves insufficient resources for the educational system (Meisenberg, 2014).

Returning to the studies listed in Table 1, we see clearly that those that recruited their subjects from the general population found lower IQs than studies of schoolchildren. The three population-based studies, those of Wachs et al. (1995, 1996) and von der Lippe (1999), are consistent in showing low IQs. The subjects in von der Lippe (1999) were mothers in a low-income neighborhood of Cairo. Only four of the 30 subjects had never been in school, while five had a 4-year university degree. Part of the reason for the low scores is most likely that the subjects were women. In many less developed countries, adult women score lower than men on cognitive tests (e.g., Adair and Pollitt, 1985). The Wachs et al. (1996) study found that this pattern is also evident in Egypt.

The subjects in Wachs et al. (1995, 1996) were residents of a large village (population 8000) 24 kilometers from Cairo. Average length of schooling of the adult subjects in Wachs et al. (1996) was 4.94 years for males and 1.4 years for females. This is lower than the average of 5 to 5.5 (males and females combined) for these cohorts in Egypt. However, all children in Wachs et al. (1995) were in school. This is almost certainly one reason, and probably the most important reason, why they scored higher than their parents on the cognitive tests. The difference was about 7 points on the Wechsler tests and at least 10 points on the Raven tests. Thus there has been a rise in cognitive development from one generation to the next: a Flynn effect.

Because Flynn effects that took place in Britain at the same time are alredy computed into the IQs in Table 1, the results suggest that Flynn effects were stronger in Egypt than in Britain at that time – at least in the village studied by Wachs et al. (1995, 1996). The generation gap is most likely the result of different educational exposure between the older and younger generations.

The school-based studies that used one of the Raven tests, either the Standard Progressive Matrices (SPM) or the Colored Progressive Matrices (CPM), do not show evidence of strong Flynn effects. Two early studies, those of Ahmed (1989) and the present one, produced IQs of 83 and 89.5, respectively, with subjects born during the 1970s. The two recent studies, reported by Eissa and Alsayed (2012), and Bakhiet and Lynn (2014), both with children born around 2000 or a little later, produced IQs of 74.5 and 85.5 respectively. The relative constancy of IQ in schoolchildren can be attributed to two opposing trends. The first is the rise in school enrolment, with a decline in the number of unschooled children from approximately 25% of those born in the 1970s to less than 12% of

those born around 2000 (Barro & Lee, 2010). This enrolment increase is predicted to decreases the average intelligence of schoolchildren because those who are in school are a less selected group. At the same time, improved quality of schooling and rising standard of living are expected to raise performance. The extent to which quality of schooling and economic conditions did improve for common people in Egypt is hard to assess. Despite moderately strong economic growth, the proportion of people living below the official poverty line has increased from17% in 2000 to 25% in 2011; and although primary school enrolment is now virtually complete and even secondary enrolment is at 86%, public expenditures for education have declined from an average of 5% in the 1970s to 3.8% in 2008 (World Bank, 2015).

The studies of university students show IQs that are not much different from those of school children. The first of these, by Abdel-Khalek (1988), found an average of 79 for students of social sciences and humanities born in the early 1960s. The present study, also with students born in the early to mid-1960s, found an average of 89.3. The most recent study, by Abdel-Khalek, Nour-Eddin and Lynn (2015), found IQs of 100.5 for science students and 92 for arts students born around 1980. Thus there may be a trend for rising test performance of university students in Egypt that exceeds the gains in Britain and other developed countries, despite a large increase in the proportion of young people attending college or university. According to the Barro-Lee data set, the proportion of Egyptians (males and females combined) with at least some tertiary education increased from 3.6% of those born 1960-1965 to 12.2% of those born 1980-1985.

Computing the average IQ for Egypt during the period covered in the surveyed studies is difficult because of the difference between population-based and school-based studies. Population-based studies are likely to be more representative of the total population, especially in age groups and at time points where school enrolment is incomplete. On the other hand, most IQ studies both in developed and developing countries are done with school children. Therefore school-based studies are more suitable when the aim is to compare IQs in different countries. Studies with university students should be avoided because these are an elite group that is expected to score substantially higher than the population average. Therefore we propose that as a compromise, we should compute the “national IQ” as the mean or median of all available school-based and population-based studies, using student samples only as (dis)confirmatory evidence. When we assign average scores of 71, 62 and 62, respectively, to studies 5, 6 and 7 of Table 1, the mean of the 9 studies calculates as 77.2, with a median of 81.

International assessments of achievement in curricular subjects such as mathematics, science and reading are alternative measures of intelligence that correlate highly with results from IQ tests, with correlations of up to .90 at the level of country averages (Meisenberg and Lynn, 2011). Egypt participated in the 2003 and 2007 TIMSS (Trends in International Mathematics and Science Study) assessments in grade 8. Egyptian students achieved an overall average scaled score of 406.5, which corresponds to an IQ of 83.5. This is virtually the same as the average of the six school based studies in Table 1, which is 83.3.

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