

**Sex Differences in Means
and Variance of Intelligence:
Some data from Morocco**

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The study provides the first report for intelligence in Morocco and gives data for a sample of 202 adults tested with the Raven Standard Progressive Matrices. The results show that in this sample, men had a higher mean IQ than women by 5.7 IQ points. Sex differences in variance were inconsistent. The mean IQ is estimated at 81.

Key Words: Progressive Matrices; General intelligence; Gestalt continuation; Verbal-analytical reasoning; Ability; Visuospatial; Sex differences; Variance.

There has been considerable interest in sex differences and national differences in intelligence for around a century, but while data on these have been published for many countries, none have been published for Morocco. Our purpose in this paper is to contribute to the literature on these issues by presenting data for this country. There has been interest in sex differences since at least World War 1, during which Terman (1916, pp. 69-70) reported, on the basis of his American standardisation sample of the Stanford-Binet test on approximately 1,000 4-16 year olds, that girls obtained a slightly higher average IQ than boys but “the superiority of girls over boys is so slight ... that for practical purposes it would seem negligible”. Terman (1916) also discussed the question of the variability of intelligence in males and females and wrote that “it is often said that women are grouped closely around the average, while men show a wider range of distribution”. However, in his data for 1000 children aged 6 to 14 years he found no difference between boys and girls in variability.

Both these questions regarding sex differences in

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means and variability of intelligence have been discussed by numerous scholars. The consensus view, asserted by virtually all scholars over the decades, was summarized by Eysenck (1981, p.42): "While men and women average pretty much the same IQ score, men have always shown more variability in intelligence. In other words, there are more males than females with very high IQs and very low IQs." Herrnstein & Murray (1994, p. 275) reached the same conclusion: "The consistent story has been that men and women have nearly identical IQs but that men have a broader distribution...the larger variation among men means that there are more men than women at either extreme of the IQ distribution."

The conclusion that there is no sex difference in general intelligence has continued to be advanced right up to the present. For instance, "There appears to be no sex difference in general intelligence; claims that men are more intelligent than women are not supported by experimental data" (Hines, 2007, p.103); "General intelligence does not differ between men and women" (Haier, 2007); "There is no difference in intelligence between males and females...overall, the sexes are equally smart" (Halpern, 2007, p.123); "Men and women have equal cognitive capacity" (Speke, 2007, p. 65).

The assertion that there is no sex difference in mean IQ has been challenged by Lynn (1994, 1999) who has contended that the zero sex difference only holds up to the age of 15 years, but that from the age of 16 years males begin to show greater intelligence reaching an advantage of 3 to 6 IQ points in adults. This claim was disputed by Mackintosh (1996) who contended that the Progressive Matrices is an excellent measure of intelligence and of Spearman's *g*, that it has been shown by Court (1983) there is no sex difference on the Progressive Matrices, and therefore that Lynn's claim is refuted. In response to this criticism Lynn & Irwing (2004) carried out a meta-analysis of sex differences on the Progressive Matrices and found that there was no sex difference up to the age of 15 years, but from the age of 16 years males obtain higher means and in adults men obtain a higher mean IQ than women by an average of 5 IQ points. This conclusion was confirmed in

a further meta-analysis of sex differences on the Progressive Matrices among college students (Irwing & Lynn, 2005). Lynn's contention that from the age of 16 years males begin to show greater intelligence than females reaching an advantage of 3 to 6 IQ points in adults has been confirmed by Colom & Lynn (2004), Nyborg (2003, 2005) and Meisenberg (2009).

Lynn and his colleagues have also disputed the contention that males have greater variability of intelligence than females. Irwing & Lynn (2005) have reported that there was no sex difference in variability in a meta-analysis of sex differences on the Progressive Matrices among university students. Lynn and his colleagues have reported a number of other studies in which females have greater variance than males, including a study of 15 through 24 year olds in Saudi Arabia, and concluded that "the greater variance of males is not a universal phenomenon" (Abdel-Khalek & Lynn, 2009, p.112).

Interest in national and population differences in intelligence goes back to Galton (1869, p. 192), who concluded that the people of classical Athens of 500-300 B.C. had the highest average IQ, on the basis that a small population had produced so many brilliant people. He concluded that these were followed successively by the lowland Scots, the English, the sub-Saharan Africans, and finally by the Australian Aborigines. National and population differences in intelligence have been documented by Lynn & Vanhanen (2002, 2006), who have given average IQs for all nations in the world. They calculate these on a metric with the IQ set at 100 in Britain and SD of 15. They estimate the average IQ for Morocco at 84 (Lynn & Vanhanen (2006, p.59). However, this estimate is based on Moroccan immigrants in the Netherlands, where several studies of Moroccan immigrants obtained lower IQs than native Dutch samples (Sijtsma & Resing, 1991; Te Nijenhuis & van der Flier, 1997; Te Nijenhuis et al., 2004). However, Moroccan immigrants in the Netherlands are not ideal samples from which to estimate an IQ of Moroccans because immigrants are not necessarily representative of the Moroccan population. Hence, we present here data for indigenous Moroccans.

Method

The Raven Standard Progressive Matrices (SPM) (Raven et al., 1996) was administered to a sample of 202 subjects in Morocco, consisting of 92 men (mean age 26.77, SD=7.76) and 110 women (mean age 26.40, SD=7.38). To obtain the samples we contacted the directors of university halls of residence in the cities of Casablanca, Marrakech, Meknes and Tangiers. With consent of the directors we then contacted the residents, consisting of university students studying a wide range of subjects, and the staff of the halls of residence consisting of administrative staff, cleaners, waiters and cooks. When these samples had performed the test, we obtained further subjects through the social networks of these initial subjects. This method is sometimes known as snowball sampling. The test was administered without time limits. Answering the test was voluntary and anonymous, and no reward was given for performing the test.

Results

The test was scored for the total scores and for the scores on the three sub-factors of gestalt continuation, verbal-analytical reasoning and visuospatial ability identified in the Standard Progressive Matrices by factor analysis by Lynn et al. (2004). The reliabilities of the scores as assessed by Cronbach's α are satisfactory for the four factors, as shown in Table 1.

Table 1 Reliabilities (Cronbach's α) of the Raven test and of the three Raven subscores.

Tests	Items	Total	Men	Women
		202 α	92 α	110 A
Raven	60	.96	.95	.97
Gestalt continuation	18	.93	.84	.95
Verbal-analytic reasoning	10	.82	.84	.79
Visuospatial ability	22	.94	.92	.94

More men than women were university students or had

university degrees, so to estimate the sex differences it is necessary to control for this. Therefore the sample was divided into students and those with university degrees, and those who were not students and did not have university degrees. The results for students and those with academic degrees are shown in Table 2. The differences between the men and women on the total score and on the three sub-factors of gestalt continuation, verbal-analytic reasoning and visuospatial ability are negligible. For the total score, the difference is 0.047d, equivalent to 0.7 IQ points.

Table 2 Male-female differences for those who are either students or have university degrees.

Test	Sex	N	Means	SD	Student's t
Raven total	Men	67	46.42	11.43	0.24 (p=.80)
	Women	48	45.92	9.85	
Gestalt continuation	Men	67	16.37	2.47	0.44 (p=.66)
	Women	48	16.17	2.55	
Verbal-analytical reasoning	Men	67	4.84	3.02	1.27 (p=.21)
	Women	48	4.15	2.64	
Visuospatial ability	Men	67	17.90	5.24	0.71 (p=.48)
	Women	48	18.54	4.20	

Table 3 Differences between Moroccan men and women who were not students and did not have university degrees.

Test	Sex	N	Means	SD	t
Raven total	Men	25	47.76	11.12	3.25 (p=.002)
	Women	62	37.50	17.60	
Gestalt continuation	Men	25	16.48	2.87	2.71 (p=.008)
	Women	62	13.85	6.13	
Verbal-analytical reasoning	Men	25	4.88	3.19	1.70 (p=.092)
	Women	62	3.71	2.77	
Visuospatial ability	Men	25	18.68	4.51	3.34 (p=.001)
	Women	62	14.37	7.26	

The results for those who were not students and did not have university degrees are shown in Table 3. The

differences between the men and women on the total score and on the three sub-factors are quite large, with men scoring higher than women. The differences are statistically significant at $p < 0.01$, except for verbal-analytical reasoning. For the total score, the difference between men and women is 0.71d, equivalent to 10.7 IQ points.

Discussion

The results contain three points of interest. First, to estimate the difference between men and women, the best procedure is to average the differences in the two samples. These are 0.7 IQ points in the first sample and 10.7 IQ points in the second sample. The average of these is 5.7 IQ points and is very close to the 5 IQ point adult male advantage reported by Lynn & Irwing (2004) in their meta-analysis of sex differences in adults on the Progressive Matrices. The men also obtained significantly higher means than the women on two of the three subtests.

Second, as regards variability, in the first sample consisting of students and those with university degrees, men have a greater standard deviation than women. For this sample the variance ratio (VR: the squared standard deviation of the men divided by the squared standard deviation of the women) is 1.35. However, in the second sample consisting of those who were not students and without university degrees, women have greater variance than men. For this sample the variance ratio is 0.40. This confirms other studies showing that the greater variance of men is not a universal phenomenon, as noted by Abdel-Khalek & Lynn (2009) and by Meisenberg (2009).

Third, with regard to the calculation of an average IQ for Morocco, the mean score of the sample (43.73) is at the 10th percentile of the 1992 British standardization sample given in Raven et al. (1996, p. 62) and is equivalent to an IQ of 81. This is slightly lower than the median IQ of 84 calculated from five samples of Moroccan immigrants in the Netherlands given by Lynn & Vanhanen (2006). The likely explanations for the slightly lower IQ of the present sample than of Moroccan immigrants in the Netherlands are that immigrants have slightly higher IQs than the indigenous population, and that they may have had an environmental

advantage arising from living and being educated in an economically developed society. No adjustment is made for a Flynn effect because there has been no increase in SPM scores in Britain among those aged 13+ years from 1979 to 2008 (Lynn, 2009).

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