# Sex Differences on the Progressive Matrices: Some Data from Syria

Omar Khaleefa*
*University of Khartoum*
Richard Lynn
*University of Ulster*

A recent standardization of the Progressive Matrices in Syria for the ages 7 through 18 is analysed for (1) sex differences on the test and shows there are none; (2) for sex differences in variability and also shows there are none; and (3) for the mean IQ compared with those in Britain and the United States; this shows that the average IQ is lower than in Britain and the United States.

**Key Words:** Sex differences; Progressive Matrices; Syria; Variability.

The Progressive Matrices is widely accepted as one of the best tests of reasoning ability, general intelligence and Spearman's *g* (Jensen, 1998). The test was constructed in Britain in the 1930s by John Raven (1939) and numerous studies have been published on it during the last seventy years. Three of the issues that have been discussed and researched are (1) are there any sex differences on the test? (2) is there are sex difference in variability? And (3) are there national differences in the mean IQs obtained on the test?

The first of these questions (are there any sex differences on the test?) has been discussed since the test was first published. Raven (1939) reported that in his initial study on children up to the age of 14 that there was no difference in the average scores obtained by boys and girls. This conclusion was affirmed for adults as well as children in a review of numerous studies by Court (1993) and later by Mackintosh (1996), who agued that as there is no difference in the mean scores obtained by males and females on the Progressive Matrices, and therefore there is no difference between males and females in reasoning or in Spearman's *g*. These conclusions have been disputed by Lynn and Irwing (2004) in a meta-analysis of sex differences on the Progressive Matrices that has shown that while there is no sex

* Address for correspondence: Dr. Omar Khaleefa, P.O. Box 12718, Khartoum, Sudan

difference in children, at the age of 16 years boys obtain a slightly higher mean, and this increases in size into adulthood where it reaches about 5 IQ points.

The second question is whether there are sex differences in variability, such that males have greater variability than females, i.e. are there more males with high and low intelligence, while females cluster around the mean? This contention has been asserted since the early years of the twentieth century, when it was proposed by Havelock Ellis (1904), Thorndike (1910) and Terman (1916). These early writers proposed this difference in variability to explain why men are so greatly over-represented among geniuses, when there is apparently no sex difference in general intelligence. The theory that there is greater variability among males entailing more males among those with very high intelligence (as well as more males with very low intelligence) seemed to provide a solution to this problem.

Thorndike (1910) put the theory as follows: "The trivial difference between the central tendency of men and that of women which is a common finding of psychological tests and school experience may seem at variance with the patent fact that in the great achievements of the world in science, art, invention, and management, women have been by far excelled by men. One who accepts the equality of typical representatives of the two sexes must assume the burden of explaining this great difference in the high ranges of achievement. The probably true explanation is to be sought in the greater variability within the male". Thorndike examined test data on variability and concluded that men are about one twentieth more variable than women. There has been a good deal of subsequent research on this theory and on the whole this has confirmed it (e.g. Hedges & Nowell, 1995; Deary, Irwing, Der, & Bates, 2007).

The third question that has been much discussed is whether there are national differences in the mean IQs obtained on the Progressive Matrices test. The numerous studies on this question have been summarized in Lynn (2006) and generally show that average scores are somewhat higher in the economically developed nations of Europe and North America than in the economically developing nations.

None of these questions have been addressed in Syria, and we now present some data that contribute to all three of them.

## Method and Results

The data to be analysed are given from an unpublished Ph.D thesis by Azizha Rahma (2004) from Damascus University, Syria. The thesis presents a standardization of the Standard Progressive Matrices on a sample of 7-18 years olds in Damascus city. It would not be possible to know this from the title of the thesis and it is therefore unlikely that anyone searching the literature would find it, quite apart from the problem of obtaining a copy of the thesis, and we therefore present the principal findings here. Table 1 gives the data from the study consisting of the numbers, and mean scores and standard deviations for boys and girls. For some unexplained reason, the scores for 14 year old girls were not given. In addition, we have calculated the differences between the means of the boys and girls expressed in standard deviation units (*d*, obtained by dividing the difference between the means by the "pooled standard deviation, i.e. the average of the two standard deviations; minus signs denote higher scores obtained by girls), the VRs (variance ratios, obtained by dividing the boys' variance by the girls' variance) in order to examine whether boys have greater variance than girls, and the British and American percentile equivalents (PCE) of the scores, in order to compare the scores with those in Britain and the United States.

**Table 1.**
*Sex differences on the Progressive Matrices in Syria*

| *Age* | *Sex* | *N* | *Mean* | *SD* | *d* | *VR* | *Br/US PCE* |
|---|---|---|---|---|---|---|---|
| 7 | M | 153 | 12.5 | 5.1 | -.06 | 1.00 | 12.5 |
| | F | 148 | 12.8 | 5.1 | | | 13.0 |
| 8 | M | 205 | 16.1 | 6.3 | .27 | 1.31 | 16.2 |
| | F | 171 | 14.5 | 5.5 | | | 11.5 |
| 9 | M | 123 | 18.3 | 7.4 | .08 | 1.03 | 13.3 |
| | F | 150 | 17.7 | 7.3 | | | 12.2 |
| 10 | M | 124 | 21.5 | 6.9 | .18 | .87 | 8.5 |
| | F | 140 | 20.2 | 7.4 | | | 8.0 |
| 11 | M | 171 | 25.4 | 8.2 | .47 | .98 | 4.0 |
| | F | 147 | 21.5 | 8.3 | | | 2.5 |
| 12 | M | 198 | 26.5 | 8.3 | .10 | 1.08 | 3.5 |
| | F | 150 | 25.6 | 8.0 | | | 3.0 |

| *Age* | *Sex* | *N* | *Mean* | *SD* | *d* | *VR* | *Br/US PCE* |
|---|---|---|---|---|---|---|---|
| 13 | M | 173 | 29.4 | 8.3 | .06 | 1.41 | 6.0 |
| | F | 180 | 28.9 | 7.0 | | | 5.0 |
| 14 | M | 130 | 32.5 | 7.3 | - | - | 6.5 |
| | F | 136 | - | - | | | - |
| 15 | M | 178 | 34.3 | 5.1 | .06 | .47 | 10.0 |
| | F | 182 | 33.9 | 7.4 | | | 10.0 |
| 16 | M | 148 | 34.5 | 6.4 | -.45 | .94 | 8.0 |
| | F | 155 | 37.4 | 6.6 | | | 10.5 |
| 17 | M | 62 | 37.6 | 6.4 | -.27 | 1.57 | 6.0 |
| | F | 113 | 39.2 | 5.1 | | | 11.0 |
| 18 | M | 33 | 36.3 | 8.4 | .23 | 2.25 | 6.3 |
| | F | 77 | 34.7 | 5.6 | | | 4.7 |
| Total | M | 1739 | 25.4 | 10.5 | -.06 | .91 | 8.2 |
| | F | 1750 | 26.0 | 11.0 | | | 8.3 |

**Discussion**

The results are interesting for the three issues discussed in the introduction. These are:

(1) are there any sex differences on the test? The results show that there are no significant sex differences. For the total samples shown in the bottom two rows of Table 1, the sex difference of .06*d* in favor of females is negligible. There are differences at some of the age groups, most strikingly the boys' advantage of .47*d* among 11 year olds, the girls' advantage of .45*d* among 16 year olds, but there is no consistent pattern and these have to be regarded as sampling errors. It is interesting to note that in this rather traditional Muslim society girls do just as well as boys on this test. It is sometimes argued that girls are handicapped in traditional societies and this impairs their intellectual development, and that as females become more emancipated and gain greater equality, their cognitive abilities improve. Clearly this theory receives no support from the results.

(2) is there a sex difference in variability? There is no consistent answer. In 7 of the age groups, boys have greater variability than girls, but in 4 of the age groups, and in the sample considered as a whole, girls have greater variability than boys.

(3) are there national differences in the mean IQs obtained

on the test? The results confirm the conclusion advanced in Lynn (2006) that average scores are somewhat lower in the economically developing nations that in the economically developed nations of Europe and North America. The last column of Table 1 shows that this is confirmed in these results from Syria. For the 7-15 year olds, this column gives the British 1979 percentile equivalents of the mean scores. The average of these (excluding 14 year olds) is 8.7, and this is equivalent to a British IQ of 80. There are no satisfactory British norms for 16-18 year olds, but American (1993) norms are a close approximation and are given in Raven, Raven and Court (2000). The American percentile equivalents of the scores of these age groups is 7.8, and this is equivalent to an American IQ of 79. This figure is close to the IQ of 83 for Syria given in Lynn (2006), based on a study of 241 7 year olds tested with the Colored Progressive Matrices reported by Guthke and Al-Zoubi (1987). In fact, the British IQ equivalent of the 7 year olds in the present data is 82.7, virtually identical to the 83 derived from the Guthke and Al-Zoubi data.

It has become well established that British and American IQs have been increasing since 1917 at about 3 IQ points a decade (Flynn, 1984, 2007). It can therefore be said that the British and American IQs were about 80 in the1930s, and hence approximately the same as the IQ in Syria at the beginning of the twenty-first century. These IQ increases over most of the twentieth century that have been found in Britain and the United States, and also in Japan and a number of other countries (Lynn and Hampson, 1986; Flynn, 1987) appear to be due mainly to improvements in nutrition and education (Lynn, 1990), and can be anticipated for the future with further economic development in Syria.

## References

Court, J.H.
(1983) Sex differences in performance on Raven's Progressive Matrices: A review. *Alberta Journal of Educational Research*, 29, 54-74.

Deary, I.J., Irwing, P., Der, G. & Bates, T.C.
(2007) Brother-sister differences in the *g* factor in intelligence: analysis of full, opposite-sex siblings from the NLSY 1970. *Intelligence*, 35, 451-456.

Ellis, H.
(1904) *Man and Woman: A Study of Human Secondary Sexual Characteristics*. London: Walter Scott.

Flynn, J.R.
(1984) The mean IQ of Americans: massive gains 1932 to 1978. *Psychological Bulletin*, 95, 29-51.

Flynn, J.R.
(1987) Massive IQ gains in 14 nations: what IQ tests really measure. *Psychological Bulletin*, 101, 171-191.

Flynn, J.R.
(2007) *What is Intelligence? Beyond the Flynn Effect*. Cambridge: Cambridge University Press,

Guthke, J. & Al-Zoubi, A.
(1987) Kulturspezifische differenenzen in den Coloured Progressibe Matrices (CPM) und in einer lerntestvariante der CPM. *Psychologie in Erziehung und Unterricht*, 34, 306-311.

Hedges, L. V. & Nowell, A.
(1995) Sex differences in mental test scores, variability, and numbers of high-scoring individuals. *Science*, 269, 41-45.

Jensen, A.R.
(1998) *The* g *Factor*. Westport, CT: Praeger.

Mackintosh, N.J.
(1996) Sex differences and IQ. *Journal of Biosocial Science*, 28, 559-572.

Lynn, R.
(1990) The role of nutrition in secular increases of intelligence. Personality *and Individual Differences*, 11, 273–285.

Lynn, R. and Irwing, P.
(2004) Sex differences on the Progressive Matrices: a meta-analysis. *Intelligence*, 32, 481-498.

Lynn, R.
(2006) *Race Differences in Intelligence: An Evolutionary Analysis*. Athens, GA: Washington Summit Books.

Lynn, R & Hampson, S.L.
(1986) The rise of national intelligence: evidence from Britain, Japan and the USA. *Personality and Individual Differences*,7,23-32.

Rahma, A.
(2004) The effectiveness of using time series and regression analysis in studying the intelligence of individuals from 7-18 years old: A field statistical study in Damascus city. Unpublished Ph.D thesis, Damascus University, Syria.

Raven, J.C.
(1939) The RECI series of perceptual tests: An experimental survey. *British Journal of Medical Psychology*, 18, 16-34.

Raven, J., Raven, J.C. & Court, J.H.
(2000) *Standard Progressive Matrices*. Oxford: Oxford Psychologists Press.

Terman, L.M.
(1916) *The Measurement of Intelligence*. New York: Houghton Mifflin.

Thorndike, E.L.
(1910) *Educational Psychology*. New York: Houghton Mifflin.