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NOTES AND SHORTER COMMUNICATIONS

Differences between males and females in mean IQ and university examination performance in Ireland

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Summary—The thesis that among adults males have a higher mean IQ than females and perform better at university is examined for Ireland. Evidence is presented from the Irish standardisation sample of the Differential Aptitude Test that among 17–18 yr olds males have a higher mean IQ by 2.60 IQ points. Performance at Irish universities is also examined for approximately 7000 graduates over the years 1991–93 and it was found that males obtained a significantly greater proportion of first class degrees. It is proposed that the sex difference in mean IQ explains the difference in examination performance. Copyright © 1996 Elsevier Science Ltd.

INTRODUCTION

It has been shown by Ankney (1992) and Rushton (1992, 1994) that males have on average larger brains than females, both absolutely and in relation to body size. It is also well established that brain size is positively associated with intelligence, the evidence for which is reviewed by Jensen and Sinha (1993) and Rushton (1994). It should follow that males have a higher average IQ than females. However, it is generally stated in textbooks that there is no average difference in intelligence between males and females (e.g. Halpern, 1992; Brody, 1992). It is apparent that there is a paradox here which requires resolution.

I have proposed that the resolution of the paradox is that males do have higher average IQs than females (Lynn, 1994). This proposition defines intelligence as a combination of reasoning, verbal comprehension and visuospatial abilities. Evidence is presented from 11 countries in support of this proposition showing that the magnitude of the male–female difference among adults is approximately 4 IQ points. This can be disaggregated to a male advantage of approximately 1 IQ point for verbal comprehension, 3 IQ points for reasoning and 8 IQ points for visuo-spatial abilities. Confirmation of this conclusion, showing a male advantage of approximately 7 IQ points in reasoning among 187,000 German 18 yr old applicants for medical school, has been reported by Stumpf and Jackson (1994).

The reasons why the sex difference in intelligence has not been noted by previous students of this question are twofold. Firstly, girls maturate faster than boys up to mid-adolescence. This reduces the intelligence difference and, in some studies, gives a female advantage in verbal comprehension and verbal reasoning abilities. It is only after the age of around 16 that the male advantage in these abilities appears clearly. Secondly, virtually all intelligence tests either exclude or give minimum weight to the visuo-spatial abilities in which the male advantage is greatest. The effect of these two factors is that the difference between males and females on most intelligence tests up to the age of 16 is very small, as asserted in the standard textbooks.

In addition to proposing that among adults, when visuo-spatial abilities are weighted equally with verbal comprehension and reasoning abilities, there is an average male advantage of approximately 4 IQ points, I have suggested that this advantage explains why males perform better than females at universities in Britain. On the basis of their performance, largely on examinations, British students are graded into Class 1, Class 2 Division 1, Class 2 Division 2, Class 3, and Pass. It has been shown in a number of studies that men obtain a higher proportion of first class degrees than women. In the late 1970s results for approximately 200,000 graduates showed that 9% of males obtained firsts as compared with 5% of females (Clarke, 1988). At Cambridge in 1987, 17.9% of males obtained firsts as compared with 8.5% of females (Goodhard, 1988); and at Oxford in the years 1984–88, 16.7% of males obtained first as compared with 9.1% of females (McCrum, 1994). Thus men in British universities obtain approaching twice as many first class degrees, proportionate to their numbers, as females. Numerous explanations have been advanced for this disparity, but consideration of these is postponed until later.

The object of this paper is to present for Ireland data on sex differences in intelligence among 18 yr olds and on university degree results in order to determine whether the conclusions reached previously concerning the sex difference in mean IQ and examination performance can be confirmed for a further country.

SEX DIFFERENCES IN INTELLIGENCE IN IRELAND

Normative data on sex differences in intelligence in Ireland are available in the Irish standardisation sample of the Differential Aptitude Test (DAT, 1986). This American test was standardised in Ireland in 1975–76 by the Educational Research Unit at St Patrick's College, Drumcondra. The standardisation sample consisted of approximately 10,000 adolescents at schools, obtained as a stratified cluster sample. The DAT consists of eight subtests, namely verbal reasoning, abstract reasoning, language usage, space relations, clerical speed and accuracy, mechanical reasoning, numerical ability and spelling. The test manual gives the means and standard deviations for the Leaving Certificate grade consisting largely of 17–18 yr olds. In accordance with our previous analysis intelligence is defined as the aggregate of reasoning, verbal comprehension

Table 1. Mean raw scores and standard deviations of Irish adolescents on tests of verbal and abstract reasoning, language usage and space relations; *d* differences, the differences expressed in standard deviations units; and IQ differences

	Males		Females			
	Mean	SD	Mean	SD	*D*	IQ Difference
Verbal reasoning	33.59	9.37	29.75	9.77	0.25	3.75
Abstract reasoning	34.96	8.78	32.78	8.80	0.25	3.75
Language usage	37.16	7.30	37.56	8.33	0.05	0.07
Space relations	31.85	11.31	28.64	10.37	0.27	4.01

and spatial abilities. These are represented in the DAT by the verbal and non-verbal reasoning, language and space relations tests. Table 1 gives the means and standard deviations obtained by males and females in the Irish standardisation sample for these four tests, the *d* (the difference expressed in standard deviation units) and the IQ difference based on an IQ metric in which the mean is 100 and the standard deviation is 15. It will be seen that there is a negligible difference between males and females on language usage (0.07 IQ points) in favour of females but appreciable differences favouring males on the two reasoning tests (3.75 IQ points) and on space relations (4.01 IQ points). This is the pattern of cognitive differences between the sexes virtually universally found in large scale normative data sets in a number of countries reviewed in Lynn (1994). The male superiority in most pronounced in spatial ability, a little less on verbal and non-verbal reasoning, and negligible or very small on verbal comprehension. If the results for reasoning, verbal and spatial abilities are averaged, we arrive at a male advantage of 2.60 IQ points.

With regard to the other four tests in the DAT, not used in this computation, males achieve higher scores on mechanical reasoning and numerical ability, while females have higher scores on clerical speed and accuracy. There is no difference on spelling. If the entire set of tests is used, the sex difference comes out slightly greater than the 2.60 IQ points, but this would not be the best way of using the test to quantify the male–female difference in overall IQ because of the arbitrary nature of the four additional tests.

SEX DIFFERENCES IN UNIVERSITY DEGREE RESULTS

In order to ascertain whether the male advantage in university degree results found in Britain is present in Ireland, letters were sent in early 1994 to all Irish universities asking for class lists of graduates with full Christian names for the years 1991, 1992 and 1993. The result of this enquiry was that the required data were obtained for University College Dublin for 1993, University College Cork for 1992, University College Galway for 1991, and Limerick University for 1991. This provided a total of 7301 graduates, of whom 3522 (48.2%) were female and 3779 (51.8%) were male. Irish universities use the same classification system as in Britain, except for the omission of the third class. The breakdown of males and females into the numbers and percentage classified into first, 2.1, 2.2 and pass degrees is shown in Table 2. Notice that a higher proportion of males obtain firsts and 2.1 degrees than females. Conversely, a higher proportion of females obtain 2.2 and pass degrees than males. The statistical significance of this distribution was tested by chi-squared and gave a value of 34.9, showing a statistically significant difference at a probability of less than one in 1000 ($P < 0.001$). The difference in the numbers of firsts was also tested by chi squared and gave a value of 18.1, also statistically significant at $P < 0.001$. The excess of males among those obtaining firsts is 30% and is rather less than the excess in Britain where as noted in the introduction, it is around 80%. Nevertheless, the main point is that in Ireland men obtain significantly more first class degrees than women, as they do in Britain.

In my previous paper I proposed that the sex differences in mean IQ in Britain can explain the difference in examination performance. The broad terms of this explanation are that it is known that intelligence is a significant determinant of university performance (Heim, 1968), and that a small difference in mean IQ between males and females produces appreciable differences in the proportions with high IQs. For instance, in populations with a mean IQ of 100, 2.28% have an IQ of 130 and above. In a population whose mean IQ is 2.6 IQ points lower (females, in the case of Ireland) 1.50% will have an IQ of 130 and above. Thus the 2.6 IQ point difference in mean IQs between males and females in Ireland will produce a 52% excess of males, as compared with females, with an IQ of 130 and above, and this is broadly of the same order of magnitude as the excess of males obtaining firsts.

Table 2. Comparison of the numbers of males and females attaining each grade

	Male		Female	
Grade	Number	%	Number	%
First	504	14.3	416	11.0
2:i	1219	34.6	1217	32.2
2:ii	931	26.4	1187	31.4
Pass	868	24.6	959	25.4

ALTERNATIVE EXPLANATIONS

The plausibility of a theory is to some degree determined by the plausibility of alternative theories. In the case of the greater proportion of males achieving first class degrees, the major alternative is that males are more strongly motivated for work effort than females. This follows from the general formula IQ × Motivation = Achievement, first advanced by Galton (1869) and frequently reappearing, e.g. in Jensen's (1980) Motivation × Aptitude × Opportunity = Achievement. The thesis that the better average university performance of men is due to stronger work motivation is rendered implausible by research evidence that females are more strongly motivated than males. Four studies in the United Stated have found that women students have greater work commitment than men (Farmer, 1983; Nevill & Perrotta, 1985; Nevill & Super, 1988; Luzzo, 1994). The same difference was found by Watson and Stead (1990) in South Africa. Furthermore, it has generally been found that female students have a stronger work ethic than males. In a 43 nation study involving the administration of the Spence–Helmreich work ethic questionnaire to several hundred university students in each country, it was found that females obtained higher mean scores in 35 of the countries, of which in 13 the difference was statistically significant (Lynn, 1991). These results taken as a whole indicate that work commitment and the work ethic are somewhat stronger in female students than in males, and appear to rule out an explanation of the better examination performance of men in terms of greater motivation. This conclusion is reinforced by American studies of the prediction of college grades from Scholastic Aptitude Test results taken before college entrance. These studies show that SAT results 'over predict' the grades obtained by males and 'under predict' the grades achieved by females (Linn, 1990; Young, 1991, 1994). What this means is that in relation to their IQs, assessed by the SAT, men tend to do poorly and women tend to do well in college grades. The most probable explanation for this is that women work harder because of their greater work commitment and work ethic, so that for any given IQ they obtain better grades. For these reasons it is improbable that the greater proportion of firsts obtained by men can be explained in terms of stronger motivation.

Another theory sometimes proposed to explain the greater proportions of men obtaining firsts is the institutional culture hypothesis advanced by Spurling (1990) and McCrum (1994). This holds that universities are male dominated institutions that favour male cognitive style, particularly the more assertive and aggressive approach to handling examination questions, as compared with a more deferential approach typically adopted by females. This thesis is difficult to test and there is no positive evidence to support it. An obvious problem is that males perform best in the physical sciences where assertive answers are probably least likely to impress examiners favourably.

A further hypothesis sometimes advanced is that predominantly male examiners favour male students. This can be ruled out because the sex difference is unaffected by marking systems in which the sex of the examinee is unknown to the examiners (McCrum, 1991, 1994). Yet other hypotheses can be advanced, but it is believed that none of them have empirical support and that the better average performance of males at universities can be attributed to their higher mean IQ.

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