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Intelligence in Hong Kong Measured for Spearman's *g* and the Visuospatial and Verbal Primaries

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Values for Spearman's *g* for Hong Kong are calculated from data derived from the administration of Raven's Standard Progressive Matrices to several thousand children. The results indicate that the mean IQ in Hong Kong for the mid 1980s is approximately 108 in relation to a Caucasian mean of 100 for the United States and the United Kingdom. Values for the spatial and perceptual speed primaries are also substantially higher in Hong Kong. On the other hand Hong Kong children are relatively weak on the word fluency primary. The pattern of abilities of Chinese Hong Kong children is broadly similar to that obtained on other Mongoloid populations.

A number of studies have shown that certain Mongoloid or Oriental populations have a different profile of intelligence from that of Caucasian populations in the United States and the United Kingdom. The principal distinguishing features of the two populations are that Mongoloids are characterized by somewhat higher general intelligence or Spearman's *g* as assessed by tests of abstract reasoning or from the factor scores derived from the first principal component of the Wechsler tests. Mongoloids also tend to have high visuospatial abilities, as represented by tests of spatial intelligence and perceptual speed. On the other hand the verbal abilities appear to be relatively weak among Mongoloid populations. These generalizations are largely derived from studies of the intelligence of the Japanese and of ethnic Orientals in the United States. The evidence for them is reviewed in detail in Lynn (1987).

The consistency with which this profile of abilities has been found among Mongoloid peoples in such apparently different cultures as Japan and the United States raises the question of whether this profile may be a universal feature of the intelligence of these peoples. In order to examine this possibility we consider the

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intelligence profile of Chinese children in Hong Kong. A preliminary report of the scores of 13-year-old Hong Kong Chinese children tested in the mid 1970s on Raven's Progressive Matrices established that they scored somewhat higher than the British standardization sample of 1938 (Chan, 1976). In this paper we present more extensive data on this question.

SPEARMAN'S *g* IN HONG KONG

We consider first some data for the value of Spearman's *g* among Hong Kong children. The essence of Spearman's *g* is abstract reasoning ability, and one of the most well-known widely used and effective tests of abstract reasoning ability is Raven's Standard Progressive Matrices (Jensen, 1980). Two major studies involving the standardization of the Progressive Matrices on Hong Kong schoolchildren were carried out in 1968 and 1982. Both were based on large and representative samples of schoolchildren. The numbers tested were 13,822 in 1968 and 4,500 in 1982. The mean raw scores for each age group from 6.5 to 13.5 years (1968) and from 6.5 to 15.5 years (1982) are shown in Table 1. Also shown in Table 1 are the equivalent British mean IQs of these raw scores. These

TABLE 1
Raw Scores and IQs of Hong Kong Children Based on the Standard Progressive Matrices

	1968		1982	
Age	Score	IQ	Score	IQ
6.5	15	95.5	19	104.5
7	18	103.0	22	109.0
7.5	21	97.5	26	105.5
8	25	100.0	29	103.5
8.5	30	98.5	33	104.0
9	32	100.0	36	106.5
9.5	34	98.5	40	109.0
10	36	96.5	43	111.0
10.5	39	101.5	44	113.0
11	41	103.0	44	109.0
11.5	42	102.5	47	113.0
12	43	105.5	48	114.5
12.5	45	108.0	49	118.0
13	47	106.0	50	112.0
13.5	47	104.0	51	115.0
14	—		51	113.0
14.5	—		51	109.0
15	—		52	113.0
15.5	—		53	115.5
Mean		101.3		110.4

mean IQs are derived from the 1979 restandardization of the test in Britain for which norm tables based on 4,660 children are given in Raven, Court, and Raven (1983). The mean IQs in Table 1 were derived by transforming the mean raw scores into percentiles and the percentiles into IQs based on a standard deviation of 15.

It will be seen that the Hong Kong children obtained British mean IQs of 101.3 in 1968 and 110.4 in 1982. These figures require adjustment because of the increase over time that has taken place in the intelligence of British children. Over the period from the first standardization of the Progressive Matrices in Britain in 1938 to the restandardization in 1979, the mean IQ of British children rose by 1.9 IQ points per decade (Lynn & Hampson, 1986). Hence the British mean IQ for 1968, considered in terms of the 1979 standardization, would have been lower than 100. The mean for 1968 would have been 98.9 ($100 - 0.19 \times 11$). Making this adjustment, the Hong Kong superiority for 1968 was approximately 3.4 IQ points ($101.3 - 98.9$), and the Hong Kong mean can be estimated at 103.4.

Making a similar adjustment for the 1982 Hong Kong data entails the subtraction of 0.6 IQ points from the Hong Kong mean to allow for the 3 years of growth of the British mean from 1979–82. This reduces the Hong Kong mean for 1982 to 109.8 in relation to a British mean of 100 for that year.

After making these adjustments we conclude that the mean IQ of Hong Kong children, in relation to British means of 100, was 103.4 in 1968 and 109.8 for 1982. Differences of this magnitude on such large numbers of subjects are of course highly statistically significant.

The difference between the Hong Kong mean IQs for 1968 and 1982 is 6.4 IQ points. This represents a rise in the mean IQ of Hong Kong children over the period 1968–82 relative to that in Britain. The mean IQ of British children has itself increased by 2.7 IQ points over this period. Hence the absolute rise in the mean IQ of Hong Kong children over the period is given by the addition of these two figures ($6.4 + 2.7$) and amounts to 9.1 IQ points. Secular increases in population means for intelligence and in particular for the Progressive Matrices have been reported for a number of developed countries (Flynn, 1987; Lynn & Hampson, 1986). The increase in Hong Kong is a further case. Although the magnitude of the Hong Kong rise is considerable, there is nothing particularly surprising about the secular increase.

Two footnotes to these results may be of interest. First, in our previous studies of intelligence in Japan, mean Japanese IQs for various abilities have been calculated in relation to means of 100 for American Caucasians. Here the Hong Kong mean IQs are calculated in relation to means of 100 for British Caucasians. It has been shown that the mean IQs of American and British Caucasians for abstract reasoning and also for spatial ability are identical (Lynn, Hampson, & Iwawaki, 1987). Hence the Japanese, Hong Kong, British, and American means are all based on a single scale.

TABLE 2
Per Capita National Incomes in U.S. Dollars in Hong Kong, the U.K., and the U.S.A. for Selected Years (Source: United Nations Statistical Yearbooks)

Country	1960	1963	1970	1975
Hong Kong	333	409	735	1740
UK	1277	1584	2606	3697
USA	2560	3142	4270	6324

The second point concerns the standard of living in Hong Kong. The Hong Kong standard of living has been considerably lower than that in the United Kingdom. Per capita income figures for the two countries for the representative years 1960, 1963, 1970, and 1975 are shown in Table 2. It will be seen that the per capita income in Hong Kong has been less than a third of that in the United Kingdom for the years 1960–70 and was less than half in 1975. Also shown in Table 2 are per capita incomes for the United States.

The low per capita income in Hong Kong in association with the high mean IQ is an unusual conjunction because it has almost invariably been found within countries that the mean IQs and mean incomes of population subgroups are positively correlated. This generalization holds for socioeconomic classes, ethnic groups, and geographically dispersed populations (e.g., the population of London has a higher mean IQ and higher mean income than the populations of Scotland, Wales, and Ireland; Lynn, 1979). It has been widely held that the explanation for this association is that low incomes act as an environmental depressant on intelligence. This explanation is a matter of dispute because it implies that the causal effect is entirely from low incomes to low intelligence and discounts the alternative possibility of a causal effect of low intelligence to low incomes.

Nevertheless, if it is the case that low incomes have some depressant environmental influence on intelligence, then the mean Hong Kong IQ must be to some degree depressed by the low per capita incomes in Hong Kong. It follows that the figures for the Hong Kong mean IQ must be underestimates of the figures that would be obtained if the populations of Hong Kong and the United Kingdom were equated for incomes.

On the whole the figures shown in Table 2 seem to throw some doubt on the "sociologists' theory" that per capita incomes are a significant determinant of intelligence. Per capita incomes in the U.S. are approaching double those in the U.K., yet the mean IQs of the Caucasian populations of the two countries are identical. Hong Kong per capita income is less than half that of the U.K. and about a quarter of that in the U.S., yet the Hong Kong mean IQ is more than half a standard deviation higher than that in the U.K. and the U.S. Jensen has dubbed the thesis that incomes exert powerful effects on IQ "the sociologists' fallacy" (Jensen, 1973). The data set out in Table 2 suggest he is right.

VISUOSPATIAL AND VERBAL ABILITIES IN HONG KONG

In this section we present the results of a study designed to ascertain values for some of the major visuospatial and verbal abilities in Hong Kong children. The general rationale of this study was to obtain samples of 10-year-old children in Hong Kong and the U.K. and administer the Progressive Matrices to ensure that the samples were representative of the child population for Spearman's *g* as assessed by the Progressive Matrices. Additional tests were given of spatial ability and perceptual speed, the two major visuospatial primaries, and of word fluency, a major verbal primary. These primaries were originally identified by Thurstone (1938) as 3 of his 7 primary abilities and appear in Cattell's (1971) list of the 15 major primaries. The subjects and tests used in this study are now described.

Subjects

The subjects were 10-year-old children with a mean age of approximately 10.5 years in Hong Kong and the United Kingdom. The children were drawn from socially representative state primary schools in both countries. All children in the grade for 10-year-olds were tested who were present on the day the tests were administered. All the British children were Caucasian. In Hong Kong, children who do poorly at school are frequently required to repeat the year in the same grade. The effect is that there were a number of older children in the grade for 10-year-olds. These children were eliminated as unrepresentative. This practice is not followed in the U.K. The numbers on whom the test results were based for Hong Kong was 120 boys and 77 girls and for the U.K. 75 boys and 95 girls.

The occupation of the children's fathers was obtained and coded on a 3-point scale. Both samples were approximately representative of the populations of their respective countries for fathers' socioeconomic status and obtained almost identical means.

The final step taken to ensure that the samples were representative was to administer the Standard Progressive Matrices to both samples. This test has been standardized in both countries, as described above, and it is therefore possible to determine whether the samples were representative of their respective child populations in terms of their means on the Progressive Matrices. The tests were administered in both countries in the early summer of 1987.

Tests

In addition to the Progressive Matrices the children took the following tests:

1. The Space Relations scale from the Primary Mental Abilities (PMA) Test. This is a test of the spatial primary ability of Thurstone and Cattell involving the visual analysis of spatial relationships.
2. The Perceptual Speed scale from the Primary Mental Abilities Test. This is a test of the perceptual speed primary of Thurstone and Cattell. The test involves making fast and accurate visual comparisons.

3. Word Fluency. This ability consists of the production of items belonging to verbal categories such as flowers, objects that are round and red, words beginning with one letter and ending with another, and so forth. It is generally considered that the test measures long-term verbal memory and the ability to retrieve material in the stipulated category from the memory store, as proposed by Carroll (1976). The test of this ability used in the present study required the subjects to write down the names of as many animals as they could think of in the space of 2 minutes. Hong Kong children wrote down the animals in Chinese and U.K. children in English. This test was used to provide a measure of one of the verbal abilities that overcome the translation problems that are inherent in most verbal tests, such as vocabulary and verbal comprehension, which need to be translated from one language to another and where it is hard to capture exactly equivalent levels of difficulty in the two languages and cultures. It was considered that the fluency task of writing down the names of animals would be of equivalent difficulty for Hong Kong and British children.

Results

There are significant sex differences on several of the tests, and for this reason it is important to compare the sexes separately. The means, standard deviations, and significance levels for the tests are shown for British and Hong Kong boys and girls in Table 3.

TABLE 3
Means for British and Hong Kong Boys and Girls on 4 Tests

Test	United Kingdom		Hong Kong			HK–UK Difference in UK *SD* Units
	M	*SD*	*M*	*SD*	*t*	
Boys						
Progressive Matrices[a]	51.72	28.84	71.48	20.00	5.20***	+0.69
Space Relations	109.74	14.78	124.85	17.54	6.46***	+1.02
Perceptual Speed	103.38	11.13	112.60	11.30	5.59***	+0.83
Fluency	15.49	4.53	15.07	4.28	0.64	−0.09
Girls						
Progressive Matrices[a]	51.72	28.62	68.44	21.34	4.39***	+0.58
Space Relations	106.18	15.12	119.56	14.79	5.84***	+0.88
Perceptual Speed	110.81	10.57	109.01	10.12	1.14	−0.17
Fluency	17.52	4.97	13.14	3.67	6.64***	−0.88

[a]M figures are percentiles.
***Statistical significance at $p < .001$.

The first row gives the results for the Progressive Matrices. Mean raw scores were transformed to percentiles given in the British norm tables derived from the 1979 British standardization of the test (Raven, et al., 1983). The British boys and girls obtained identical means equivalent to percentiles of 51.72. This is itself equivalent to a mean IQ of 100.5. Thus our British sample was closely representative for general intelligence of all British children to within 0.5 of an IQ point.

As noted above, there has been a small secular increase in the means of British children on this test, and an adjustment can be made for this to allow for the increase between the date of the British standardization (1979) and the present study (1987). The mean scores of British children on this test have shown a secular increase over the period 1938–79 of 1.9 IQ points per decade (Lynn & Hampson, 1986). If this secular increase is projected forward, the British mean for 1987 would have risen to 101.5. Thus our sample's mean of 100.5 becomes 1 IQ point below the mean for all British children as of the year 1987. After making this adjustment, our sample of British children remains representative of all British children for general intelligence for the year 1987 to within 1 IQ point.

The Hong Kong boys and girls both obtained significantly higher means on the Progressive Matrices than the British. The Hong Kong boys' mean percentile was 71.48 and is equivalent to an IQ of 108.5. The Hong Kong girls' mean percentile was 68.44 and is equivalent to an IQ of 107.4. For both boys and girls the Hong Kong means are significantly higher than the British. The higher mean obtained by Hong Kong boys as compared with Hong Kong girls on this test is not statistically significant ($t = 1.01$).

The Hong Kong mean for boys and girls combined is 107.95. This is marginally lower than the mean of 109.8 calculated above for Hong Kong children for 1982. In addition, the Hong Kong means will have risen over the 5-year period 1982–87. It is not certain what adjustment should be made for this increase. Nevertheless, it is proposed that our Hong Kong sample is broadly representative of Hong Kong children for the Progressive Matrices in so far as it has a mean about one half of a standard deviation higher than that in Britain, although even at this high figure it may be marginally on the low side for Hong Kong children for 1987.

*1. **Space Relations.*** Raw scores were transformed to IQs from the norm tables. Hong Kong boys obtained a significantly higher mean IQ than British boys (124.85 against 109.74). It will be noted that the Hong Kong boys' lead of 15.11 IQ points on this test is substantially greater than the lead of 8.5 IQ points on the Progressive Matrices.

Hong Kong girls also obtained significantly higher means than British girls (119.56 as against 106.18). The lead of the Hong Kong girls over the British girls amounts to 13.38 IQ points, closely similar to the lead of 15.11 IQ points of Hong Kong boys over British boys.

Both Hong Kong and British boys tended to obtain higher means than girls on this test. In the Hong Kong sample this difference amounts to 5.29 IQ points and is statistically significant ($t = 2.09$, $p < .05$). In the British sample the difference amounts to a 3.56 advantage in favor of boys, but this difference is not statistically significant ($t = 1.54$). The tendency of boys to obtain higher means than girls on spatial ability is well known. The sex difference is greater after puberty and is quite small among younger children (Linn & Petersen, 1986). Our present finding of a male superiority of 3.56 IQ points, among British 10-year-olds, not statistically significant on this number of subjects, is fairly typical of studies in the United States and Britain.

It will be noted that the mean IQs for the British children are well above the national average of 100 for Caucasian children in Britain and the United States. The reason for this is that the test was standardized in 1962 and, as noted above, mean IQs have been rising in Britain, the United States, and many other economically developed nations (Flynn, 1987; Lynn & Hampson 1986). The rate of secular increase appears to differ to some degree from one primary ability to another, but in general it amounts to around 3 IQ points per decade. Hence over the 25-year period separating the standardization of the test and its administration in the present study (1962–87), the mean IQ of British children should have risen from around 100 to around 107.5. The mean IQ of the boys and girls combined in the present study is 107.86, and this is approximately the figure which would be expected for a representative sample of British children taking the test in 1987.

2. Perceptual Speed. The raw scores were transformed to IQs from the norm tables. Hong Kong boys obtained a significantly higher mean than British boys ($t = 5.59, p < .001$). However, there was no significant difference between girls from the two populations.

It is generally found in Western populations that girls obtain higher means than boys on perceptual speed. This result was found on the coding subtest of the WISC-R in the American standardization sample (Jensen & Reynolds, 1983). This sex difference is present in the British sample where girls score significantly higher than boys ($t = 4.42, p < .001$). However, this sex difference is curiously reversed in Hong Kong, with boys scoring higher than girls ($t = 2.26, p < .05$).

As with the PMA space relations test, the British means on the perceptual speed test are somewhat higher than 100. As explained above, this should be attributed to the secular rise in intelligence that has taken place since the test was standardized in 1962.

3. Fluency. The results of the fluency test are in the reverse direction from the first three tests. British boys and girls obtain higher means than Hong Kong boys and girls, although only the difference between the girls is statistically significant.

It is common in Western populations for females to obtain higher means than males in tests of fluency. This difference is present among the British sample, where the girls' mean is significantly higher than the boys' ($t = 2.78, p < .01$). Among the Hong Kong children this sex difference is reversed, with boys obtaining a significantly higher mean than girls ($t = 3.25, p < .001$).

IQ PROFILES IN HONG KONG, BRITAIN, AND JAPAN

In this section a comparison is made of the results obtained for Hong Kong and British children in relation to those previously obtained for children in Japan. The methodology employed is as follows. The data for the British tests were converted to IQs with means of 100 and standard deviations of 15. The Hong Kong data were then calculated as IQ deviations from the British standard. This was the method previously used for the calculation of Japanese IQs and permits comparisons between the three countries in terms of the familiar IQ scale based on British means of 100. The resulting means for Hong Kong and Japan are shown in Table 4. The Japanese means in Table 4 are those for 10-year-olds or, in the case of word fluency, for 7-year-olds as the nearest age group for whom data are available. The derivation of these means is given in Lynn (1987). Inspection of the table will show that the profile of abilities in Hong Kong is broadly similar to that in Japan.

DISCUSSION

The principal objective of the present study was to determine whether the pattern or profile of cognitive abilities previously found for Japanese children was also present among children in Hong Kong. The results shown in Table 4 indicate that this is broadly the case and that Hong Kong children resemble Japanese children in having high Spearman's *g*, high spatial ability, high perceptual speed, and low word fluency.

TABLE 4
IQ Means for Hong Kong and Japanese Children Calculated in Relation to British Means of 100

Samples	Sex	Spearman's *g*	Spatial	Perceptual Speed	Fluency
British	both	100.0	100.0	100.0	100.0
British	boys	100.0	101.8	94.8	96.8
British	girls	100.0	98.2	105.1	105.2
Hong Kong	both	109.5	114.2	105.1	92.4
Hong Kong	boys	110.3	116.9	107.6	95.4
Hong Kong	girls	108.7	111.6	102.6	89.4
Japanese	both	104.1	109.6	114.1	96.4

While the broad pattern of abilities among Hong Kong and Japanese children is quite similar, there are both similarities and differences of detail. Hong Kong children obtain higher means for Spearman's *g* than Japanese children. However it should be borne in mind that the Japanese values for *g* were calculated from the factor scores on the first principal component of the WISC-R. This has given a slightly verbal bias to the score and hence reduced the mean because of the relatively low verbal abilities of the Japanese. When Japanese values for *g* are calculated from the Columbia Mental Maturity Scale, an abstract reasoning test closely resembling the Progressive Matrices, the Japanese mean is 107.5 (Lynn, 1987; Misawa, Motegi, Fujita, & Hattori, 1984). This value is quite close to the Hong Kong mean of 109.5 derived from the Progressive Matrices.

Both Hong Kong and Japanese children obtain higher means on spatial ability than they do on Spearman's *g*. This result confirms our previous conclusion that high spatial ability is a characteristic widely found in Mongoloid and Oriental populations.

The perceptual speed results are less clear. The Hong Kong mean of 105.1 is a little lower than the mean for Spearman's *g*, while the Japanese mean is higher. It should be noted that different tests were employed for the derivation of the figures for perceptual speed for Hong Kong and Japan. While the Hong Kong figure was derived from the PMA perceptual speed test, the Japanese figure was derived from the coding test in the WISC-R. Although apparently similar, these tests are not identical, and small differences between tests can produce discordant results because they call on different primary abilities.

The word fluency test shows Hong Kong and Japanese children at 92.4 and 96.4, respectively, a score significantly below British Caucasian children.

In addition to the similarities in the profile of cognitive abilities between the children of Hong Kong and Japan, it is interesting to note the recent report that some features of this cognitive profile are also present among ethnic Japanese (Americans of Japanese origin) in Hawaii. As compared with matched Caucasians, ethnic Japanese in Hawaii have strong spatial ability, strong perceptual speed, and weak verbal ability (Nagoshi & Johnson, 1987).

In considering the reasons for the similarities of the cognitive profile among Japanese, Hong Kong Chinese, and American ethnic Japanese, it may be that there are common cognitive socialization patterns in the families of these three populations. Alternatively, it may be thought that this is improbable and that it is more likely that the patterns are to some degree genetically programmed and hence reappear in diverse cultural environments.

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