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Fluid intelligence but not vocabulary has increased in Britain, 1979–2008

Richard Lynn

University of Ulster, Coleraine, Northern Ireland, BT52 1SA, UK

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ABSTRACT

New standardizations of the Coloured and Standard Progressive Matrices in Britain in 2007 and 2008 show that on the Coloured Progressive Matrices the intelligence of 4 to 11 year olds increased over the years 1982–2007 by 8 IQ points, representing a gain of 3.2 IQ points a decade, and on the Standard Progressive Matrices the intelligence of 7 to 15 year olds increased over the years 1979–2008 by 6.2 IQ points, representing a gain of 1.85 IQ points a decade. IQ gains were greater among those at the low ability level. New standardizations of the Crichton Vocabulary Scale and the Mill Hill Vocabulary Scale in Britain in 2007 and 2008 show a marginal decline on the Crichton Vocabulary Scale among 4 to 11 year olds, and a marginal increase on the Mill Hill Vocabulary Scale among 7 to 15 year olds, suggesting there has been little change in vocabulary over the same time periods. These results are more consistent with the improvements in nutrition theory than with the improvements in education and greater cognitive stimulation theories of the secular gains in intelligence.

1. Introduction

It has become well established that intelligence has increased in a number of countries during the last 80 years or so. An early study by Tuddenham (1948) reported that the IQ of American conscripts increased by 4.4 IQ points a decade over the years 1917–1943. Subsequent studies confirmed that IQ increases have occurred in the United States, Scotland, England, Japan and several countries in continental Europe (Cattell, 1951; Flynn, 1984, 1987, 2007; Lynn, 1982; Lynn & Hampson, 1986; Lynn, Hampson, & Mullineaux, 1987; Scottish Council for Research in Education, 1949). Most of these IQ increases have been reported in the economically developed nations but IQ increases have also been found in a few economically developing countries including Brazil (Colom, Flores-Mendoza, & Abad, 2007), Dominica (Meisenberg, Lawless, Lambert, & Newton, 2006), Kenya (Daley, Whaley, Sigman, Espinosa, & Neuman, 2003), and Sudan (Khaleefa & Lynn, 2009).

Discussion of these IQ increases has focussed on four principal points. First, have the IQ increases ceased or even gone into reverse in the economically developed nations in the closing decades of the twentieth century and first decade of the twenty-first century? Four recent studies have reported this. These are, first, a study of the intelligence of conscripts in Norway over 50 years has reported that there were the usual gains up to the mid-1990s, but from then until 2002 there has been no increase (Sundet, Barlaug, & Torjussen, 2004). Second, in Australia the IQ of 6–11 year olds measured by the Colored Progressive Matrices has shown no increase from 1975–2003 (Cotton et al., 2005). Third, in Denmark the IQ of young men aged 18–19 conscripted for military service increased between 1959 and 1989 by 3 IQ points per decade, the rate of increase fell to 1.6 IQ points from 1989–1998, peaked in 1998, and declined by 1.6 IQ points from 1988 to 2004 (Teasdale & Owen, 2008). Fourth, in Britain a decline in Piagetian IQ among 11–12 year olds of 12 IQ points over the years 1975–2003, representing a decline of 4.3 IQ points a decade, has been reported by Shayer (2007).

Second: have the increases been greater for fluid IQ (non-verbal & reasoning abilities) than for crystallized intelligence (verbal and educational abilities) and if so, why? Wheeler (1942) appears to be the first to find greater gains in non-verbal than in verbal abilities in a report of the increase in IQs in East Tennessee children aged 6–16 over the years 1930–40. The average gain was considerably greater for non-verbal ability (6.0 IQ points per decade) than for verbal ability (2.6 IQ points per decade).

E-mail address: Lynnr540@aol.com.

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This result has been confirmed in many other studies including Flynn (1987, 2007), Lynn and Hampson (1986), and Lynn (1990b).

Third: have the size of increases been the same at all ability levels or greater among lower IQ groups? This question was addressed by Cattell (1951) in his study of the IQ increase in Britain (1936–49) in which he reported that the gain was only present in the lower half of the distribution. In another early study, Elley (1969) reported that IQ gains in New Zealand (1936–68) were smallest in the children of professional parents and greatest in the children of unskilled parents. Other studies finding greater gains among those at lower levels of ability have been reported for Denmark (Teasdale & Owen, 1987, 1989, 2008), Norway (Sundet et al., 2004) and Spain (Colom, Lluis-Font, & Andres-Pueyo, 2005). However, gains have been equally great among those at higher levels of ability in France, the Netherlands and the United States (Flynn, 2007, p.104), while Spitz (1989) has reported that gains in the United States have been greatest at the average IQ level.

Fourth: what factor or factors have been responsible for the IQ increases? Nine principal theories have been advanced. These are (1) Improvement in education has been the most favored theory proposed by Tuddenham (1948), Flynn (1984, 2007), Teasdale and Owen (1994), Flieller (1996, 1999), Greenfield (1998), Jensen (1998), Weede & Kampf (2002), Garlick (2002), Blair, Gamson, Thorne, and Baker (2005), and Meisenberg, Lawless, Lambert, and Newton (2006). (2) Increased test sophistication: Tuddenham (1948), Brand (1987), and Jensen (1998). (3) The greater cognitive stimulation arising from the greater complexity of more recent environments provided by e.g. television, media and computer games: Elley (1969), Jensen (1998), Schooler (1998), Williams (1998), and Sundet et al. (2004). (4) Improvements in child rearing: Elley (1969) and Flieller (1996). (5) More confident test taking attitudes: Brand (1987) and Brand, Freshwater, and Dockrell (1989). (6) The "individual multiplier" and the "social multiplier" (Dickens & Flynn, 2001; Flynn, 2007). (7) Improvements in nutrition: Lynn (1990a, 1993, 1998), Jensen (1998), Colom et al. (2005), and Arija et al. (2006). (8) Heterosis (hybrid vigor) arising from increased out breeding: Jensen (1998) and Mingroni (2004, 2007). (9) Smaller family size (Sundet, Borren, & Tambs, 2008).

In this paper new data are reported bearing on all the issues summarized above. These consist of the secular trend of IQ in Britain for the years 1979–2008 measured by the Coloured Progressive Matrices and the Crichton Vocabulary Scale, and for 1979–2008 measured by the Standard Progressive Matrices and the Mill Hill Vocabulary Scale.

2. Coloured Progressive Matrices

The Coloured Progressive Matrices (CPM) was constructed in the 1940s as a suitable test for children aged 5 to 11 years and as an easier version of the Standard Progressive Matrices. The initial standardization of the CPM was carried out in 1949 on 608 children in the small town of Dumfries in Scotland. The test was restandardized in 1982 on a sample of 608 children, again in Dumfries (Raven, Court, & Raven, 1995, p. 56). The 1982 sample showed an increase of 2.7 IQ points a decade over the 33 years 1949–1982 (Lynn & Hampson, 1986).

The test was restandardized again in 2007 on 608 children, but on this occasion the standardization sample included 4 year olds, and the sample was drawn from the whole of the United Kingdom and matched to the population for geographical location and ethnic identity, given in the 2001 census (Rust, 2008a). As in the manuals of previous standardizations, the results of the 2007 restandardization are not given as means and standard deviations but as equivalents of raw scores for each age group. The raw scores at the 50th percentile is an approximate measure of the means for each age group and allow comparison with the previous 1982 standardization sample. This comparison is shown in Table 1. Row 1 gives the ages ranging from 4.5 to 11.5 years. Row 2 gives the median scores of the 1982 sample (including the mean of 4 year olds given by Raven, Court, & Raven, 1977, p.32). Row 3 gives the median scores of the 2008 sample. Row 4 gives the percentiles (PC) of the 2007 sample on the 1982 norms. Thus, the 5.5 year olds in 2007 scored at the 75th percentile of the 1982 standardization sample, etc. It will be seen that at all ages the 2007 sample scored higher than the 1982 standardization sample. The mean of the percentiles of the 2007 sample is 70 and is equivalent to an IQ of 108. Thus the 2007 sample gained 8 IQ points on the 1982 sample, representing a gain of 3.2 IQ points a decade over the 25 years.

To examine the magnitude of the gains at different points of the distribution of intelligence, raw score gains have been calculated for each of the percentiles 5, 25, 50, 75 and 95 (1Qs 75, 90, 100, 110, 125) for which data are given for 1982 and 2007. The raw score gains of the 13 age groups have been averaged and the results are given in Table 2. We see here that the IQ gains have been greatest at the 5th percentile where the raw score gain was 3.5, and the gains decline steadily to less than half (1.6) at the 95th percentile.

Table 2
Raw score gains 1982–2007 on the Coloured Progressive Matrices at percentiles 5 through 95

Percentile	5	25	50	75	95
Gain	3.5	3.2	3.1	2.5	1.6

3. Standard Progressive Matrices

The Standard Progressive Matrices (SPM) was constructed in the 1930s and first standardized in 1938 on children aged 8 to 14 years (Raven, 1939, 1941). The test was

Table 1
Median scores of the 1982 and 2007 standardization samples on the Coloured Progressive Matrices

Age		4.6	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5
1982	Median	12	15	16	17	18	20	22	24	26	28	30	31	31	32
2008	Median	15	18	19	21	24	26	27	28	29	29	30	31	32	33
2008	PC	70	75	75	80	87	83	81	78	75	56	50	50	63	62