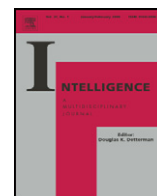


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Who discovered the Flynn Effect? A review of early studies of the secular increase of intelligence

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ABSTRACT

Flynn has been credited with having discovered the increase in IQs that have been reported in a number of countries during most of the twentieth century and that have come to be known as “the Flynn effect”. This paper documents and discusses a number of reports of increases in IQs that were published from 1936 onwards before the phenomenon was rediscovered by Flynn (1984, 1987). These early reports showed that the Flynn effect is fully present in pre-school children, does not increase during the school age years, and is greater for non-verbal abilities than for verbal abilities.

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1. Introduction

The term “the Flynn effect” was coined by Herrnstein and Murray (1994, p.307) to designate the increases in IQs during the twentieth century that were documented for the United States and for a number of other countries by Flynn (1984, 1987). This designation has led many to believe that it was Flynn who discovered the phenomenon. Thus, the rise of IQs “has been called the Flynn effect after its discoverer” (Newcombe, 2007, p. 74); “Flynn’s discovery” (Zhu & Tulskey, 1999, p.1,255); “Flynn, a New Zealand psychologist who discovered that IQ scores are inflating over time” (Syed, 2007, p.17); and “the insight that made him famous...intelligence scores are rising, James R. Flynn has discovered” (Holloway, 1999, p.3).

These attributions are misplaced. There were numerous reports of secular increases in intelligence during the half century before they were rediscovered by Flynn (1984). The first objective of this paper is to summarize these early and largely forgotten studies. Who knows today of the work of Runquist (1936), who first discovered the effect? Or of Roesell (1937), Johnson (1937), Wheeler (1942) or Smith (1942) who published early reports on this phenomenon? None of these names appear in textbooks on intelligence such as those of Brody (1992), Sternberg (2000), Hunt (2011), Mackintosh (2011) and

Sternberg and Kaufman (2011), or even in books wholly devoted to the Flynn effect by Neisser (1998) and Flynn (2007). The second objective of this paper is to discuss the implications that can be drawn from these early studies.

2. The United States

The first report of a secular increase in intelligence appears to have been published by Runquist (1936) in a study that gave median scores on the Minnesota College Aptitude Test of high school seniors in Minneapolis in 1929 and 1933 (numbers = 1559 and 1768, respectively). The median score was 33.7 in 1929 and had risen to 42.3 in 1932. The author commented that “considering the short time interval involved, the increase in test score on the part of the 1933 class is astonishing” (p.303). The author did not give standard deviations so it is not possible to calculate the increase in IQ points. A year later, however, two studies appeared that reported IQ increases with means and standard deviations from which the gains in IQ points can be calculated. These were followed by eight further studies published between 1938 and in 1973. The results of these are summarized in Table 1. The studies are given in order of the date of publication and given location, the age of the samples, the years of the first and second test administrations, the IQ rise between the two test administrations, the IQ rise per decade, and the reference. The Bayley gains of 8.9 and 6.6 on the mental and motor scales for infants aged 2 to 15 months are approximations

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Table 1
Secular increases in IQ in ten early American studies.

Location	Age	Test	Years	IQ rise	Rise per decade	Reference
Minnesota	13–18	Miller MA	1920–34	4.0	2.9	Roesell, 1937
St. Louis	–	Terman	1922–36	4.0	2.9	Johnson, 1937
USA	5–11	Stanford Binet	1916–37	3.0	1.4	Merrill, 1938
Hawaii	10–14	–	1924–38	6.0	4.3	Smith, 1942
Tennessee	6–16	Dearborn	1930–40	10.8	10.8	Wheeler, 1942
Mid-west	10–14	Miller MA	1923–42	3.4	1.8	Finch, 1946
USA	Adults	Army Alpha	1917–43	11.5	4.4	Tuddenham, 1948
USA	0.2–1.3	Bayley Mental	1933–60	24.0	8.9	Bayley, 1965
USA	0.2–1.3	Bayley Motor	1933–60	17.6	6.6	Bayley, 1965
USA	2–18	Stanford Binet	1932–72	9.9	2.5	Terman & Merrill, 1973

calculated from Figures 1 and 2 of her paper. It is evident that the magnitude of the IQ gain was fairly consistent lying between 1.4 and 4.4 IQ points a decade, except for Wheeler's result of a 10.8 IQ point gain and the Bayley results for infants which found gains of 8.9 and 6.6 on the mental and motor scales. The mean of the ten studies is a gain of 3.65 IQ points per decade, a little higher than the gain of 3.0 IQ points per decade estimated by Flynn (1984). An increase of intelligence was also reported by Shaie and Strother (1968) but the magnitude of the increase was not quantified.

Wheeler (1942) and Smith (1942) appear to be the first to report age differences in the Flynn effect. Wheeler's (1942) results for the increase in IQs in East Tennessee children aged 6–16 over the years 1930–40 analyzed by age are shown in Table 2. The average gain for the total sample was 10.8 IQ points. The gain among the 6 and 7 year olds averaged 8.4 IQ points, and the gain increased among 8, 9, 10 and 11 year olds up to a maximum of 13.9 IQ points. The gain then declined to 7.9 IQ points among 15 year olds and to 6.5 IQ points among 16 year olds. This is an early finding that the intelligence gains are mainly present among 6 year olds, and that the gain among 6 year olds (7.9 IQ points) is greater than among 16 year olds (6.5 IQ points), suggesting that schooling has little or no effect on the gains.

IQ gains by age were also reported Smith (1942) in his study of the rise in IQ in Hawaii over the years 1924–38. His results are shown in Table 3. The data are for 10 to 14 year olds and are expressed as gains per decade. The data have two interesting features. First, the rise of verbal ability was the greatest at 2.4 in the youngest age group and declined with increasing age to 1.6 in 14 year olds, confirming Wheeler's results given in Table 2. The rise of non-verbal ability was approximately the same at 5.7 in the youngest age group and 5.5 in 14 year olds.

Smith (1942) was the first to report that gains for non-verbal abilities (6.0 IQ points per decade) have been much greater than for verbal ability (2.6 IQ points per decade). This result also shown in Table 3 has been confirmed in numerous subsequent studies.

A third early study to find that IQ gains have been greater in younger than in older children was reported by Finch (1946).

Table 2
IQ gains by age in Tennessee, 1930–40 (Wheeler, 1942).

Age	6	7	8	9	10	11	12	13	14	15	16
IQ rise	7.9	8.9	10.3	10.1	7.2	13.9	8.7	10.1	10.3	7.9	6.5

The samples were from two high schools in a small mid-western city and its surrounding areas. The test was the Miller Mental Abilities and is a test of verbal comprehension. The students were tested in 1923 and in 1942. The rise per decade for each of the five ages 14 to 18 year olds is shown in Table 4. The rise for 14 to 17 year olds was approximately constant averaging 2.15 but among 18 year olds it was only 0.6 IQ points a decade.

A fourth early study to find that IQ gains have been greater in younger than in older children was reported by Terman and Merrill (1973). This study reported gains on the Stanford-Binet from 1932 to 1972 by the administration of the 1932 standardization and the 1972 standardized to samples given both versions of the test. The 1972 sample registered the increases shown in Table 5. It will be seen that the greatest increases occurred in the preschool children aged 2 to 5 years, where they ranged between 2.42 and 2.70 IQ points a decade. Among those aged 6 to 15 years, the increases were smaller at between 0.47 and 0.97 IQ points a decade. From the age of 16 to 18 years, the gains increased slightly to between 1.17 and 1.72 IQ points a decade. The gains made by the pre-school children were checked by Thorndike (1977) by retesting them three years later. In the later testing, the IQs had dropped by 2.9 IQ points, indicating that the sampling of the standardization sample had been faulty by under-representing children with lower IQs. Thorndike adjusted for this and calculated that the gain for the 2 year olds was reduced to 7.5 IQ points, or 1.87 IQ points a decade. Even with this adjustment, however, the IQ gains of the preschool children were greater than those of the school children aged from 6 to 18 years. Thorndike (1975) proposed that the explanation of this age effect was that children were maturing earlier and that this increased the intelligence of young children but had less effect with increasing age.

Table 3
IQ rise per decade of verbal and non-verbal abilities in Hawaii, 1924–1938 (Smith, 1942).

Age	Verbal	Non-verbal
10	2.4	5.7
11	2.1	6.4
12	1.4	6.1
13	2.1	6.4
14	1.6	5.5
Mean	2.6	6.0

Table 4
IQ rise per decade of verbal ability in the Midwest, 1923–1942 (Finch, 1946).

Age	14	15	16	17	18	Mean
IQ rise	2.4	2.1	1.4	2.7	0.6	1.8

Table 5
IQ rise on the Stanford-Binet, 1932–1972 (Terman & Merrill, 1973).

Age	Rise per decade	Age	Rise per decade	Age	Rise per decade
2.0	2.60	6.0	1.77	14.0	0.82
2.6	2.65	7.0	1.25	15.0	0.97
3.0	2.67	8.0	0.82	16.0	1.17
3.6	2.70	9.0	0.52	17.0	1.42
4.0	2.67	10.0	0.47	18.0	1.72
4.6	2.60	11.0	0.55		
5.0	2.42	12.0	0.62		
5.6	2.10	13.0	0.72		

3. The British Isles

Early studies reporting secular increases of intelligence in the British Isles began to be reported shortly after the end of World War Two. The results are summarized in Table 6. The average of the increases was 3.3 IQ points a decade. The two studies for England found only very small rises of 0.03 and 0.60 IQ points a decade. This may be attributable to the interrupted schooling of many children who were evacuated during World War Two retarding their IQs in 1947 and 1949. Children were not evacuated in Scotland, where the IQ increases in 1932–1947 was 1.47 IQ points. The last row gives the results of a study for Ireland showing an increase of 1.8 IQ points a decade on a test of English comprehension. This relatively small increase is consistent with the American studies showing smaller IQ rises in verbal abilities.

4. Japan

Three early studies reporting secular increases in intelligence in Japan are summarized in Table 7. The first two studies show large increases of 14.3 and 9.2 IQ points per decade in children. These large increases may be attributable to the privation suffered in Japan during and after World War II, which may have depressed intelligence levels, and the rapid post-war economic recovery. The third study reported an IQ gain in Japan relative to that in the United States. As the gain in the United States was approximately 3 IQ points a decade, this

Table 6
Studies reporting secular increases of intelligence in the British Isles.

Location	Years	Age	Test	Rise per decade	Reference
Scotland	1932–47	11	Verbal/educational	1.47	Thomson, 1949
England	1938–47	11	Verbal reasoning	0.03	Emmett, 1950
England	1936–49	9–11	Abstract reasoning	0.60	Cattell, 1951
Scotland	1947–57	11	Verbal reasoning	3.3	Boyne & Clark, 1959
Scotland	1945–57	5–10	Verbal reasoning	5.0	Pilliner, Sutherland, & Taylor, 1960
Scotland	1953–63	10	Mechanical arithmetic	4.8	Scottish Council for Research in Education, 1968
Scotland	1953–63	10	Arithmetical reasoning	6.0	Scottish Council for Research in Education, 1968
Scotland	1953–63	10	English usage	5.5	Scottish Council for Research in Education, 1968
Scotland	1953–63	10	English comprehension	4.8	Scottish Council for Research in Education, 1968
Ireland	1942–59	10–13	English comprehension	1.8	Macnamara, 1964

Table 7
Increases in intelligence in Japan 1953–1972.

Years	Age	IQ increase	Increase per decade	Test	Reference
1953–60	9–15	10	14.3	General	Ushijima, 1961
1954–72	10–11	16.6	9.2	General	Sano, 1974
1941–54	Adults	11.0	7.9	Wechslers	Lynn, 1982

figure needs to be added to the Japanese gain to give the 7.9 per decade gain shown in Table 7.

5. Bulgaria, Canada, New Zealand and Poland

Early studies reporting secular increases in intelligence in Bulgaria, Canada, New Zealand and Poland are summarized in Table 8. The increases range between 2.06 IQ points per decade in Bulgaria from 1941 to 1973 and 6.0 IQ points per decade in Poland from 1927 to 1962. A secular increase in intelligence was also reported in France by Girod and Allaume (1976) but they did give a quantification of the increase.

6. Discussion

Six conclusions can be drawn from these early studies of the Flynn effect. First, a total of 24 studies have been cited that reported the Flynn effect before the effect was rediscovered by Flynn (1984). It is believed that the effect was first discovered by Runquist (1936). Second, Flynn (1984) showed that IQ gains in the United States could be dated from 1932. In fact, the early studies summarized in Table 1 show that the gains have been taking place from 1916 (Merrill, 1938), from 1917 (Tuddenham, 1948), and from the 1920s (Roesell, 1937; Runquist, 1936). It is therefore necessary to revise Jensen's (1998, p.328) observation that "it is improper to extrapolate the trend much beyond one generation". To the contrary, these early studies show that intelligence has been increasing for three generations, from 1916 to at least the mid-1990s.

Third, several of these early studies found that IQ gains have been greater in younger children than in adolescents and adults. This was first reported by Wheeler (1942) and Smith (1942) and was confirmed by Finch (1946), Terman and Merrill (1973) and Thorndike (1977). Bayley (1965) even found that the gains were present on the mental and motor scales in infants aged 2 to 15 months.

Table 8
Secular increases in IQ in Bulgaria, Canada, New Zealand and Poland.

Country	Years	Age	Test	Rise per decade	Reference
Bulgaria	1941–73	3–18	Binet-Simon	2.06	Piryov, 1974
Canada	1946–55	14	Laycock	4.33	Binning, 1958
New Zealand	1936–68	10–14	Otis	2.19	Elley, 1969
Poland	1927–62	14–18	Otis	6.0	Sikora, 1968

Fourth, Smith (1942) was the first to report that IQ gains have been greater for non-verbal abilities than for verbal abilities at 6.0 and 2.6 IQ points per decade, respectively, in Hawaii over years 1924–1938.

All of these results have been confirmed in a number of later studies reviewed by Flynn (1984, 1987), Lynn and Hampson (1986) and Lynn (2009a, 2009b). It can be fairly said that all the important features of the secular increase of intelligence were established by these early studies.

Fifth, these results tell against most of the explanations advanced for the Flynn effect, namely that it is attributable to increased test sophistication and education (Tuddenham, 1948), “improvements in education reflecting more effective teaching” (Meadows, Herrick, Feiler, & the ALSPAC Study Team, 2007, p.58), the greater complexity of more recent environments providing greater cognitive stimulation (Williams, 1998), greater cognitive stimulation from television and media (Greenfield, 1998), and from computer games (Wolf, 2005), improvements in child rearing (Elley, 1969), more confident test taking attitudes (Brand, Freshwater, & Dockrell, 1989), the “individual multiplier” and the “social multiplier” (Dickens & Flynn, 2001) and “an enhanced real-world capacity to see the world through scientific spectacles” (Flynn, 2007, p.42). All these hypotheses predict that the effect should be absent or minimal among infants and should increase progressively through childhood and adolescence as these environmental inputs have cumulatively IQ boosting impacts, and most of them predict that that the Flynn effect should be greater for verbal abilities that are taught in schools than in non-verbal abilities. The early evidence falsifies these predictions and arguably leaves the nutrition theory impacting on infants as the most plausible explanation of the secular increase of IQs, although this has also been criticized (Flynn, 2008).

Finally, these early studies reporting secular increases in intelligence raise the question of what should be the proper designation of the phenomenon. Because all the important features of the increase had been reported many years before Flynn's studies, it is difficult to find any justification for designating the phenomenon “the Flynn effect”. In the history of science it is customary to name phenomena after those who first identified them, e.g. Boyle's law, the Heisenberg indeterminacy principle, and the Doppler effect. The first to report the secular increase in intelligence was Runquist (1936) and therefore the proper designation should surely be “the Runquist effect”.

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