
Previously published as
CHAPTER 3

TWENTY YEARS A GROWING: GAINS IN THE INTELLIGENCE TEST SCORES OF IRISH CHILDREN OVER TWO DECADES

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INTRODUCTION

Increases in scores on culture-reduced IQ tests in industrialized countries have recently been reviewed and debated (e.g. Brand, 1990; Brand et al, 1989, Flynn, 1987, 1990; ). In particular, Flynn (1987) has presented data which demonstrates a world-wide rise in IQ's measured by tests like Raven's Standard Progressive matrices (RSPM) of up to 18 points or 1.2 standard deviations for the period 1950-1980 (Raven, 1977). In the light of these data, Flynn argues that the equation of IQ scores with the construct of intelligence is erroneous. However, he offers no explanation for the gains. Brand (1989, 1990) has put forward the hypothesis that the increases in scores on tests like the RSPM reflect the influence of the Permissive Society on strategies to multiple-choice test taking.

Against the backdrop of this recent debate, an interesting question is the extent to which Irish Children have shown substantial gains on culture reduced tests such as the RSPM over the past 20 years.
Data for this review come from three major studies. Gill and Byrt's 1972 standardization of the RSPM on a national sample of Irish primary school children, O'Connor & Ruddle's 1987 survey of a large sample of school children in Clare and Jeffer's and Fitzgerald's 1989 survey of 9-12 year olds in a Dublin suburb.

Jeffer and Fitzgerald (1991) surveyed all children in fourth standard in all schools (excluding those for the mentally handicapped) in a suburb of Dublin. The suburb contained both private housing estates and local authority estates. Forty-five percent of the youngsters were in schools for the disadvantaged. Only one school refused to participate, representing a non-response rate of only 2.5%. In all, a population of 2029 children between the ages of 9 and 12 in 39 schools were screened. 1925 returned validly completed RSPM answer sheets. These results are summarised in Table 2.7 of Jeffers and Fitzgerald's report. Data from this table were used in the analyses reported below.

O'Connor et al. drew a stratified random sample of 1,361 children in from a population of 26,633 children in 147 primary schools in County Clare and Limerick City. First, 147 schools were stratified into twelve subgroups according to size, participation in the government's disadvantaged school scheme and whether they were rural or urban. Second, from these subgroups, a total of 74 schools were randomly chosen. Third, within each of the 12 subgroups, 10 teachers were randomly selected and 12 pupils were chosen from their class lists using random number tables for inclusion in the study, yielding a total of 1,440 participants. The overall non-response rate was less than 5%. 1357 valid RSPM answer sheets were returned in this survey and presented in Table 4.4 (p.60) of O'Connor & Ruddle's report. These data were used in the analyses reported below.

Table 3.1. Characteristics of the samples
In both the Clare and Dublin studies, Gill & Byrt's (1973) norms were used to categorize respondents into ability ranges. These norms are based on a sample of approximately 1% of the 350,000 children between 6 and 13 years who were attending State National Schools in the Republic of Ireland in 1972. First, 86 schools were randomly selected from a list of all primary schools in the 26 counties of the Republic of Ireland. From their registers, 3695 children were randomly selected and administered the RSPM. Complete data were collected on 3464 children and presented in Table 4.3.4 of Gill & Byrt's Dissertation. These data were used in the analyses reported below.

A summary of the characteristics of each of the three samples is contained in Table 3.1. O'Connor et al's sample had a mean age of 9 years and 8 months with a range from 6 years and 2 months to 11 years and 9 months. Unfortunately insufficient data are available in their report to give a mean age for Jeffers and Fitzgerald's sample. However, they did note that participants in their study fell within the age range 9 years 3 months to 12 years and 11 months. 90% of the sample were between 9 years and 8 months and 11 years and 2 months.

<table>
<thead>
<tr>
<th>CHARACTERISTIC</th>
<th>Gill &amp; Byrt</th>
<th>O'Connor &amp; Ruddle et al</th>
<th>Jeffers &amp; Fitzgerald</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area</td>
<td>26 Counties</td>
<td>Clare &amp; Limerick</td>
<td>Dublin Suburb</td>
</tr>
<tr>
<td>Number of Schools</td>
<td>82</td>
<td>74</td>
<td>39</td>
</tr>
<tr>
<td>Sample size</td>
<td>3038</td>
<td>1,361</td>
<td>2029</td>
</tr>
<tr>
<td>Male/Female Ratio</td>
<td>?</td>
<td>1/1.2</td>
<td>1.1/1</td>
</tr>
<tr>
<td>Age Range</td>
<td>6-12</td>
<td>6-12</td>
<td>9-12</td>
</tr>
<tr>
<td>School Classes</td>
<td>1st-5th</td>
<td>1st-5th</td>
<td>4th.</td>
</tr>
<tr>
<td>% Disadvantaged</td>
<td>?</td>
<td>17%</td>
<td>45%</td>
</tr>
</tbody>
</table>
In both studies the testing instructions and time limits specified in the Standard Progressive Matrices Manual were used (Raven, Raven & Court, 1983).

**RESULTS**

In all three studies, data were presented as frequencies of children falling within five centile ranges. Frequencies and percentages of children falling within these ranges for all three studies are presented in Table 3.2 and Graphed in Figure 3.1. Appropriate comparative data were abstracted from Gill & Byrt's dissertation to compare with the results of the Clare and Dublin studies. Thus, frequencies for 6-12 year olds from the normative study were compared with the Clare data. The results of the Dublin study were compared with normative data for 9-12 year olds.

Chi Square tests were used to compare the results of each survey with normative data. The results of these tests were highly statistically significant for both the Dublin (Chi Square = 334.56, P < .0001), and Clare (Chi Square = 662.32, P < .0001) data. More children from the recent surveys fell into the higher scoring ranges and fewer children fell into the lower scoring ranges in comparison with the normative sample.

Based on Gill & Byrt's norms, the median IQ scores for the Dublin and Clare samples were estimated using the following method. First, the centile intervals of the Standard Progressive Matrices norms were converted to intervals expressed in IQ points as set out in Table 3.2.
Table 3.2. Intelligence levels of Irish children on the Raven’s Standard Progressive Matrices in the early 1970s and the late 1980s

<table>
<thead>
<tr>
<th>Investigators</th>
<th>Gill &amp; Byrt</th>
<th>O’Connor &amp; Ruddle et al*</th>
<th>Jeffers &amp; Fitzgerald†</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year data were collected</td>
<td>1972</td>
<td>1987</td>
<td>1989</td>
</tr>
<tr>
<td>Geographical area</td>
<td>Ireland</td>
<td>Clare</td>
<td>Dublin</td>
</tr>
<tr>
<td>Age</td>
<td>6-12y</td>
<td>9-12y</td>
<td>6-12y</td>
</tr>
<tr>
<td>N</td>
<td>3318</td>
<td>1831</td>
<td>1357</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Intelligence level</th>
<th>Superior Above the 95th centile IQ above 125</th>
<th>High Average 75th - 95th centile IQ 110 - 125</th>
<th>Average 25th - 75th centiles IQ 90 -110</th>
<th>Low Average Between the 5th and 25th centiles IQ 75 -90</th>
<th>Borderline or Mental Handicap Below the 5th centile IQ below 75</th>
<th>Total N</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(166) 5% (92) 5% (232) 17% (310) 16%</td>
<td>(664) 20% (366) 20% (493) 36% (662) 34%</td>
<td>(1659) 50% (916) 50% (484) 36% (783) 41%</td>
<td>(664) 20% (366) 20% (116) 9% (150) 8%</td>
<td>(166) 5% (92) 2% (32) 1% (20)</td>
<td>(3318) (1831) (1357) (1925)</td>
</tr>
</tbody>
</table>

Note: Frequencies are given in parentheses.
*When data from O’Connor et al’s study is compared with normative data from Gill & Byrt, Chi Square = 662.32, P < .0001.
† When data from Jeffers & Fitzgerald’s study is compared with normative data from Gill & Byrt, Chi Square = 334.56, P < .0001.

So, for example, the interval from the 25th to the 75th percentile was transformed to the interval between the 90 and 110 IQ points. Second, for each sample the number of cases falling into each of these intervals was tabulated. Third, the following formula from Guilford & Fruchter (1973, p50) was applied to this table...
\[ \text{Median} = L + \left[ \frac{(N/2 - Fb)/Fp}{i} \right] \]

Where \( L \) is the lower limit of the class interval containing the median

\( N \) is the number of cases

\( Fb \) is the sum of all frequencies below \( L \)

\( Fp \) is the frequency of the interval containing the median

\( i \) the size of the class interval

Using this procedure the median IQ's for Clare and Dublin were found to be 111 and 110 respectively.

Neither study found significant sex-differences in scores on the Standard Progressive matrices.

**DISCUSSION**

In considering the results of the comparisons reported here, it is important to keep in mind that the standardization sample included children from schools for the mentally handicapped, while the two survey's did not. Mentally handicapped children with IQ's below 70 account for approximately 2.7% of the population (Gelder et al., 1983, p. 688). Some of these, particularly the mildly mentally handicapped with IQs between 50 and 70 are educated in ordinary primary schools. Less than 0.5% of the population have IQs below 60. Altogether, therefore it may be assumed that about 1% of children in the population attend special schools for the mentally handicapped or that, what Jack Tizard called, the *administrative prevalence* of mental handicap is 1% (Tizard, 1964). Thus the omission of children from special schools from the recent surveys may have inflated the median gain in IQ points on the RSPM by the equivalent of about 1 percentile point or less than 1 IQ point. Conservatively we may therefore state that the mean gain in IQ points on the RSPM has been approximately 9 IQ points over the past 15-17 years: that is, the periods 1972-1987 and 1972-1989.
This gain of about 0.6 standard deviations in IQ points on the RSPM has occurred in both a rural and an urban area. The 9 IQ point gain over about 16 years is comparable to the 18 IQ point gain that has been observed on culture reduced tests over the 30 year period between 1950-1980 in 14 of the world's advanced economies (Flynn, 1987).

Precisely what the national and international gains on the RSPM means is open to a variety of interpretations. If the RSPM is measuring intelligence (g), then clearly Irish children are making the gains that their international contemporaries are. If the RSPM is measuring the development of new test taking strategies, then these new strategies are being developed by Irish children at the same rate as their international counterparts. Both of these conclusions are particularly important in view of previous claims that Irish children were intellectually inferior to children from other countries a position discussed and criticized by Benson (1987).

Finally, Brand has argued that gains in IQ on the RSPM probably reflects a test taking strategy where speed is preferred to accuracy and that this strategy
Intelligence

arises from participation in the Permissive Society (Brand et al, 1989). Ireland is a highly conservative country with strong traditional values. While the permissive society has made inroads into Irish life, it could be argued that the rate of change over the 17 year period between 1972 and 1989 has not been as dramatic here as in other industrialized countries. This is particularly true of rural Ireland. The view that participation in the permissive society offers an explanation for the substantial gains shown by Irish Primary school children on the RSPM over the past two decades seems unlikely.

What is more likely is that changes in the quality of life and opportunities of intellectual stimulation which have occurred in Irish society over the past twenty years have allowed Irish children to make the same gains in intellectual prowess (as assessed by the Standard Progressive Matrices) as their international counterparts.

SUMMARY

Using data from Gill and Byrt's 1972 standardization of the Ravens Standard Progressive Matrices (RSPM) on a national sample of Irish primary school children, O'Connor & Ruddle's 1987 survey of a large sample of school children in Clare and Jeffer's and Fitzgerald's 1989 survey of 9-12 year olds in a Dublin suburb, we found that over the period from 1972-1989 the mean gain in IQ points on the RSPM was approximately 9 IQ points. This gain of about 0.6 standard deviations in IQ points has occurred in both a rural and an urban area. The 9 IQ point gain over about 16 years is comparable to the 18 IQ point gain that has been observed on culture reduced tests over the 30 year period between 1950-1980 in 14 of the world's advanced economies (Flynn, 1987).
REFERENCES


