

## AN ESTIMATE OF THE FLYNN EFFECT: CHANGES IN IQ AND SUBTEST GAINS OF 10-YR.-OLD FRENCH CHILDREN BETWEEN 1965 AND 1988<sup>1</sup>

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*Summary.*—The significant increase in IQ in the industrialised countries during recent decades, known as the eponymous Flynn Effect, tends to be given numerous explanations (progress in schooling, television, nutrition, etc.). One way of studying this effect consists of assessing in which subtests the change in IQ takes place. Using the comparison among 120,000 French children on an intelligence test in 1965 and the results of 8,640 children on the same test in 1988, Greenfield's hypothesis is discussed: that television and other media using graphical representations have induced an improvement in spatial and visual capacities to the detriment of capacities relating to vocabulary. The results are compatible with Greenfield's hypothesis, although other explanations are still possible.

Flynn (1987; cf. Flynn, in press, for a recent synthesis) synthesised a group of studies from several countries, which show an increase in mental abilities assessed by classic intelligence tests over the last few decades. In the United States for instance, Flynn concluded that scores on the Wechsler Intelligence Scale for Children (cf. Wechsler, 1991) have increased by 9 IQ points per generation (30 years) since 1947.

One hypothesis is that exposure to frequent and intensive stimuli provided by television, computers, video games, and other printed graphical representations results in an improvement in visual and spatial abilities (Subrahmanyam & Greenfield, 1994; Greenfield, 1998). For instance, Okagaki and Frensch (1994) showed a positive correlation between exposure to video games and an increase in the skills necessary to obtain a good score on the nonverbal visual tasks in IQ tests. Greenfield's hypothesis also fits the historical modest rise in Verbal IQs and the decline in Scholastic Aptitude Test scores, as experience with mixed media elicit more visuospatial skills and presumably strengthen these skills through repeated use. The exposure to media in France is very difficult to quantify except for television. For instance, in 1965, television penetration in households was approximately 50% of families and reached 94.5% in 1988. Nevertheless, Greenfield's hypothesis may be supported by analysing the subdomains in which the improvement in IQ has taken place in these data.

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## METHOD

In 1965, the Echelle Collective de Niveau Intellectuel (ECNI), a test comparable to the WISC, was given to 120,000 French schoolgirls and boys, under the aegis of the regional career guidance counselors. This study was conducted by the National Institute for Demographic Studies and the National Institute for the Study of Work and Career Guidance (Insitut National des Etudes Démographiques and the Insitut National du Travail et d'Orientation Professionnelle, 1969). In 1988, a study of 8,640 children aged 10 (born in 1978), which is approximately 90% of the 10-yr.-olds in the province of Oise (750,000 inhabitants), was carried out by the academic authorities, using the same test as the one given in 1965. The objective of this article is to analyse both the overall increase in mean ECNI IQ scores, and the specific changes on the eight subtests of the ECNI. The results of 1988 are compared to those of the Picardy and Champagne Regions, of which the Oise is part, since the number of schools from the Oise visited in the 1965 study was insufficient to norm the test.

## RESULTS

The 1965 study had sociological rather than psychological aims and, despite the substantial resources deployed, the only information available for the Picardy-Champagne sector relates to total IQ given by the Echelle Collective de Niveau Intellectuel ( $M=96.5$ ,  $SD=14.1$ ). Taking girls and boys together, the pupils from the Oise in 1988 had a mean ECNI IQ score of 102.5. In 23 years, 6 IQ points were gained, which is 40 standard deviations ( $p<.001$ ). This result corresponds approximately to the estimate for the Flynn effect of 3 points per decade for the WISC, according to the data cited in the introduction to this paper.

The construction of the ECNI guarantees that the Verbal and Nonverbal tests contribute to the IQ in equal measure, and that the subtests contribute equally to the verbal and nonverbal tests. Table 1 shows the results for each subtest of the verbal and nonverbal tests. The reference score of 1965 for each of the subtests is 5. The average nonverbal score is higher than the average verbal one ( $t=16$ ,  $p<.001$ ). The nonverbal subtest showing the biggest improvement is that involving matrices, which reinforces Greenfield's (1998) hypothesis that the improvement is essentially related to an increase in visuospatial abilities. Also, in agreement with Greenfield (1998), scores actually declined on the Vocabulary subtest.

## DISCUSSION

The Flynn effect is generally described by a phrase such as "IQ rises." Results showed that this description is only approximate and that in fact, "IQ changes," and this only in part. The increase in ECNI IQ scores between 1965 and 1988 for a sample of 8,640 French 10-yr.-old children

TABLE 1  
 SCORES ON EIGHT SUBTESTS OF ECHELLE COLLECTIVE DE NIVEAU INTELLECTUEL FOR  
 8,640 10-YR.-OLD CHILDREN FROM PROVINCE OF OISE, FRANCE IN 1988

Test	Boys	Girls
Nonverbal		
Differences	5.49	5.44
Odd-one-out	6.82	6.81
Matrices	7.86	8.13
Series	4.92	4.68
Verbal		
Membership	6.63	6.86
Vocabulary	4.72	4.77
Comprehension	5.39	5.42
Analogies	6.71	7.14

*Note.*—1988 scores are compared to a reference score of 5 for 1965. Differences: compare a graphical stimulus to other stimuli to choose the one least similar; Odd-one-out: find the odd one out in a set; Matrices: similar to Raven's (1981); Series: complete a series of numbers; Membership: choose the word which fits in the set; Vocabulary: find a synonym; Comprehension: choose the sentence which best explains the proverb; Analogies: complete sentences like "eyes are for seeing as ears are for . . ."

conforms to the expectation of an increase in IQ of approximately 3 points per decade for an industrialised country on an intelligence test comparable with the WISC. This study shows an unquestionable improvement in visuospatial abilities as the average score in nonverbal subtests is higher than in verbal subtests. The most noticeable improvement concerns the nonverbal subtest Matrices. This fact tends to confirm Greenfield's hypothesis of an increase in intellectual level essentially related to an improvement in visuospatial performance. This phenomenon is accompanied by a mean score regression on the Vocabulary subtest, also compatible with Greenfield's theory of an impoverishment of capacities relating to vocabulary due to the strong use of media compared to reading.

Nevertheless, considering the biggest improvement in each category, the Analogies subtest rivaled Matrices. Analogies being very similar to the Similarities subtest of the WISC, the overall pattern of results are also compatible with the hypothesis of large improvements in items characterized by on-the-spot problem-solving components (Flynn, in press).

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