Available online at www.sciencedirect.com
SCIENCE DIRECT®
Intelligence 32 (2004) 85–93
INTELLIGENCE

The Flynn effect: Smarter not faster

Ted Nettelbeck[a,*], Carlene Wilson[a,b]

[a] *Department of Psychology, University of Adelaide, Adelaide, South Australia 5005, Australia*
[b] *CSIRO, Adelaide, South Australia, Australia*

Received 30 September 2002; received in revised form 13 June 2003; accepted 30 June 2003

Abstract

Inspection time (IT) and Peabody Picture Vocabulary Test (PPVT) scores from 75 school children aged 6–13 years in 2001 were compared with the performances of 70 children aged 6–13 years who had attended the same primary school in 1981 [*J. Exp. Child Psychol.* 40 (1985) 1.]. ITs for the 2001 sample were measured with the same four-field tachistoscope and identical computer-based procedures followed by Wilson in 1981. The 2001 sample completed two versions of PPVT concurrently: PPVT (1965, Form A) as used in 1981 and PPVT-III (1997, Form IIIA). Mean ITs from both samples, 20 years apart, were essentially the same (123 ± 87 and 116 ± 71 ms in 1981 and 2001, respectively). There was, therefore, no evidence that speed of processing had improved. Correlations between IT and raw PPVT scores were significant ($P < .01$) for both 1981 ($r = -.43$) and 2001 ($r = -.31$). Within the 2001 sample, concurrent PPVT scores correlated .68; however, means revealed a significant Flynn effect. Thus, scores for the 2001 cohort on the earlier PPVT were higher (*M* standardized IQ 118.52 ± 16.62) than the recently restandardized PPVT-III (113.97 ± 12.23), although, compared in terms of the most recent standardization sample, the 2001 cohort was equivalent to the 1981 sample (113.66 ± 16.72). The Flynn effect has nothing to do with speed of processing as measured by IT, despite the effect being strongest for ability tests that earn bonus scores for quick performance. Because IT correlates with IQ but appears to be stable across 20 years, whereas IQ is not, IT may have promise as a useful biological marker for an important component of cognitive decline during old age.

Keywords: Flynn effect; Inspection time; Peabody Picture Vocabulary Test

1. Introduction

This study drew on two lines of inquiry: a steady, continuing, long-term, and worldwide improvement in IQ and the theoretical contribution of inspection time (IT), envisaged as a measure

* Corresponding author. Tel.: +61-8-8303-5738; fax: +61-8-8303-3770.
E-mail address: ted.nettelbeck@psychology.adelaide.edu.au (T. Nettelbeck).

0160-2896/$ - see front matter © 2004 Elsevier Inc. All rights reserved.
doi:10.1016/S0160-2896(03)00060-6

of speed of processing, to an understanding of the nature of individual differences in intelligence. The critical proposition on which the study was based was that comparisons between ITs from cohorts of children separated by 20 years, made by replicating earlier research procedures, provided the means for testing whether rising IQ (the ''Flynn effect'') was the consequence of or accompanied by faster processing.

Flynn (1999) has clearly documented widespread rises in mean IQs from substantial samples from some 20 nations representing western European/North American cultures or technologies. These increases in mean IQ, apparently without changes in variance, are presumed to be caused by environmental influences as yet unidentified. There is considerable interest in Flynn's finding (Neisser, 1998) and ongoing debate about a range of explanations, generally covering improved physical health, nutrition and well-being, and extensive educational and technological changes within the countries involved across the 20th century. IQ has risen, despite evidence that differences in IQ are substantially influenced by genetic variation (Plomin & Petrill, 1997) and that individual IQ is generally not susceptible to improvement (Spitz, 1999). Moreover, improved IQ appears to represent gains in problem-solving abilities more than straightforward knowledge acquisition, because the largest effects involve tests designed to measure nonverbal reasoning and abstract problem-solving, like Raven's progressive matrices and the Performance subtest from the Wechsler scales. Of immediate relevance to the current study, most of these tests carry bonus points for quicker responding. By Flynn's account, average gains of about 1 IQ point every 3 years have probably been occurring since the IQ test was invented. Yet, almost no one believes that human genotypic intelligence has improved significantly during the course of the 20th century. Although the Flynn effect has thus far been demonstrated predominantly for young (male) adults (which seems to rule out earlier maturation in more recent generations as an explanation), at least one study, by Tasbihsazan, Nettelbeck and Kirby (1997), has demonstrated an improved Mental Development Index of 18 points across 25 years among infants aged 18–27 months based on concurrent Bayley's (1969, 1993) comparisons. This finding is not plausibly attributable to improved education.

It is important to note that these IQ improvements are cross sectional, derived from the achievements of different cohorts on test content that has not changed or changed little across generations. There is no suggestion that individual IQs have improved longitudinally. Within generations, IQ scores remain good predictors of academic, work performance, and other life achievements (Jensen, 1998), and there is now general consensus that individual differences in IQ reflect a substantial genetic component (Neisser et al., 1996). Nonetheless, rising IQs can only be substantially explained environmentally and they therefore challenge the construct validity of the tests as measures of fundamental, inborn cognitive abilities. The Flynn effect implies that abstract reasoning abilities, previously held by many to reflect basic capacities, are influenced by as yet undetermined environmental circumstances.

Considerable speed-based research has found that speed measures correlate with IQ (Nettelbeck, 1998, 2001). IT (Vickers, Nettelbeck, & Willson, 1972) measures individual differences in threshold to detect the location (left or right) of the shorter of two vertical lines displayed in a briefly exposed target figure. The threshold measure is essentially a critical stimulus onset asynchrony (CSOA), defined as the minimum delay required, between the onset of the target figure and the subsequent onset of a backward masking figure so as to achieve predetermined high accuracy. IT correlates at about −.5 with nonverbal IQ (Deary & Stough, 1996; Grudnick & Kranzler, 2001; Kranzler & Jensen, 1989; Nettelbeck, 1987). The basis of this correlation has not been clearly identified, but there are strong grounds for supposing