



Survey of expert opinion on intelligence: The Flynn effect and the future of intelligence



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ARTICLE INFO

Article history:

Received 24 August 2016

Received in revised form 28 October 2016

Accepted 31 October 2016

Available online 14 November 2016

Keywords:

Intelligence

Survey

Experts

Flynn effect

Secular rise in IQ

National cognitive ability development

ABSTRACT

Experts on intelligence, cognitive ability and student achievement were surveyed for their opinions on the causes of the 20th century rise in intelligence test results called the “Flynn effect”, on the causes of a possible end of the Flynn effect and on the future development of IQ in different world regions. Ratings from $N = 75$ experts attributed the secular IQ rise to better health and nutrition, more and better education and rising standards of living. Genetic changes were seen as not important. A possible stagnation or retrograde of the Flynn effect was attributed to asymmetric fertility (genetic and socialization effects), migration, declines in education and the influence of media. Experts expected 21st century IQ increases in currently on average low-ability regions (+6 to +7 IQ points, in Latin America, Africa, India) and in East Asia (+7 IQ), but not in the West (a stagnation, below +1 IQ), with a small decline in the US (−0.45 IQ). Similar results were obtained for all experts and experts on the Flynn effect itself (mean $r = 0.90$ to 0.97 ; $N = 17$). The results correlated strongly with and confirmed a recent meta-analysis on the causes of the Flynn effect ($r = 0.65$ to 0.71 ; Pietschnig & Voracek, 2015).

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1. Introduction

Among the most discussed topics in intelligence research is the rise of average IQ test results across generations in the 20th century. The trend was first reported by Rundquist (1936). The American-New-Zealand political scientist Flynn (1984) systematically reviewed evidence of the trend in his seminal paper, “The mean IQ of Americans: Massive gains 1932 to 1978”. The effect was later labeled the “Flynn effect”.

Lynn (1982) described the same phenomenon for Japan. Because both Lynn and Flynn rediscovered the trend, we label it the “Flynn effect”. In Western countries, the increase in IQ in the 20th century has been about 3 IQ points per 10 years, or 2.83 IQ points per decade, according to a meta-analysis by Pietschnig and Voracek (2015).

There is evidence of a decline or inversion of the Flynn effect in developed countries and of recent gains in IQ in developing countries. In particular, the Flynn effect has declined, stopped or inverted in Norway (stopped; Sundet, Barlaug, & Torjussen, 2004), Denmark (inversion; Teasdale & Owen, 2008), England (inversion measured by Piaget tests; Shayer & Ginsburg, 2009), Australia (stopped; Cotton et al., 2005), Finland (inversion; Dutton & Lynn, 2013; Heller-Sahlgren, 2015b), Austria (inversion; Pietschnig & Gittler, 2015), and the US (decline; Rindermann & Thompson, 2013). The Flynn effect has also inverted in Western countries for mental speed (inversion; Woodley,

te Nijenhuis, & Murphy, 2013), which has been linked to intelligence, and for world achievements and school grades (Jensen, 2006; Rindermann & Neubauer, 2000). Positive trends of the Flynn effect can co-occur with negative trends across scales, subgroups and countries (co-occurrence model; Woodley of Menie & Fernandes, 2015). There seems to be a certain historical timeframe for the Flynn effect. The decline of the Flynn effect in developed countries, and its increase in developing regions with currently lower than average ability levels (e.g., Africa), may lead to a narrowing of international gaps (Meisenberg & Woodley, 2013; Rindermann, 2013).

Future IQ changes are linked to past cognitive development and expected demographic changes, which permit predictions of future development at the country level (e.g., +0.45 to +0.76 IQ points per decade in the US; Rindermann & Pichelmann, 2015). Demographic changes may be linked to genetic effects, which are influenced by asymmetric birth rates in modern populations (e.g., Lynn, 2011; Nyborg, 2012). Negative genetic effects on intergenerational changes in ability are plausibly linked to: (a) parent-children correlations in intelligence (for individuals about $r = 0.40$ to 0.50 ; Plomin, DeFries, Knopik, & Neiderhiser, 2013, p. 76), (b) the well established theory that intelligence is not only transmitted via family environment but also via genes (backed by twin research; Plomin et al., 2013) and (c) better educated and more intelligent adults having fewer children (e.g., Loehlin, 1997). If these three statements are correct, negative genetic effects on intergenerational development are a logically compelling consequence. Such negative effects may be aggravated, if migration produces brain drain in developing countries, which occurs when high ability people in

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developing countries immigrate to developed countries (e.g., Kapur & McAle, 2005), or if low ability people (relative to the level in destination countries) immigrate to developed countries, a pattern observed in the West over the last decades (e.g., Rindermann & Thompson, 2016).

Does the Flynn effect represent real ability gains? James Flynn (initially, 1987) and others (e.g., te Nijenhuis & van der Flier, 2013) have argued that the secular gains may reflect mere increases in test scores, a kind of “IQ inflation”, with no real increase in problem solving ability. Different secular trends for different abilities underscore such doubts. For example, secular declines have been found for mental speed, digit span backwards, the use of difficult words, and color acuity, all of which are related to intelligence (Madison, Woodley of Menie & Sanger, 2016; Woodley et al., 2013; Woodley of Menie & Fernandes, 2015; Woodley of Menie, Fernandes, Figueredo, & Meisenberg, 2015; Woodley of Menie & Fernandes, 2016). In contrast, secular increases have been found for tests of fluid intelligence and (but to a lesser extent) of crystallized intelligence ($dec_{fl} = 4.06$ vs. $dec_{cr} = 2.05$; Pietschnig & Voracek, 2015).

However, some portion of the secular trend may also reflect real gains in ability, as indicated by various criteria linked to cognitive ability. For example, there is evidence of increases in real world ability with today more people working in intellectually demanding jobs (e.g., professionals). In addition, there are rising cognitive demands in everyday life, positive changes in the determinants of intelligence (e.g., increases in brain size), increases in educational attainment and improvements in general living conditions (Howard, 2001).

A further contentious issue concerns the causes of the secular rise in test results and intelligence. Possible causes have included the acquisition of “scientific spectacles”, which facilitate logical and abstract reasoning (Flynn, 2007; see also, Armstrong et al., 2016); improvements in nutrition (Lynn, 1990); increases in the quantity and quality of education; increases in technological, social and cultural modernization (Flynn, 2012); and feedback loops between environmental factors and cognitive ability (e.g., Meisenberg, 2014; for an overview, see Williams, 2013).

The current study focuses on expert opinions on the Flynn effect. The study is an extension of an earlier study, which examined the causes of international differences in cognitive ability but not the Flynn effect (Rindermann, Becker, & Coyle, 2016). Expert opinions provide insight into the views of people who are actively involved in research. In the current study, we examined the views of experts doing research on cognitive ability, and especially on the Flynn effect. We were interested in expert opinions on the causes of the secular rise, the causes of a possible end to the secular rise and the future development of intelligence.

An expert survey has three advantages. First, according to the Spearman-Brown prediction formula, increases in the items being analyzed (here expert ratings) will increase the reliability of the final averaged result. Second, the average result of an expert survey may be closer to the truth than the average result of a non-expert survey (e.g., Rindermann et al., 2016). Third, in the current study, data collection procedures were designed to ensure anonymity, which reduced pressure for socially desirable responses and increased the likelihood of obtaining honest opinions about controversial issues.

Although majority opinion is no guarantee of truth, the validity of aggregated expert opinions has been confirmed in certain contexts. The accuracy of expert opinions was first described by Galton (1907), who asked stockbreeders and butchers at a cattle market to estimate the weight of an ox. Galton analyzed the estimates and found that the mean value of all results was correct within 1% of the real value. That is, the average opinion of experts was very close to the real answer. More recent studies on expert validity (e.g. Martinez i Coma & van Ham, 2015; Meyer & Booker, 2001) have backed the validity and usefulness of expert surveys. The accuracy of expert opinions may extend to the current study. Experts are able to respond anonymously, which enhances validity (e.g., by reducing political pressures). In addition, experts are drawn from groups with above average ability levels

(e.g., college professors and researchers), which enhances accuracy (e.g., Mellers et al., 2015).

Following Snyderman and Rothman (1987, 1988), we conducted a survey of scientists who study cognitive ability and intelligence. The survey results presented here will focus on expert opinions on the causes of the Flynn effect, its possible end and the future development of intelligence. These issues were not addressed by Snyderman and Rothman, who did not examine the Flynn effect. In addition, to assess the validity of expert opinions, we compared experts doing research on the Flynn effect to experts doing research on other aspects of cognitive ability and also compared the results of our study to a recent meta-analysis of the Flynn effect (Pietschnig & Voracek, 2015).

2. Method

2.1. Survey: Expert Questionnaire on Cognitive Ability

To examine expert opinions, we created a new online questionnaire (“Expert Questionnaire on Cognitive Ability”; Rindermann et al., 2016). There were 62 main questions with follow-up questions and space for comments. The current paper focuses on questions about the development of intelligence at the national level (Flynn effect).

2.2. Questions

Experts in cognitive ability research were asked to answer three questions that focused the Flynn effect. A list of possible answers followed each question. In addition, respondents could provide additional responses and written comments for each question.

The first question addressed possible causes of the Flynn effect: “In your opinion, what are the most plausible scientific theories about the Flynn-effect (Flynn-effect) in 20th century?” Predetermined answers were presented in the following order: (1) rising standard of living (wealth), (2) decline of group-inequality, (3) genetic changes, (4) better education and school-systems, (5) longer education for more people, (6) better education in families, (7) better nutrition, (8) better health, (9) smaller families, (10) TV and media, (11) computer (and similar as smartphones), (12) immigration, (13) more test experience, (14) more educated parents, and (15) more intelligent social environment. Respondents rated each factor on a scale of 1 (“not important/not true”) to 9 (“important/true”).

The second question concerned a possible end of the Flynn effect: “In your opinion, if there is an end or retrograde of the Flynn-effect in industrial nations, what are the most plausible scientific theories to explain this development?” The following options were presented: (1) decline in educational values, (2) worse education and school-systems, (3) worse education in families, (4) worse nutrition, (5) worse health, (6) low intelligent adults have more children than others (genetic effect), (7) low intelligent adults have more children than others (socialization effect), (8) TV and media, and (9) migration.” The rating scale varied between 1 (“not important/not true”) to 9 (“important/true”).

Finally, we asked participants about the future development of intelligence in different world regions. The question was: “What is your opinion on the future development of intelligence up to 2100 in listed regions? Please mark the IQ points how much average cognitive ability will increase (right side) or decrease (left side) or remain stable (0) (in today’s norms).” The predetermined scale of IQ changes consisted of 19 levels, from “–29 or less” to “+29 or more”. The world regions comprised: (1) Western countries in general, (2) Scandinavia, (3) West-Middle Europe, (4) Southern Europe, (5) Eastern Europe, (6) USA, (7) Canada, (8) Latin America, (9) Australia (10) East Asia (China, Japan, Korea), (11) Africa, (12) Arabian and Muslim countries, (13) India, and (14) Israel.

We also asked respondents, all of whom were experts on cognitive ability, if they had also done research on the Flynn effect itself: “Please

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