IQ's Generation Gap

Is intelligence reaching new heights, or is something amiss with the tests that measure it?

By BRUCE BOWER

In the Netherlands, IQ points are blooming faster than tulips. In fact, according to an analysis by political scientist James R. Flynn, the average IQ of Dutch draftees increased by 20 points in the span of one generation, from 1952 to 1982.

And the IQ increase is not just a Dutch treat. Flynn, of the University of Otago in Dunedin, New Zealand, collected data from investigators around the world whose work is largely unknown to one another. He found single-generation IQ gains ranging from 5 to 25 points in 13 other developed nations. Among these are the United States, Japan, France, Belgium, Norway, New Zealand and Canada.

If IQ tests really tap into a fundamental aspect of intelligence, says Flynn, the implications of this trend are staggering. In the Netherlands, for instance, the 30-year increase implies that about one-quarter of the population qualifies as mentally gifted, with IQs of at least 130. Those with IQs over 150 have increased almost 60-fold since 1952 — a jump that translates into 300,000 potential geniuses. "The result should be a cultural renaissance too great to be overlooked," maintains Flynn.

There are, of course, no indications of such a dramatic leap forward in thought. Instead, as Flynn explains in an upcoming book (*Measurement, Realism and Objectivity*, John Forge, Ed., Reidel Publishing Co., 1987) and in the March PSYCHOLOGICAL BULLETIN, it appears that IQ tests measure not intelligence but some form of abstract problem-solving ability that has little ultimate effect on intelligence. IQ estimates of this ability have been shown to predict real-world achievements, such as job status and performance, fairly well for siblings raised in the same family or people of the same generation who share the same cultural environment. But Flynn contends that intelligence test scores cannot bridge the cultural distance that separates generations in modern industrial societies, or, for that matter, Americans from Japanese and American whites from American blacks.

A time span of 30 years is hardly long enough for genetic changes to boost IQ scores, he notes. Furthermore, the Dutch data surprisingly reveal that three environmental factors often invoked to explain improved performance on IQ tests — more education, higher socioeconomic standing and experience in test taking — account for only about 5 of the 20 IQ points gained. Flynn concludes that most of the increase must be due to currently unknown environmental influences.

Ironically, the greatest IQ gains occurred on "culture-fair" tests that present subjects with novel problems requiring no prior experience. One such test consists of geometric patterns, each containing a gap; the correct missing piece must be chosen from six alternatives. Other tests, such as the Stanford-Binet and Wechsler that are given in the United States, have similar measures of problem-solving but also contain items on general information, vocabulary and mathematics.

"No experience required" intelligence tests have been heralded by some researchers, most notably psychologist Arthur R. Jensen of the University of California at Berkeley, as the best measure of general mental ability, or *g* for short. This is a statistical calculation of what Flynn calls "the significant tendency of those who do well on one test to excel on all mental tests," from vocabulary to number series, logical reasoning to coding digits. According to Jensen, although the true nature of *g* is far from clear, it is the best known predictor of success in school and college, in the armed forces and in business and industry. A substantial portion of *g*, in his view, is determined genetically.

Since large single-generation jumps in IQ and *g* have not been accompanied by proportional real-world achievements, Flynn says that Jensen's theory, grounded in the work of British psychologist Charles Spearman at the turn of the century, needs to be revised. Huge *g* gains from one generation to another show it is highly sensitive to the environment, and Flynn suggests that learned strategies of problem-solving picked up at school or home may play a critical role.

"I very much suspect that the Spearman-Jensen theory will not be abandoned but will find a place within a new theoretical structure," says Flynn.

Jensen's critics are often not so generous. He has been enmeshed in controversy since 1969, when he proposed in the HARVARD EDUCATIONAL REVIEW that there is a partial but significant genetic influence on persistent IQ differences between whites and blacks. Some scientists, such as Yale University's Robert J. Sternberg, charge that there is much more to "intelligence" than a single *g* factor and that Jensen has read too much into black-white differences on flawed intelligence tests.

A recent random survey of 1,027 psychologists and educators involved in mental testing found, however, that about half attributed racial IQ differences to both genes and environment. The environment as sole cause of the racial IQ

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gap was cited by 17 percent of the respondents, and 30 percent said there is insufficient evidence to reach any conclusion. Most respondents to the survey, in the spring 1986 PUBLIC INTEREST, said that although the tests are not perfect, group differences in IQ are insignificantly affected by bias in test items.

Still, the public policy implications of intelligence testing continue to generate controversy. In California, the Hispanic mother of a 14-year-old son, whose father is black, has protested a state law prohibiting IQ tests for blacks who are referred to remedial classes. She says an IQ test will help to determine if her son, who has been struggling in school lately, really needs extra academic help. A court ruling, upheld on appeal last year, holds that such tests are racially and culturally biased. In July, a member of the U.S. Commission on Civil Rights suggested a review of the California law was in order.

Flynn's cross-generational data add a new twist to the controversy. "His findings are important," says Jensen. "It appears that IQ tests have no predictive validity across generations, but within a generation they are still the best predictors of scholastic and occupational achievement." One reason for this puzzling inconsistency, he notes, is that IQ tests measure *g* on a relative, not absolute, scale. It is like measuring people's heights only on the basis of their shadows; the shadows bear some systemic relationship to actual heights, but these relationships become blurred or invalid if different people are measured at different hours of the day, different times of year or different geographic locations. "IQ tests are like the shadows in this respect," says Jensen, "except there are unknown factors that make raw scores vary across decades or generations."

But black-white group differences in IQ still hold up within the same generation, asserts Jensen. IQ scores predict scholastic and job performance equally well for both races, he says, and the same average gap of 18 points between blacks and whites shows up in each succeeding generation.

The importance of Flynn's report, according to psychologist Christopher Brand of the University of Edinburgh, Scotland, is the demonstration that "massive IQ-type gains are possible without psychologists having the foggiest idea as to their cause." But he does not write IQ tests off as trivial, since they are "the major predictor of occupational success in the United States, despite occupational psychologists having labored for decades to stress the importance of other factors."

So why do IQ scores increase markedly across generations? One answer, suggests Brand in the July 9 NATURE, may be modern educational practices that inadvertently boost performance on "culture-fair" IQ tests by encouraging speed of thought and intelligent guessing in the classroom. "Such tests are often given under time limits that hardly encourage reflection," says Brand. "[They] perhaps give a slight edge to the person who is able to rape reality rather than to cherish it." Success at this type of novel problem-solving, in his view, does not reflect accuracy of thought, attention to detail, organization and memory. It may be appropriate, however, for comparing "one victim of educational liberalism with another."

Nevertheless, adds Brand, *g* has bigger and better associations with all mental abilities and with lifetime achievements than any other measure in psychology. "All told, *g* is to psychology what carbon is to chemistry," he says.

Flynn, on the other hand, contends that the generation gap in IQ scores calls for a fundamental rethinking and reworking of mental tests to remedy defects in the current *g*. "We omit an 'intelligence factor' from our theories of human behavior at our peril," he says. "When you formulate a theory to explain the life histories of individuals and groups, your theory will lose explanatory power unless it includes a mental ability or abilities distinct from memory and learning." □

switching from liquid-helium to liquid-nitrogen cooling, which could save in yearly cooling costs, although the change probably wouldn't cut costs substantially in the million-dollar machines. The high-temperature superconductors would, however, be expected to make the systems generally more available, says John Stekley of Intermagnetics General in Guilderland, N.Y., which manufactures MRI systems. These systems, which create high-resolution images of soft tissue in the body, would not be greatly enhanced by the higher fields that can be obtained by the new superconductors, he says.

• *Biomagnetism:* Cooling with liquid nitrogen would enable researchers in this discipline, which uses SQUIDs to study magnetic fields in the body, to replace a bulky liquid-helium container system with a more flexible liquid-nitrogen system. This would allow closer placement of sensors to various parts of the body, thus increasing sensitivity.

Because so many questions about high-temperature superconductivity remain, the man who made the early investment in yttrium may someday wonder what possessed him to do so. On the other hand, it may turn out that the people who laughed at him are the ones who end up pouring his champagne. □