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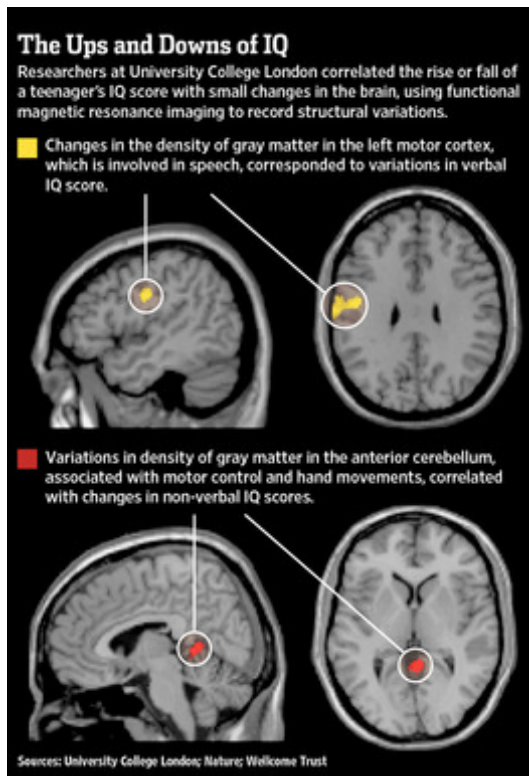
## As Brain Changes, So Can IQ

*Study Finds Teens' Intellects May Be More Malleable Than Previously Thought*

By ROBERT LEE HOTZ

A teenager's IQ can rise or fall as many as 20 points in just a few years, a brain-scanning team found in a study published Wednesday that suggests a young person's intelligence measure isn't as fixed as once thought.

The researchers also found that shifts in IQ scores corresponded to small physical changes in brain areas related to intellectual skills, though they weren't able to show a clear cause and effect.



University College London; Nature

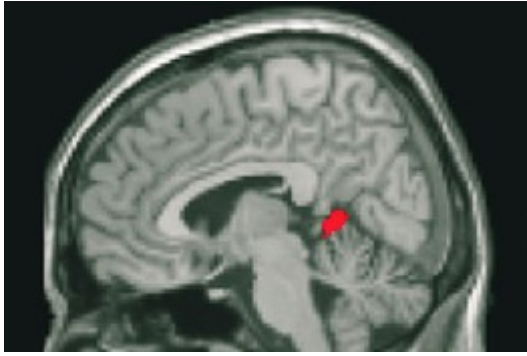
"If the finding is true, it could signal environmental factors that are changing the brain and intelligence over a relatively short period," said psychologist Robert Plomin at Kings College in London, who studies the genetics of intelligence and wasn't involved in the research. "That is quite astounding."

Long at the center of debates over how intelligence can be measured, an IQ score—the initials stand for "intelligence quotient"—typically gauges mental capacity through a battery of standardized tests of language skill, spatial ability, arithmetic, memory and reasoning. A score of 100 is considered average. Barring injury, that intellectual capacity remains constant throughout life, most experts believe.

But the new findings by researchers at University College London, reported online in *Nature*, suggest that IQ, often used to predict school performance and job prospects, may be more malleable than previously believed—and more susceptible to outside influences, such as tutoring or neglect.

"A change in 20 points is a huge difference," said the team's senior researcher, Cathy Price, at the university's Wellcome Trust Centre for Neuroimaging. Indeed, it can mean the difference between being rated average and being labeled gifted

—or, conversely, being categorized as substandard.



Nature, University College London

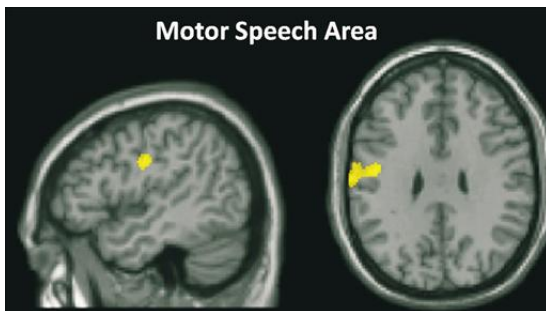
Researchers found that dramatic changes in verbal IQ corresponded to changes in an area of the brain associated with speech, whereas nonverbal IQ changes were related to an area involved in hand movements.

To better understand intelligence, Dr. Price and her colleagues studied 33 healthy British teenagers whose IQ scores initially ranged from 80 to 140. They tested the volunteers on standardized intelligence exams in 2004 and again in 2008, to encompass the peak years of their adolescence, while monitoring subtle changes in brain structure using functional magnetic resonance imaging.

By analyzing verbal and nonverbal IQ performance separately, the researchers discovered that these fundamental facets of intelligence could change markedly, even in cases when an overall composite IQ score remained relatively constant.

"One fifth of them jumped one way or the other," Dr. Price said. One teenager's verbal IQ score rose to 138 at age 17 from 120 at age 13, while her nonverbal IQ dropped to a below-

average score of 85 from 103. Another's verbal IQ soared to 127 from 104 in four years, while his nonverbal performance stayed the same.



A teenager's IQ can rise or fall up to 20 points in just a few years, in a finding that pinpoints unexpected variations in a measure of intelligence often used to predict school performance and job prospects. Robert Lee Hotz explains on The News Hub.

The rise or fall in verbal IQ scores appeared to be connected to changes in an area of the brain associated with speech, whereas shifts in nonverbal IQ related to an area involved in motor control and hand movements.

In recent years, scientists have determined that experience can readily alter the brain, as networks of neural synapses bloom in response to activity or wither with disuse. Expert musicians, circus jugglers and London cab drivers studying maps—even Colombian guerrillas learning to read—have all shown brain changes linked to practice, several brain imaging studies have reported. But until now, researchers had considered general intelligence too basic to be affected by such relatively small

neural adjustments. Dr. Price and her colleagues don't know what caused the changes in both the brain and the scores they documented, but speculated they could be a result of learning experiences.

Several brain specialists said the changes could just as plausibly reflect the pace of normal growth, and shifts in scores could be due to inconsistent test performance.

The varying IQ scores could also indicate the test itself is flawed. "It could be a real index of how intelligence varies or it could suggest our measures of intelligence are so variable," said neuroimaging pioneer B.J. Casey at Cornell University's Weill Medical College, who wasn't involved in the study.

The size of the study was too small to warrant broad conclusions about adolescence and learning, a time when the brain is normally in flux, experts said. Studies seeking the genetic origins of intelligence, for example, have encompassed thousands of test subjects across decades yet have been unable to conclusively identify the genes that shape intelligence, said Dr. Plomin, the Kings College psychologist.

Other experts were confident the IQ variations were evidence of the neural impact of experience, for better or worse.

"An important aspect of the results is that cognitive abilities can increase or decrease," said Oklahoma State University psychometrician Robert Sternberg, a past president of the American Psychological Association who wasn't part of the study. "Those who are mentally active will likely benefit. The couch potatoes among us who do not exercise themselves intellectually will pay a price."

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