# Models of Intelligence

### Controversy Warning

There are many controversies surrounding the use of IQ tests to identify people with more potential for success or to label people as “gifted” or “needing help.” In the past, the IQ test has been used to promote racist philosophies and practices such as forced sterilization and ethnic cleansing. Along with people questioning the motivations and the history of IQ tests, many question their efficacy and propose that the idea of intelligence is only relevant in certain cultural climates. While there are many detractors of the concept of intelligence and the use of IQ tests in education and the workplace, there are many who promote it as a valid way of identifying those who are gifted as well as measuring progress in those who struggle with mental health disorders. Being the only measure we have of intelligence that reliably predicts long-term success, the IQ test is widely accepted as the most useful and accurate tool we currently have in the education system as an indicator of academic potential and to predict long-term success.

**Summary**

Many models of intelligence have been proposed, including the ideas of general intelligence, triarchic intelligence, and multiple intelligences. The most prevalent and research-based model of intelligence recognized in psychology today is that which is measured by the Intelligence Quotient Test.

Intelligence Quotient (IQ) is a commonly used measure of cognitive ability, which compares an individual's cognitive ability to that of their peers. Historically, IQ scores were calculated by dividing an individual's mental age by their chronological age and then multiplying the quotient by 100. However, this method is no longer in widespread use, and IQ scores are now typically derived from standardized tests, with scores being adjusted to reflect the average score of the population. While IQ scores have been used to predict school and job performance, there have been criticisms that the tests do not measure innate intelligence and may be influenced by factors such as socioeconomic background and cultural bias. IQ tests are far from perfect and researchers often struggle to understand exactly what they measure and how to define “intelligence,” but what they do measure provides much useful information to both psychologists and educators alike.

The construct of general intelligence refers to an individual's ability to acquire and retain knowledge, as well as to apply problem-solving strategies. This construct is often divided into two subtypes, as proposed in the Cattell-Horn-Carroll Theory of Intelligence. These subtypes are fluid intelligence and crystallized intelligence. Fluid intelligence is associated with the ability to reason, comprehend, and solve problems without relying on prior knowledge or experiences. Crystallized intelligence, on the other hand, pertains to the ability to recall and utilize previously acquired knowledge and skills.

Fluid intelligence is thought to be related to cognitive processes such as pattern recognition and abstract reasoning, and it is believed to decline with age. However, some studies have suggested that fluid intelligence can be improved through specific training. Crystallized intelligence, which is related to education, experience, and cultural background, is believed to peak at an older age and to decline later in life.

It is worth noting that in many tasks, both fluid intelligence and crystallized intelligence are utilized together. For example, solving a novel problem requires fluid intelligence, but may also require the recall of how to use a tool, which requires crystallized intelligence. Additionally, the use of fluid intelligence leads to the creation of crystallized intelligence by learning new information and gaining new experiences.

### Sources

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### Connections to Education

* Each teacher should have a basic understanding of the different theories of intelligence and why it is useful to understand in education. One teacher might recognize for example that her student George already has a great deal of previous knowledge on the topic of United States history while her student Mary does not. What she may not realize is that George’s mother is a history teacher and often watches documentaries at home. This has led to George having a great deal of crystallized intelligence on the topic. Mary on the other hand has never been exposed to history before but is eager to learn and can pick up on the material quickly due to her high level of fluid intelligence. If the teacher is unaware of the difference between crystallized and fluid intelligence, she may mistakenly believe that George is more “gifted” than Mary and may neglect to give Mary the attention necessary for her to use her gifts to learn the material.
* When it comes to IQ tests, each teacher should be aware of the strengths and weaknesses of the tests. An understanding of what they can and cannot tell us is essential to giving every child the help they need to excel in their education.

### Current Events in Education

* In 2006 Carol Dweck published a book pioneering the idea of how mindset can affect the way we learn. She says that the most important factor in successful learning is whether we believe that we can do it. She calls this “growth mindset” vs. “fixed mindset.” Currently, many educators believe that instead of focusing so much on test scores and measured intelligence, we should be trying to teach our students to change their mindset to make learning possible.
* There continues to be a heated debate over the use of IQ tests in the education system. They are traditionally used to identify gifted students and students in need of extra help. Generally, teachers decide which students they think might be gifted and recommend them for IQ testing. This can present many problems due to possible teacher biases and their stereotyping of students based on race, economic status, etc. Some school districts have begun to administer these tests to all students rather than based on teacher recommendations. Reportedly, this has led to many students having a chance in gifted programs who would not otherwise have been recommended.

### Vocabulary

* Intelligence Quotient: a test used to compare one’s intelligence to that of his/her peers.
* Fluid intelligence: The ability to solve novel problems.
* Crystallized intelligence: One’s overall sum of knowledge.
* General intelligence: The ability to apply and retain knowledge, broken into fluid and crystallized components.

### Key Thinkers

* Raymund Bernard Cattell (20 March 1905 – 2 February 1998) was the originator of the theory of fluid and crystallized intelligence, named the Cattell-Horn theory of intelligence. He was one of the most prolific psychologists of his time and is still widely cited today. He was born in England and earned a BSc degree in chemistry and a PhD in Psychology at King’s College, London. He later moved to the United States and was a professor at Harvard University and the University of Illinois. He died in Hawaii after retiring.
* John L Horn (September 7, 1928 – August 18, 2006) was a Ph.D. student of Raymund Cattell at the University of Illinois. He researched to further develop Cattell’s theory of intelligence. He proposed many factors that contribute to intelligence such as auditory, visual, and quantitative factors.
* Alfred Binet and Theodore Simon were two French scientists who were asked to create a test identifying children who needed to be placed in special education classrooms. They developed a test that involved tasks of increasing difficulty that measured the mental age of the child. If the child was found to have a below-average mental age they were put into a special education program. This test called the Binet-Simon test, was the first iteration of what would later become known as the intelligence quotient test.

### Summary

There are many different ways to define and measure intelligence. The most common way of measuring is with intelligence quotient (IQ) tests. These tests measure someone’s intelligence in comparison to those of other people. Raymond Catell and John Horn developed the theory that general intelligence is divided into two parts: fluid intelligence and crystallized intelligence. Fluid intelligence is the ability to recognize patterns and use them to solve problems that one has not encountered before. Crystallized intelligence is the amount of concrete knowledge that one has acquired throughout their life. The two types of intelligence are both necessary and are often used together.

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