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I INTRODUCTION

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Intelligence, term usually referring to a general mental capability to reason, solve problems, think abstractly, learn and understand new material, and profit from past experience. Intelligence can be measured by many different kinds of tasks. Likewise, this ability is expressed in many aspects of a person's life. Intelligence draws on a variety of mental processes, including [memory](#), [learning](#), [perception](#), decision-making, thinking, and reasoning.

II DEFINING INTELLIGENCE

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Most people have an intuitive notion of what intelligence is, and many words in the English language distinguish between different levels of intellectual skill: *bright, dull, smart, stupid, clever, slow*, and so on. Yet no universally accepted definition of intelligence exists, and people continue to debate what, exactly, it is. Fundamental questions remain: Is intelligence one general ability or several independent systems of abilities? Is intelligence a property of the brain, a characteristic of behavior, or a set of knowledge and skills?

The simplest definition proposed is that intelligence is whatever intelligence tests measure. But this definition does not characterize the ability well, and it has several problems. First, it is circular: The tests are assumed to verify the existence of intelligence, which in turn is measurable by the tests. Second, many different intelligence tests exist, and they do not all measure the same thing. In fact, the makers of the first intelligence tests did not begin with a precise idea of what they wanted to measure. Finally, the definition says very little about the specific nature of intelligence.

Whenever scientists are asked to define intelligence in terms of what

causes it or what it actually is, almost every scientist comes up with a different definition. For example, in 1921 an academic journal asked 14 prominent psychologists and educators to define intelligence. The journal received 14 different definitions, although many experts emphasized the ability to learn from experience and the ability to adapt to one's environment. In 1986 researchers repeated the experiment by asking 25 experts for their definition of intelligence. The researchers received many different definitions: general adaptability to new problems in life; ability to engage in abstract thinking; adjustment to the environment; capacity for knowledge and knowledge possessed; general capacity for independence, originality, and productiveness in thinking; capacity to acquire capacity; apprehension of relevant relationships; ability to judge, to understand, and to reason; deduction of relationships; and innate, general cognitive ability.

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People in the general population have somewhat different conceptions of intelligence than do most experts. Laypersons and the popular press tend to emphasize cleverness, common sense, practical problem solving ability, verbal ability, and interest in learning. In addition, many people think social competence is an important component of intelligence.

Most intelligence researchers define intelligence as what is measured by intelligence tests, but some scholars argue that this definition is inadequate and that intelligence is whatever abilities are valued by one's culture. According to this perspective, conceptions of intelligence

vary from culture to culture. For example, North Americans often associate verbal and mathematical skills with intelligence, but some seafaring cultures in the islands of the South Pacific view spatial memory and navigational skills as markers of intelligence. Those who believe intelligence is culturally relative dispute the idea that any one test could fairly measure intelligence across different cultures. Others, however, view intelligence as a basic cognitive ability independent of culture.

In recent years, a number of theorists have argued that standard intelligence tests measure only a portion of the human abilities that could be considered aspects of intelligence. Other scholars believe that such tests accurately measure intelligence and that the lack of agreement on a definition of intelligence does not invalidate its measurement. In their view, intelligence is much like many scientific concepts that are accurately measured well before scientists understand what the measurement actually means. Gravity, temperature, and radiation are all examples of concepts that were measured before they were understood.

III MEASURING INTELLIGENCE

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The first intelligence tests were short-answer exams designed to predict which students might need special attention to succeed in school. Because intelligence tests were used to make important decisions about people's lives, it was almost inevitable that they would become controversial. Today, intelligence tests are widely used in education, business, government, and the military. However, psychologists continue to debate what the tests actually measure and how test results should be used.

A Early Tests

Interest in measuring individual differences in mental ability began in the late 19th century. [Sir Francis Galton](#), a British scientist, was

among the first to investigate these differences. In his book *Heredity and Genius* (1869), he compared the accomplishments of people from different generations of prominent English families. No formal measures of intelligence existed at the time, so Galton evaluated each of his subjects on their fame as judged by encyclopedia entries, honors, awards, and similar indicators. He concluded that eminence of the kind he measured ran in families and so had a hereditary component. Believing that some human abilities derived from hereditary factors, Galton founded the [eugenics](#) movement, which sought to improve the human species through selective breeding of gifted individuals.

Between 1884 and 1890 Galton operated a laboratory at the South Kensington Museum in London (now the Victoria and Albert Museum) where, for a small fee, people could have themselves measured on a number of physical and psychological attributes. He tried to relate intellectual ability to skills such as reaction time, sensitivity to physical stimuli, and body proportions. For example, he measured the highest and lowest pitch a person could hear and how well a person could detect minute differences between weights, colors, smells, and other physical stimuli. Despite the crude nature of his measurements, Galton was a pioneer in the study of individual differences. His work helped develop statistical concepts and techniques still in use today. He also was the first to advance the idea that intelligence can be quantitatively measured.

In the 1890s American psychologist [James McKeen Cattell](#), who worked with Galton in England, developed a battery of 50 tests that attempted to measure basic mental ability. Like Galton, Cattell focused on measurements of sensory discrimination and reaction times. Cattell's work—and by association, Galton's—was unsupported in 1901, when a study showed that the measurements had no correlation with academic achievement in college. Later researchers, however, pointed out that Cattell's test subjects were limited to Columbia University students, whose high academic performance was not representative of the general population. Better-designed tests given

to broader samples have shown that reaction time and processing speed on perceptual tasks do correlate with academic achievement.

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