A vertical spiral binding on the left side of a notebook, with the metal wire looping through a series of holes in a brown cover. The notebook pages are a light beige color.

Chapter 8

Intelligence (only)

Measuring Intelligence: A Brief History

- **Intelligence tests** were invented a little over 100 years ago by **1 (last name)** in order to identify mentally subnormal children in a way to avoid complete reliance on teachers evaluations which might often be **2** and biased.
- Theodore Simon created the first useful test of general **3** ability that was capable of predicting children's performance in school fairly well. This **Binet-Simon Scale** gave a score a child's **4 (2 words)**. **Mental age** indicated that a child displayed a mental ability typical of a child that **5** age (i.e., a child may have a mental age of 10, even though s/he is 6 years old)

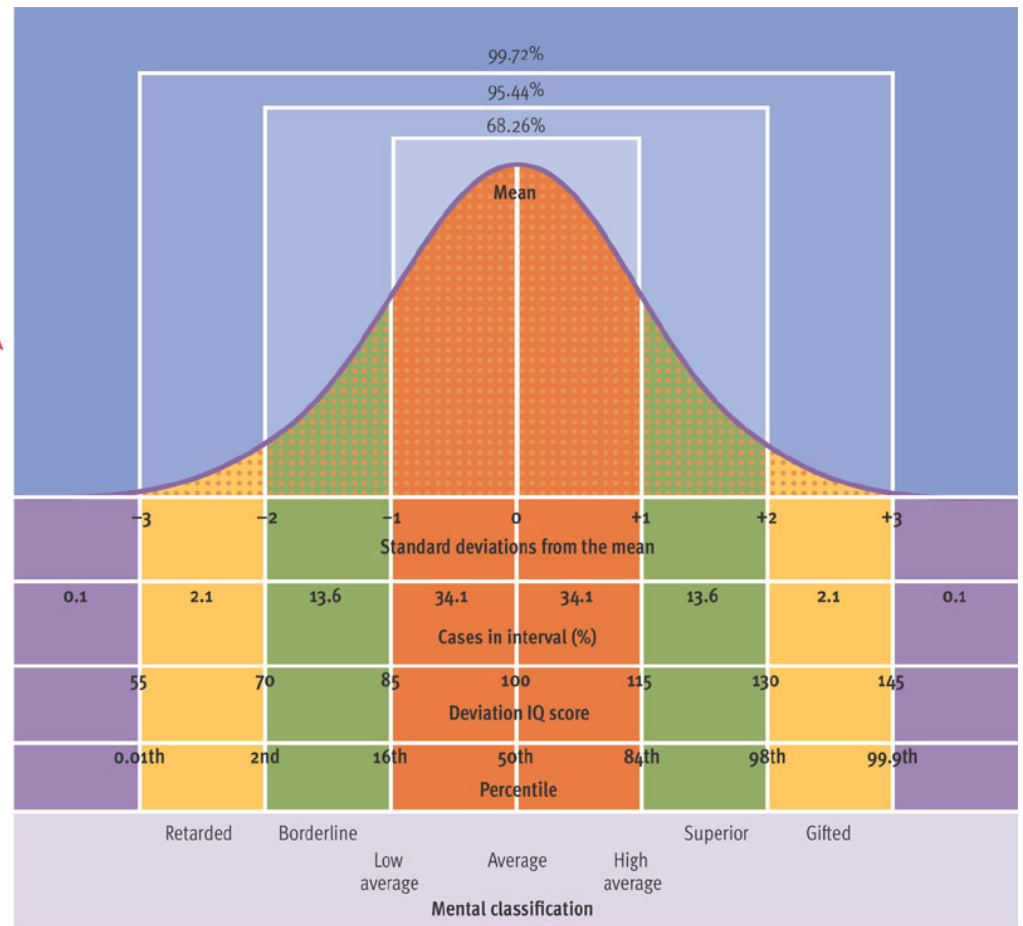
Measuring Intelligence: A Brief History

- **Terman** devised “**IQ**” or **6 (2 words)** from the formula:
 $(\text{Mental Age} \div \text{Chronological Age}) \times 100$
 - Therefore if one’s **Mental and Chronological age** is the same one’s IQ would be **# (7)**.
- **David Wechsler** created the first high-quality intelligence test designed specifically for **8**. It is still used today and is called the **Wechsler Adult Intelligence Scale** or **9**, for short.
- Wechsler improved IQ testing by:
 - making a distinction between **10** and non-verbal ability
 - basing his scoring scheme around the **11 (2 words)**.

The Normal Distribution: Interpreting the Modern IQ

- The normal distribution is a symmetrical **“12 (2 words)”** curve that represents the pattern in which many characteristics (including intelligence scores) are distributed across the population.
 - If IQ scores are **“normal”** then most scores are found around the middle of the distribution (the average score, the **50 percentile**).
 - For **13 IQ** tests the average or “mean” score at 100 points and the standard deviation at 15.
 - A **14 score** indicates the percentage of people who score **at or 15** the score one has obtained.

Number of cases ↑



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The Normal Distribution.

Many characteristics are distributed in a pattern represented by this bell-shaped curve. The horizontal axis shows how far above or below the mean a score is (measured in plus or minus standard deviations). The vertical axis is used to graph the number of cases obtaining each score. In a normal distribution, the cases are distributed in a fixed pattern. For instance, 68.26% of the cases fall between +1 and -1 standard deviation. Modern IQ scores indicate where a person's measured intelligence falls in the normal distribution. On most IQ tests, the mean is set at an IQ of 100 and the standard deviation at 15. Any deviation IQ score can be converted into a percentile score.

Reliability and Validity of Intelligence Tests

- A 16 test is one that yields similar results each time it is repeated. For example, if you scored 120 on an IQ test each time you took it...it is a “reliable test”.
- It is important to understand that just because a test is reliable does not make it “meaningful” or “accurate”.
- A **meaningful test** is called “**Valid**”. Specifically, 17 refers to the ability of a test to measure what it is designed to measure. For example, if an IQ test correctly predicts future performance in school, it could be said that this test is valid.
- **Sternberg** has argued IQ tests should be valid measures of at least 3 kinds of intelligence: **Verbal, Practical, & Social**, but most only measure 18 intelligence.

Heredity & Environment as Determinants of Intelligence

Heredity

- The average **correlation** for identical twins is very high. This indicates that identical twins tend to be quite **19** in intelligence, While slightly lower, the correlations remain strong even if twins are reared apart.
- Based on research of how similar the IQs are of related and non-related persons, scientists have suggested that the **heritability** of IQ (what percent of intelligence is inherited) is about **20 (#-percentage)%** at the “high end”.

Environment

- There is plenty of evidence that the way one is brought up affects intelligence as well. The **21 (2 words) hypothesis** suggests that children who are raised in substandard circumstances should experience a decrease in IQ as they grow older. Conversely, if children are raised in an “enriched” environment they will benefit. Research generally supports both of these.

Heredity & Environment as Determinants of Intelligence

- **Interaction**

- The current thinking is that heredity may set certain limits on intelligence and that environmental factors determine where individuals fall within these limits. That is, genetic makeup places an 22 limit on a person's IQ that can't be exceeded even when environment is ideal.
- Also there is a lower limit on IQ even if environment is a deprived one.
- The concept of the 23 range refers to genetically determined limits on IQ (or other traits).

- **Kamin and others** disagree with **Arthur Jensen**. They argue that the cultural differences seen in IQ scores, are not caused by genetic differences.

- Socioeconomic Disadvantage: Many scientists argue that minority students IQ scores are depressed because these children tend to grow up in 24 (2-words) that create a disadvantage— both in school and on IQ tests.

New Directions in the Assessment & Study of Intelligence

- Exploring **Biological Indexes of Intelligence**

- Researchers have been exploring the relationship betw intelligence and specific brain characteristics..
- Researchers have found intriguing correlations btw the volume/density of specific areas (prefrontal cortex, gray matter volume) and intelligence.
- The findings have been embraced by those who tout the _25_ of intelligence. However... research has has demonstrated that an -26_ environment can produce more dense neural networks and heavier brains!

- **Both Robert Sternberg and Howard Gardner have suggested that there are a variety of kinds of intelligence.**

- In the most recent extension of **Sternberg's triarchic theory of human intelligence**, he has asserted that there are three aspects or facets of intelligence— 27, 28 and 29 intelligences.
- **Gardner** suggests the existence of a number of relatively independent human intelligences. He has concluded humans exhibit 30 (#) intelligences: **Logical-Mathematical, linguistic, musical, spatial, bodily-kinesthetic, interpersonal, intrapersonal, & naturalist.** There has been little research investigating Gardner's theory however.

Table 8.4 Gardner's Eight Intelligences

Intelligence	End-States	Core Components
Logical-mathematical	Scientist Mathematician	Sensitivity to, and capacity to discern, logical or numerical patterns; ability to handle long chains of reasoning
Linguistic	Poet Journalist	Sensitivity to the sounds, rhythms, and meanings of words; sensitivity to the different functions of language
Musical	Composer Violinist	Abilities to produce and appreciate rhythm, pitch, and timbre; appreciation of the forms of musical expressiveness
Spatial	Navigator Sculptor	Capacities to perceive the visual-spatial world accurately and to perform transformations on one's initial perceptions
Bodily-kinesthetic	Dancer Athlete	Abilities to control one's body movements and to handle objects skillfully
Interpersonal	Therapist Salesperson	Capacities to discern and respond appropriately to the moods, temperaments, motivations, and desires of other people
Intrapersonal	Person with detailed, accurate self-knowledge	Access to one's own feelings and the ability to discriminate among them and draw upon them to guide behavior; knowledge of one's own strengths, weaknesses, desires, and intelligences
Naturalist	Biologist Naturalist	Abilities to recognize and categorize objects and processes in nature

SOURCE: Adapted from Gardner, H., & Hatch, T. (1989). Multiple intelligences go to school: Educational implications of the theory of multiple intelligences. *Educational Researcher*, 18 (8), 4–10. American Educational Research Association. Additional information from Gardner, 1998.