

1. TALK	draw	eat	speak	sleep
2. PERMIT	allow	sew	cut	drive
3. PARDON	forgive	pound	divide	tell
4. COUCH	pin	eraser	sofa	glass
5. REMEMBER	swim	recall	number	defy
6. TUMBLE	drink	dress	fall	think
7. HIDEOUS	silvery	tilted	young	dreadful
8. CORDIAL	swift	muddy	leaky	hearty
9. EVIDENT	green	obvious	skeptical	afraid
10. IMPOSTER	conductor	officer	book	pretender
11. MERIT	deserve	distrust	fight	separate
12. FASCINATE	welcome	fix	stir	enchant
13. INDICATE	defy	excite	signify	enchant
14. IGNORANT	red	sharp	uninformed	precise
15. FORTIFY	submerge	strengthen	vent	deaden
16. RENOWN	length	head	fame	loyalty
17. NARRATE	yield	buy	associate	tell
18. MASSIVE	bright	large	speedy	low
19. HILARITY	laughter	speed	grace	malice
20. SMIRCHED	stolen	pointed	remade	soiled
21. SQUANDER	tease	belittle	cut	waste
22. CAPTION	drum	ballast	heading	ape
23. FACILITATE	help	turn	strip	bewilder
24. JOCOSE	humorous	paltry	fervid	plain
25. APPRISE	reduce	strew	inform	delight
26. RUE	eat	lament	dominate	cure
27. DENIZEN	senator	inhabitant	fish	atom
28. DIVEST	dispossess	intrude	rally	pledge

13. INDICATE	defy	excite	signify	bicker
14. IGNORANT	red	sharp	uninformed	precise
15. FORTIFY	submerge	strengthen	vent	deaden
16. RENOWN	length	head	fame	loyalty
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23. FACILITATE	help	turn	strip	bewilder
24. JOCOSE	humorous	paltry	fervid	plain
25. APPRISE	reduce	strew	inform	delight
26. RUE	eat	lament	dominate	cure
27. DENIZEN	senator	inhabitant	fish	atom
28. DIVEST	dispossess	intrude	rally	pledge
29. AMULET	charm	orphan	dingo	pond
30. INEXORABLE	untidy	invincible	rigid	sparse
31. SERRATED	dried	notched	armed	blunt
32. LISSOM	moldy	loose	supple	convex
33. MOLLIFY	mitigate	direct	pertain	abuse
34. PLAGIARIZE	appropriate	intend	revoke	maintain
35. ORIFICE	brush	hole	building	late
36. QUERULOUS	maniacal	curious	devout	complaining
37. PARIAH	outcast	priest	lentil	locker
38. ABET	waken	ensue	incite	placate
39. TEMERITY	rashness	timidity	desire	kindness
40. PRISTINE	sound	first	level	vain

(1) 1 2 3 4 5 _
(2) White black short long down _ _
(3) AB BC CD D _
(4) Z Y X W V U _
(5) 12321 23432 34543 456 _
(6) NE/SW SE/NW E/W N/_
(7) escape scape cape _ _ _
(8) oh ho rat tar mood _ _ _ _
(9) A Z B Y C X D _
(10) tot tot bard drab 537 _ _ _
(11) mist is wasp as pint in tone _ _
(12) 57326 73265 32657 26573 _ _ _ _
(13) knit in spud up both to stay _ _
(14) Scotland landscape scapegoat _ _ _ _ _ ee
(15) surgeon 1234567 snore 17635 rogue _ _ _ _ _
(16) tam tan rib rid rat raw hip _ _ _
(17) tar pitch throw saloon bar rod fee tip end plank _ _ _ _ _ meals
(18) 3124 82 73 154 46 13 _
(19) lag leg pen pin big bog rob _ _ _
(20) two w four r one o three _

Shipley Hartford IQ Norms		
Abstraction	Vocab + Abstraction	IQ
40	80	136
38	75	131
34	67	121
32	61	115
28	54	105
26	50	100
24	46	95
18	39	85

Constructing an Intelligence Test	
As France moved in the direction of universal education and away from an education for the privileged there developed a need to distinguish children who were in need of remedial help in special classes.	
<ul style="list-style-type: none"> Why not have parents who know their children best, make decision? Why not have teachers do this? IQ test has always been excellent at trying to even the playing field for those who are tested 	
Alfred Binet and Theophile Simon 1905	
<ul style="list-style-type: none"> Strategy was to use sample "school" items to predict ability to do school work. Chose items that did not reflect formal learning but rather "natural intelligence" that would be in the experience of the average person. Assumed that natural intelligence grew with age and that items could be age graded. Concept of Mental Level and Mental Age. 	

Measures of Intelligence

Mental Age

- Lewis Terman and the Stanford Binet 1916, added IQ formula:
- $IQ = MA/CA \times 100$ Example ($12/10 \times 100 = 120$)
 - Average IQ = 100, MA = CA, person performing at his mental age level
 - Below Average IQ MA < CA
 - Above Average IQ MA > CA

Measure	Child 1	Child 2	Child 3	Child 4
Mental age (MA)	6 years	6 years	9 years	12 years
Chronological age (CA)	6 years	9 years	12 years	9 years
$IQ = \frac{MA}{CA} \times 100$	$\frac{6}{6} \times 100 = 100$	$\frac{6}{9} \times 100 = 67$	$\frac{9}{12} \times 100 = 75$	$\frac{12}{9} \times 100 = 133$

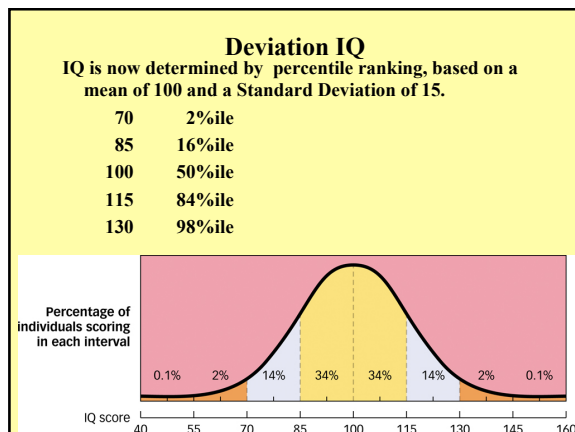


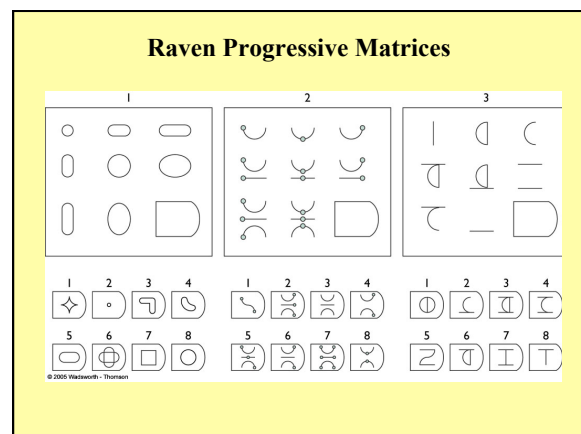
TABLE 9.1 Examples of the Types of Items on the Stanford-Binet Test

Age	Sample Test Item
2	Test administrator points at pictures of everyday objects and asks, "What is this?" "Here are some pegs of different sizes and shapes. See whether you can put each one into the correct hole."
4	"Why do people live in houses?" "Birds fly in the air; fish swim in the ____."
6	"Here is a picture of a horse. Do you see what part of the horse is missing?" "Here are some candies. Can you count how many there are?"
8	"What should you do if you find a lost puppy?" "Stephanie can't write today because she twisted her ankle. What is wrong with that?"
10	"Why should people be quiet in a library?" "Repeat after me: 4 8 3 7 1 4."
12	"What does regret mean?" "Here is a picture. Can you tell me what is wrong with it?"
14	"What is the similarity between high and low?" "Watch me fold this paper and cut it. Now, when I unfold it, how many holes will there be?"
Adult	"Make up a sentence using the words celebrate, reverse, and disappointment." "What do people mean when they say, 'People who live in glass houses should not throw stones'?"

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WAIS
Provides an overall IQ as well as:

Test	Description	Example
Verbal scale		
Information	Tests general range of information	On what continent is France?
Comprehension	Tests understanding of social conventions and ability to evaluate past experience	Why are children required to go to school?
Arithmetic	Tests arithmetic reasoning through verbal problems	I have many hours left to take to drive 150 miles at 30 miles per hour?
Similarities	Asks to what way certain objects or concepts are similar; measures abstract thinking	How are a calculator and a typewriter alike?
Digit span	Tests attention and rote memory by orally presenting series of digits to be repeated forward or backward	Repeat the following numbers backward: 2 4 3 1 8 6
Vocabulary	Tests ability to define increasingly difficult words	What does audacity mean?
Performance scale		
Digit symbol	Tests speed of learning through timed coding tasks in which numbers must be associated with marks of various shapes	Shows: 1 2 3 4 7 4 3 2 Fill in: [] [] [] [] [] [] [] []
Picture completion	Tests visual alertness and visual memory through presentation of an incompletely drawn figure; the missing part must be discussed and named	Tell me what is missing: [Image of a windmill with a missing part]
Block design	Tests ability to generate and analyze patterns by perceiving designs that must be copied with blocks	Assemble blocks to match this design: [Image of a 3x3 block design]
Picture arrangement	Tests understanding of social situations through a series of comic strip-type pictures that must be arranged in the right sequence to tell a story	Put the pictures in the right order: [Image of a comic strip sequence]
Object assembly	Tests ability to deal with part-whole relationships by perceiving puzzle pieces that must be assembled to form a complete object	Assemble the pieces into a complete object: [Image of puzzle pieces forming a bird]



Intelligence Test

Count the F's in the sentence. Count them ONLY ONCE; do not go back and count them again. 15 seconds.

FINISHED FILES ARE THE RESULT OF YEARS OF SCIENTIFIC STUDY COMBINED WITH THE EXPERIENCE OF YEARS.

Results

- 2 F's below average
- 3 F's Average
- 4 F's Above Average
- 5 F's Superior
- 6 F's Genius

The Structure of Intelligence

One of the first questions posed for new test was: Is intelligence composed of a single factor that pervades all tests of mental ability or are there many types of intelligence?

Spearman's psychometric approach:

- To test the hypothesis, Spearman measured how well people performed on a diverse selection of mental tasks to determine if the level of performance on one task was correlated positively with level of performance on all of the others.

Two-factor theory of intelligence, "g" and "s"

- "g" stood for general ability that was indicated by the strong correlations people showed from one task to the next
- However, correlation not perfect so posited an "s" factor which suggested that specific skills that were called for in each task helped people who had those skills do better.

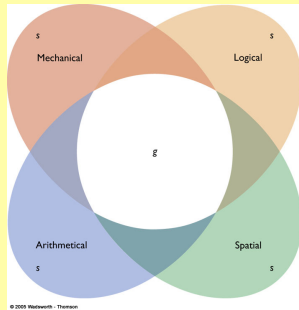


Figure 9.3 According to Spearman (1904), all intelligent abilities have an area of overlap, which he called (for “general”). Each ability also depends partly on an s (for “specific”) factor.

The “g” Factor

Charles Spearman - All cognitive abilities share an important core factor or “g” for general ability.

The report cards of Charles Spearman's children.

	Tom	Dick	Harry
Mathematics	B	C	A-
English	B-	C+	A
Chemistry	B+	C-	A
Sociology	B	C	A+
Classics	B-	C-	A+
Psychology	B	C+	A
Physics	B+	C	A
Anthropology	B	C+	A-
German	B+	C	A

Structure of Intelligence

L.L. Thurstone - Intelligence is composed of a number of distinct abilities.

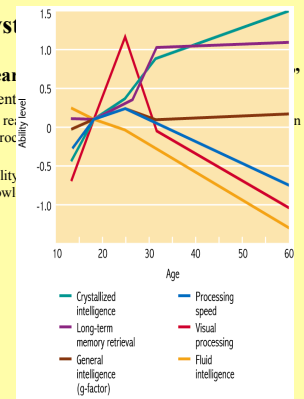
The report cards of L. L. Thurstone's children.

	Tom	Dick	Harry
Mathematics	B	A	C-
English	A-	B+	A
Chemistry	B+	A	C
Sociology	C	C	A+
Classics	A-	B-	A+
Psychology	C	C+	A
Physics	B+	A	C
Anthropology	C	C+	A
German	A+	B	A

Fluid versus Crystallized Intelligence

Raymond Cattell modified Spearman's theory.

- The “g” factor has two components:
 - Fluid Intelligence** - involving rapid mental processing. Refers to mental processing that develops slowly from age 20).
 - Crystallized Intelligence** - ability to solve problems using knowledge acquired from experience.



Fluid and Crystallized Intelligence

A 16-year-old learns to play chess and quickly becomes proficient enough to be accepted into the school's chess club. Is this fluid or crystallized intelligence?

Ten years later, the chess player achieves grandmaster status. Is this a result of fluid or crystallized intelligence?

You discover you have cancer and you want the best care you can get? You have a choice of two doctors. James, 32, who graduated from Medical School 5 years ago, and Dillon, 53, who has worked with cancer patients for 18 years. Which one would you choose and why?

What is “g”

Spearman referred to his theory as “monarchic” because the dominant ability of “g” rules over all of the others, the lesser “s” abilities.

But what is “g”? Here are some definitions of intelligence from psychologists:

- The mental abilities that enable one to adapt to, shape or select one's environment.
- The ability to judge, to comprehend, and to reason.
- The ability to understand and deal with people, objects and symbols.
- The ability to act purposefully, think rationally and deal effectively with the environment.

Many psychologists are not sure what intelligence actually is, and are not satisfied with the tests that are in current use.

What is Intelligence

Gardner's theory of multiple intelligences

- Criticized the concept of "g" by pointing out that only basis for it is that mental tests are correlated. It may be that researchers avoided testing mental functions that did not correlate because that would suggest there was not an underlying unifying factor to intelligence.

Gardner believes that the definition of intelligence should be expanded to other mental abilities and if this is done it seems that people who excel in one area may lack knowledge and skill in another.

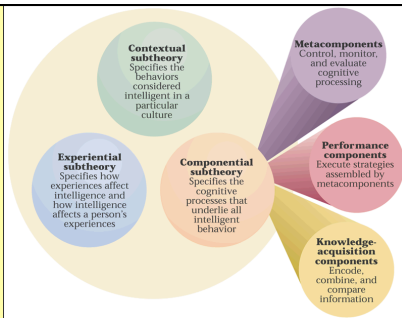
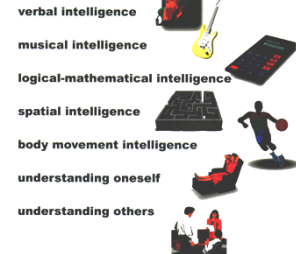
- There is little research to date to support this view, though it makes a good deal of intuitive sense. Problem is that many of his intelligences correlate rather well.
- A second problem is that what he calls intelligences oftentimes does not meet people's understanding of what is "intelligent" behavior.

Howard Gardner

believed "g" too narrowly defined. Leaves out many other equally legitimate mental skills. **Intelligence** is composed of a variety of unrelated forms of multiple-intelligence.

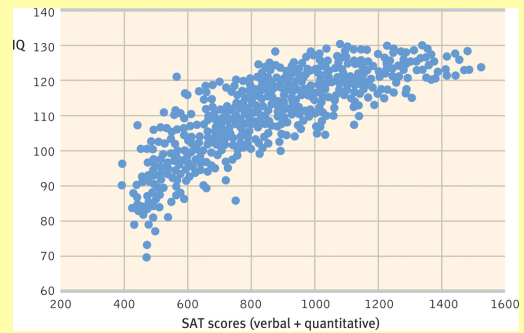
Defining Intelligence (Gardner)

GARDNER'S MULTIPLE-INTELLIGENCE THEORY



Sternberg's triarchic theory of intelligence:
Identifies 1) What cognitive processes aid intelligence 2) What a culture considers to be intelligent 3) How we have learned to act intelligently through our experience.

Intelligence is meant to be an aptitude test but.....

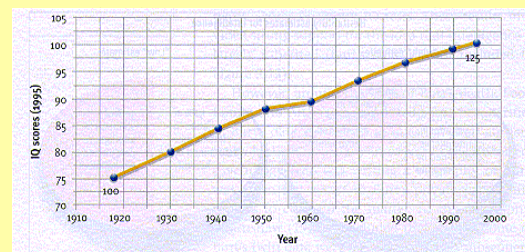


Constructing an Intelligence test

For a psychological test to be acceptable it must fulfill the following three criteria:

- Standardization—it must be administered in a standardized manner to all who take the test, and given to a representative sample of people who will be used for comparison.
- Reliability—The test must show consistent scores for the individual who takes the test
- Validity—The test measures what it is purported to measure.

Standardizing the Intelligence Test



Flynn Effect and Comparing Generations

Your author makes a statement that if you compared yourself with your grandparents that because of the Flynn effect they would have lower IQs. That would be true assuming that they didn't change over that 25 year period, but that is unlikely. However, if you are talking about the IQ test they took as children that would be true.

The Enigma of the Flynn Effect

Although average intelligence test score has been going up, the scores on standard achievement test have gone down since the 1970s.

Curious position: Students today are smarter than they were 30 years ago but they know much less. What does this mean?

The Flynn Effect

There has been an increase in IQ scores but has there been an increase in intelligence?

- The mean increase in IQ scores, about 30 points, should mean that teachers have a large number of gifted people in their classes.
- Conversely, if a score of 70, 50 years ago meant the same thing it does today, most people of that generation would have been barely able to function without supervision.
- What do IQ scores really signify then?

Flynn Effect

We don't know what causes it but possible explanations for the Flynn Effect include:

- Improved health and nutrition
- Better education
- Improved test-taking skills
- Increased opportunity for visual-spatial stimulation (TV/Video games).
- The rise in IQ scores does not necessarily indicate that people are becoming more intelligent.

Evaluation of Tests

Reliability

- The reliability of a test is defined as the repeatability of its scores
 - A reliable test measures something consistently.
 - Psychologists use correlational procedures and calculate a coefficient to indicate how reliable a test is.
 - They test the same group of people twice
 - with the same test
 - equivalent versions of the test
 - or the two halves of the test.
 - Studies using these methods find reliability in the high 80s

Stability

Stability is a measure related to reliability but is actually quite different. Stability measures how much we change in IQ over our life-span.

- Early studies of the intelligence test showed that a child's IQ at 6 will correlate with their IQ at age 18 in the .60s. This suggests a fairly stable level of IQ functioning.
- However, even with correlations in the .60s would mean that over half are show IQ changes of a standard deviation or more **15 pts.**
- Your textbook talks about studies that finds correlations near .9 after 10 to 20 years apart. What is reason for difference?

Early study had more representative sample, e.g. every third child who was born in Oakland California. Greater diversity here in experiences and environments.

If you take a group of middle class kids and test them over time is there reason to expect their IQs will be more stable?

Validity

Validity of a test is usually defined as the ability of a test to measure what it is intended to measure.

Types of Validity

- Content Validity—Does the test contain content that is related to the construct being measure?
 - Mental reasoning
 - Vocabulary
- Predictive Validity—Does the test predict performance in areas related to the construct you are intending to measure?
 - Grades in elementary and high school $r = .5-.6$
 - Years in school, $r = .5$

Not surprisingly the IQ test predicts school performance because it was designed for that.

Evaluation of Tests

Predictive Validity

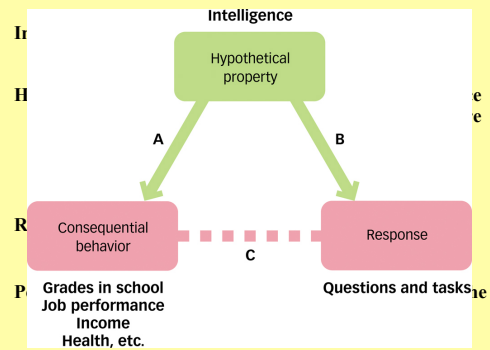
- A special problem in measuring predictive validity
 - A test can have high predictive validity only for a population whose scores vary widely.
 - If all applicants score in a high range, the predictive validity drops.
 - For example, almost all the applicants to a graduate program in engineering will have high quantitative GRE scores. The predictive validity of the quantitative GRE for those students will be substantially lowered.

Concept Check:

Would the predictive validity of the SAT be greater at a highly selective school or at one where an open admissions policy is maintained?

Predictive validity would be greater at the open admissions school.

Creating an Intelligence test



Construct Validity

Although it was designed to predict school performance what is the underlying theoretical construct that is responsible for performance in school?

If the underlying construct is intelligence and you are measuring that what other characteristics will it be correlated with?

- Occupational status, $r = .4$
- Job performance, $r = .5$

Your Author states that IQ scores also correlate with

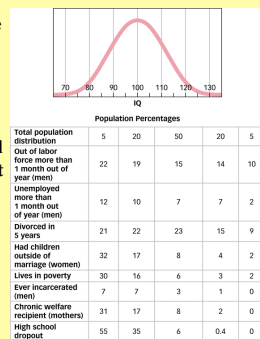
- having fewer automobile accidents
- Likelihood of suffering PTSD
- taking your medicines
- “Although some of these correlations are small, they indicate that IQ scores relate to real world outcomes outside the classroom.”

Life Outcomes and Intelligence

Would intelligence predict these life outcomes?

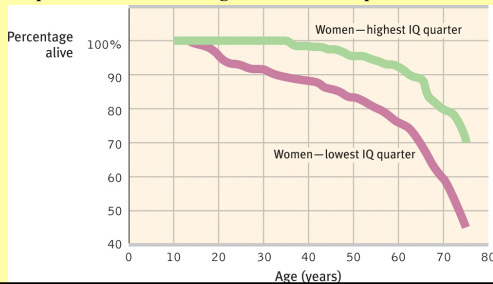
But are they caused by intelligence or another Factor?

Interestingly, IQs are correlated with social class status. What does this mean?



What This Graph Mean?

“Among those girls scoring in the highest 25 percent, 70 percent were still alive at age 76—as were only 45 percent of those scoring in the lowest 25 percent.”



People with High IQs

L. M. Terman's study of "Genius."

- Top 3% of the population, 130 IQ
 - 70% graduated from college
 - 86% have jobs in highest occupational categories

Terman Data on "Genius" group as adults

- As and Bs, differential success but same Level of IQ
- A's income \$24,000, Bs \$7,178, national average \$5,000
- As more advantaged, home libraries
 - Parents stress prudence, forethought, will power, perseverance and desire to excel
- As have less stressful family environments, less divorce
- Terman's subjects show low artistic creation

Revisionist Perspective

David McClelland criticism:

"...neither professor Terman nor anyone else has yet brought forward conclusive evidence that it is giftedness per se...that is responsible for these happy life outcomes, gifted children were drawn disproportionately from the ranks of the educated, the wealthy, and the powerful. This means that they not only had a better chance to acquire the characteristics measured in the test, but also to be happier (since they had more money), and also to have access to higher occupations and better social standing."

To be fair to Kalat he does say that such things as creativity, motivation, self discipline and study habits (good middle class traits) are also important for how we develop intellectually but I am not sure he made that clear.

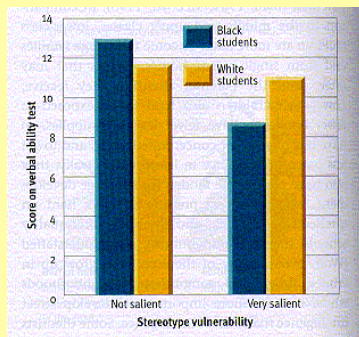
Are IQ Tests Biased

Are IQ tests biased? How would we know?

- If IQ tests under-predicted the performance of one ethnic group relative to another, it would be fair to say that the tests are biased.
- However, students who get a certain IQ score regardless of their race or ethnicity have the same grade point averages.
- Various plausible causes, other than innate differences, have been proposed, but the IQ tests themselves cannot tell us what the cause or causes of the differences might be; they only tell us that the differences exist.

Do IQ Tests Cause Anxiety?

Stereotype threat –
Claude Steel



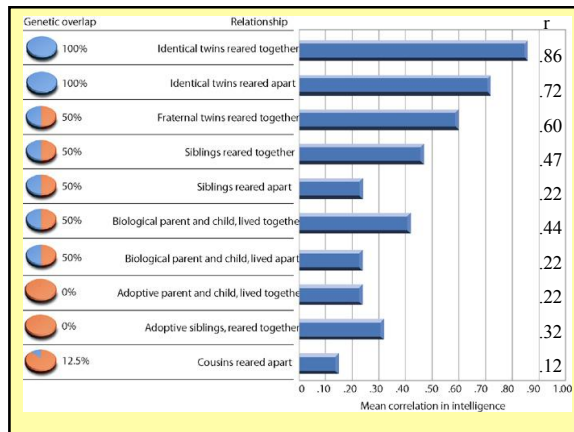
How do Heredity and Environment Affect IQ Scores?

Members of the same family tend to resemble each other in IQ, with stronger positive correlations for stronger degrees of relationship.

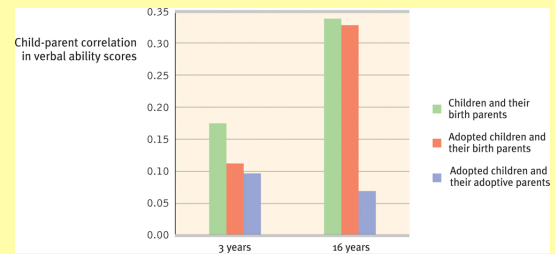
There is a lower, but still noticeable, correlation between the IQ scores of unrelated children adopted into the same family.

The IQ scores of adopted children tend to resemble those of their birth parents in the long run.

Adoption data suggests that children who are adopted may not receive the best prenatal care and early environment prior to adoption.



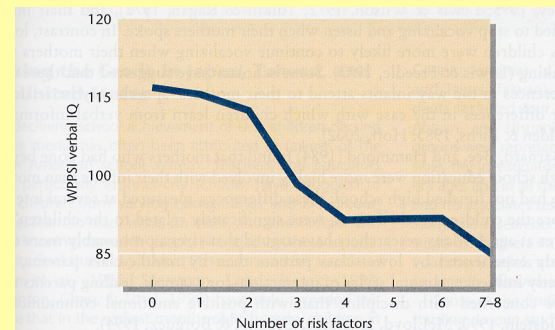
Biological and Adoptive Parents



Last Word on Genes and Intelligence

The field of Behavioral Genetics has been growing in importance in informing psychology about the relationship of genetics and the environment and IQ. Based on what you read in this chapter, on average what is the percentage of variability in scores is determined by genes and environment.

The Environmental Hypothesis



Does IQ tell the whole story?

Estimated IQs of Eminent Men

• Adams, J. Q.	165	American Statesman
• Bentham, Jeremy	180	Writer
• Coleridge, S. T.	175	English Writer
• Leibniz, G. W.	185	Philosopher
• Mill, John Stuart	190	English Philosopher
• Voltaire	170	French Writer
• Bunyan, John	105	English Writer
• Cervantes, Miguel de	105	Spanish Writer
• Grant, U.S.	110	American Leader
• Luther, Martin	115	Religious leader
• James Watson	115	Biologist, DNA
• Madison	120	American Statesman

The Apocryphal Physics Test

“How can you use a barometer to measure the height of a tall building?”

- Barometer on a string
- Falling barometer
- The shadow of your barometer
- Barometer units
- The attractive power of a gift barometer

Beyond Intelligence

John Guilford's 150 factors-operations, contents, products

- IQ tests measure convergent thinking – solving problems that have one agreed on answer. Conventional intelligence.
 - "On what continent is France?"
- Creativity tests measure divergent thinking – solving problems in a new or innovative way.
 - Original Uses: "How many uses can you think of for a newspaper?"

Studies of creativity suggest no correlation with IQ among moderately intelligent individuals, IQ 115 or above.

- Creativity appears to be learned. Low heritability on test.

Creativity-Remote Associates Test

jump	kill	bliss	joy
dog	tower	wrist	watch
soul	busy	guard	body
arrow	laced	narrow	straight
soap	shoe	tissue	box

Remote Associates Test

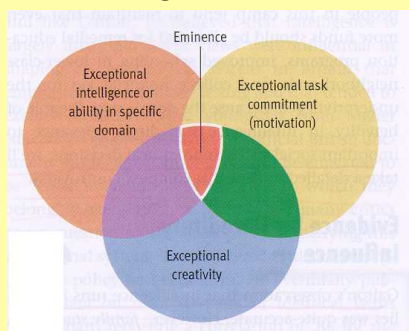
	Remote Associates Test Correlations
Rated Creativity in Architecture	.70
Rated Creativity in Psychology Graduate Students	.55
Divergent Productivity	.38
Originality	.31
Conformity	-.31
Authoritarianism	-.19

Do Creativity Tests Predict Creativity

People who are judged to be creative do well on creativity tests.

However, people who do well on creativity tests may not end up being recognized as creative in their chosen field.

Is Outstanding Achievement Dependent on a Single Attribute?



Creative Types

Creatives more likely to be:

- Independent, nonconformist, unconventional, even bohemian.
- Likely to have wide range of interests, greater openness to new experiences, a more conspicuous behavioral and cognitive flexibility, and more risk-taking boldness (Simonton, 2000).

Upbringing not always nurturant

- Seems to be related to require an exposure to diversifying experiences that help weaken the constraints of socialized conventionality as well as an exposure to challenging experiences that strengthen a person's capacity to persevere.

Recent research demonstrates exceptional talents are less born than made.

- Creativity limited to areas of expertise. Creative ideas arise from well-developed skills and a rich domain of knowledge

What Determines Genius

I have no great quickness of apprehension or wit which is so remarkable in some clever men, for instance Huxley. I am therefore a poor critic; a paper or book, when first read, generally excites my admiration, and it is only after considerable reflection that I perceive the weak points. My power to follow a long and purely abstract train of thought is very limited; I should, moreover, never have succeeded with metaphysics or mathematics. . . .

On the favourable side of the balance, I think that I am superior to the common run of men in noticing things which easily escape attention, and in observing them carefully. My industry has been nearly as great as it could have been in the observation and collection of facts. What is far more important, my love of natural science has been steady and ardent. This pure love has, however, been much aided by the ambition to be esteemed by my fellow naturalists. From my early youth I have had the strongest desire to understand or explain whatever I observed, that is, to group all facts under some general laws. These causes combined have given me the patience to reflect or ponder for any number of years over any unexplained problem.

Charles Darwin, 'The Autobiography' *The Autobiography of Charles Darwin: 1809-1882. W. W. Norton & Company, 1958.