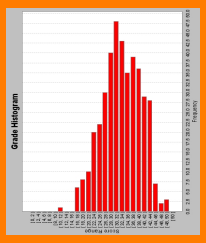
Exam 3

- Mean: 32.3
- Median: 32
- Mode: 31
- SD = 6.8



- Top Score: 49
- Top Cumulative Score to date: ***141***

1

Intelligence

Chapter 10

Psy 12000.003
Spring 2011

2

My Brilliant Brain

- Susan Polgar, Chess Champion

- http://www.youtube.com/watch?v=4VlGGM5WYZo
- http://www.youtube.com/watch?v=95eYyvg1g5s

3

What is Intelligence?

Intelligence (in all cultures) is the ability to learn from experience, solve problems, and use our knowledge to adapt to new situations.

This is the conceptual definition.

In research studies, *intelligence* is whatever the intelligence test measures. This tends to be "school smarts" and it tends to be culture-specific.

This is the operational definition.

4

Conceptual Difficulties

Psychologists believe that intelligence is a concept and not a thing.

Unfortunately, it is treated like a thing…a real thing.

When we think of intelligence as a trait (thing) we make an error called *reification* — viewing an abstract immaterial concept as if it were a concrete thing.

5

Controversies About Intelligence

Despite general agreement among psychologists about the nature of intelligence, *at least* three controversies remain:

- Is intelligence a single overall ability or is it several specific abilities?
- With modern neuroscience techniques, can we locate and measure intelligence within the brain?
- Do between group differences in IQ scores (and distributions around the mean for each group) reflect real group differences in intelligence or are they artifacts of the testing instrument and procedure?

6

Intelligence: Ability or Abilities?

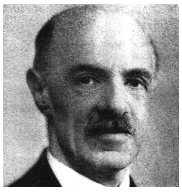
Have you ever thought that because people's mental abilities are so diverse, it may not be justifiable to label those abilities with only one word, *intelligence?*

You may speculate that diverse abilities represent different kinds of intelligences. How can you test this idea?

7

General Intelligence

The idea that general intelligence (*g*) exists comes from the work of Charles Spearman (1863-1945) who helped develop the factor analysis approach in statistics.



8

General Intelligence

Spearman proposed that *general intelligence (g)* is linked to many clusters that can be analyzed by factor analysis.

Spearman, using an earlier approach to factor analysis, found that scores on all mental tests (regardless of the domain or how it was tested) tend to load on ***one major factor***. Spearman suggested that these disparate scores are fueled by a common metaphorical "pool" of mental energy. He named this pool the general factor, or ***g*** (Spearman, 1904).

9

General Intelligence

L. L. Thurstone, a critic of Spearman, analyzed his subjects NOT on a single scale of general intelligence, but on seven clusters of *primary mental abilities,* including:

- Word Fluency
- Verbal Comprehension
- Spatial Ability
- Perceptual Speed
- Numerical Ability
- Inductive Reasoning
- Memory

10

General Intelligence

Later psychologists re-analyzed Thurstone's data and found a weak relationship between these clusters, suggesting some evidence of a *g* factor.

11

Contemporary Intelligence Theories

Howard Gardner (1983, 1999) supports Thurstone's idea that intelligence comes in multiple forms. Gardner notes that brain damage may diminish one type of ability but not others.

People with savant syndrome excel in abilities unrelated to general intelligence.

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Savants

Daniel Tammet, "Brainman"

Brainman:
http://www.youtube.com/watch?v=hKk96kOAnLg&feature=related
http://www.youtube.com/watch?v=8Vs6R5YZQ3c

On Letterman:
http://www.youtube.com/watch?v=qXG-1YLGAS0&feature=related

Howard Gardner

Gardner proposes *eight types* of intelligences and speculates about a ninth one — *existential intelligence.* Existential intelligence is the ability to think about the question of life, death and existence.

GARDNER'S EIGHT INTELLIGENCES

Aptitude	Exemplar
1. Linguistic	T. S. Eliot, poet
2. Logical-mathematical	Albert Einstein, scientist
3. Musical	Igor Stravinsky, composer
4. Spatial	Pablo Picasso, artist
5. Bodily-kinesthetic	Martha Graham, dancer
6. Intrapersonal (self)	Sigmund Freud, psychiatrist
7. Interpersonal (other people)	Mahatma Gandhi, leader
8. Naturalist	Charles Darwin, naturalist

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Robert Sternberg

Sternberg (1985, 1999, 2003) also agrees with Gardner, but suggests *three* intelligences rather than eight.

- Analytical Intelligence: Intelligence that is assessed by intelligence tests.
- Creative Intelligence: Intelligence that makes us adapt to novel situations, generating novel ideas.
- Practical Intelligence: Intelligence that is required for everyday tasks (e.g. street smarts).

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Other Intelligences: Emotional Intelligence

Emotional intelligence is the ability to perceive, understand, and use emotions (Salovey and colleagues, 2005). The test of emotional intelligence measures overall emotional intelligence and its four components.

Peter Salovey

16

Emotional Intelligence: Components

Component	Description
Perceive emotion	Recognize emotions in faces, music and stories
Understand emotion	Predict emotions, how they change and blend
Manage emotion	Express emotions in different situations
Use emotion	Utilize emotions to adapt or be creative

17

Emotional Intelligence: Criticisms

1. Gardner and others criticize the idea of emotional intelligence and question whether we stretch this idea of intelligence too far when we apply it to our emotions.

2. Sex differences draw into question whether the EQ test is sex biased.

18

Intelligence and Creativity

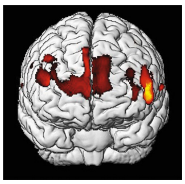
Creativity is the ability to produce ideas that are both novel and valuable. It correlates somewhat with intelligence.

- Factors associated with creativity:
  - Expertise: A well-developed knowledge base.
  - Imaginative Thinking: The ability to see things in novel ways.
  - Adventuresome Personality: A personality that seeks new experiences rather than following the pack.
  - Intrinsic Motivation: A motivation to be creative from within.
  - A Creative Environment: A creative and supportive environment allows creativity to bloom.

19

Is Intelligence Neurologically Measurable?

Recent Studies indicate some correlation (about +.40) between brain size and intelligence. As brain size decreases with age, scores on verbal intelligence tests also decrease.



Gray matter concentration in people with high intelligence.

20

Get ready…

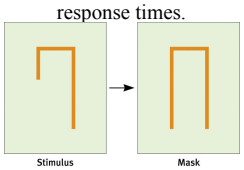
21

Long side on left or right?

22

Brain Function

Studies of brain functions show that people who score high on intelligence tests perceive stimuli faster, retrieve information from memory quicker, and show faster brain response times.



Question: Long side on left or right?

People with higher intelligence respond correctly and quickly to the above question.

23

Assessing Intelligence

Psychologists define intelligence testing as a method for assessing an individual's mental aptitudes and comparing them with others using numerical scores.

24

Alfred Binet

Alfred Binet and his colleague Théodore Simon practiced a more modern form of intelligence testing by developing questions that would predict children's future progress in the Paris school system.

25

Lewis Terman

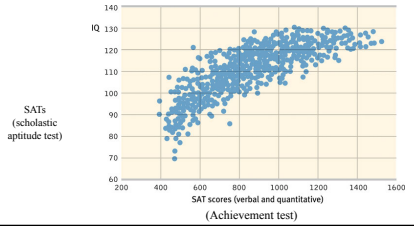
In the US, Lewis Terman adapted Binet's test for American school children and named the test the Stanford-Binet Test. The following is the formula of Intelligence Quotient (IQ), introduced by William Stern:

$$IQ = \frac{\text{mental age}}{\text{chronological age}} \times 100$$

26

Aptitude and Achievement Tests

Aptitude tests (most IQ tests) are intended to *predict* your ability to learn a new skill and achievement tests are intended to *reflect* what you have already learned.



27

David Wechsler

Wechsler developed the Wechsler Adult Intelligence Scale (WAIS) and later the Wechsler Intelligence Scale for Children (WISC), an intelligence test for preschoolers.

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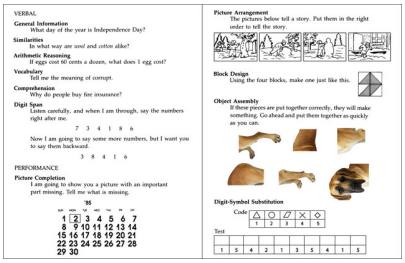
WAIS

WAIS measures overall intelligence and 11 other aspects related to intelligence that are designed to assess clinical and educational problems.



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Principles of Test Construction

For a psychological test to be acceptable (as a diagnostic tool) it must fulfill the following three criteria:

- Standardization
- Reliability
- Validity

30

Standardization

Standardizing a test involves administering the test to a representative sample of future test takers in order to establish a basis for meaningful comparison.

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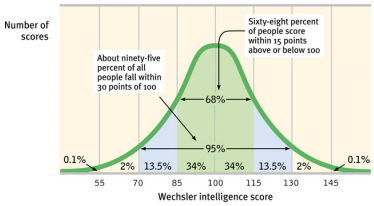
Normal Curve

Standardized tests establish a normal distribution of scores on a tested population in a bell-shaped pattern called the normal curve.



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Reliability

A test is *reliable* when it yields consistent results. To establish reliability researchers establish different procedures:

- Split-half Reliability: Dividing the test into two equal halves and assessing how consistent the scores are.
- Reliability using different forms of the test: Using different forms of the test to measure consistency between them.
- Test-Retest Reliability: Using the same test on two occasions to measure consistency.

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Validity

Reliability of a test does not ensure validity. Validity of a test refers to what the test is supposed to measure or predict.

- Content Validity: Refers to the extent a test measures a particular construct, behavior, or trait.
  - Isomorphism
- Predictive Validity: Refers to the function of a test in predicting a particular outcome
  - do test scores predict final grade?
  - does final grade predict GRE performance?
  - does GRE performance predict success in life?

34

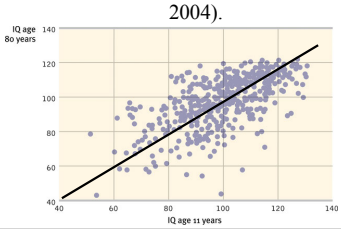
The Dynamics of Intelligence

Does intelligence remain stable over a lifetime or does it change? Are individuals on the two extremes of the intelligence scale really that different?

35

Stability or Change?

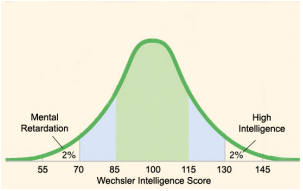
Intelligence scores become stable after about seven years of age. In numerous studies, stability of intelligence scores have been determined (Angoff, 1988; Deary et al., 2004).



36

Extremes of Intelligence

A valid intelligence test divides two groups of people into two extremes: the mentally retarded (IQ 70) and individuals with high intelligence (IQ 135). These two groups are significantly different.



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Mental Retardation

Mentally retarded individuals required constant supervision a few decades ago, but with a supportive family environment and special education they can now care for themselves.

DEGREES OF MENTAL RETARDATION

Level	Approximate Intelligence Scores	Percentage of Persons with Retardation	Adaptation to Demands of Life
Mild	50–70	85%	May learn academic skills up to sixth-grade level. Adults may, with assistance, achieve self-supporting social and vocational skills.
Moderate	35–50	10%	May progress to second-grade level academically. Adults may contribute to their own support by laboring in sheltered workshops.
Severe	20–35	3–4%	May learn to talk and to perform simple work tasks under close supervision but are generally unable to profit from vocational training.
Profound	Below 20	1–2%	Require constant aid and supervision.

Source: Reprinted with permission from the *Diagnostic and Statistical Manual of Mental Disorders*, Fourth Edition, text revision. Copyright 2000 American Psychiatric Association.

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High Intelligence

Contrary to popular belief, people with high intelligence test scores tend to be healthy, well adjusted, and unusually successful academically.

39

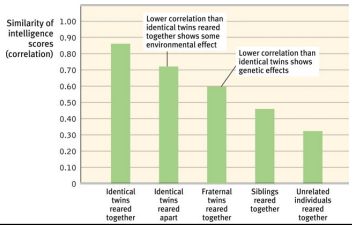
Genetic and Environmental Influences on Intelligence

No other topic in psychology is so passionately followed as the one that asks the question, "Is intelligence due to genetics or environment?"

40

Genetic Influences

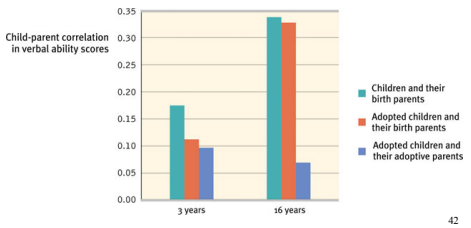
Studies of twins, family members, and adopted children together support the idea that there is a significant genetic contribution to intelligence.



41

Adoption Studies

Adopted children show a marginal correlation in verbal ability to their adopted parents.



42

Environmental Influences

Studies of twins and adopted children also show the following:

- Fraternal twins raised together tend to show similarity in intelligence scores.
- Identical twins raised apart show slightly less similarity in their intelligence scores.

43

Early Intervention Effects

Early neglect from caregivers leads children to develop a lack of personal control over the environment, and it impoverishes their intelligence.

Romanian orphans with minimal human interaction are delayed in their development.

44

Schooling Effects

Schooling is an experience that pays dividends, which is reflected in intelligence scores. Increased schooling correlates with higher intelligence scores.

To increase readiness for schoolwork, projects like Head Start facilitate learning.

45

Group Differences in Intelligence Test Scores

Why do groups differ in intelligence? How can we make sense of these differences?

46

Ethnic Similarities and Differences

To discuss this issue we begin with two disturbing but agreed upon facts:

- Racial groups differ in their average intelligence scores.
- High-scoring people (and groups) are more likely to attain high levels of education and income.

47

Racial (Group) Differences

If we look at racial differences, white Americans score higher in average intelligence than black Americans (Avery and others, 1994). European New Zealanders score higher than native New Zealanders (Braden, 1994).

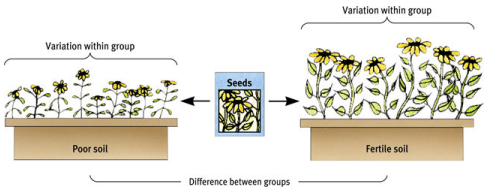
White-Americans	Black-Americans
Average IQ = 100	Average IQ = 85

Hispanic Americans

48

Environmental Effects

Differences in intelligence among these groups are largely environmental, as if one environment is more fertile in developing these abilities than another.



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Reasons Why Environment Affects Intelligence

- Races are remarkably alike genetically.
- Race is a social category.
- Asian students outperform North American students on math achievement and aptitude tests.
- Today's better prepared populations would outperform populations of the 1930s on intelligence tests.
- White and black infants tend to score equally well on tests predicting future intelligence.
- Different ethnic groups have experienced periods of remarkable achievement in different eras.

50

Gender Similarities and Differences

There are seven ways in which males and females differ in various abilities.

1. Girls are better spellers
2. Girls are verbally fluent and have large vocabularies
3. Girls are better at locating objects
4. Girls are more sensitive to touch, taste, and color
5. Boys outnumber girls in counts of underachievement
6. Boys outperform girls at math problem solving, but under perform at math computation
7. Women detect emotions more easily than men do

51

The Question of Bias

Aptitude tests are necessarily biased in the sense that they are sensitive to performance differences caused by cultural differences.

However, aptitude tests are not biased in the sense that they accurately predict performance of one group over the other.

52

Stereotype Threat

A stereotype threat is a self-confirming concern that one will be evaluated based on a negative stereotype.

This phenomenon appears in some instances in intelligence testing among African-Americans and among women of all colors.

53