Reification Fallacy: The Mismeasure of Man

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History of Biology
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Content Overview

Craniology

- History
- Skull cavity measurements
- Brain Measurements
- Skull ratio measurements
- Criticisms

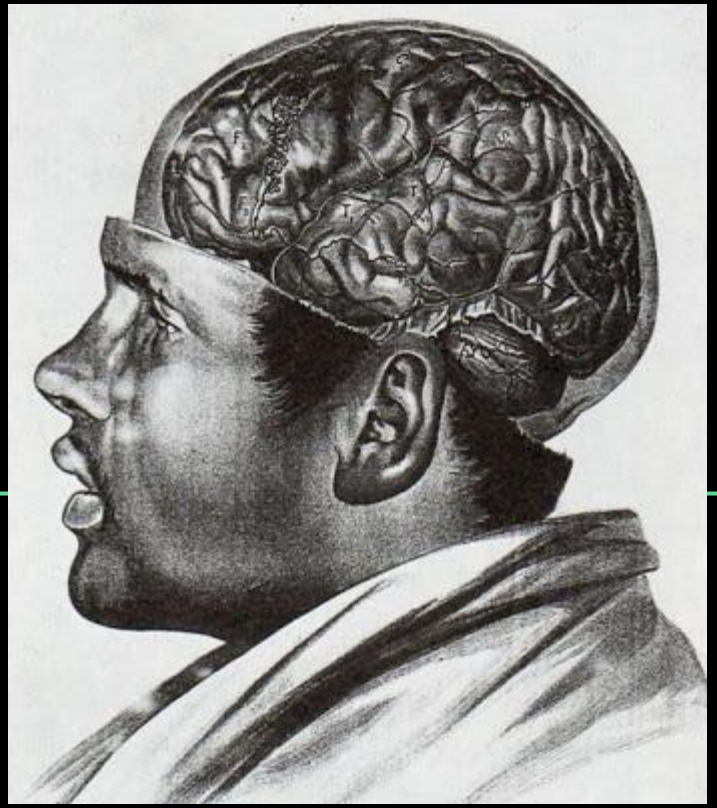
Intelligence Quotient

- History
- IQ testing in WWI
- Current IQ testing
- IQ bell curve
- Criticisms

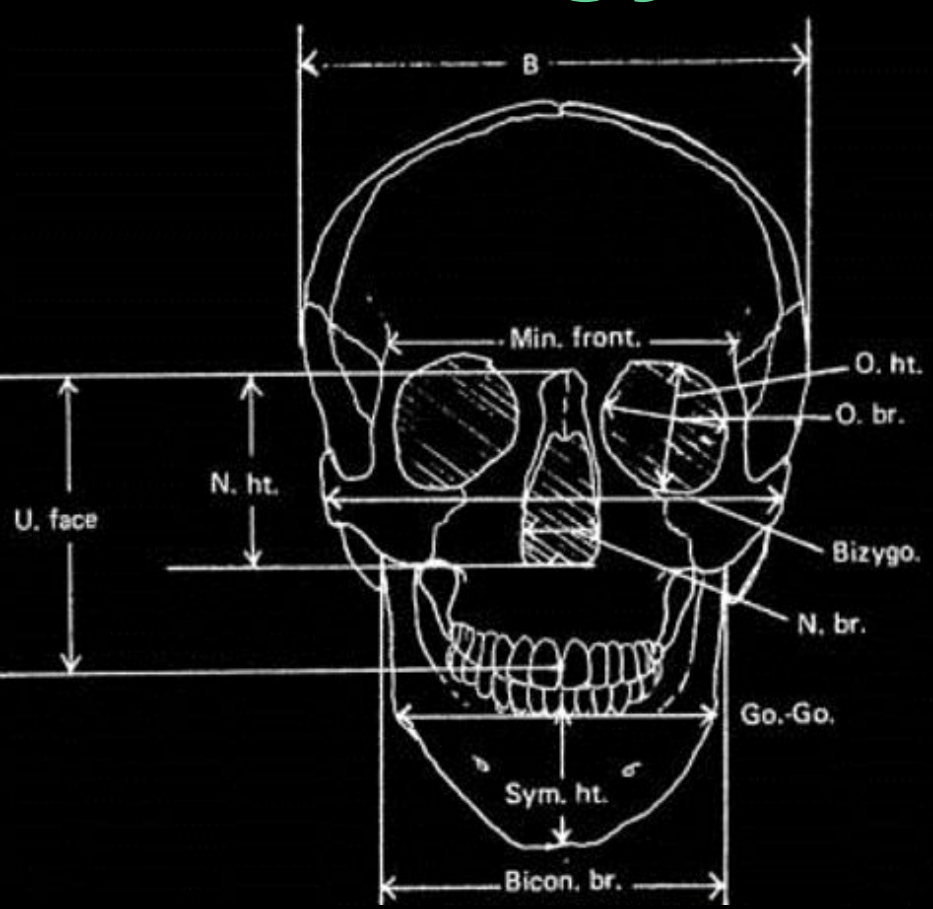
Reification

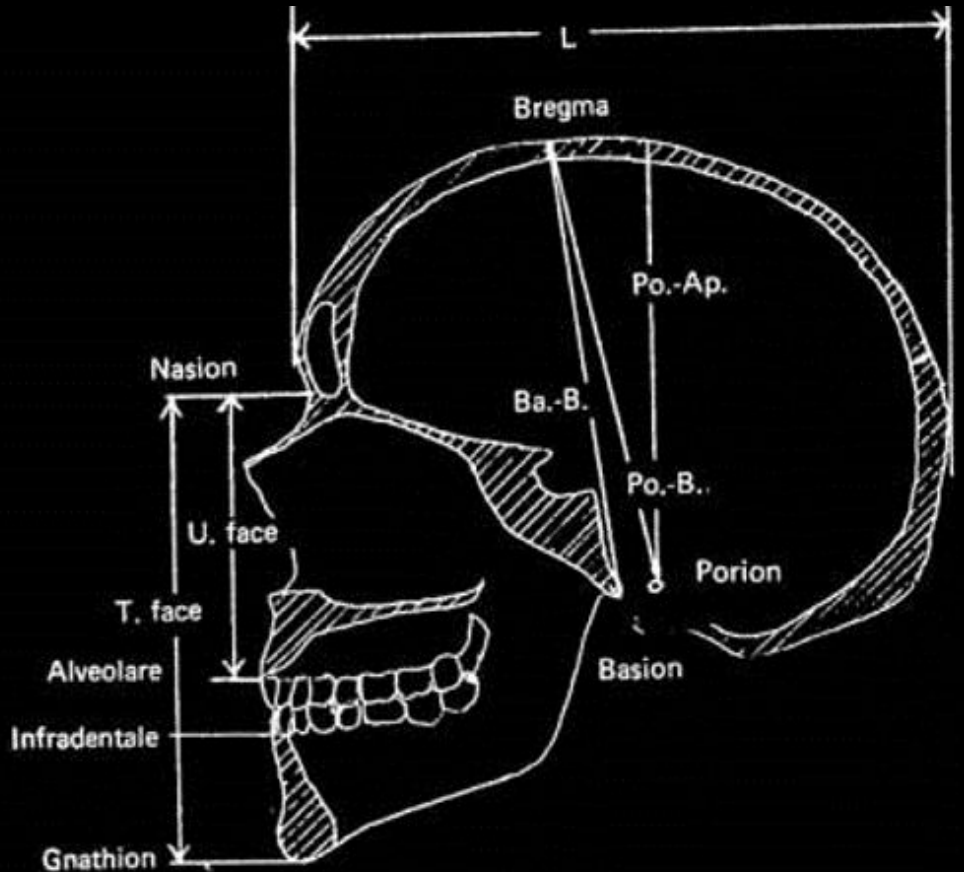
To regard something abstract as a material thing or definitive ‘real’ concept.

German word: Verdinglichung



Craniology


B
Min. front.
O. ht.
O. br.
N. ht.
U. face
Bizygo.
N. br.
Go.-Go.
Sym. ht.
Bicon. br.


L
Bregma
Po.-Ap.
Nasion
Ba.-B.
Po.-B.
U. face
Porion
T. face
Basion
Alveolare
Infradentale
Gnathion

craniology noun

Save Word

cra·ni·ol·o·gy | \ ˌkrā-nē-ˈä-lə-jē \

Definition of *craniology*

: a science dealing with variations in size, shape, and proportions of skulls among human races

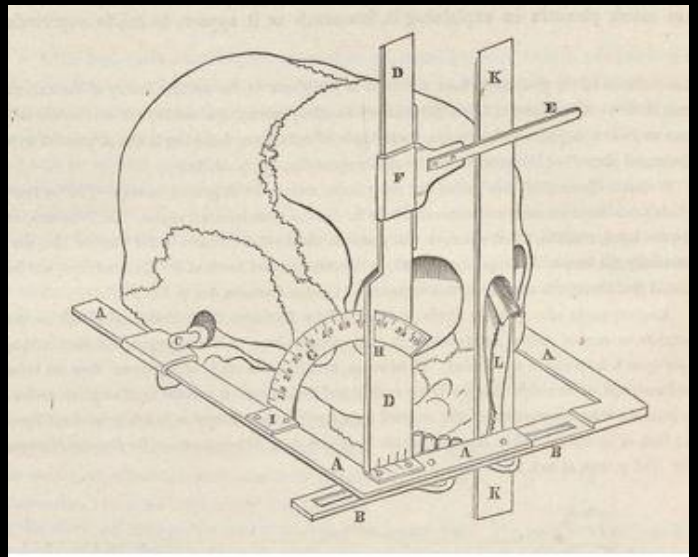
phrenology noun

Save Word

phre·nol·o·gy | \ fri-ˈnä-lə-jē \

Definition of *phrenology*

: the study of the conformation of the skull based on the belief that it is indicative of mental faculties and character



A "facial goniometer" depicted by Morton in *Crania Americana*, 252.

Phrenology/Craniology is a **pseudoscience** of the 17th-18th century.

- Measurements of the **neurocranium** became a reification of intelligence between the races. *Larger brain case = higher intelligence.*
- Characteristics of skull features (I.e jaw shape, brow ridge) used to infer personal characteristics.
- Inherently racist

Timeline

1400s-1600s

Leonardo da Vinci (1452-1519), Albrecht Dürer (1471-1528), Anders Vesalius (1514-1564): Anatomist Artists

Versalius (1514-1564)

Spieghel (1578-1625)

François Bernier (1620-1688): Classified races based on geography

1700s

Daubenton (1716 – 1800): Studied cranial characteristics

Pieter Camper (1722-1789): Facial angle to distinguish between humans and apes

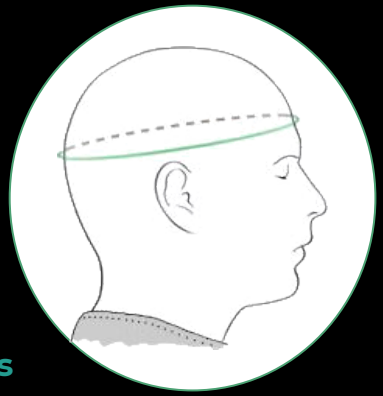
1800s

Anders Retzius (1796-1860): Cranium length breadth index, described three general head types.

Paul Broca (1824-1880): Compare skulls of men to skulls of other animals

Franz Joseph Gall (1758-1822): Inventor of phrenology

Samuel George Morton (1799-1851): Largest skull collection. Wrote Crania Americana.



1900s

Franz Boas's (1858-1942): Study of immigrant parents-cephalic index has low heredity

1940s - Nazi Germany race science

1945+ - Craniology used for anthropology, paleontology, medicine. Not as a measure of intelligence.

Context

Biological Determinism: The notion that people at the “bottom” are constructed of intrinsically inferior materials

Political Context: Social rankings accepted by white political leaders:

“There is a physical difference between the white and the black races which I believe will forever forbid the two races living together on terms of social and political quality. And inasmuch as they cannot so live, *while they do remain together there must be the position of superior and inferior, and I as much as any other man am* ***in favor*** *of having the* ***superior position*** *assigned to the* ***white race***.” - Abraham Lincoln (Goulding, 1981)

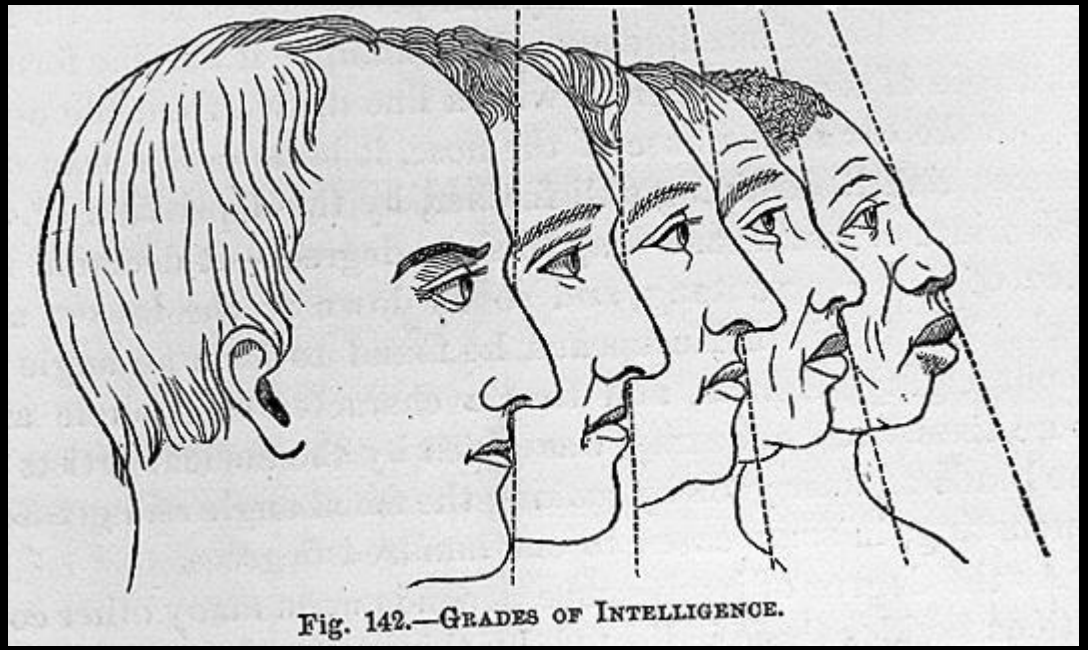
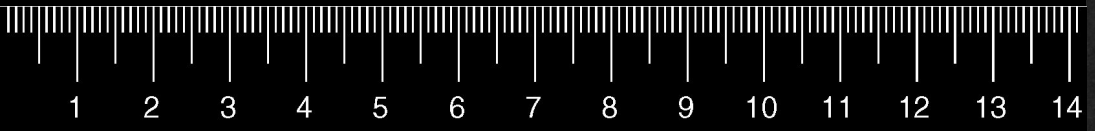
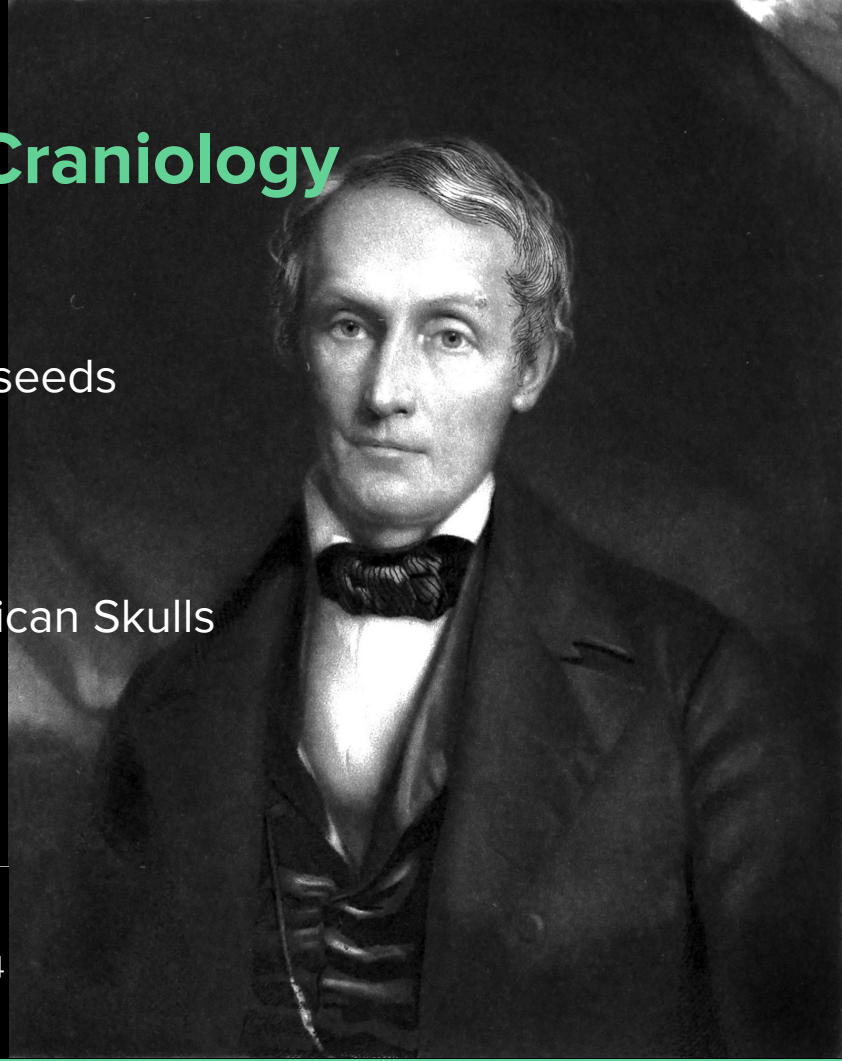


Fig. 142.—Grades of Intelligence.

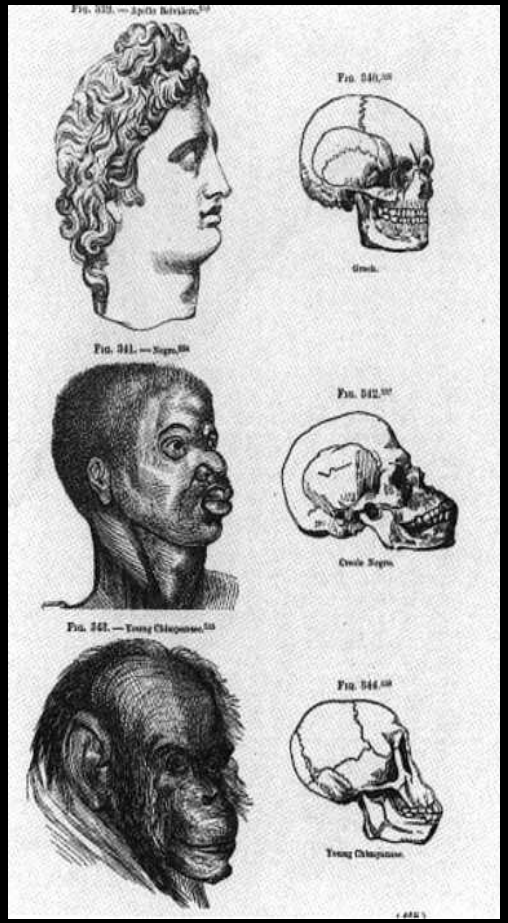
Samuel Morton - Founder of Craniology

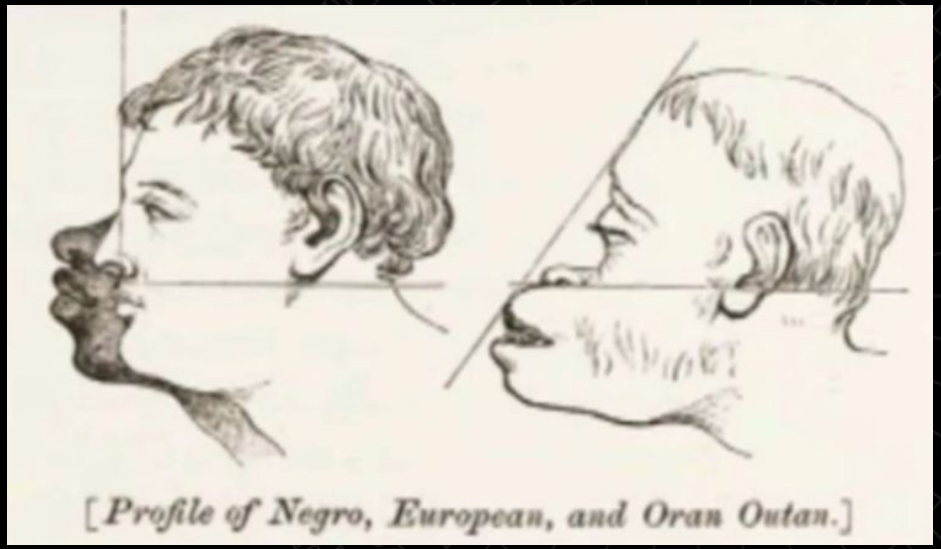
- Largest collection of skulls
- Measured the inside at first using mustard seeds
  - Different sizes even after sieving
- Switched to bb pellets for higher certainty
- Compared Anglo, Native American and African Skulls
- Published his raw data
- Racial bias





Illustrations from Morton's Publications





[*Profile of Negro, European, and Oran Outan.*]

Summary of Crania Americana data: White people have the biggest brain cases (are the smartest), followed by indians, followed by black people.

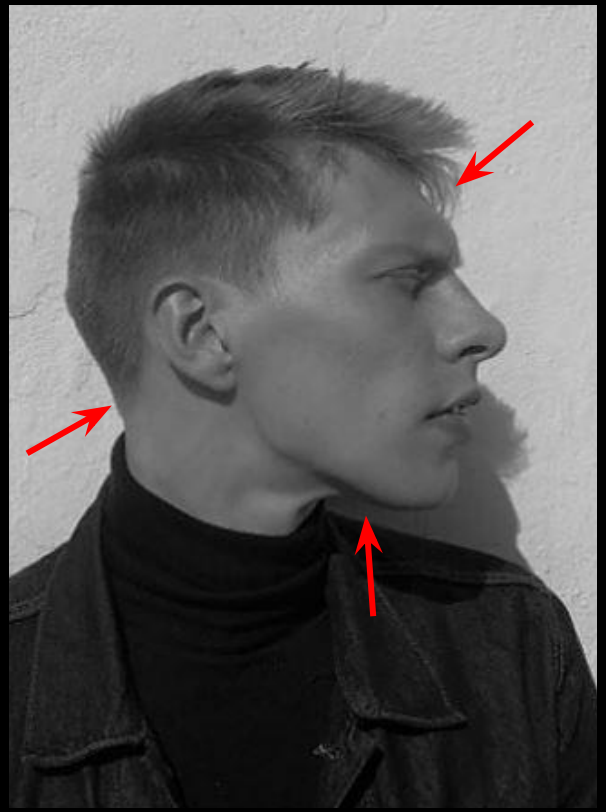
Anders Retzius: Three Skull Classifications

Dolichocephalic: Long skulls

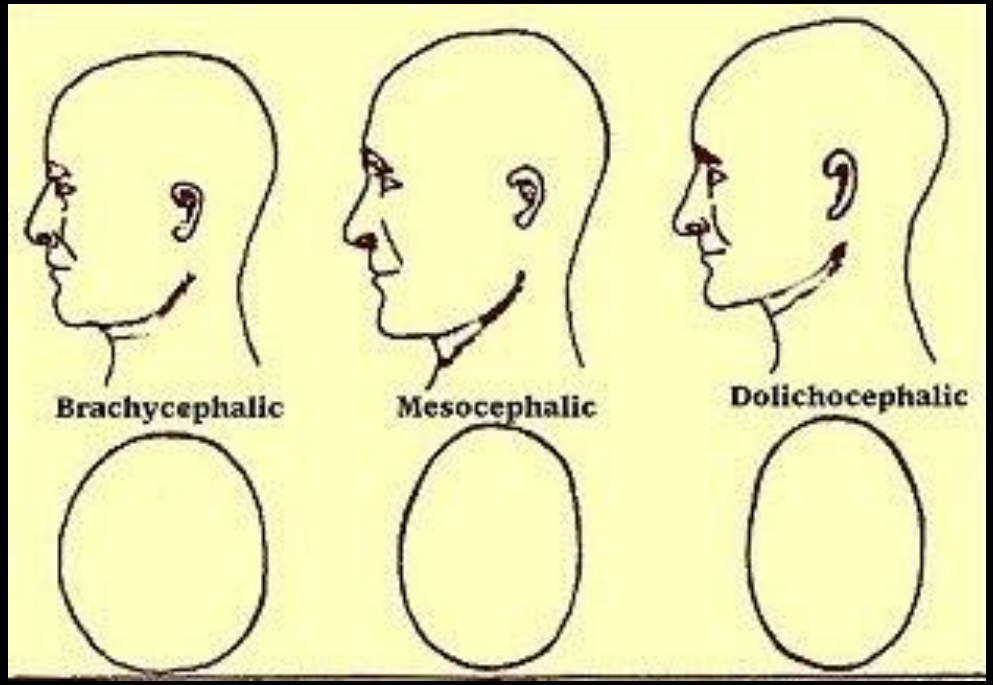
Mesocephalic: Intermediate skulls

Brachycephalic: Short skulls

Head ratio measurements based on the facial angle (jutting forward of face and jaws) and cranial index measured as the ratio of maximum width to maximum length of the skull.



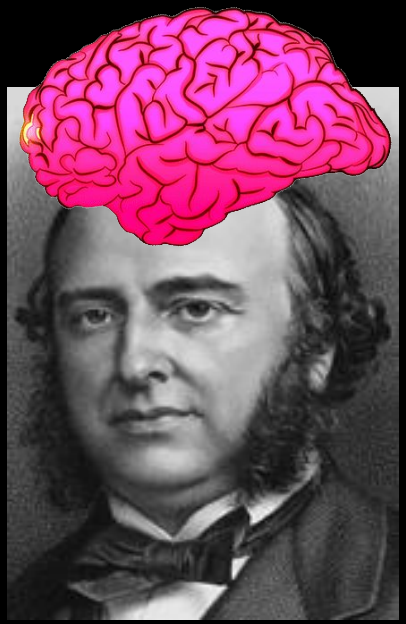
A Conflict to Divide Countries



- English and French (generally **brachycephalic**) consider people with **dolichocephalic** heads to be criminals
- The Indo-European scientists (generally dolichocephalic) argue this.
- But uh-oh! Black people have dolichocephalic heads too which the Indo-Europeans didn't like.
    - Tried to say the blacks other features cancelled out their "good heads."

The Dissection of Dead Colleagues

- Measuring brain masses of recently deceased scientists based on the belief that **big brain = big smart**
- No significance between measurements and perceived intelligence
- Scrambling for meaning, using excuses: “Oh, it’s because he’s old and the brain shrinks... its still that larger brains indicate higher intelligence.”
- All of the deceased mathematicians/scientists of the time had smaller brains than the **largest female brain** ever weighed at the time- The brain from a woman who murdered her husband.



Paul Broca

Additional Reification Examples

The distance between the naval and the penis:

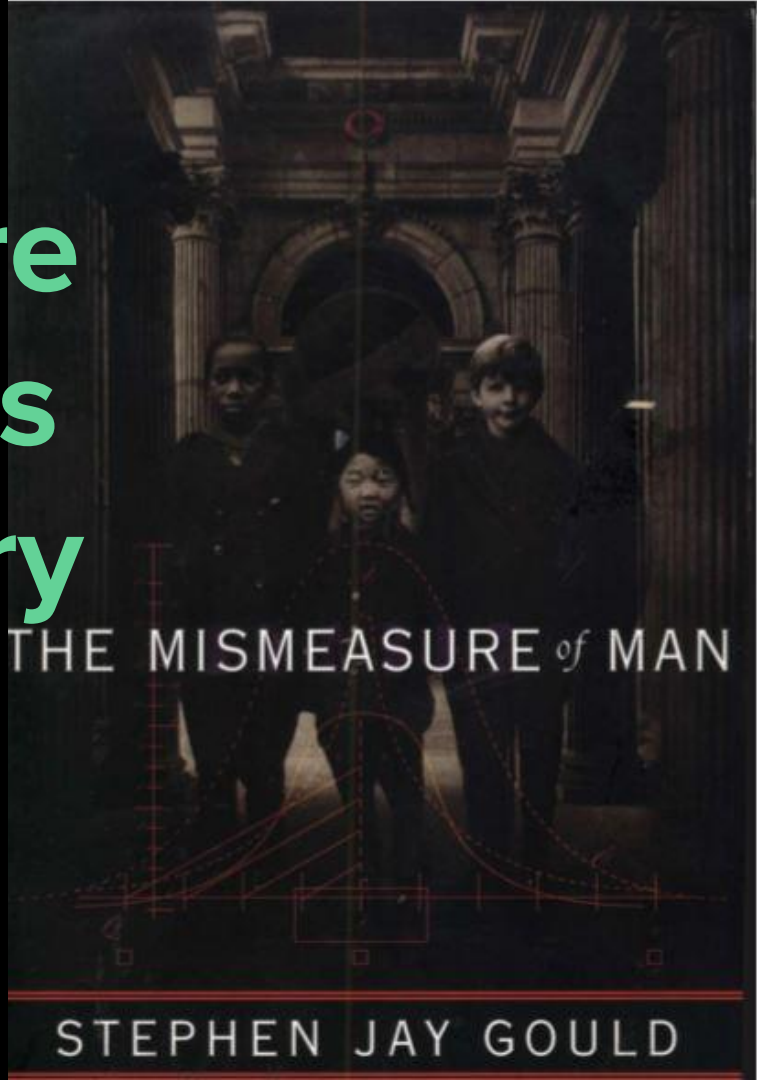
- The ineffacable sign of embryonic life in man
- Small in babies
- Highest in whites, intermediate in “yellows” and small in black people
- Implying that black people stay **child-like** (therefore are the most inferior)

Anthropological criminology:

- **Cesare Lombroso** (1835-1909) claimed he could go to a crime scene and see the personality of the person left behind based on their skull.
- Criminal features:

Large jaws, Forward projection of jaw, Low sloping forehead, High Cheekbones
Flattened or upturned nose, Handle shapes ears

“Sizes of brains are related to the sizes of bodies that carry them” - Gould



Criticisms

Gould's Craniology Criticisms

- Morton's measurement techniques - the force he packed the pellets in the skull would cause variation.
- Morton lumped all naive skulls to be the same, few small outliers brought down average significantly.
- Morton's texts were highly racist implying his subconscious biases.
- Excluded skulls.

Later Refutations Against Gould

- After publication of Mismeasure of Man, people revisited Mortons preserved cranium collection to remeasure where they found the same results.

Other refutations

- Morton's measurements not corrected for age.
- Environmental factors on body sizes (therefore head sizes)

Psychology Behind Physical Reifications

Validated the top (white men)

- Validated racism
- Thought that brain areas grew and affected the skull
    - gave hope that less intelligent people could grow their skull to a smart shape and size

Cultural Leftovers

High brow: synonymous to intellectual

Low brow: opposite

Well rounded: Having a personality that is fully developed in all aspects

Measuring intelligence using the IQ test

History of IQ testing

Binet's scale and the birth of the IQ

- In 1898-1900 Alfred Binet (1857-1911) set out to measure intelligence using the Broca's method, measuring skulls.
- Studied students designated by their teachers to be the 'smartest' and 'stupidest'. Noticed that there were **very small**, if any, differences
- Did not observe larger differences in the anterior region of the skull, "**where the seat of higher intelligence supposedly lay**"

History of IQ testing

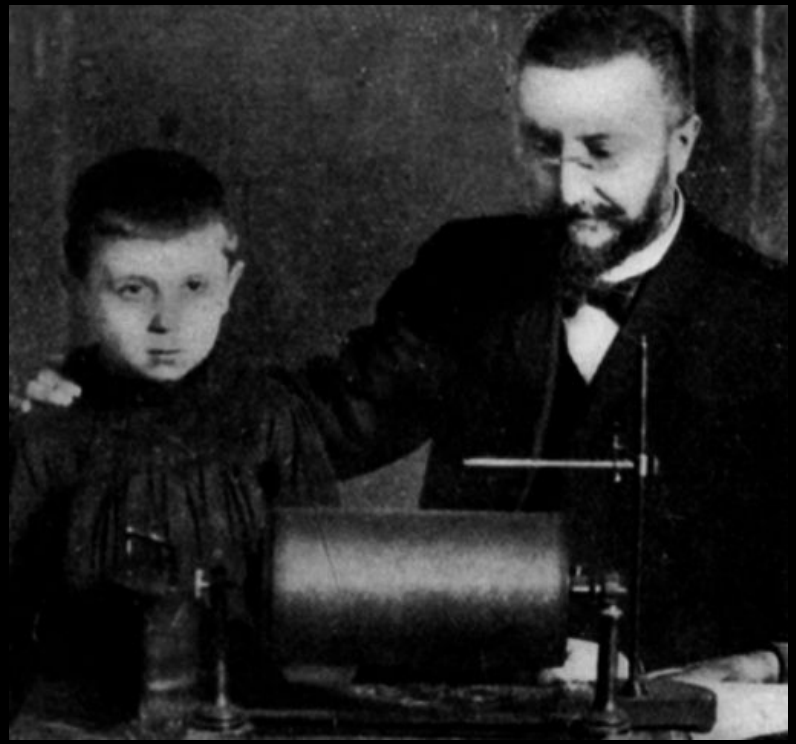
Binet's scale and the birth of the IQ

- Found that the largest and smallest skulls usually belong to the '**poorer' student**
- Unconscious bias to increase the cephalic volume of intelligent heads and decrease unintelligent heads when measuring skulls
- Craniometry **cannot** be used to assess intelligence anymore.

History of IQ testing

Binet's scale and the birth of the IQ

- Wanted to use '**psychological**' methods rather than '**medical**' methods' to measure intelligence
- Developed tests that involved short tasks related to everyday problems
- Tested processes of reasoning such as direction, comprehension, invention, and correction. Not learned skills like reading
- Purpose was to develop techniques for **identifying children whose lack of normal success in classrooms suggested the need for some special education**



History of IQ testing

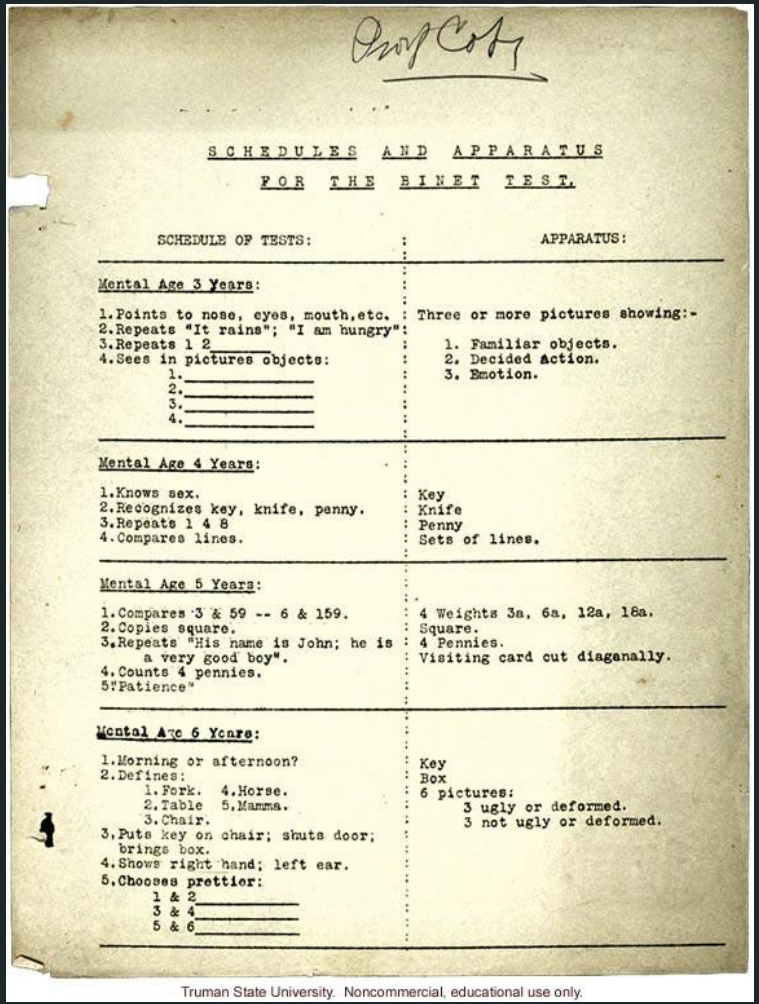
Binet's scale and the birth of the IQ

- Assigned an age level to each task defined as the youngest age at which a child of ‘normal’ intelligence should be able to complete the task successfully
- The age associated with the last test completed = mental age
  - The general intellectual level could be calculated by subtracting the mental age from the true age.
- If mental age much lower, then could be identified for special education
- W. Stern suggested that mental age should be divided by chronological age creating an intelligence quotient (IQ). More appropriate because it is relative rather than absolute.

History of IQ testing

Binet's scale and the birth of the IQ

Sample Binet's test



Prof Cody

SCHEDULES AND APPARATUS
FOR THE BINET TEST.

SCHEDULE OF TESTS:	APPARATUS:
Mental Age 3 Years:	
1. Points to nose, eyes, mouth, etc. 2. Repeats "It rains"; "I am hungry". 3. Repeats 1 2 _____ 4. Sees in pictures objects: 1. _____ 2. _____ 3. _____ 4. _____	Three or more pictures showing:- 1. Familiar objects. 2. Decided Action. 3. Emotion.
Mental Age 4 Years:	
1. Knows sex. 2. Recognizes key, knife, penny. 3. Repeats 1 4 8 4. Compares lines.	Key Knife Penny Sets of lines.
Mental Age 5 Years:	
1. Compares 3 & 59 -- 6 & 159. 2. Copies square. 3. Repeats "His name is John; he is a very good boy". 4. Counts 4 pennies. 5. "Patience"	4 Weights 3a, 6a, 12a, 18a. Square. 4 Pennies. Visiting card cut diagonally.
Mental Age 6 Years:	
1. Morning or afternoon? 2. Defines: 1. Fork. 4. Horse. 2. Table 5. Mamma. 3. Chair. 3. Puts key on chair; shuts door; brings box. 4. Shows right hand; left ear. 5. Chooses prettier: 1 & 2 _____ 3 & 4 _____ 5 & 6 _____	Key Box 6 pictures: 3 ugly or deformed. 3 not ugly or deformed.

History of IQ testing

H.H Goddard

- H.H. Goddard brought the Binet scale to America. Invented the word “morons” from a Greek word meaning foolish.
- **Intelligence as a Mendelian gene**
- Goddard believed mental deficiency was governed by a single gene and was recessive to **normal intelligence.**

P = Mm x Mm

	M	m
M	MM	Mm
m	Mm	mm

3(normal):1(moron) ratio

History of IQ testing

Stanford-Binet scale

- Binet's last version of the scale included 54 tasks ranging from prenursery to mid-teen age.
- Lewis M. Terman revised this test in 1916 which provided 90 tasks and extended the scale to "**superior adults**"
- Standardized for all IQ tests following

History of IQ testing

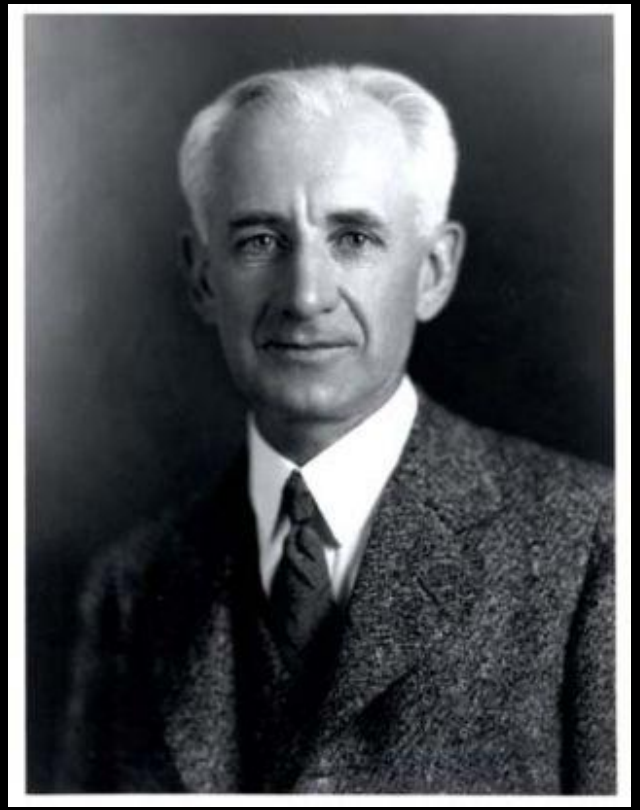
Stanford-Binet scale

- IQ = Mental age/chronological age X 100

- Terman:
  - IQ < 75 = Should be in the realm of labor
  - 75 < IQ < 85 = “Semi-skilled” labor
  - For “substantial success probably required IQ above 120”

IQ testing in WWI

- In 1915, many believed psychology was a **soft science**, if it was a science at all
- Science was equated with numbers and quantification, which psychology was lacking
- **Robert M. Yerkes**, the president of the American Psychology Association was frustrated by this and argued that it could be as rigorous of a science as physics

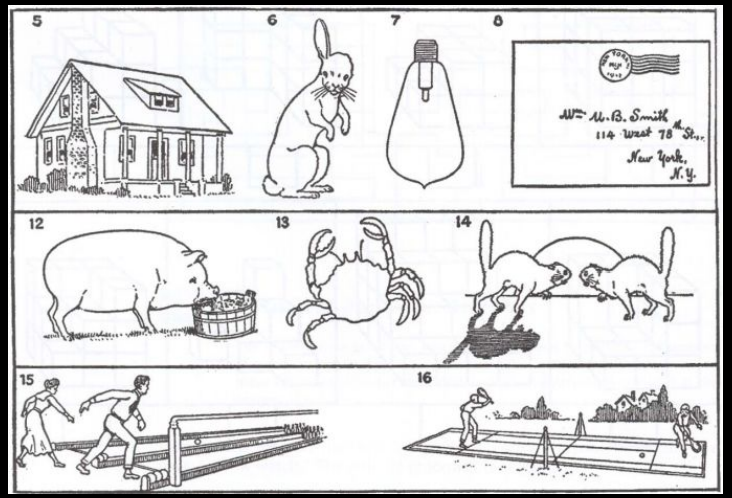


IQ testing in WWI

- He believed the most promising source of copious and objective numbers lie in the field of **mental testing**
- In 1917 when the US declared war on Germany, he seen a perfect opportunity to prove this
- If he could test all the recruits, he would get a uniform body of numbers that could move mental testing (and psychology) from an **art to a science**
- 1.75 million IQ tests were administered

IQ testing in WWI

- Three tests
  - **Alpha test:** For literate individuals
  - **Beta:** Illiterate and those who failed alpha test (pictoral test)
  - Those who failed beta where given an individual exam



Sample beta test:

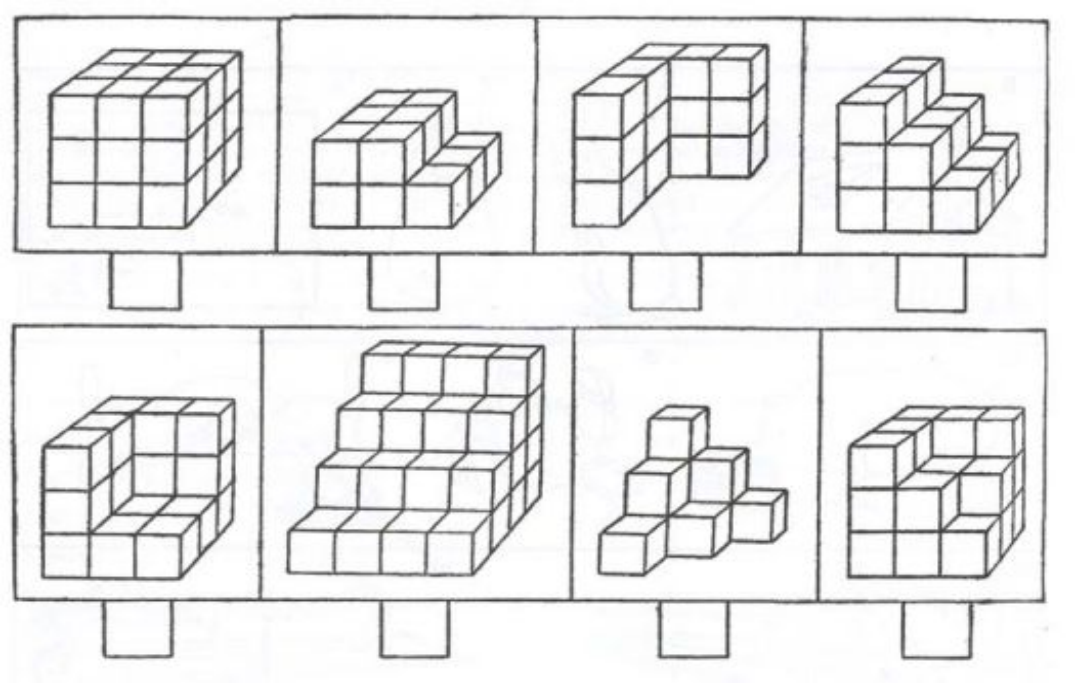
1.5 minutes to determine what's wrong with each of the 9 pictures

Sample alpha test:

Answer 20 of these in 2 minutes

1. wood guns of made are.....	true	false
2. people are many candy of fond.....	true	false
3. war in are useful airplanes the.....	true	false
4. must die men all.....	true	false
5. property floods life and destroy.....	true	false
6. grow a climate oranges cold in.....	true	false

IQ testing in WWI



Beta test

1 minute 15 seconds to calculate number of cubes in the eight drawings

IQ testing in WWI

- Results
  - People were graded from A-E and provided with information on suitable tasks
  - The major impacts of the tests did not fall upon the army. They didn’t make much use of the results
  - Provided Yerkes with uniform data on 1.75 million men
  - Inquiries flooded from schools and businesses
  - The era of mass testing had begun

Current IQ testing

Wechsler Intelligence Scales

- The **Wechsler scale** was developed by an American psychologist David Wechsler.
- He was displeased with the Stanford-Binet scale so created his own. The **Wechsler Adult Intelligence Scale** (WAIS), in 1955
- This is the current IQ test used and there have been four different versions of the WAIS:
  - WAIS (1955)
  - WAIS-R (1981)
  - WAIS-III (1997)
  - WAIS-IV (2008) (Current)

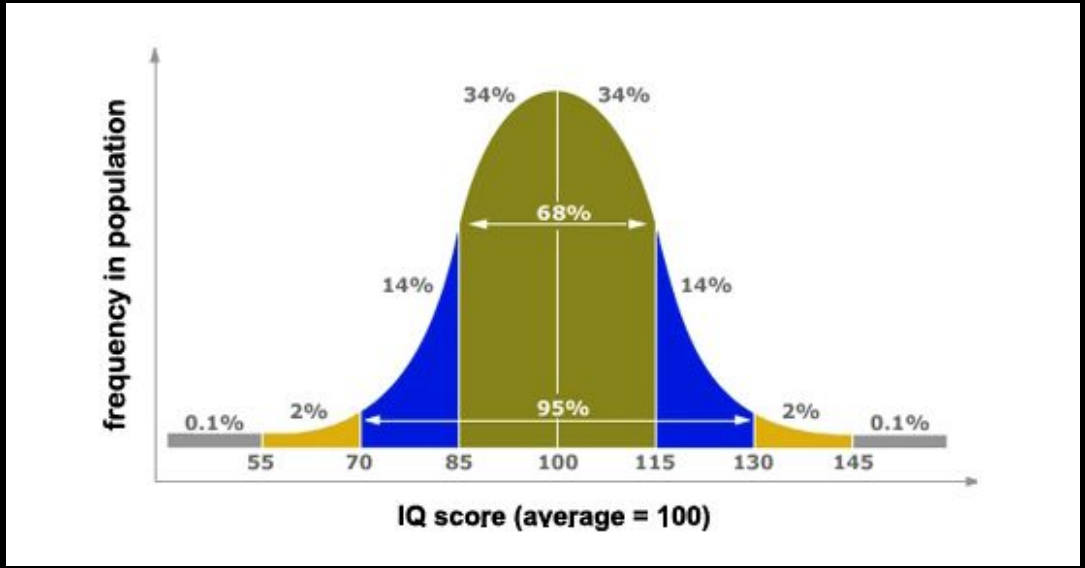
Current IQ testing

Wechsler Intelligence Scales

- The Wechsler Intelligence Scale for Children (WISC) and the Wechsler Preschool and Primary Scale of Intelligence (WPPSI).
- The current WAIS provides scores in four major areas of intelligence:
  - Verbal Comprehension
  - Perceptual Reasoning
  - Working Memory and
  - Processing Speed

IQ bell curve

- 95% of the population have an IQ score (measured by a valid IQ test) somewhere between 70 and 130.
- Very high IQ > 140
- Genius = IQ > 160



Criticisms of IQ testing

- May only represent a narrow set of skills and only show ability to take a test
- Do not offer information on motivation, emotion, attitudes, and other similar factors
- intelligence is far too complex to be precisely measured by tests
- shown to have high error margins and can vary considerably depending on the day

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Links to figures

http://apa.nyu.edu/hauntedfiles/race-and-intelligence-the-bell-curve-20-years-later/

https://www.psychologytoday.com/ca/blog/between-the-lines/201412/psychologists-and-the-us-military-then-and-now