

## 1 Intelligence and Race

Cranial Capacity and IQ

## 2 Intelligence and Race

- Certainly the most controversial topic in the study of human variation is the question of the relationship between genetics, race, and intelligence

## 3 Intelligence

- **Intelligence:** mental capacity; ability to learn, reason, or comprehend and interpret information, facts, relationships, meanings, etc.; the capacity to solve problems, whether through application of previously acquired knowledge or through insight

## 4 Anthropological Studies of Intelligence

- Two Primary Areas of Study
  - Cranial Capacity/Brain Volume
  - Intelligence Quotient (IQ)

## 5 Cranial Capacity and Intelligence

## 6 Humans and Large Brains

- One obvious biological characteristic of the human species is our large brains
- Humans have large brains and small faces in contrast to other living primates and other animals

## 7 Cranial Capacity and Mental Capability

- **Cranial Capacity** is a measure of the interior volume of the brain case and is used as an approximation of brain size
- Long been used to indicate mental capacity
- Can be measured in both the living and the dead using measurements and formulae in the living and by direct measurement in the dead
- Three measures (cephalic length, breadth, and height) can be taken and used to calculate cranial capacity in the living
- In cranial material the cranial capacity can be measured directly through filling the brain cavity with different substances (shot, poppy seeds, mustard seed)

## 8 Evolution of Cranial Capacity

- Low average of 450 cc among our earliest ancestors (*Australopithecus*)
- Average of 650 cc in *Homo habilis*
- Average of 970 cc in *Homo erectus*
- Average of 1450 cc in Neandertals

- Average of 1345 cc in modern humans

9  **Evolution of Cranial Capacity in Hominids**

10  **Interspecies Variation:  
Brain Size in Living Primates**

11  **Problems with the Use of Cranial Capacity**

- Absolute brain size is not a good measure of intelligence because larger animals tend to have larger brains
- An alternative way of looking at brain size is to express the weight of the brain as a ratio of body weight (**Brain Weight/Body Weight Ratio**)
- For humans the ratio is  $1/49 = 0.020$ , larger than many other primates
- For squirrel monkeys the ratio is  $1/31 = 0.032$
- Don't tend to think of squirrel monkeys and other primates who have a larger ratio as being more intelligent

12  **Allometry**

- This is because of **allometry** (the change in proportion of various body parts as a consequence of different growth rates) – animals that are larger appear to have smaller brain/body size ratios – the relationship between brain size and body size is not linear
- Humans are exceptions for primates – they have a brain three times the size we would expect for a primate our body size

13  **Primate Brain Weight/Body Weight Ratio**

14  **Human Growth Pattern**

15  **Encephalization Quotient**

- The increase in brain size over and beyond that which can be explained by an increase in body size is termed the **encephalization quotient (EQ)**

16  **Human Brain Complexity**

- In addition to overall larger relative brain size, humans have proportionately more cerebral cortex than other primates (part of the brain involved in forming complex associations) and have increased convolution (folding of the brain tissue)

17  **Brain Components in Humans and Other Animals**

18  **Brain Components in Humans and Other Primates**

19  **The Human Cerebral Cortex**

20  **Energy Usage by the Brain**

- Larger mammals have larger brains and also produce greater amounts of metabolic energy, however, mammals show a great deal of variation in the amount of energy used by the brain:
  - Dogs and Cats: 4-6% of their body metabolism
  - Old World Macaques: 9%
  - Humans: 20%

- 21  **Intraspecies Variation: Sexual Dimorphism**
- Males and females differ in cranial capacity
  - Males have a larger average brain size than females (Males average about 1400 cc and females about 1200 cc)
  - Factoring out body size, the differences in cranial capacity are zero
  - Lab IX – Cranial Capacity, Body Size, Correlation

- 22  **Worldwide Variation in Cranial Capacity**
- Wide range of variation in modern populations
  - Some overlap with fossil species
  - Cranial capacity correlated with stature – larger brains are associated with larger overall body size
  - Highly variable within a population

- 23  **Studies of Racial Differences in Cranial Capacity: An Example of Scientific Racism**
- **Samuel Morton** (Physician 1799-1851) polygenist, convinced of the inferiority of African and other non-White populations
  - Measured cranial capacity in a large number of crania of different races to assess differential worth
  - Very careful technician, published extensive list of measurements of cranial capacities
    - Collected over 1000 skulls between the 1820s and 1851
    - Considered a great data-gatherer and objectivist
    - Oliver Wendell Holmes praised the “severe and cautious character of his work”
    - On his death, the New York Tribune wrote that “probably no scientific man in America enjoyed a higher reputation among scholars throughout the world, than Dr. Morton”

- 24  **Results of Morton’s Studies**
- *Crania Americana, or, a Comparative View of the Skulls of Various Aboriginal Nations of North and South America* (Philadelphia: J Dobson, 1839)
  - Corroborated Blumenbach’s five-fold racial division
  - Concluded that American Indians were descended from a common stock distinct from the races of the Old World based on cranial capacity
  - Argued against environmental causes of race formation
  - Demonstrated significant differences in cranial capacity and therefore, according to him, intelligence among the races
  - Mongolians and Caucasians head the list and American Indians and Ethiopians bring up the rear

25  **Morten’s Racial Rankings**

Racial Category	Morton’s Averages (inches <sup>3</sup> )
Caucasian	87
Mongolian	83
Malay	81
American	82
Ethiopian	78

## 26 Results of Morton's Studies

- *Crania Aegyptiaca*, or, *Observations on Egyptian Ethnography, Derived from Anatomy, History, and the Monuments* (Philadelphia: J Pennington, 1844)
- Compared skulls obtained by George R. Gliddon from archaeological sites in Egypt, then the oldest available
- Deduced that racial distinctions were as prominent 6,000 years ago as they were in 1840
- The elite of Ancient Egypt, he argued, were Caucasians
- He claimed that while Negroes were abundant, “their social position, in ancient times was the same as it is now, that of servants or slaves.”
- Here he makes his strongest argument for the polygenic origins of humanity and the irreducibility of racial distinctions.

## 27 Stephen J. Gould

- Stephen Gould reanalyzed Morton's data and found no significant differences between the samples and a bias in the selection of crania and measurements used to calculate cranial capacity

## 28 Morton's Racial Rankings

Racial Category	Morton's Averages (inches <sup>3</sup> )	Gould's Averages (inches <sup>3</sup> )
Caucasian	87	87
Mongolian	83	87
Malay	81	85
American	82	86
Ethiopian	78	83

No significant differences between Gould's means.

## 29 Intelligence Quotient (IQ) and Intelligence

### 30 Intelligence Quotient (IQ)

- One measure of intelligence has been IQ
- Originally developed by **Alfred Binet** (French psychologist in 1905) who sought a means by which to identify children with learning disabilities
- It was not designed to measure intelligence per se but to identify children who would most likely require special education
- Sought to determine what was “normal mental development” for his society during his time

### 31 Intelligence Quotient as a Measure of Intelligence

- The **intelligence quotient** is a measure obtained by dividing a person's “mental age” by his or her chronological age
- So an individual who is four years of age but performs at a level of a 5 year old on the intelligence test has an IQ of 5/4 or 125
- Designed so that the average score for a reference population (usually white-middle class) is 100
- Scores can vary from 4 to 5 points on retesting and can over several years vary by as much as 20 to 30 points
- Individuals under a score of 75 were thought to be mentally deficient

- 32  **Use of the IQ Test in the United States**
- The test was imported into the US by **Lewis Terman** (Stanford University) who reworked the test to fit the “American experience” and based it on a sample of middle class California school children – **Stanford Binet Test**
  - In contrast to its usage by Binet, the test results were interpreted by Terman, and later others, as a measure of inherited mental ability
  - Thus schoolchildren could be placed in educational tracks commensurate with their tested level of intelligence (biological determinism)
- 33  **Use of the IQ Test in the United States**
- The IQ test was later used by the US Army to test WWI recruits
  - Results indicated that the average American male had a mental age of 14
  - From this was drawn the conclusion that America was at risk because of the immigration of individuals of low intellect
  - IQ tests were used to test immigrants into the US
- 34  **Flynn Effect**
- Intergenerational IQ level increases with continued residence in the US and acculturation
- 35  **Is Intelligence a Single Thing That Can Be Measured by an IQ Test?**
- Some say yes, others note that there are many different types of intelligence, some of which may not be assessed as well by conventional IQ tests
- 36  **How is IQ Affected by Genetics and the Environment (Not the Same as Asking About Intelligence)**
- Evidence for a strong genetic component
  - Evidence for a strong environmental component (diet, education, social class, and health among others)
  - Heritability estimates range from 60-80% to 34-48%
- 37  **Heritability Estimates for IQ Measures**
- 38  **Are There Racial Differences in IQ Test Scores?**
- Studies of the US Army recruits indicated that recent immigrant males from non-northern European countries scored on average lower than US Citizens (by 10 to 20 points lower)
- 39  **Population Variability in IQ Scores of US Immigrants**
- 40  **Population Variation in IQ Scores Among US Immigrants**
- European Americans tend to score higher on average than African Americans (15 points higher on average)
  - Used to make public policy such as keeping segregation in schools and limiting immigration from certain countries (non-western European)

- 41  **American Blacks and IQ**
- Most of the use of IQ scores to promote certain public policies revolve around IQ test results for American Blacks
  - American Blacks during the 1950s scored on average about 15 points below whites
- 42  **Euroamericans and American Blacks and IQ**
- 43  **Problems with the use of IQ Tests**
- Categories such as those above are broad groupings based on ethnicity and national origin but are not homogeneous populations
  - Assumption that any group differences in IQ are genetic differences
  - IQ tests are **culture bound** – Black Intelligence Test of Cultural Homogeneity (Bitch Test)
- 44  **Example of Culture Bound**
- 45  **Evidence for an Environmental Explanation for Racial Differences in IQ**
- Bulk of evidence supports an environmental explanation for the differences in IQ noted between races
  - Moving children from a deprived environment to a an improved one can boost scores 20 to 30 points
- 46  **Socioeconomic Status and IQ**
- Socioeconomic status also greatly influences IQ scores
- 47  **Quality of Education and IQ Scores**
- High correlation between performance on IQ tests and quality of education (children from states that spend less on education consistently show lower IQ scores)
- 48  **Health Factors and Nutrition and IQ Scores**
- Health factors and nutrition also play strong roles in IQ results
  - School lunch programs boost up to 10 points in IQ scores
  - Maternal health also plays a significant role