1 # Anthropology 362

Human Biological Variation

2 # Variation, Race, and the Evolutionary Approach

3 # Variation

The differences among individuals or populations of a species

4 ## Variation

- Anthropologists interested in both **cultural** and **biological** variations
- Anthropologists use the **comparative approach** to studying human variation in an attempt to generalize about aspects of behavior and biology that are similar in all populations and those that are unique to specific environments and cultures

5 ## Kinds of Variation – 1
(Observation Methods)

- **Visual Variation:** variation visible to the human eye (stature, weight, hair color, hair form, skin color, eye color, body proportions, dermatoglyphics, etc.)
- **Biochemical Variation:** variation observable only through chemical tests (ABO blood type, other blood types, restriction fragment length polymorphisms, single nucleotide polymorphisms, mtDNA and nDNA variations)

6 ## Kinds of Variation – 2
(Levels)

- Idiosyncratic Variation (Individual Variation)
- Sex Variation
- Age Variation
- Populational/Racial Variation

7 ## Kinds of Variation – 3
(Trait Types)

- **Quantitative (Continuous, Metric) Variation:** variations that exhibit a continuous or uninterrupted distribution (stature, weight, etc.)
- **Qualitative (Discontinuous, Non-metric) Variation:** variations that exhibit a discontinuous or interrupted distribution (ABO blood system, tongue curling, attached/unattached ear lobes, etc.)

8 ☐ **Causes of Variation in Humans**

- Biology
- Environment
- Culture

9 ☐ **Measuring Visible Human Variation**

- **Anthropometry:** the physical measurement of human body form
  - Anthropometrics
  - Osteometrics
  - Odontometrics
  - Anthroposcopy
- Lent a sense of scientific certainty to the measurement of human variation over simplistic observations such as tall vs. short, light vs. dark, etc.

10 ☐ **Historical Views on Human Variation**

- **Pattern:** most historical views on human variation emphasized the pattern (or product) of evolution - variation
- **Process:** today's view of human variation emphasizes both pattern (variation) but also the process by which that variation developed (evolutionary forces)

11 ☐ **Typological Approach**

- Prior to Darwin, the study of animal (including human) variability was dominated by the **Typological Approach** – a revival of Aristotle's view of variation at the species level:
  - idealized living forms (types)
  - all species and types were unchanging and fixed

12 ☐ **Typological Approach**

- Variation viewed as the imperfect reflection of the more real essence or type
- Average or typical individual reflected the real essence or type

13 ☐ **Example of a Western Typological Approach to Human Variation**

- Leonardo da Vinci's explanation of the variation of human skin color as a result of activity times:
  - Dark skinned peoples lived in hot climates and could only be active during the night and therefore had dark skin
  - Light skinned peoples lived in cooler climates and were active during the day and therefore had light skin

14 ☐ **Non-Western Typological Examples**

- Chinese writers of the 3rd century BC explained the "disgusting" appearance of the yellow-haired, green-eyed barbarians from distant provinces as deriving from a different paternity, that is from the breeding of dogs and humans
- Cherokee Indians of North America explained the differences in skin color as being the result of an infallible creator – paleskins were considered underbaked by the creator, dark skinned people were considered overbaked, and the Indian was the result of the creator's perfection of the technique

15 ☐ **Great Chain of Being (*scala naturae*)**

- Developed by Aristotle in the 4th century BC but remained popular through the 19th century
- Linear arrangement of animal types into grades of development from lower to higher categories (man near the top)
- Human variation also included with Europeans placed at the top and newly discovered peoples further below

16 ☐ **Aristotle's Great Chain of Being**

17 ☐ **Great Chain of Being**

18 ☐ **Great Chain of Being (St. Thomas Aquinas)**

1 ☐
God
Angels
Kings/Queens
Archbishops
Dukes/Duchesses
Bishops
Marquises/Marchionesses
Earls/Countesses
Viscounts/Viscountesses
Barons/Baronesses
Abbots/Deacons
Knights/Local Officials
Ladies-in-Waiting
Priests/Monks
Squires
Pages
Messengers

2 ☐
Merchants/Shopkeepers
Tradesmen
Yeomen Farmers
Soldiers/Town Watch
Household Servants
Tennant Farmers
Shepherds/Herders
Beggars
Actors
Thieves/Pirates
Gypsies
Animals
Birds
Worms
Plants
Rocks

19 ☐ **18th Century Thinkers**

Carolus Linnaeus (1707-1778)

- Father of Taxonomy
- *Systema Naturae* (system of classification based on a nested two-dimensional hierarchy)
- Species were unchanging and were typological in nature

- Human diversity classified into subspecies categories he called **varieties**
- Goal of classification was to reveal God's plan

20 ☐ **Great Chain of Being and Linnaeus' Taxonomic Hierarchy**

21 ☐ **Taxonomy of Modern Humans**

22 ☐ **Linnaeus' View of Human Variation**

Homo sapiens Eoropeus albescens
("white" people = Europeans)
Homo sapiens Africanus negreus
("black" people = Africans)
Homo sapiens Asiaticus fucus
("dark" people = Asians)
Homo sapiens Americanus rubescens
("red" people = Native Americans)

23 ☐ **18th Century Thinkers**

Count de Buffon

- Recognized that the external environment was an agent of change in a species
- Rejected the idea that one species could change into another
- Focused on the population as a unit of assessing variability rather than on classification as a goal

24 ☐ **18th Century Thinkers**

Jean-Baptiste Lamarck (1744-1832)

- Major taxonomic groups were linked geneaologically (through evolution)
- Species adapted to their changing environments through acquired characteristics (process)

25 ☐ **Giraffe Example**

26 ☐ **Charles Darwin (1809-1882)**

- First to correctly synthesize pattern and process correctly
- Evolution by Natural Selection (Process)
- Nature selected those individuals that survived and reproduced because of certain characteristics

27 ☐ **Giraffe Example**

28 ☐ **Race and Racial Classification**

- Even after Darwin the study of human variation remained focused on the **pattern** of variation rather than on the **process** until the 1940s

- **Race (biological):** a division of a species that differs from other divisions by the frequency with which certain hereditary traits appear among its members

29 ## Two Characteristics of Race

- Group of populations that share some biological characteristics
- These populations differ from other groups of populations according to these characteristics

30 ## Early Racial Classifications

31 ## Early Racial Classifications

- Early racial typologies were made on the basis of:
  - visible traits such as skin and hair color, stature, face, nose, and eye form
  - Geographic distributions of people
  - Perceived behavioral attributes - **biodeterminsim**

32 ## Eugenics Movement

- **Biodeterminism** reached its peak in the 19th century (Broca, Retzius, Morton, Quetelet, Lombroso – criminal tendencies, and others)
- Out of this environment was born the **Eugenics Movement** – the idea that physical and mental characteristics (of real or assumed genetic basis) could be improved in the human species through selective breeding
- Eugenics Movement encouraged the mating of "talented" men and women but sanctioned (usually through sterilization) of "untalented" (usually criminals or people with mental disabilities or disorders).

33 ## Later Racial Classifications

34 ## The Beginning of the End of the Racial Approach to Human Variation

- Began in the 1940s when the futility of using the racial concept finally was recognized

35 ## Problems of Racial Classification

- No agreement on the number of races

36 ## Racial Classifications and Numbers of Races

37 ## Problems of Racial Classification

- Biological variation is real but the order we impose on the variation by

using the race concept is not (races are discrete units but much of human variation is continuous)

38 **Example of the Continuous Nature of Traits**

39 **Example of the Continuous Nature of Traits**

40 **Problems of Racial Classification**

- The use of different traits in racial classifications result in different racial classifications

41 **Trait Selection and Racial Classifications**

42 **Problems of Racial Classification**

- Racial classifications only provide information only about the "average" in a group but nothing about the variation within a group

43 **Within and Between Group Variation**

44 **Evolutionary Approach to Variation**

- The examination of variation in terms of evolutionary forces (mutation, genetic drift, natural selection, gene flow)
- Interprets the pattern of human variation in the context of evolutionary forces that created the pattern

45 **Two "Methods" of the Evolutionary Approach to Human Variation**

- Populational Approach
- Clinal Approach

46 **Populational Approach to Human Variation**

- Focuses on the unit "**breeding population**" as the unit of comparison between humans
- Looks at the differences between breeding populations on the basis of frequency differences of various traits
- Problem: all groups are connected by interbreeding, the lines between different breeding populations are arbitrary

47 **Example of a Populational Approach**

48 **Clinal Approach to Human Variation**

- The **trait** is the unit of study
- Focuses on the distribution of traits and an analysis of those distributions in light of environmental or ecological variables in order to develop hypotheses of explanation

- **Cline**: the continuous gradation in the form or frequency of a trait or trail complex over geographical space

49 ## Distribution of Skin Color as an Example of the Clinal Approach to Human Variation