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Archaic *Homo Sapiens* and Neanderthals

NOTE

Please do not open this document in Google Docs, you will get something incoherent. Download to disk then open with a PDF reader of your choice

Tools

- Early Stone Age
 - From 1.8 to 1.5 MYA only **Oldowan** tool (ASIA)
- Lower Paleolithic (Africa)
- Smashing rocks until the rocks become sharp tools
- Children most likely learned from their parents by watching and doing themselves
- **Oldowan Technology:**
 - New technology did not emerge for another million years
- **Acheulean:**
 - It took years to master this technique
 - Pressure flaking
- **Mousterian:**
 - Does not require labor intensive pressure flaking
 - Prepare a core and one perfectly placed blow will become a sharp edgea
- Middle Stone Age
 - This era gave rise to projectile tools, used to injure animals from afar

| Stone tool industry | Oldowan | Acheulean | Mousterian | Aurignacian and others | Various |
|---------------------|-------------------------|---------------------|--------------------------|------------------------|-------------------------|
| Age (in years) | 2.6 million–1.7 million | 1.7 million–200,000 | 200,000–40,000 | 40,000–12,000 | 12,000–7,000 |
| Signature artifacts | Chopping tools | Large cutting tools | Flakes struck from cores | Rectangular flakes | Small, geometric flakes |

Figure 1: Tool Lineage



Figure 2: Oldowan Tools



Figure 3: Acheulean Handaxe



Figure 4: Stone Age Tool

Homo Habilis

Specimen Name: *Au. habilis*

Anatomical Features

- Brain volume: 500cc to 800cc
- Brain case: globular, has a slight peak at the top, reminiscent of a sagittal crest increased cranial capacity
- Face: subnasal prognathism (protrusion of the lips and chin)
- Dentition and associated musculature: comparatively smaller molar and premolar teeth of the fossils found
- Postcranial: bipedalism, marked tubercle (enlargement of bone aiding for climbing), long forearms

Behavior, Ecology and Location

- Ecology: ate meat by scavenging from animal carcasses, crude stone implements to extract bone marrow (smashing rocks)
- Climate: Grasslands. Cool and dry.
- Habitat: access to lakes and woodlands
- Location: sub-Saharan Africa
- Locomotion: bipedal
- Diet: see ecology

Tools

- first user of Oldowan Tools

Range per Region

- 2.4 to 1.65 MYA



Figure 5: Homo Habilis Brain Case

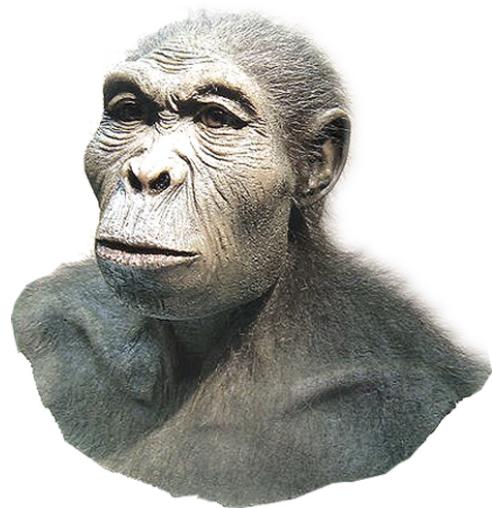


Figure 6: Homo Habilis

Homo Rudolfensis

- On the morphological boundary between the genera *Homo* and *Australopithecus*
- Only known through a handful of fossils gathered in 1972



Figure 7: *Homo rudolfensis*

Homo Ergaster

Characteristics:

- Thinner cranium
- Less brow ridge than *erectus*
- Very human like in many respects
- May have been first hominid to migrate out of Africa



Figure 8: Homo Ergaster Skull

Homo Erectus

- Nariokotome (Turkana) Boy in Kenya
 - 1.5 to 1.6 MYA
- Over time brain increased across range
 - From 640cc to 1200cc with a 900cc average



Figure 9: Homo Erectus

Homo Naledi

- Very small brain (around 450cc)
- Notice smaller browridge, moving towards a flatter face
- Long legs for distance walking
- Intentional “burial”
 - Intricate tunnels where bodies were placed
 - Lesedi Chamber
 - Dinaledi Chamber
 - People who were small enough were sent to excavate the chambers
 - It was apparent that this place was meant to be a site where people disposed of human remains but motive is unclear (religious ceremonies).
- Estimated to be at least 236,000 YO

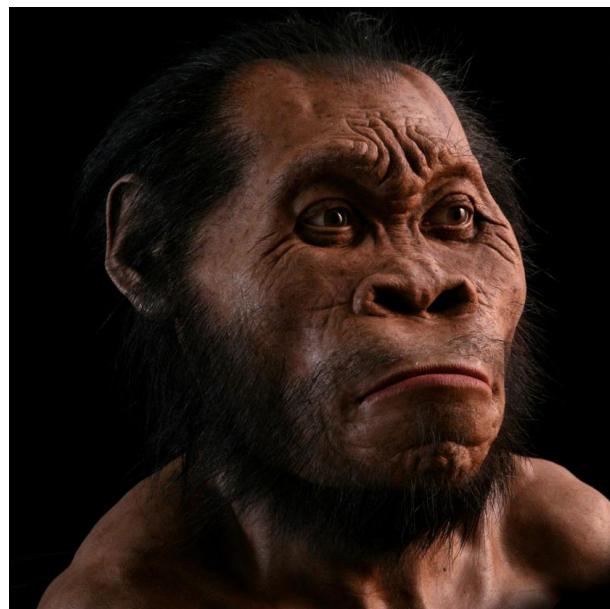


Figure 10: Homo Naledi

Homo Floresiensis (Hobbit)

Characteristics:

- Wrist, ankle, humerus, femur, pelvis almost identical to chimps and *Au. aferensis*
- Skull almost identical to small human skull, except teeth reduced for smaller jaw and brain case reduced for smaller ape-sized
- Lived in Flores from 94 KYA until 12,000 YA
- Co-existed with modern humans
- Some speculate descendants could exist today
- Stone tools associated

Height Comparison to Homo Erectus

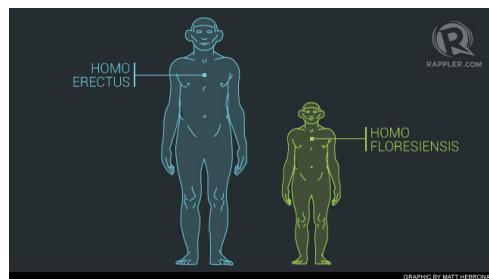


Figure 11: Homo Floresiensis

Homo Neanderthals

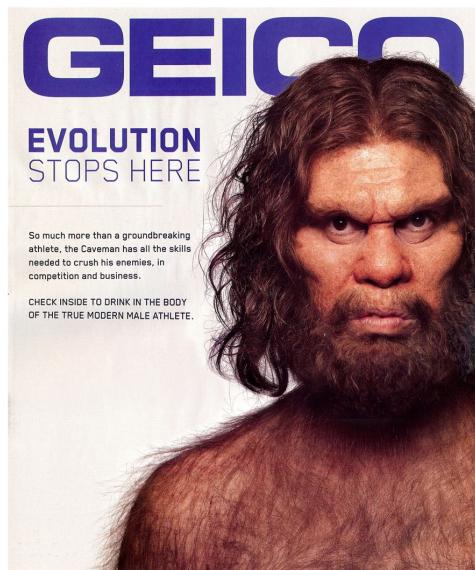


Figure 12: Geico Neanderthal

- Slightly larger brains
- Occipital bun
- The most fossil evidence recorded for all Homo species
 - 100s of finds throughout Europe, Middle East, western Asia to Siberia
 - Most of the remains were found in caves
- More muscular, thicker bones, barrel-chested, midfacial prognathism, double arched browridge, no chin, faster life-history
- Mousterian tools, later Chatelperronian blades, fire, cannibalism, adornment
- Exclusively carnivore, dangerous large mammal hunting
 - Healed fractures
 - Hard life
- Reveals great similarities with us; differing in DNA by just 0.12%

Origins of Humanity

- It is unclear which of the species we are learning about contributed the most to modern Homo Sapiens
- Glacier → River → Lake
- Coywolf example
 - A mixture of wolves, coyotes and domesticated dogs
 - Hard to determine which species was the definitive ancestor to modern humans



Figure 13: Coywolf

Types of Homo Fossils (Informal Labels)

- Early Pleistocene
 - *Classic Homo Erectus* aka *Homo Ergaster*
 - Possibly extends into middle Pleistocene in China and Indonesia (the first hominid out of Africa)
- Middle Pleistocene
 - *Advanced or late Homo Erectus*
 - * *H. antecessor* link to *H. heidelbergensis*
 - Archaic *Homo Sapiens*
 - * *H. heidelbergensis*, *rhodensiensis*
 - Evolved into Neanderthals in Europe, into Denisovans east through Asia, possibly in Africa into earliest *Homo Sapiens*
 - Late Pleistocene
 - * Anatomically modern *Homo Sapiens*
 - * Also *H. floresiensis*, *H. Neanderthalensis*, and *Denisovans*

European Archaic *Homo Sapiens*

- *Homo Heidelbergensis* (found in Germany)
- Earliest to populate Europe
 - Possibly 600 KYA
- Atapuerca (N. Spain)
 - 28 skeletons
 - Burial w/ symbolic behavior (pink quartz along with a handaxe)
 - Species seems to be disposing of their dead
- Perhaps became Neanderthals, Denisovans and *Homo Sapiens* about 130 KYA

African Archaic *Homo Sapiens*

- *Homo Rhodesiensis*
- Look different than the European sites
- 600 - 125 KYA

-
- 1300cc, others were smaller ~900cc
 - Oldest signs of stone tool defleshing of conspecific (of their own kind) skull
 - Possible evidence of cannibalism or maybe ritual, there is no way of knowing
 - Evolved into the earliest modern H. Sapiens
 - Not yet anatomically modern

Asian Archaic H. Sapiens

- Possibly related to Denisovans
- Up to 200 to 130 KYA
- 1150 to 1400cc (brain size)
- Less represented than European and African archaic H. Sapiens
- Not enough information to actually name them
- Site in China called Ngandong



Figure 14: Dali Skull

Denisovans

- DNA extracted from molars
- Not yet named as a species, pending more fossils



Figure 15: Denisovan Molar

Anatomically Modern Homo Sapiens

- Emerging around 200 KYA, last human to evolve
- Move to omnivore (to cope with climate fluctuation)
 - Gathering shellfish, roots, berries already seen 200-70 KYA
- Population bottleneck around 140 KYA when only 600 individuals
 - We barely made it
- Showed symbolic culture
 - Blombos 75 KYA

Identification Activity

This will be on the exam

- one of these is not from the genus homo, can you identify
- identify the four different homo specimens
 - Look at skull case (dome, occipital bun, overall size), browridge, prognathism (lower, mid-facial), chin
 - Include from slides and identify each skull



Figure 16: Skull One

- Answer: Australopithecus
- Why: jutted chin, resembling a chimp



Figure 17: Skull Two

- Answer: Neanderthal
- Why: large occipital bun and subdued browridge



Figure 18: Skull Three

- Answer: Archaic Homo
- Why: globular brain case, small browridge, no chin

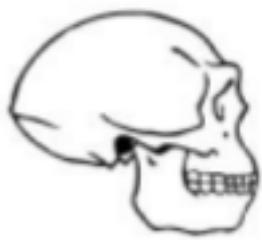


Figure 19: Skull Four

- Answer: Homo Erectus
- Why: large occipital bun, prominent browridge



Figure 20: Skull Five

- Answer: Homo Sapiens
- Why: globular brain case, flat face, no browridge, chin

External Links

[Middle Age Stone Tools](#)

[Homo Habilis Essay](#)

Quizlet Sets

[Anthropology: Homo and Homo Sapiens \(Tool List\)](#)

[Anthropology: The Origin and Dispersal of Anatomically Modern Homo Sapiens](#)

[Assorted Terms](#)

YouTube Videos

[Early Humans...in five minutes or less Anthropology Crash Course with John and Hank Green](#)

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Hominin/Human Evolution

- Behavior associated with tool production, tool use, and subsistence
- Symbolic items and behaviors after ~40KYA
 - Beads, buttons
 - Ochre, symbolic carvings
 - Venus figurines, zoomorphic statuettes (early pornographic material possibly)
 - Grave goods, arranged burials, cremations
 - Cave paintings

Models of Human Origins

- Hard to agree upon what was the first anatomically modern human
- Difference in body shapes that had to reflect with dietary adaptations)

Replacement Model

- Second migration outside of Africa
- Replacement of H. Erectus (not by a gradual change)
- This is where the evolution of anatomically modern humans
- Unknown in the disappearance of Neanderthals
 - Homo Sapiens were somehow superior to Neanderthals

Multiregional Model

- A gradual flow of new species and interbreeding
- Movement inside and outside of Africa

Final Notes

- Replacement: there are shared genes in Homo Sapiens (gene flow)
- Multiregional: there is an abrupt change in population (some places where there is interbreeding and other places shows abrupt change)
- There is a mixture of the two philosophy, based on what is most important to the scientist

Peopling of the New World

- Bearing land bridge (from Siberia) open after 15 KYA interior corridor later 14-13 KYA
- Followed Pleistocene megafauna along ice-free corridors
- PreClovis
 - May have arrived by water craft (known @ 40KYA)
 - Monte Verde, Chile 13.9 - 14.2 KYA
 - Buttermilk Creek Texas 15-13.2 KYA
- Most Pacific Islands colonized ~3.5 KYA or later
 - Likely with outrigger canoes and supplies

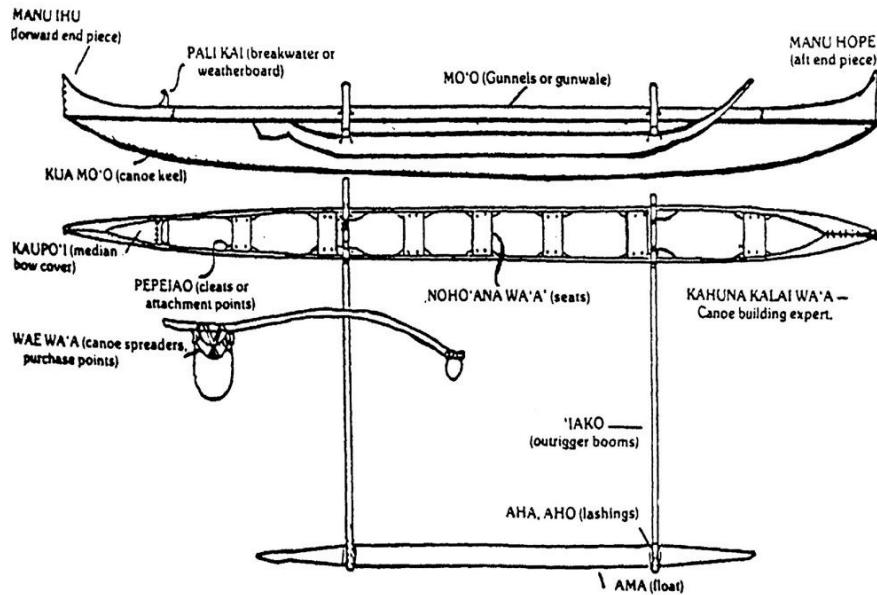


Figure 1: Outrigger Canoe

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Biomedical Anthropology

- A subfield of **Biological Anthropology**
 - traditional interests of biological anthropology (evolution, human variation, genetics, behavioral ecology)
- an empirical approach
- **Cultural & Ecological:**
 - Comparative work across cultures and environments
- Theoretically informed hypothesis testing
 - Data driven
 - Follows the scientific method
- related: **Epidemiology**

-
- Population-level health research
 - Statistical analyses based

Rates: Disease and Mortality

- rate : velocity (dx/dt)
- rate per 1000 individuals = $(\text{events}/\text{population at risk}) * 1000$
- crude death rate: $(\text{all deaths during calendar year} / \text{population at midyear})$
 - midyear : agreed upon time to gather population
- disease rate
- incidence rate: $= (\text{number of new cases of disease} / \text{total population})/\text{period of time}$ (over a period of time, more or less the average over all)
- prevalence rate: basically the rate at a given time
 - $dx/dt = 2t$ at $t = 0$.

Top Causes of Deaths

- In the last 100-120 years, the amount of deaths by contagious diseases has declined
 - Countries have gotten richer
 - Better access to nutrition, vaccinations
 - Infrastructure
- The most common form of death is lifestyle diseases, such as cancer and heart disease. Can be attributed to aging.

Connection of Wealth and Longevity

- Countries that have a higher GDP tend to do better, all political feelings aside
- Child mortality rate is very low in the modern world, at an all time low of 4.5% reported in 2015

Illness and Wellbeing

- Understood to be products of
 - Genes
 - Culture

-
- Environment
 - Diet
 - Economic and educational systems
 - Evolution

Heart Disease

- Has been around for a while (Ancient Egyptians seen to have this problem)
- Universal feature of human aging
 - Not common in young people

Comparing American Diet to Paleo

| Dietary Component | Paleolithic Diet | Contemporary Diet |
|--|---|---|
| Energy (calories) | High to support active lifestyle – higher if colder | High but beyond needed to support sedentary lifestyle |
| Micronutrients (vitamins, antioxidants, folic acid, iron, zinc) | High: 65-70% of diet rich in (from fruits, roots, nuts) | Low |
| Electrolytes (sodium, calcium, potassium) | Potassium high (10,500/day) sodium low (770/day) - good b.p. | Potassium low (3000/day) sodium high (4000/day) – high blood pressure |
| Carbohydrates | High: providing 45-50% of daily calories (from vegetable, fruits, roots) | High: providing 45-50% of daily calories (from cereal grains, sugars) |
| Fat | Provides 20-25% daily calories, better kind of fat from nuts, fish, and wild animals – high in Omega 3s | Provides 40% daily calories, domesticated meat and dairy – high in Omega 6 and saturated fats |
| Protein | High 30% daily calories from wild game. | Recommended: 12% of daily calories... (bad assoc.) |
| Fiber | 50-100g/day | 20g/day |

Figure 1: Comparison

Epidemiological Transitions

- Introduction of agriculture
 - A sustainable source of food in a controlled environment
- Introduction to large urban populations across societies and introduction of industrialization in developed countries
- Secular changes: height, weight, menarche, life expectancy

Evolutionary Medicine: Understanding disease from a Darwinian Perspective

- Defense vs. Defects
 - coughs, sneezing are ways to rid infectious material through various organs
 - Fevers are ways to kill bacteria
- Arm races: pathogens and hosts gain reproductive advantage by developing resistances to one another
- Cultural & Behavioral Interventions
 - Quarantine, vaccination
- Habits (behaviors, interactions, movements)
 - Affect chances of diseases “winning” and spreading.
 - *hosts, pathogens, mode of transportation*
- Dietary deficiencies
 - Heavy dependency on corn, rice, etc.
- Pleiotropic gene effects
 - When one gene is linked with several traits
 - Several diseases do not manifest in the EEA (Environment of Evolutionary Adaptedness)

Design Compromises

Prostate Problems

- Urination, bladder control
- Enlarged prostates will increase the likelihood of erectile dysfunction

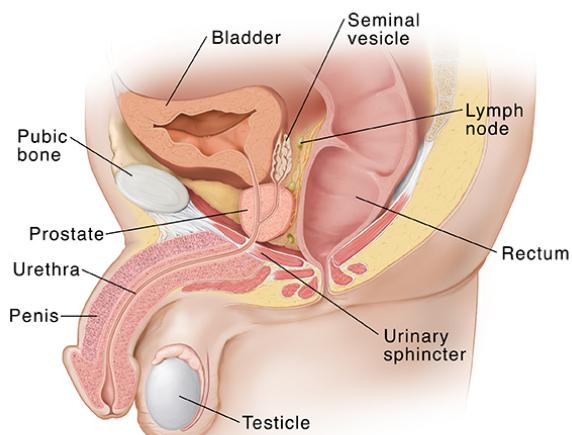


Figure 2: Prostate Diagram

Pregnancy Problems

- Incontinence (loss of bladder control), constipation (unable to poop/defecate), back pain
- **Ectopic Pregnancy:** when the fetus develops outside of the uterus, typically in the fallopian tubes

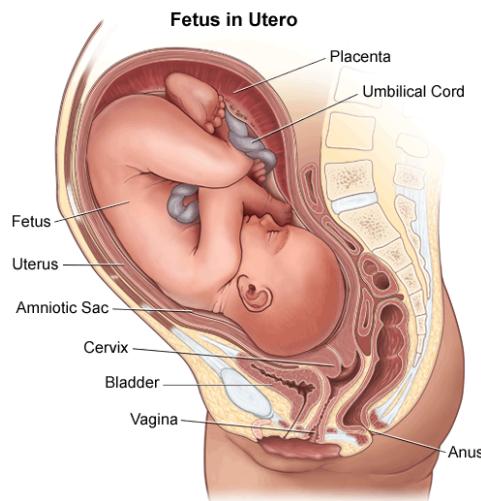


Figure 3: Fetus in Utero

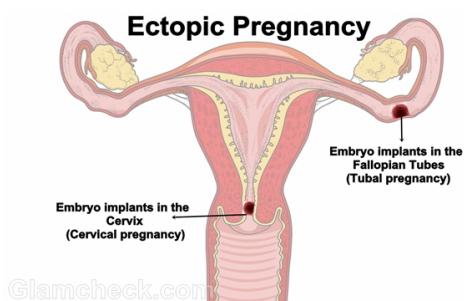


Figure 4: Ectopic Pregnancy

Windpipe Hazards

- Increased risk of choking

Birthing Process

- In humans and neanderthals, birthing is difficult because it is tight (small birthing canal)
- There is a high risk of injury or death for both the baby and the mother
- There is often assistance in this process
 - Most non Western cultures will give birth in a squat, less resistance
 - Western culture will give birth in a reclined position

Complications Carrying to Term

- **Teratogens:** substances that cause birth defects
- **Fetal Alcohol Syndrome:** a form of teratogen that will cause retardation (in the literal sense of the word) of mental development/capacity, physical growth particularly in the skull and face
 - Put down the whiskey you sick fuck
- **Morning Sickness:** characterized by vomiting right as an expectant mother wakes up
 - Hypothesized to protect the embryo from harmful teratogens
 - Women who experience morning sickness are less likely to miscarry
 - The greatest aversions (not wanting to be apart of something) are to meats, fish, poultry, and eggs

Pregnancy, Childbirth, Parenting (Continued)

Evolutionary Context

- 1 - Evolutionary Function of Crying
- 2 - Human Infants as “Carried Young”
- 3 - Co-sleeping
- 4 - Breastfeeding
- 5 - Heartbeat and Uterine Sounds
- 6 - Movement Stimulation
- 7 - Swaddling
- 8 - Continuous and Multi-Sensory Stimulation

Health Aspects of Natural Parenting

- 1 - Skin-to-Skin Care for Preterm Infants
- 2 - Touch Effects on Physiology
- 3 - Physical Growth
- 4 - Immunological Processes
- 5 - Thermal Regulation
- 6 - Orthopedic and Other Health Aspects of Infant Carrying
- 7 - Gastroesophageal Reflux and Media
- 8 - Infant Toilet Training Elimination Communication
- 9 - Bed Sharing and SIDS
- 10 - Breastfeeding
- 11 - Psychological Correlates / Attachment
- 12 - Brain Development Physiology Meets Psychology
- 13 - Infant Carrying
- 14 - Cosleeping/Bed Sharing and Room Sharing
- 15 - Infant Feeding: Breast feeding, wet nursing, artificial feeding

^ Yeah, I don't know why pandoc makes a table but it looks cool

External Links

[EEA Summary](#)

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Evolution of Language

Communication

- The human style of communication
- Communication does not mean language
 - Transmitter giving data then another organism that can decode that data into meaningful things
 - Humans are the only organisms currently known to have intelligible conversations beyond assorted sounds and grunts
- Spoken usually using words, but people can whistle it, play it on instruments, sign it, write it
 - Rare cases of whistling with distance between the two people
- **Semantics:** words have meaning
- **Phonemic:** words composed of sound elements from a set
- **Grammatical:** set of rules for use of word classes. Reliably develops, related is the observation that creoles and pidgins around the world seem to converge on basic linguistic structure - but not evidence of a “universal grammar”
 - Can use **recursion** (linking clauses, embedding clauses within clauses) which sometimes depends on keeping track of multiple ideas, objects, intentions, or processes at the same time.
 - Example; as I am talking about how amazing this semester is, I also tell you how much I love Linux, coding, and all of this amazing system administration jargon. I then continue to talk about how the classes at CSUF relate to the coding I do for fun. See how I bounce from idea to idea, keeping a conversation flow?
- accents can fade away with time but sometimes it does stick around (professor’s mom still has a strong Ecuadorian accent but her friend has lost it)

Music

- Shaped human music
 - Based on aspects of language: prosodic tonality, emphasis, phrasing in tonal and rhythmic patterns
- Auditory cheesecake (Pinker) : a byproduct hypothesis
 - to describe music as “a delightful dessert” rather than the “main dish” of language. But though the view that music came only as a by-product of language was widely accepted at the time, Henry Wadsworth Longfellow challenged him with the idea that “music is the universal language.
- For mating (Miller)
 - Advertise mating qualities (not a sound theory)
- Coalitional signaling (Hagen & Bryant)
 - Is everything about mating?
 - Music is not solo performance
 - To bring attention to teams, group competition
 - Associated with warfare (drummer boys)
- Speech surrogate - useful for oral transmission of information (educational), useful for communication in special environments (across valleys/hills, among predators and prey)
 - More or less a replacement for speaking when it cannot be done effectively
- Animals do not respond to human music like humans do
 - Seals can bob to a tune but that isn't the same

Human Physiology

- Shaped the features of the human throat
 - redesigned to include a more versatile voicebox and resonant cavity, but consequently associated with increased risk of choking
 - Most animals can breath when eating and drinking
 - In first years of life, babies can eat/drink while breathing at the same time, at around two years of age, the larynx shifts to the adult position, allowing more fully formed speech to develop. This subsequently results in a higher likelihood of choking.

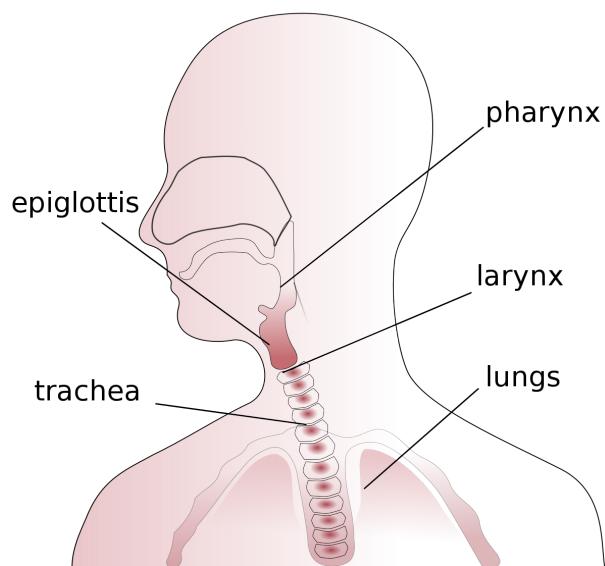


Figure 1: Human Throat Diagram

- Neanderthals had language abilities similar to humans
 - Australopithecines and early Homo **did not!**
 - Based on hyoid bone comparison
 - Paleoneurology, endocasts: encephalization quotient (EQ) and morphology hinting at developed language areas suggest this.

Human Brain

- Brain size, activity, and demands
- Specialization, modular design, language areas, motor & sensory
- Brain anatomy and your portable model of the brain

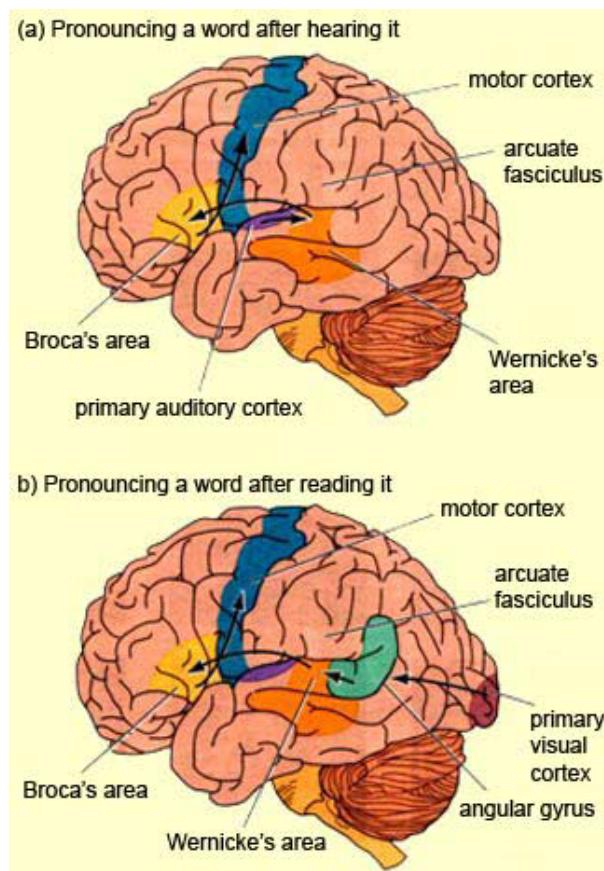


Figure 2: Brain Anatomy

- Encephalization Quotient (EQ), brain activity and metabolic demands
 - The ratio of brain mass to overall body size
 - For example, a chihuahua has a higher EQ than a German Shepard does but a GS has been shown to be more “intelligent”
 - EQ lower for larger individuals
- Does larger EQ mean more intelligence
 - No size does not matter, just how you use it

-
- Where selection led to reduced body size (relative to other species of the same family or superfamily, e.g), tends to be higher for small species. Causal arrow unclear.

The Brain is an Expensive Tissue

- Only 2% of our body mass
- Uses 16-20% of energy and oxygen consumed by body and requires constant supply of these resources
- Heart, kidneys, liver, and gastrointestinal tracts/stomach (gut) use about the same amount of energy and oxygen (combined)
- Cooking has likely allowed for selection of smaller gut which some hypothesize preceded and allowed selection for a larger brain (e.g Wrangham)
- Cooked food is more nutritious
 - Takes less energy to tear through and brings out nutrients

Brain Myths

- We only use 10% of our brain, a 1929 ad makes reference to this myth
- Recent movie that featured this: **Lucy** featuring Scarlett Johansson
- Even at resting state, we use a large portion of our brain
- Our brain is always online

Brain Localization

- **Phrenology:** functional areas of the brain (or behavioral tendencies) could be defined and identified based on external morphology
- Later localized views supported by evidence of language related to **aphasia** (inability to understand/express speech due to brain damage) and other selective deficits
 - Classic example of Phineas Gage (normal dude turns psycho due to brain being shot in the head by a rod)
- Selective deficits: concerning facial recognition, tools, auditory phenomenon (voice recognition, music), self-control

Language Areas

- Broca's Area: controls speech muscles via motor cortex

-
- Motor cortex: word is pronounced
 - Wernicke's Area: interprets auditory code
 - Angular gyrus: transforms visual representation into auditory code
 - Visual Cortex: receives written words as visual stimulation
 - Both of these areas were discovered with patients exhibiting aphasia
 - McGurk Effect: a perceptual phenomenon that demonstrates an interaction between hearing and vision in speech perception. The illusion occurs when the auditory component of one sound is paired with the visual component of another sound, leading to the perception of a third sound.

Anatomy of Hemispheres

- Contralateral control: the arrangement whereby the motor cortex of each cerebral hemisphere is mainly responsible for control of movements of the contralateral (opposite) side of the body.
- Corpus Callosum: a broad band of nerve fibers joining the two hemispheres of the brain.

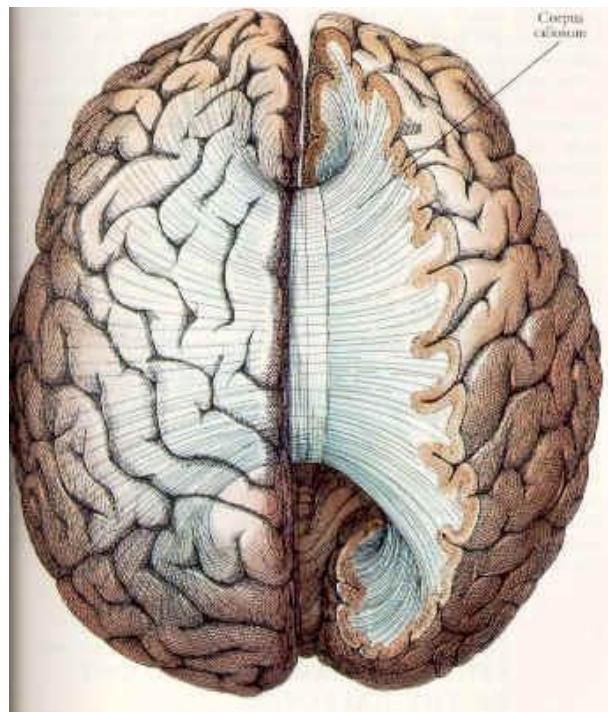


Figure 3: Bird's Eye View

Motor and Sensory Homunculus: “Little Man”

- What part of the body is the brain devoting more area towards?

-
- There is a little you inside you that controls you
 - Not taking it seriously
 - where we differentially have more or less neurons
 - hands, mouth

Cortex

- Each hand is attributed to a hemisphere
- Grey matter: tissue slightly greyer than the layer under it
 - Outer layer of the brain, much like skin on a hand (skin, then flesh)
- White matter: the inner part of the brain tissue
 - Made up of neuron's axons and myelin sheath
 - Carries information from one part of the brain to another
- Large cortex, small space
 - Brain tissue is curled to fit in the skull. Many of the structures inside the brain are C-shaped to fit in it
 - More folds will result in more neurons crammed in the same cavity
 - example: tar balls will condense a given amount data into a smaller space
 - example two: CPU registers are fast because they are so close to the CPU. Smaller brains may be smarter because information is more accessible than it was if the brain is larger.
 - The cortex has convolutions: mountain (**gyri**) and valleys (**sulci**) to fit inside the skull
 - Must be as large as possible, because it is the location of the cell bodies. More cells = more possibilities for processing information

Brain Stem

- **Brain Stem:** includes the **forebrain**, **midbrain**, and **hindbrain** to spinal cord
- The neurons that travel down the spinal chord then branch into the body to receive information from organs
- Hindbrain:
 - **Medulla Oblongata:** it controls automatic functions including heartbeat and breathing
 - **Pons:** the part of the brainstem that links the medulla oblongata and the thalamus.
 - **Cerebellum:** the part of the brain at the back of the skull in vertebrates. Its function is to coordinate and regulate muscular activity.
- Midbrain:
 - **Reticular Formation:** a diffuse network of nerve pathways in the brainstem connecting the spinal cord, cerebrum, and cerebellum, and mediating the overall level of consciousness.
- Forebrain:
 - **Thalamus:**
 - * Sensory relay station
 - * Smell is the only sensory system that has no thalamic relay

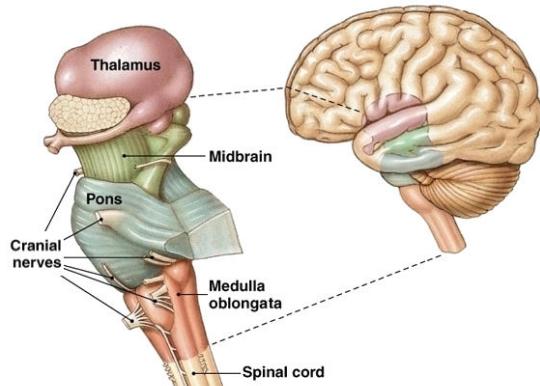


Figure 4: Brain Stem Diagram

Anatomy of the Four Lobes

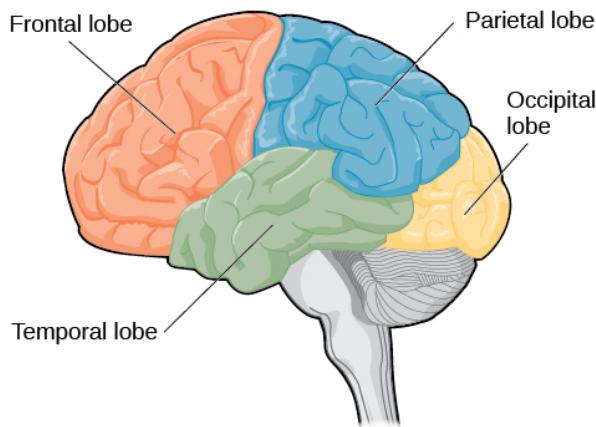


Figure 5: Lobe Diagram

- intricate details will be omitted from the exam, just know the basic anatomy
- **Frontal Lobe:** used for reasoning, emotions, judgement and voluntary movement; motor cortex. Responsible for all your poor decision making in high school.
- **Temporal Lobe:** contains centers of hearing and memory. Speech and some LTM (Long Term Memory)
- **Occipital Lobe:** contains the centers of vision and reading ability
- **Parietal Lobe:** contains important sensory centers such as touch, spatial relationships.

Brains in other Primates

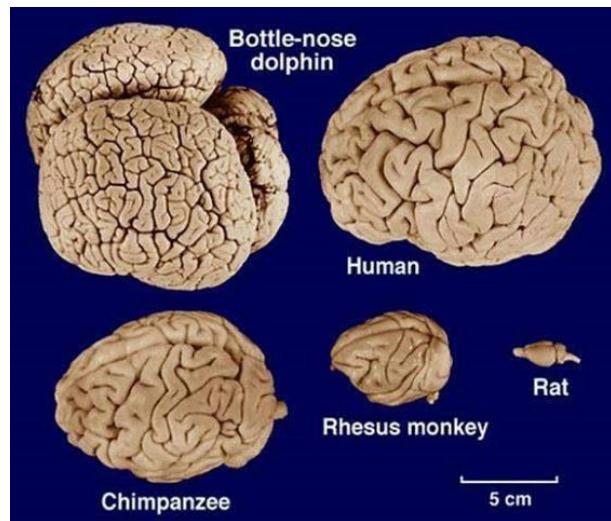


Figure 6: Brain Comparisons

Technical Intelligence

- Tool use
- Extractive foraging
 - breaking bones to extract bone marrow
- Culture
- technology and cumulative cultural evolution
 - Oldowan
 - Acheulean
 - Rapid evolution since
- Engineering
 - Learned, improvised

Ecological Intelligence

- Navigate and find food in complex environment
 - primates: evidence of mental maps
 - * object location
 - * birds-eye view, mental rotation
- Complex extraction techniques
- Art of tracking
 - Knowledge
 - Awareness (information acquisition)
 - Inference, deduction
 - Dynamic hypothesis testing

Social Intelligence

- Language and culture
- Machiavellian, Theory of Mind for strategic interaction: cooperation or exploitation
- Correlates with group size: For memory of alliances in complex networks, rivalries, debts, credits
 - Meat for sex (chimps)
 - Will groom as well as the groomer was groomed before

-
- Even chimps have “service economy”
 - Dolphins are very social and have large complex brains 1500-1700 cc; Wolfs are very social yet have smaller brains 120cc
 - What about small brained hominids
 - *Homo sapiens* ~ 950-1800cc
 - *Homo floresiensis* ~ 400cc
 - *Homo naledi* ~ 450cc

Exam 3 Tweets

The screenshot shows three tweets from the account @Sp2019BioAnth. Each tweet includes the user's profile picture (a person's face), the screen name, the date, the reply-to field, and the tweet content. Below each tweet are standard Twitter interaction icons: a speech bubble for replies, a retweet icon, a heart for likes, and an envelope for messages.

Tweet 1: CSUFullerton @Sp2019BioAnth · Apr 29
Replies to @SarahCh46685999
We can and do (e.g. for this course) anatomically compare limb length relative to stature, finger and toe shape, skull shape, overall stature, brain volume, sexual dimorphism, bone thickness, dentition, isotopic evidence of diet, brain morphology, hyoid bone, and more. #exam3

Tweet 2: CSUFullerton @Sp2019BioAnth · Apr 19
Replies to @JennCSUF
from #week13 lecture:
Neandertals' differences from modern humans:
mostly carnivorous, larger brains, more muscular, more barrel chested, more bone fractures healed, midfacial prognathism showing less chin, occipital bun, double arched browridge, faster life history. #Exam3

Tweet 3: CSUFullerton @Sp2019BioAnth · Apr 25
Replies to @Itakieddine0
from #week13 lecture: Neandertals' differences from modern humans: mostly carnivorous, larger brains, more muscular, more barrel chested, more bone fractures healed, midfacial prognathism showing less chin, occipital bun, double arched browridge, faster life history. #Exam3

Figure 7: Screenshot 1

External Links

Quizlet Sets

[Brain Anatomy](#)

Quizlet Anthropology: Homo and Homo Sapiens

Study online at quizlet.com/_2kct6b

| | | | |
|--|--|---------------------------|---|
| 1. archeulian tools | shaped the stone by knocking off more flakes from most of the edges | 16. Unifacial tool | stone has facets removed from only one side and bifacial tool has facets removed from two sides |
| 2. Early Homo | Larger brain capacity appear 2.3 mya. Genus: Homo | | |
| 3. hand axe | teardrop shaped, bifacially flaked with a thinned sharp tip using soft hammer technique | | |
| 4. Hominid Tools | dates back to 2.5 mya. Oldowan tools | | |
| 5. Homo erectus | long, low, thickly walled skull. brow ridges. sagittal keel. occipital torus-bone running horizontally along the back of the skull. Third molars larger. Lighter and thinner jaw. 985 cc brain. projecting nose. | | |
| 6. Homo Habilis | 620 cc brain. reduced molars and premolars. Skeleton resembles australopithecines including longer arms. Partially arboreal. | | |
| 7. Homo rudolfensis | similar to habilis. Larger more thickly enameled molars. flatter and broader face. modern like limb proportions | | |
| 8. Homo Sapiens | smaller teeth and jaw. larger brain. lacks sagittal keel and occipital torus. brow ridge divides. robust skeleton | | |
| 9. levalloisian method | shaped core and prepared a striking platform at one end and then knock off flakes to size | | |
| 10. Mousterian Tools | Smaller proportion of large core tools such as hand axes and cleavers and bigger proportion of small flake tools such as scrapers. Used Levalloisian method | | |
| 11. Neanderthals | Sloping forehead. Large brow ridges. flattened braincases. large jaws. lack of chin. competed for territory with modern humans. known for mousetrap tool assemblage. | | |
| 12. oldowan tools | sharp edges made by a few blows | | |
| 13. Percussion flaking | created by striking a tone with another stone, flakes and a core are produced | | |
| 14. Trends in Hominid Evolution | Expansion of brain, 640 cc- related to stone tool making (important for survival) Reduction in size of face, cheek teeth and jaws | | |
| 15. Two basic models of interaction with Neanderthal and Sapien | 1. Multiregional Model: homo erectus in africa-turn into modern humans 2. Single Origin Model: modern humans in east africa and dispersed | | |

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| Traditional Lives in Evolutionary Ecological Perspective (AKA Human Behavioral Ecology) . | 3 |
| Human Universals | 4 |

Study of the Evolution of Human Behavior

- **Sociobiology:** study of the biological basis of social behavior
 - There is a huge fission between anthropology departments at institution
 - “Race can be reasoned by empirical work”
 - Take things with a grain of salt
 - It was not well backed at first
 - People were rightly ticked off in the 70’s
- **Paleontological Reconstructions:** based on the evidence of (and relationships b/w) behavior, anatomy, ecology
 - Bring all this information from the deep past and make a narrative
- **Biocultural Approaches:** coevolution of behavior and genes (chapter 6 lactose intolerance)
 - Where does culture come from?
 - * Puts constraints on what is possible for a culture
 - * Condoms preventing the act of reproduction. Things that motivate us. This was a tangent.
 - Culture is bounded by biology
 - Will be covered at the end of the lecture
 - Not universal among all humans
 - * It would be expected that this would not be the case
- **Evolutionary Psychology:** the mind not general purpose but instead based on *cognitive modules* that can express specific behaviors (solutions) in specific situations (those that have cues of adaptive problems)
 - How did the adaptation shape the survival of the organism when it was facing the problem at hand (1 MYA for example)
 - Reverse engineering
 - These modules show *complex design* (specific inputs → algorithms → outputs)

-
- Our mind is practically a computer
 - Certain regions have specialized task handling
 - * Parts of the brain process sight, smell, balance, etc
 - The EEA was characterized by small face-to-face hunter gatherer society
 - **Psychological Adaptations:** we can reverse engineer the design of the mind by thinking about it being a product of selection for solutions of adaptive problems
 - A few features of the mind are not adaptations but *byproduct*
- **Human Evolutionary(or behavioral) Ecology:** tends to focus of hunter-gatherers and people from small scale subsistence societies, examining the ecological factors that influence reproductive success, growth, development, and behavior
 - Highly studied groups:
 - * Hadza of Tanzania (Hawkes et al)
 - * Inuit of Alaska and Arctic
 - * Ache of Paraguay. Foraging, horticulturalist
 - * Yanomamo of Amazonia. Foraging, horticulturalist
 - Best to study groups more representative of the culture seen when we were evolving
 - Western societies are not the best source of data
 - * Civilized, modern, democratic

Traditional Lives in Evolutionary Ecological Perspective (AKA Human Behavioral Ecology)

- Small scale subsistence societies are representative of the EEA in that they are
 - Not heavily dependent on or involved in market economies
 - Natural fertility (little or no birth control)
 - * Often high fertility
 - Little or no Western medicine
 - No electricity, no running portable water, no structural integrity
 - Little or no formal education (instead traditional education)
 - Calorie challenged/subsistence dependent
 - * No hoarding or caching of food, they do not have any technology to preserve the food gathered
 - Highly infectious environments/high infection rates
 - * No source of sanitation
- Research topics commonly explored
 - **Wealth:** reproductive success and/or survival
 - **Food sharing and relationships:** Food sharing is seen where it provides inclusive fitness benefits (e.g with *close kin*) and where it supports relationships that *buffer risks*. Some have suggested that food is shared to *show off* or as *tolerated theft* because it is the least-cost response and others have suggested *need-based provisioning* or *indirect reciprocity* - that sharing is simply an empathetic responses to others' need (exchange history does not matter)
 - **Sexual Division of Labor:** men and women do different tasks
 - **Behavioral Diseases:** depression, mental health issues

Human Universals

- **Cognitive Universals:**

- Psychological functions shared by all humans
 - * Language, emotions memory, attention

- **Cross-Cultural Universals:**

- A potential trait that tends to be reliably developing in a society - but is not an *individual universal* - instead we expect *within-culture variation* (between male and females)
- nepotism
- kinship terms
- division of labors
- singing, dancing
- facial expressions of emotion

- **Reproduction:** cost and benefits based on kinship

- Mating with close kin is bad
- **Incest avoidance:** all societies *taboo* incest because
 - * It is what people really want to do (FREUD)
 - * Everyone agrees that it is an undesirable behavior (with personal and social costs)
 - * **Westermarck Hypothesis:** critical period
 - * Cues of cohabitation and maternal perinatal association (birth following pregnancy - close proximity - breast feeding)
 - Kibbutzim examples: it is discouraged to have a special connection with your parents
 - Sim-pua (co-raised minors) marriages Taiwan

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Hominin/Human Evolution

- Behavior associated with tool production, tool use, and subsistence
- Symbolic items and behaviors after ~40KYA
 - Beads, buttons
 - Ochre, symbolic carvings
 - Venus figurines, zoomorphic statuettes (early pornographic material possibly)
 - Grave goods, arranged burials, cremations
 - Cave paintings

Models of Human Origins

- Hard to agree upon what was the first anatomically modern human
- Difference in body shapes that had to reflect with dietary adaptations)

Replacement Model

- Second migration outside of Africa
- Replacement of H. Erectus (not by a gradual change)
- This is where the evolution of anatomically modern humans
- Unknown in the disappearance of Neanderthals
 - Homo Sapiens were somehow superior to Neanderthals

Multiregional Model

- A gradual flow of new species and interbreeding
- Movement inside and outside of Africa

Final Notes

- Replacement: there are shared genes in Homo Sapiens (gene flow)
- Multiregional: there is an abrupt change in population (some places where there is interbreeding and other places shows abrupt change)
- There is a mixture of the two philosophy, based on what is most important to the scientist

Peopling of the New World

- Bearing land bridge (from Siberia) open after 15 KYA interior corridor later 14-13 KYA
- Followed Pleistocene megafauna along ice-free corridors
- PreClovis
 - May have arrived by water craft (known @ 40KYA)
 - Monte Verde, Chile 13.9 - 14.2 KYA
 - Buttermilk Creek Texas 15-13.2 KYA
- Most Pacific Islands colonized ~3.5 KYA or later
 - Likely with outrigger canoes and supplies

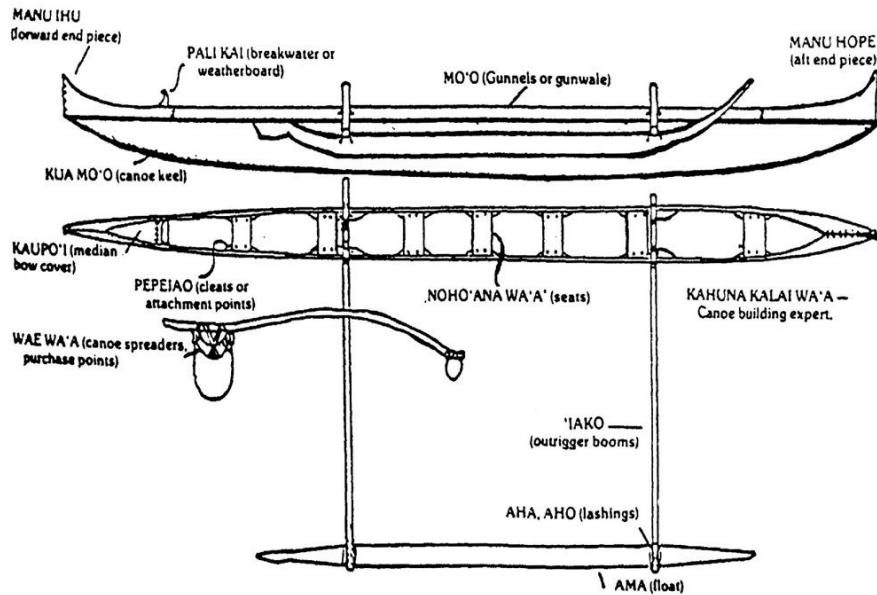
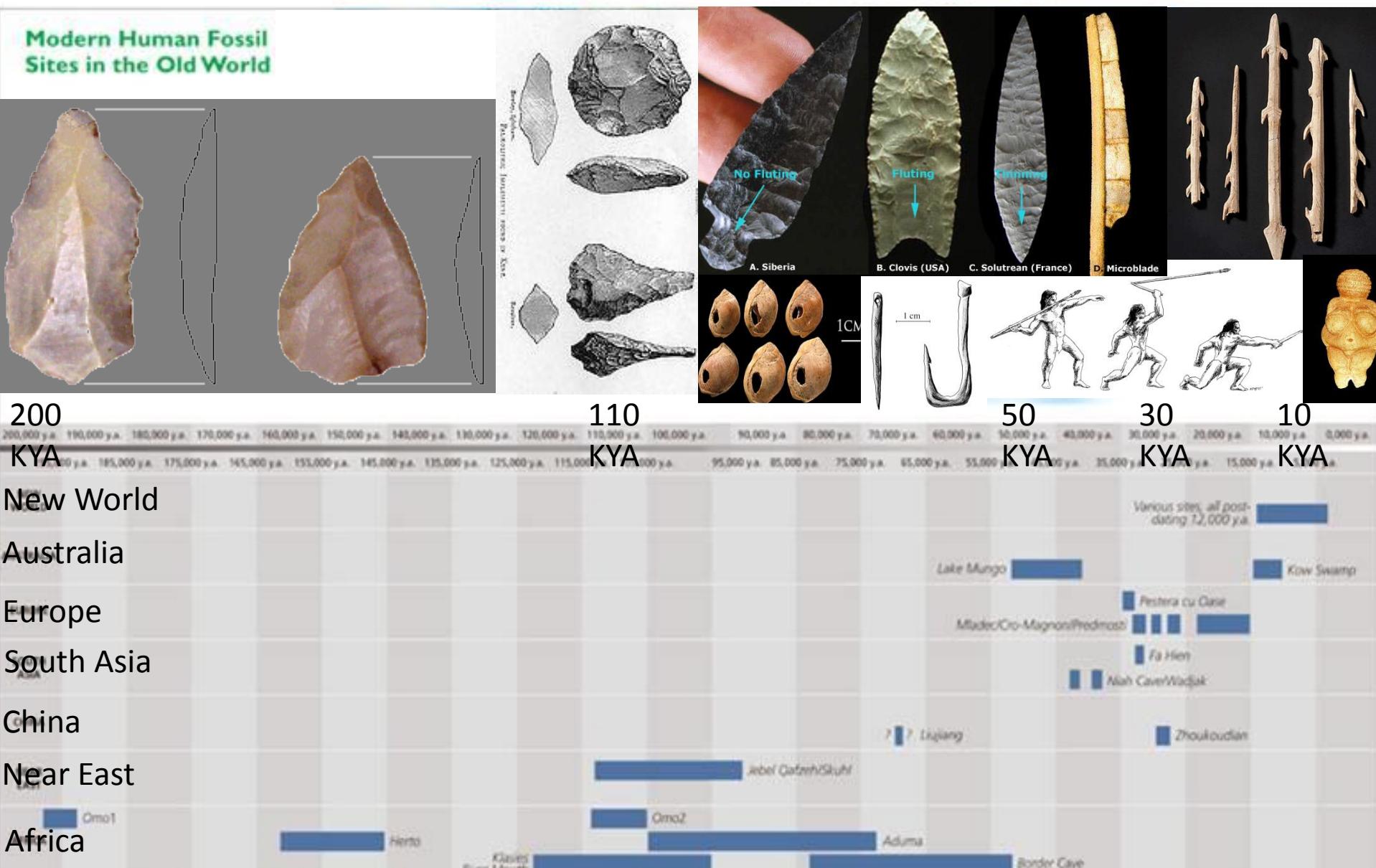


Figure 1: Outrigger Canoe

Comparative table of Homo species (from [Wikipedia](#))

| Species | Temporal range Mya | Habitat | Adult height | Adult mass | Cranial capacity (cm³) | Fossil record |
|--|------------------------------------|---|--------------------------------------|---------------------------------------|---|-------------------------------------|
| <i>H. habilis</i> | 2.1 – 1.5 ^[1] | Africa | 150 cm (4 ft 11 in) | 33–55 kg (73–121 lb) | 510–660 | Many |
| <i>H. erectus</i> | 1.9 – 0.07 ^[2] | Africa, Eurasia (Java , China , India , Caucasus) | 180 cm (5 ft 11 in) | 60 kg (130 lb) | 850 (early) – 1,100 (late) | Many ^[3] |
| <i>H. rudolfensis</i> membership in <i>Homo</i> uncertain | 1.9 | Kenya | | | 700 | 2 sites |
| <i>H. gautengensis</i> also classified as <i>H. habilis</i> | 1.9 – 0.6 | South Africa | 100 cm (3 ft 3 in) | | | 3 individuals ^[4] |
| <i>H. ergaster</i> also classified as <i>H. erectus</i> | 1.8 – 1.3 ^[5] | Eastern and Southern Africa | | | 700–850 | Many |
| <i>H. antecessor</i> also classified as <i>H. heidelbergensis</i> | 1.2 – 0.8 | Spain | 175 cm (5 ft 9 in) | 90 kg (200 lb) | 1,000 | 2 sites |
| <i>H. cepranensis</i> a single fossil, possibly <i>H. erectus</i> | 0.9 – 0.35 | Italy | | | 1,000 | 1 skull cap |
| <i>H. heidelbergensis</i> | 0.6 – 0.35 ^[6] | Europe, Africa, China | 180 cm (5 ft 11 in) | 90 kg (200 lb) | 1,100–1,400 | Many |
| <i>H. neanderthalensis</i> possibly a subspecies of <i>H. sapiens</i> | 0.35 – 0.04 ^[7] | Europe, Western Asia | 170 cm (5 ft 7 in) | 55–70 kg (121–154 lb) (heavily built) | 1,200–1,900 | Many |
| <i>H. naledi</i> | 2.5 | South Africa | 150 centimetres (4 ft 11 in) tall | 45 kilograms (99 lb) | 450 | 15 individuals |
| <i>H. tsaichangensis</i> possibly <i>H. erectus</i> | 0.19 – 0.01 ^[8] | Taiwan | | | | 1 individual |
| <i>H. rhodesiensis</i> also classified as <i>H. heidelbergensis</i> | 0.3 – 0.12 | Zambia | | | 1,300 | Very few |
| <i>H. sapiens</i> (modern humans) | 0.2 ^[9] – present | Worldwide | 150 - 190 cm (4 ft 7 in - 6 ft 3 in) | 50–100 kg (110–220 lb) | 950–1,800 | (extant) |
| <i>H. floresiensis</i> classification uncertain | 0.10 – 0.012 | Indonesia | 100 cm (3 ft 3 in) | 25 kg (55 lb) | 400 | 7 individuals |
| <i>Denisova hominin</i> possible <i>H. sapiens</i> subspecies or hybrid | 0.04 | Russia | | |  | 1 site |
| <i>Red Deer Cave people</i> possible <i>H. sapiens</i> subspecies or hybrid | 0.0145–0.0115 | China | | |  | Very few |

For higher resolution version see Figure 13.2 of textbook, or see REVEL chapter 13



← Middle Paleolithic/ MSA | Upper Paleolithic / LSA →
 Mousterian tools, Levallois technique | blades, microliths, non-stone items, symbolic

| Hominin species | Chimpanzee | <i>Australopithecus afarensis</i> | <i>Homo habilis</i> | <i>Homo ergaster</i> and <i>Homo erectus</i> | Neanderthal | <i>Homo sapiens</i> |
|--------------------------|--|--|---|--|--|--|
| Known time of existence | 7 million years ago to now | 5 to 2.5 million years ago | 2.4 to 1.6 million years ago | 2 million to 100,000 years ago | 500,000 to 30,000 years ago | Diffused out of Africa around 65,000 years ago |
| Territorial distribution | Africa | Africa | Africa | Africa, Europe, Asia | Europe, Asia | All continents |
| Most famous skeleton | Currently living species | Lucy (3.2 million year old skeleton) | Olduvai Hominid 7 discovered by Jonathan and Mary Leakey | Turkana boy (1.5 million year old skeleton) | Neanderthal 1 discovered in Neanderthal, Germany | Currently living species |
| Reconstruction |  |  |  |  |  |  |
| Walking | Quadrupedal | Bipedal | Bipedal | Bipedal | Bipedal | Bipedal |
| Associated tool culture | Chimps use natural stones to break nuts | Possibly spit stones or used natural sharp-edged stones | Mode One: Oldowan chopper | Mode Two: Acheulean symmetrical handaxe | Mode Three: Moustierian prepared-core tools | Ornamented tools |
| Stone tools |  |  |  |  |  |  |
| Average height | 1 m (3.3 ft) | 1.2 m (4 ft) | 1.3 m (4.3 ft) | 1.8 m (5.9 ft) | 1.6 m (5.2 ft) | 1.5 m (4.9 ft) |
| Approximate body weight | 45 kg (99 lb) | 32 kg (71 lb) | 45 kg (99lb) | 50 kg (110 lb) | 70 kg (154 lb) | 60 kg (132 lb) |
| Average brain volume | 350 cm³ | 350 cm³ | 630 cm³ | 1000 cm³ | 1500 cm³ | 1350 cm³ |