

Agenda Week 15

- Friques should cover the entire course in preparation for the final.
- Quiz 8
- Today, discussion of the origin of human language: where did the human ability to learn and use a language come from?

E105

205

Language is a biological oddity: only one species has it

- Other oddities: bat wings, elephant trunks, giraffe neck
- All present a challenge to theories of evolution :
 - > Evolution would claim that the oddity is a product of small changes occurring across a great number of generations
 - > But when there is little evidence from related species that the characteristic is shared it becomes difficult to find support for evolution
- Two kinds of alternative explanations have been offered in regard to the oddity of language:
 - > Language is misunderstood -- it is really not odd
 - > Evolution can produce dramatic changes in a single birth

E105

206

Two Popular Alternative Theories

- 1. Language is shared with a sister species (not an oddity)
 - > Chimps, our nearest living relative, can communicate
 - > Chimps can learn sign and spoken language when taught
 - > Chimps would have developed language if they had a vocal mechanism
 - > If these claims are true, it would suggest that language is acquired by general learning mechanisms
- 2. Language appeared fully developed in a single birth (the Big Bang)
 - > A pair of non-language hominids bore a child having a set of genes that would construct, as the child developed, a language processor much like that of modern humans
 - > This child reproduced and passed the gene along to all its progeny

E105

207

Two hypothetical theories of the origin of the trunk

- Trunks are shared with a sister species (pic)
 - > Hyrax use their snouts much like elephants use their trunks
 - > Pulling hyrax snouts would result in making them longer
 - > Hyraxes would have trunks if their legs were longer
- Trunks appeared full sized in a single birth (to very surprised hyrax parents)
- The evidence against both theories is overwhelmingly
 - > The fossil record of the true ancestors of elephants, which are extinct -- the hyrax is a distantly related cousin, demonstrates that they had trunks
 - > The fossil record also reveals that trunks underwent a gradual lengthening over generations.

E105

208



E10

209

Pinker's Natural Selection Predictions about Language

- **Disproving the two alternative theories**
 - The ancestors of Homo Sapiens Sapiens are extinct and there is no fossil record for language
- **Proof supporting evolution must be indirect**
 - There must have been a series of increasingly complex "protolanguages" leading to current human languages
 - System of arbitrary indexes referring to objects
 - System of words
 - System of simple word combinations based on tree structures
 - System of tree structures containing functional categories
 - These systems exist in the modern world that reflect prehistoric languages
 - In language development (sequence of steps)
 - In aphasia
 - In pidgins and creoles

E105

210

The Ancestral Lineage of Homo sapiens

Australopithecus aferensis (<u>Lucy</u>)	> 4 million
Homo <u>habilis</u>	2-2.5 million
Homo <u>erectus</u>	.5-1.5 million
Homo <u>sapiens</u>	200,000
H. Sapiens spread out of Africa	100,000

**Time span in which a series of increasingly complex
protolanguages could have evolved:**

3.9 million years or 350,000 generations next

E105

211

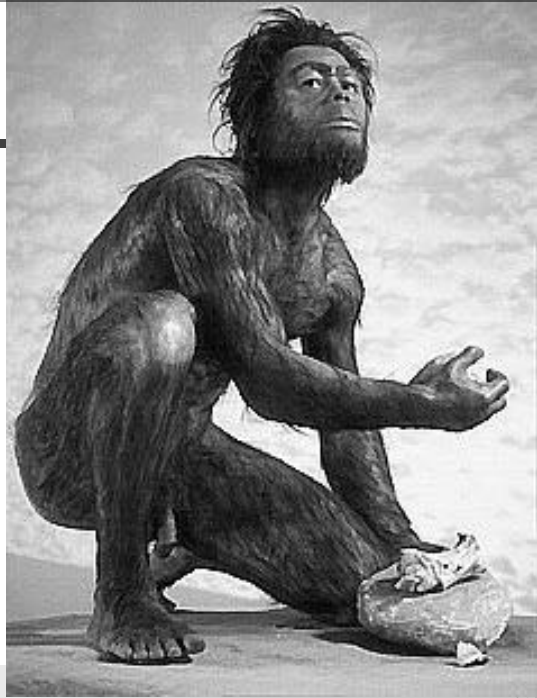
Australopithecus afarensis back



E105

Homo habilis

[back](#)



E105

213

Homo erectus [back](#)



E105

214

Home sapiens back



E105

215

Evidence for Hominid Protolanguage

■ Homo habilis

- stone tools and butchering stations, suggesting cooperation.
- Broca's area of the brain (skull) is larger on left hemisphere

■ Homo erectus: 86% of H. Sapien brain size

- fire and hand axes, suggesting cooperation

■ Homo sapiens

- Laryngeal drop expands vowel production but increases risk of choking
- Human infants drop larynx too with the same results

E105

216

Comparison of brain sizes

1400 cc
Homo sapien

1200 cc
Homo erectus

400 cc
Australopithecus
aferensis

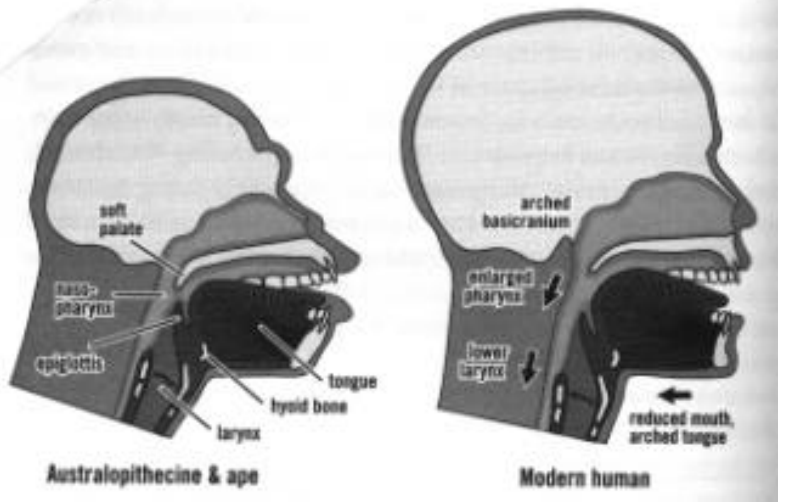
Primarily
prefrontal lobe
growth [back](#)



E105

217

Larynx Drop [back](#)



E105

218

Requirements of Natural Selection

Hunter-gathers of today make constant use of language
Their grammatical devices allow for precise description
of time, space, objects and events needed for effective
hunting

By implication, the same would be true of early
hominids

Questions to consider:

Has the association between gifted orator and
prodigious reproducer changed in modern times?

Why did prehistoric hominids become extinct?

Who are the most gifted orators and prodigious
reproducers in present day hunter-gather tribes?