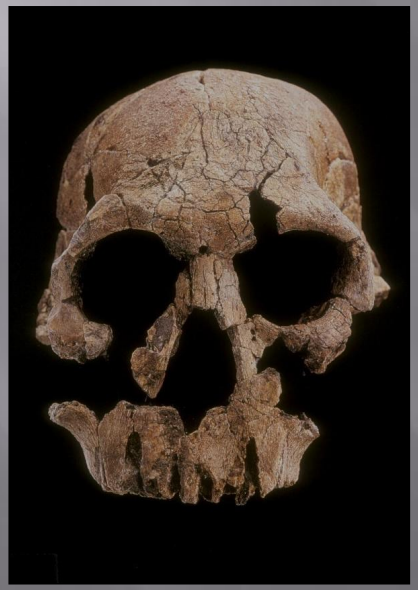
THE CO-EVOLUTION OF MUSIC AND LANGUAGE: EVIDENCE FROM THE ARCHAEOLOGICAL AND FOSSIL RECORDS

The Swedish Conference on Communication, Music and Language

19 November 2010

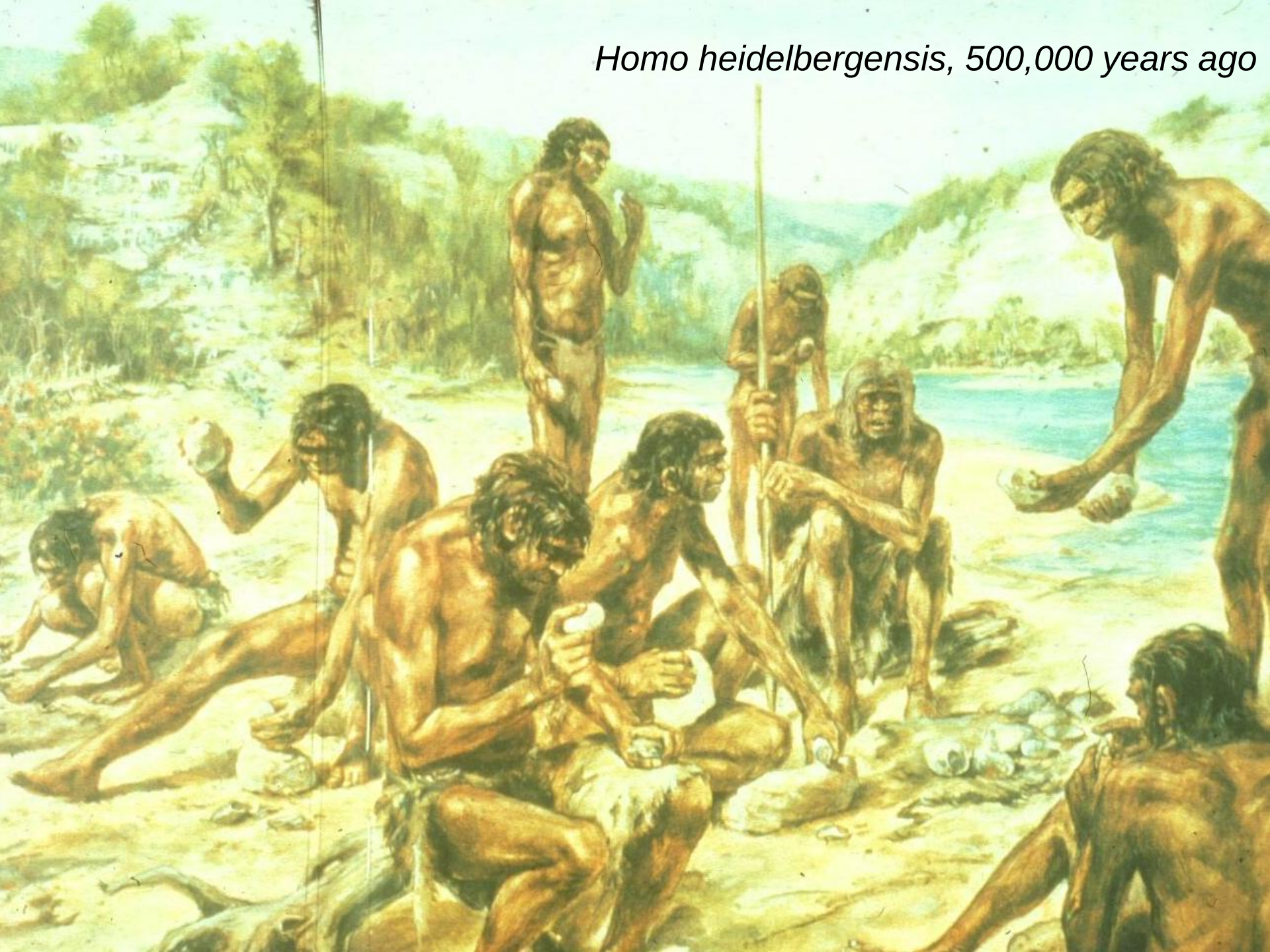


Steven Mithen

Professor of Early Prehistory,
Pro Vice Chancellor
University of Reading

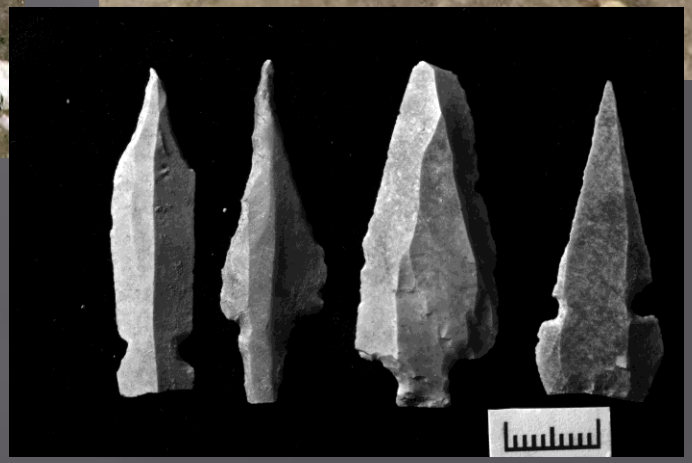
s.j.mithen@reading.ac.uk

Why music?

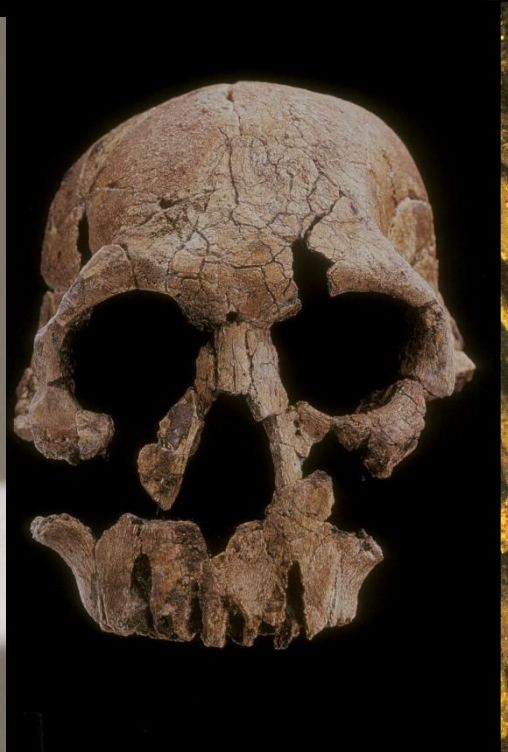

Homo heidelbergensis, 500,000 years ago


Wadi Faynan, southern Jordan

The past is silent



Why should an archaeologist be concerned with music?



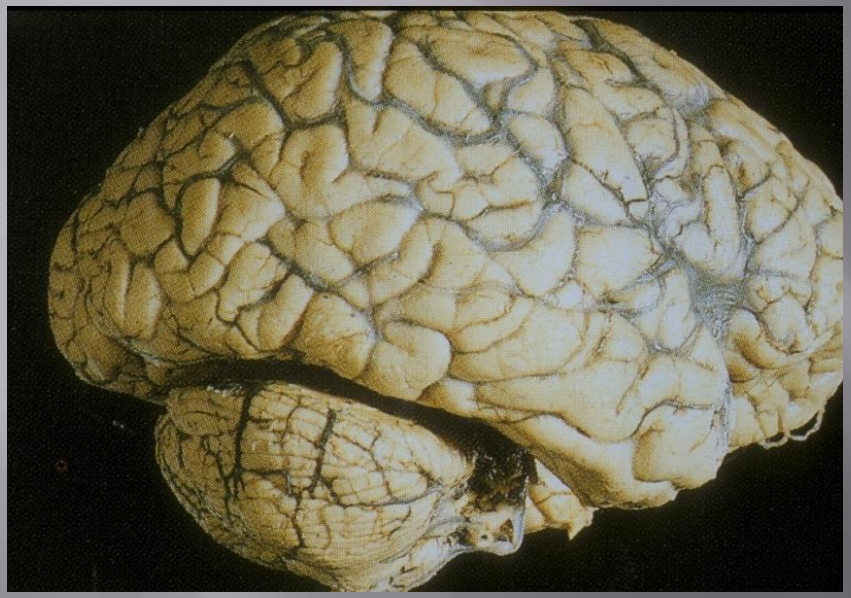
Colin Trevarthen :

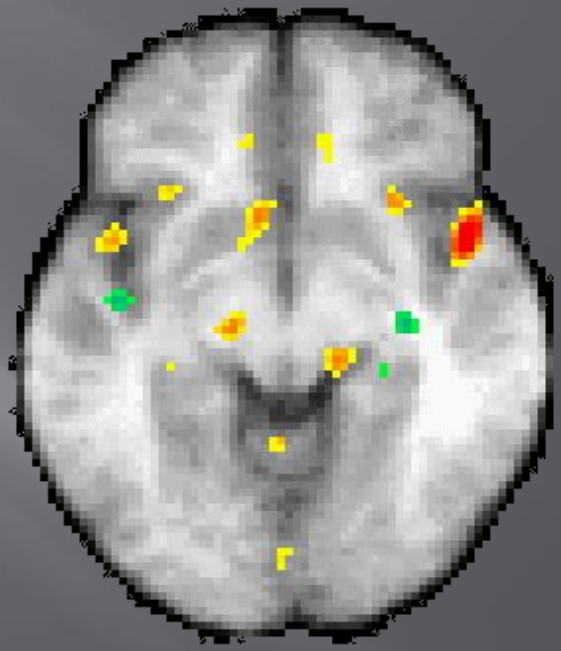
We are "*born with a musical wisdom and appetite*"

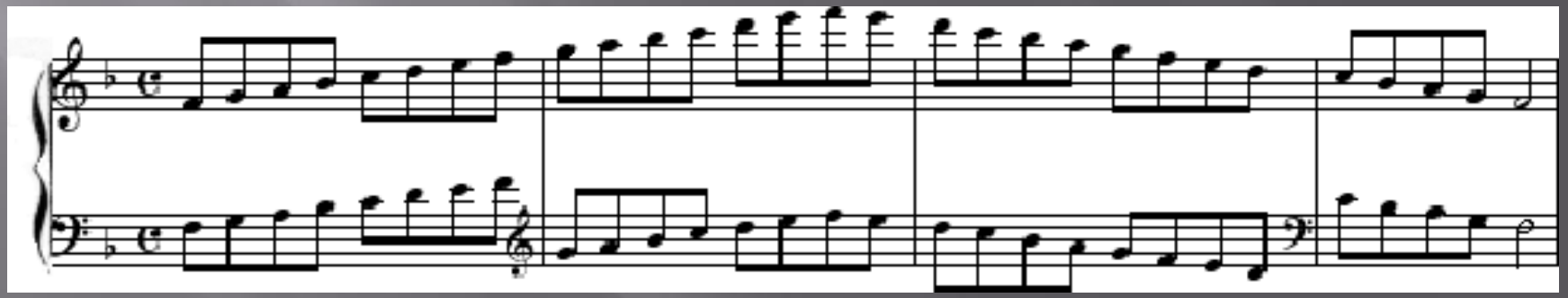
Babies prefer singing to speaking, and those who are sung to have enhanced development

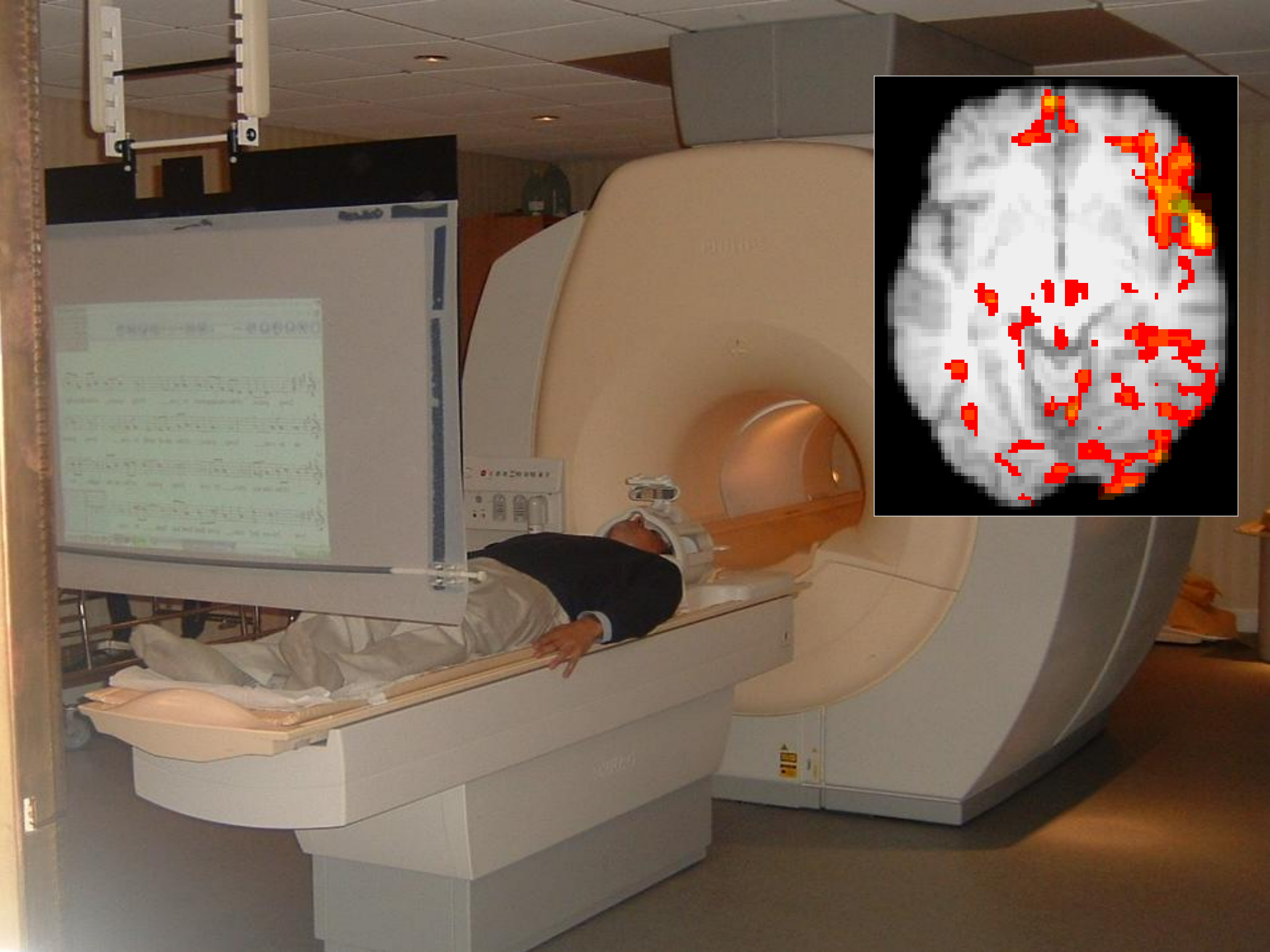
We instinctively 'talk' to babies with a high degree of musicality – 'motherese' – and feel compelled to sing to them

Music and the brain:







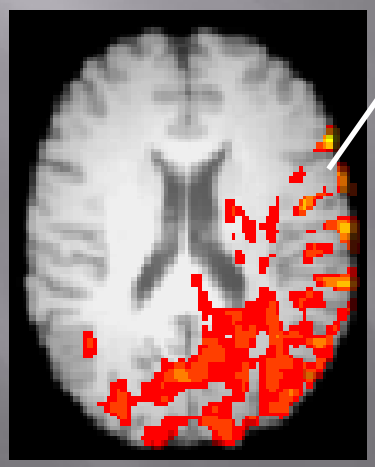


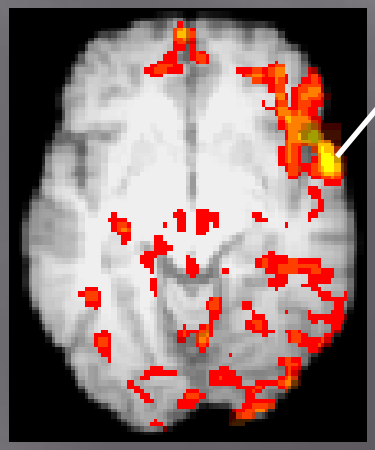
Functional Activity Increases in non-Musical Adult After 1 Year Singing Lessons/Practice

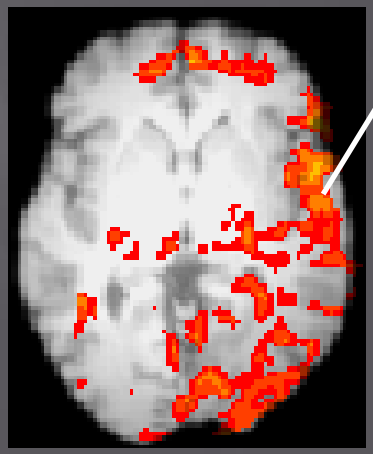
(After Lessons Minus Initial Singing)

Overall Combination of 12 Singing/Sightreading Tasks
(Involving Song, Pitch, Tone, Timbre, Dynamics, Rhythm)
fMRI (3 Tesla) ($p < 0.005$)

Enhanced motor control of vocal apparatus ← ***Enhanced processing of musical structure*** ← ***Enhanced secondary auditory processing***







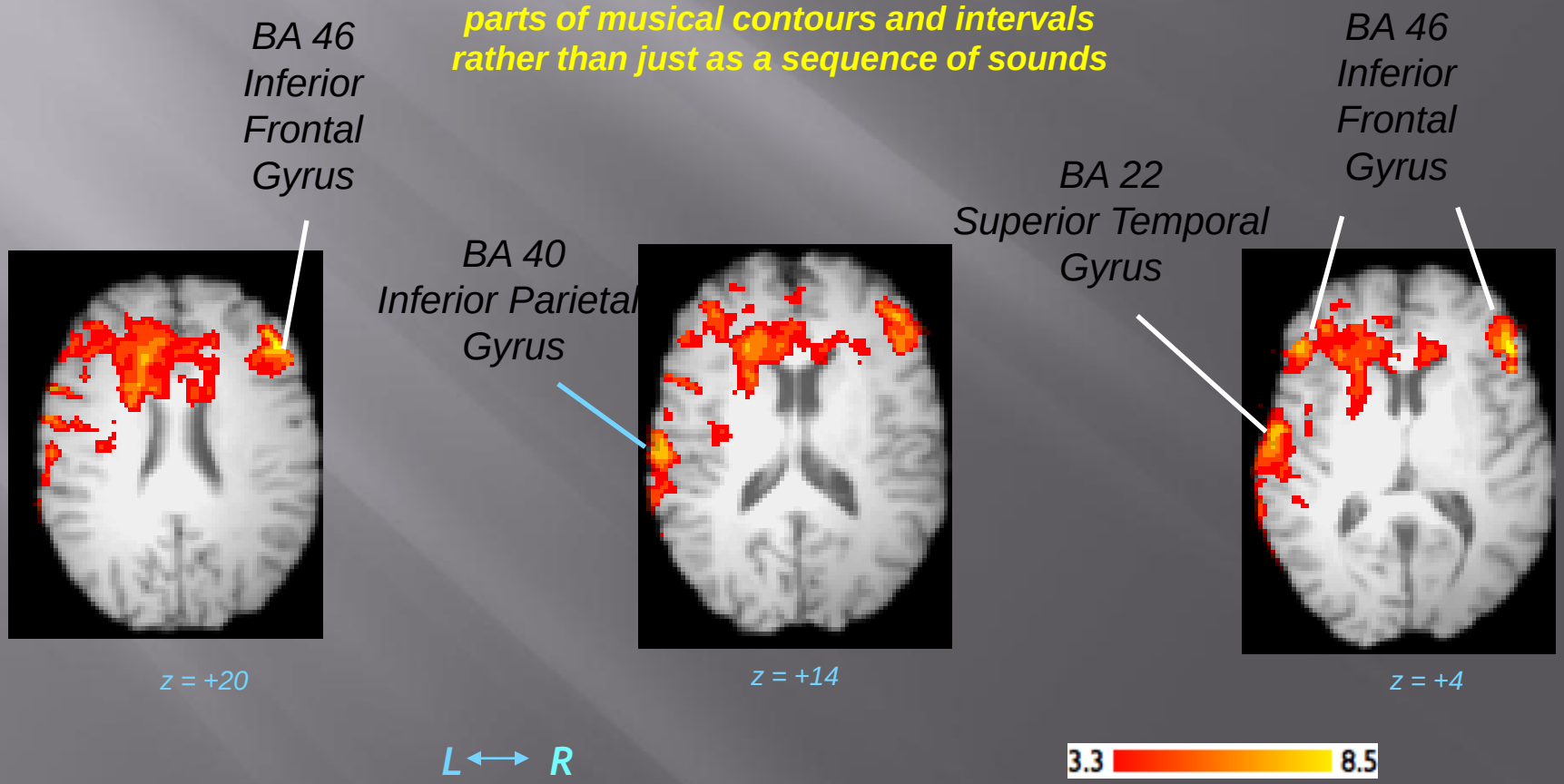
L ⟷ R

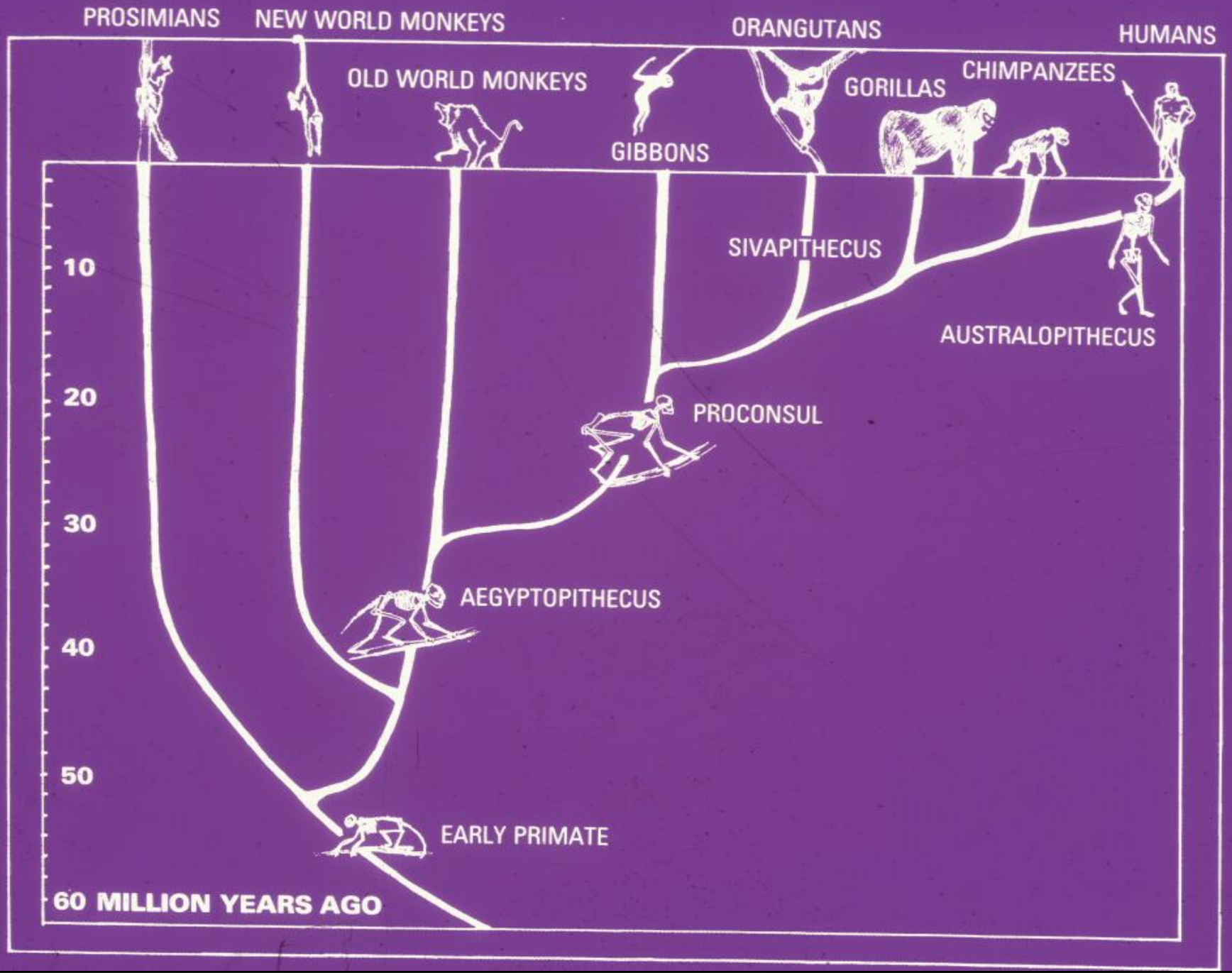
3.3 8.5

Functional Activity Decreases in non-Musical Adult
After 1 Year Singing Lessons/Practice
(Initial Singing Minus After Lessons/Practice)

Overall Combination of 12 Singing/Sightreading Tasks
(Involving Song, Pitch, Tone, Timbre, Dynamics, Rhythm)
fMRI (3 Tesla) ($p < 0.005$)

Reduction in working memory: with skill acquisition now processing sounds as parts of musical contours and intervals rather than just as a sequence of sounds

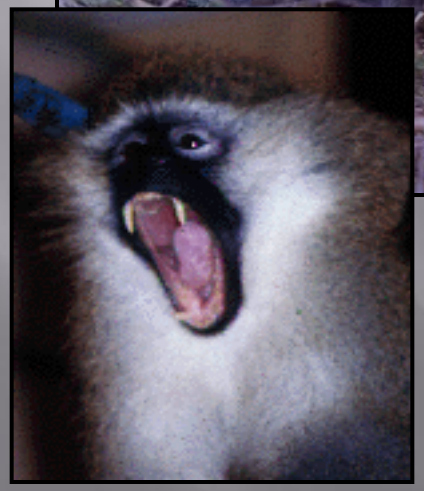



PROSIMIANS
NEW WORLD MONKEYS
OLD WORLD MONKEYS
GIBBONS
ORANGUTANS
GORILLAS
CHIMPANZEES
HUMANS
SIVAPITHECUS
AUSTRALOPITHECUS
PROCONSUL
AEGYPTOPITHECUS
EARLY PRIMATE
10
20
30
40
50
60 MILLION YEARS AGO

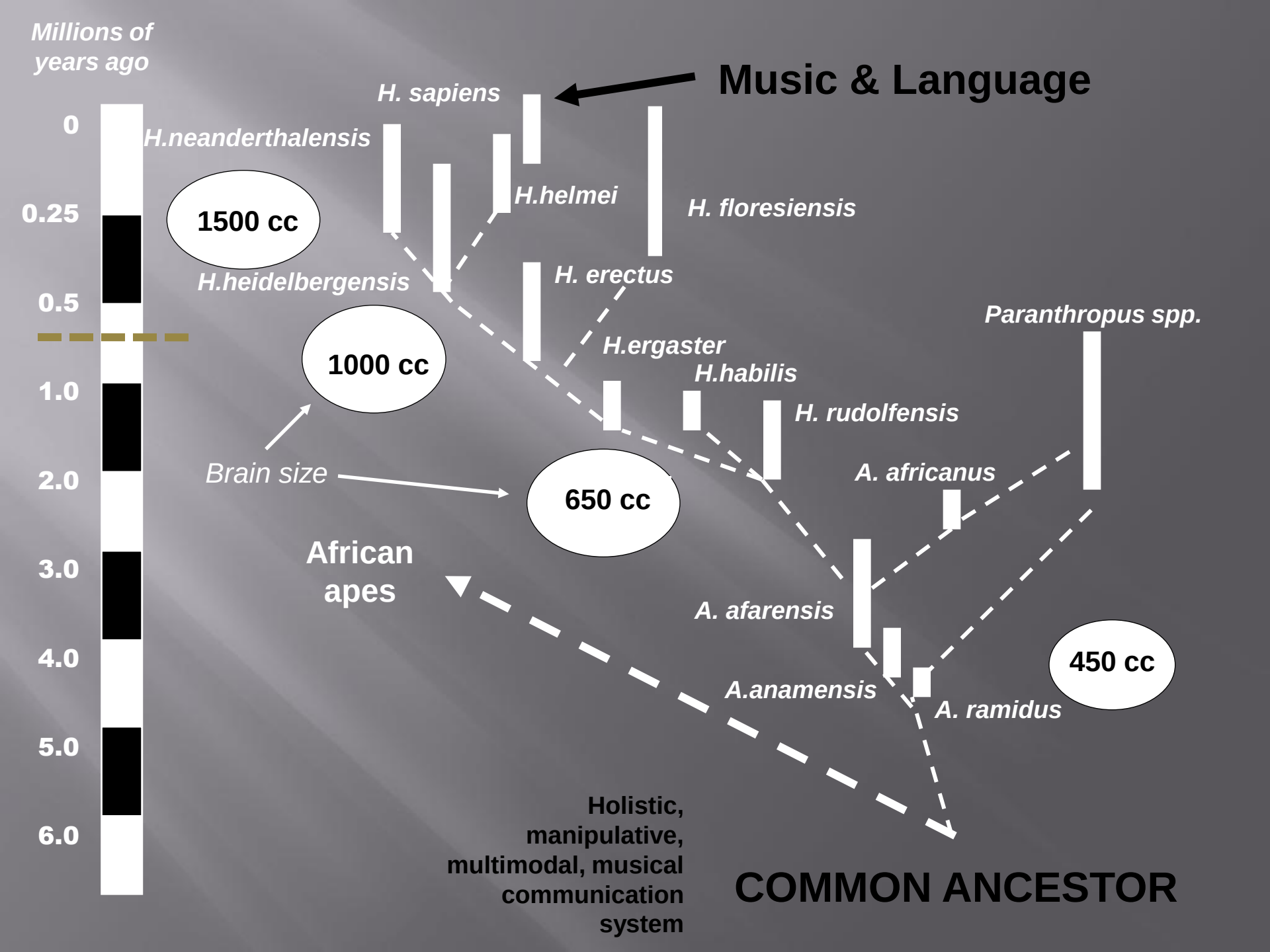
Vervet alarm calls

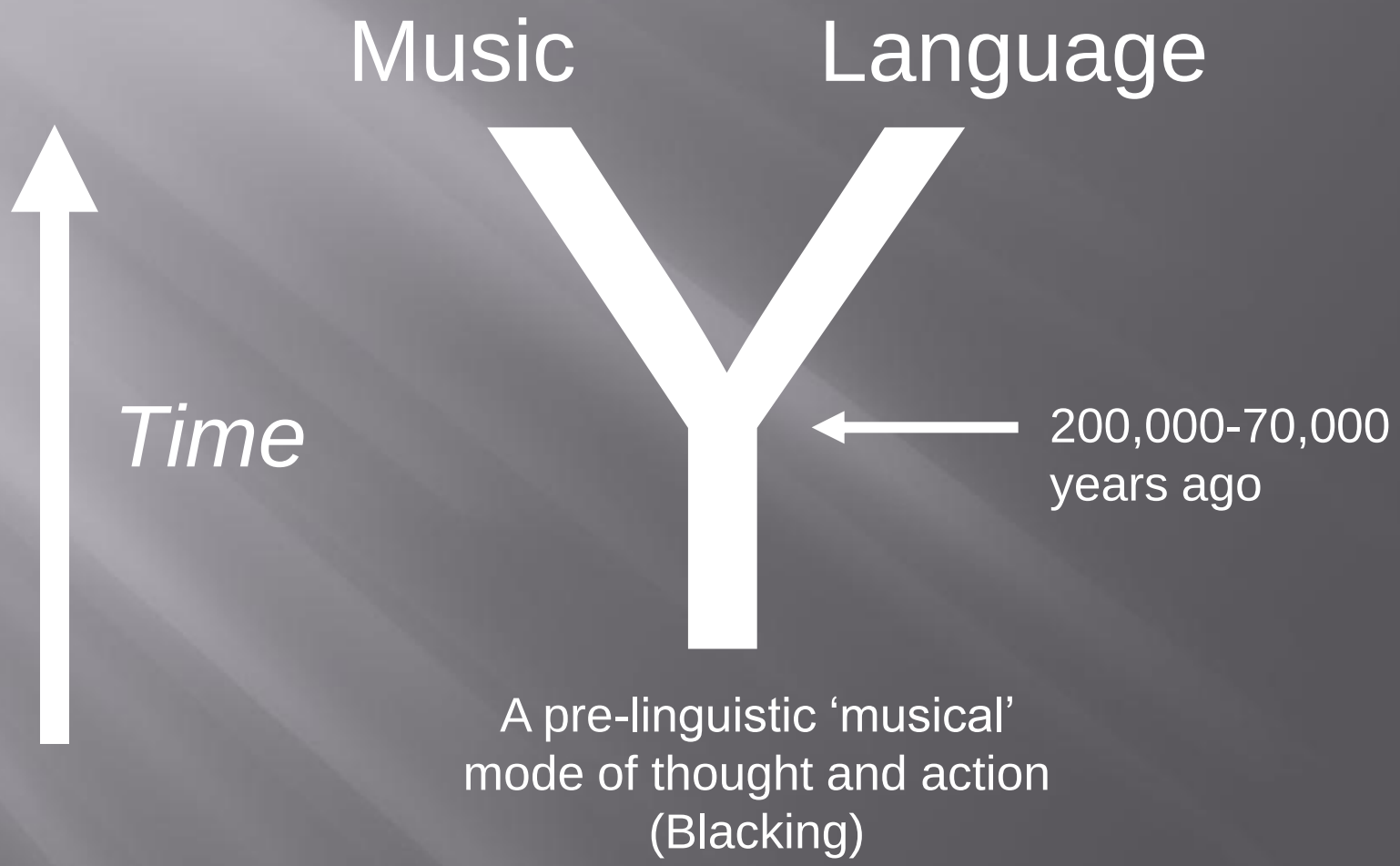
Gelada chatterings

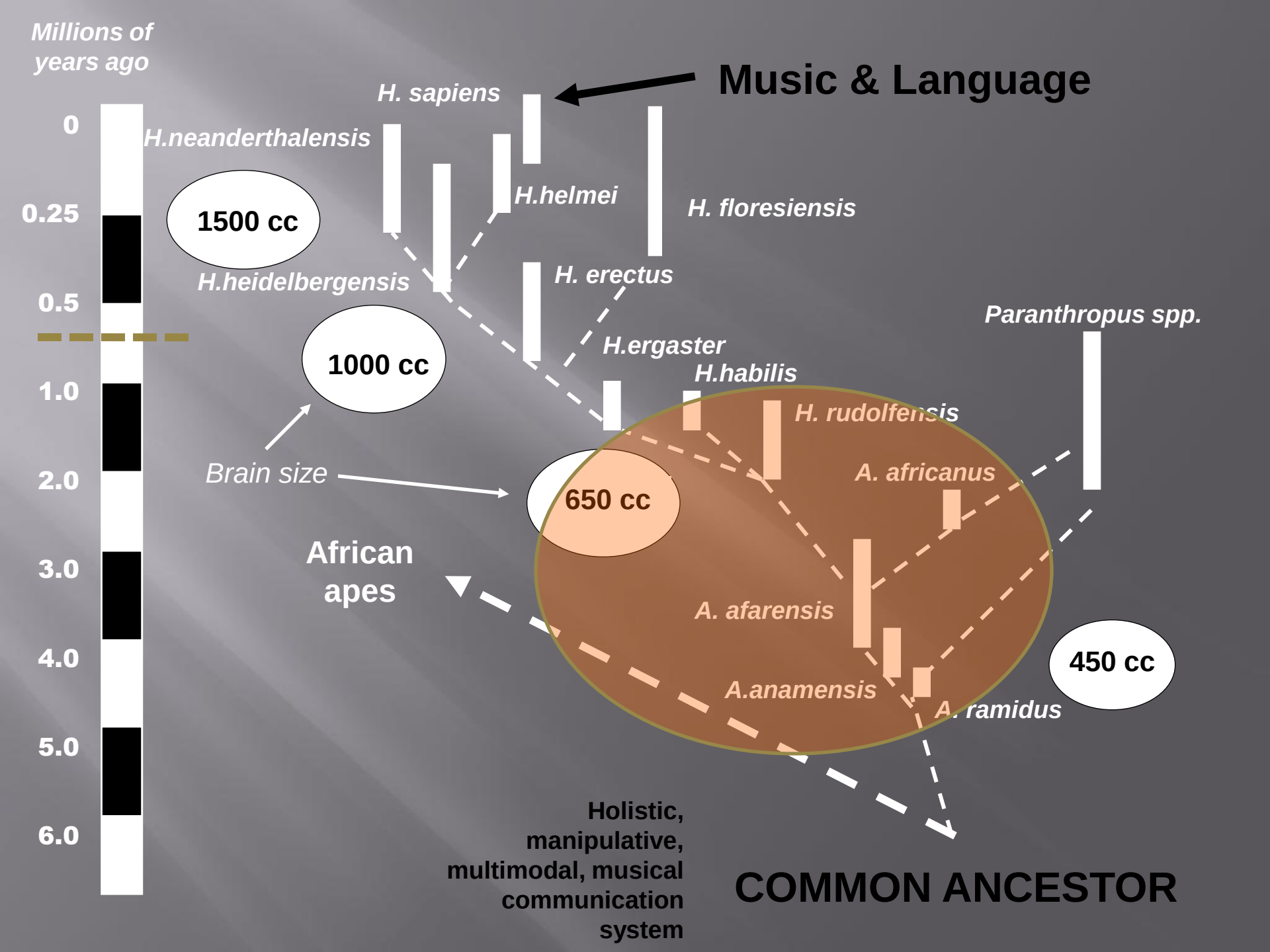
Grunts, barks, screams & hoots



Gibbon duets


Millions of years ago
0
0.25
0.5
1.0
2.0
3.0
4.0
5.0
6.0
Music & Language
H. sapiens
H.neanderthalensis
H.helmei
H. floresiensis
1500 cc
H.heidelbergensis
H. erectus
Paranthropus spp.
1000 cc
H.ergaster
H.habilis
H. rudolfensis
Brain size
650 cc
A. africanus
African apes
A. afarensis
450 cc
A.anamensis
A. ramidus
Holistic, manipulative, multimodal, musical communication system
COMMON ANCESTOR


Music
Language
Time
200,000-70,000
years ago
A pre-linguistic ‘musical’
mode of thought and action
(Blacking)


Millions of years ago
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African apes
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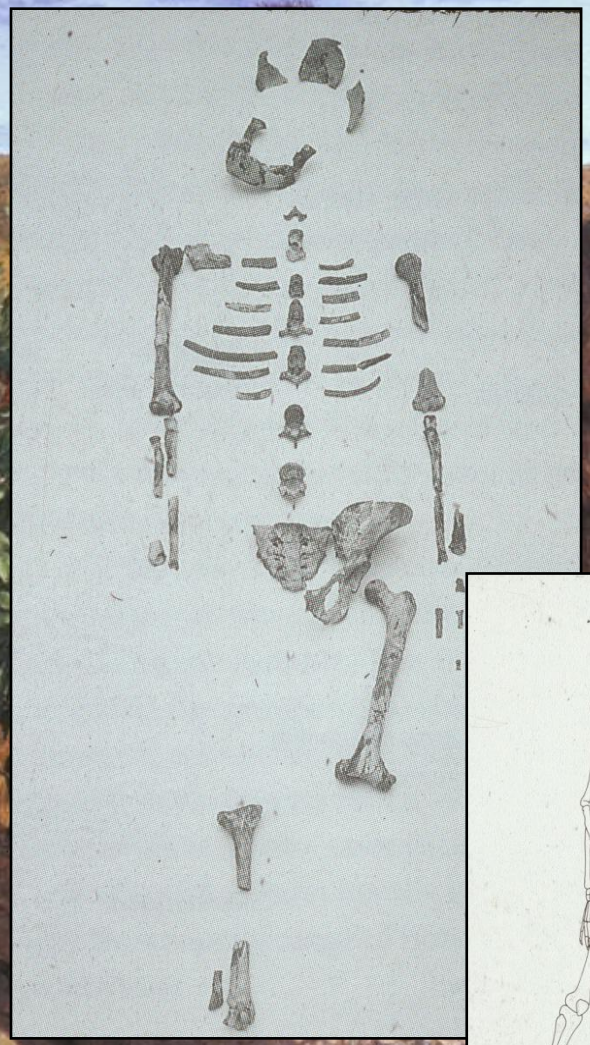
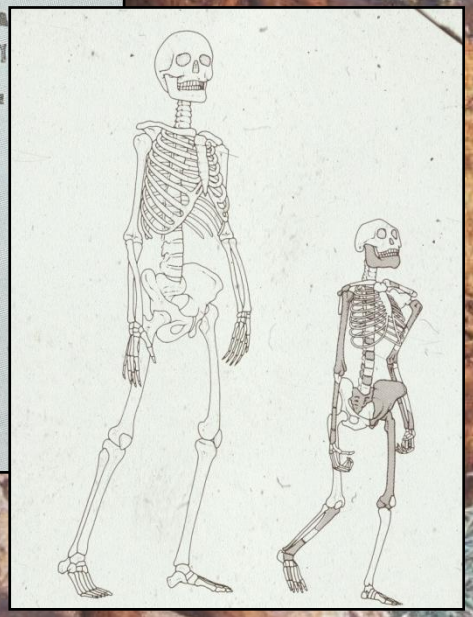
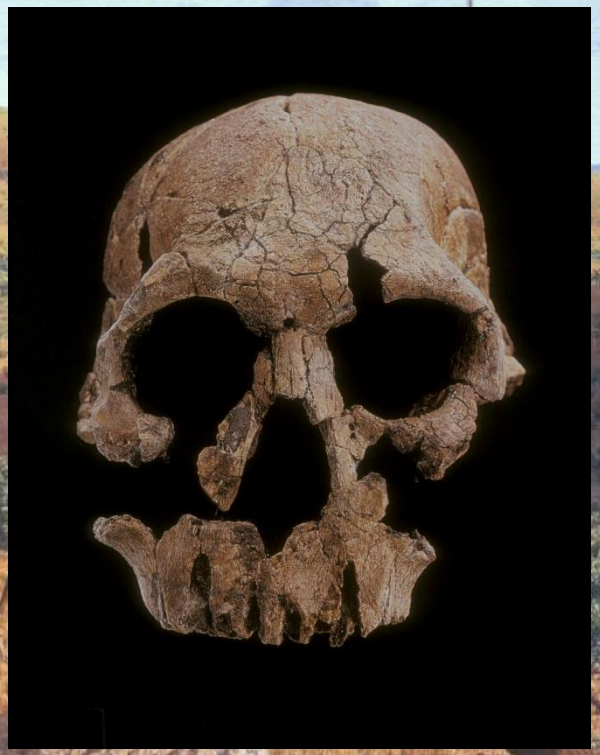
450 cc
A.anamensis
A. ramidus
Holistic, manipulative, multimodal, musical communication system
COMMON ANCESTOR

Australopithecines, 3.5 million years ago







KNM 1470 *H.rudolfensis*

A.L.288-1. *A.afarensis*, ‘Lucy’

Excavations at the HAS site, Koobi Fora

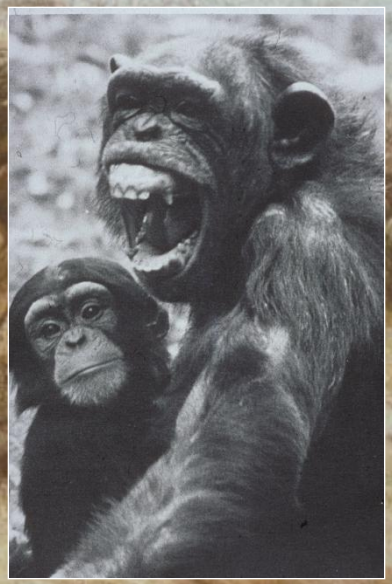
Faunal remains at FLK 22, Olduvai Gorge

***Homo habilis* 2.0 million years ago**

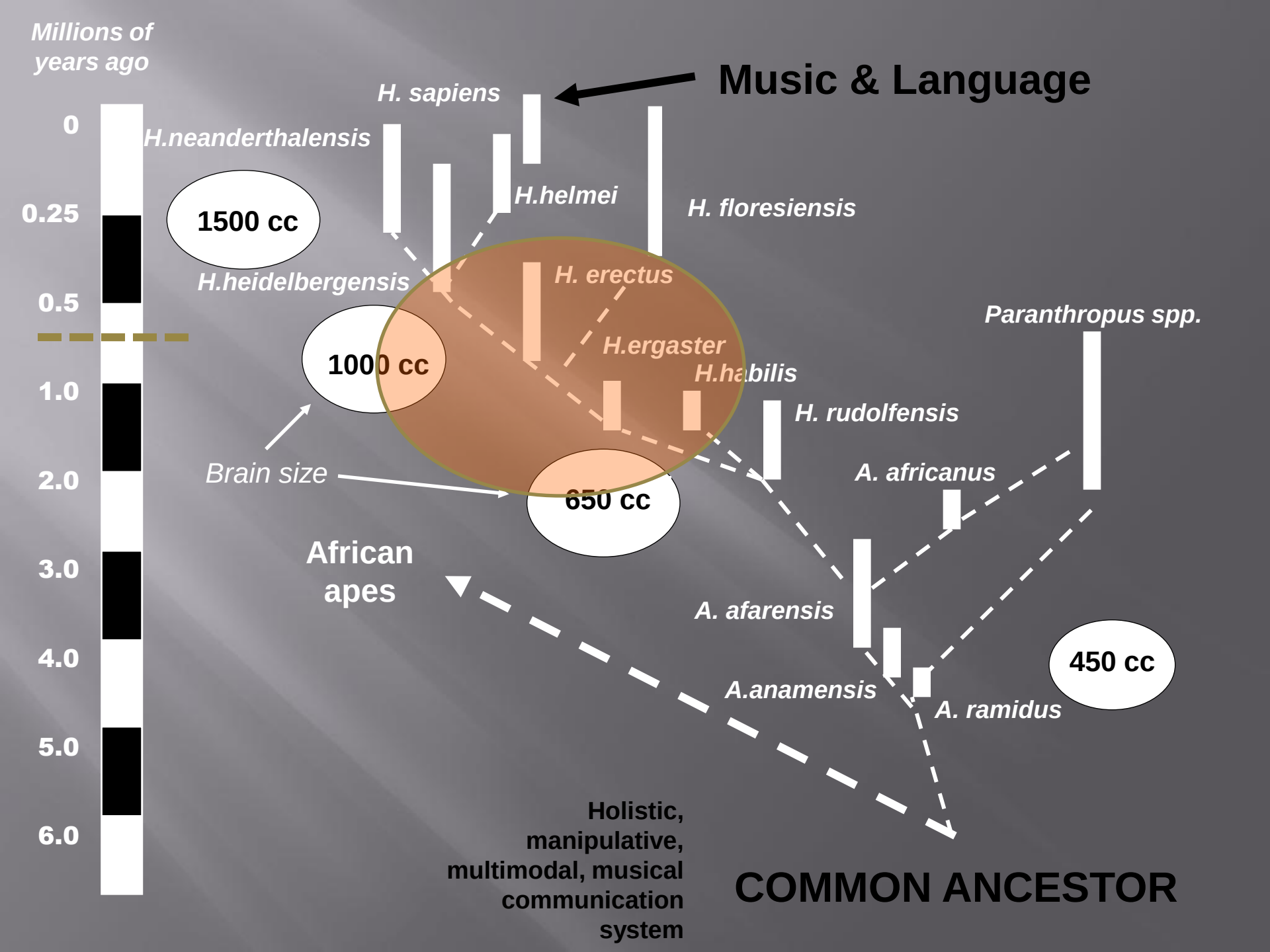
Changes to the vocal tract arising from reduced dentition

Selective pressures arising from:
Foraging:
predator alarm calls,
calls for help & support …

… and Socialising
vocal grooming
emotional manipulation



The need to be emotional


Millions of years ago
0
0.25
0.5
1.0
2.0
3.0
4.0
5.0
6.0
Music & Language
H. sapiens
H.neanderthalensis
H.helmei
H. floresiensis
1500 cc
H.heidelbergensis
H. erectus
1000 cc
H.ergaster
H.habilis
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Brain size
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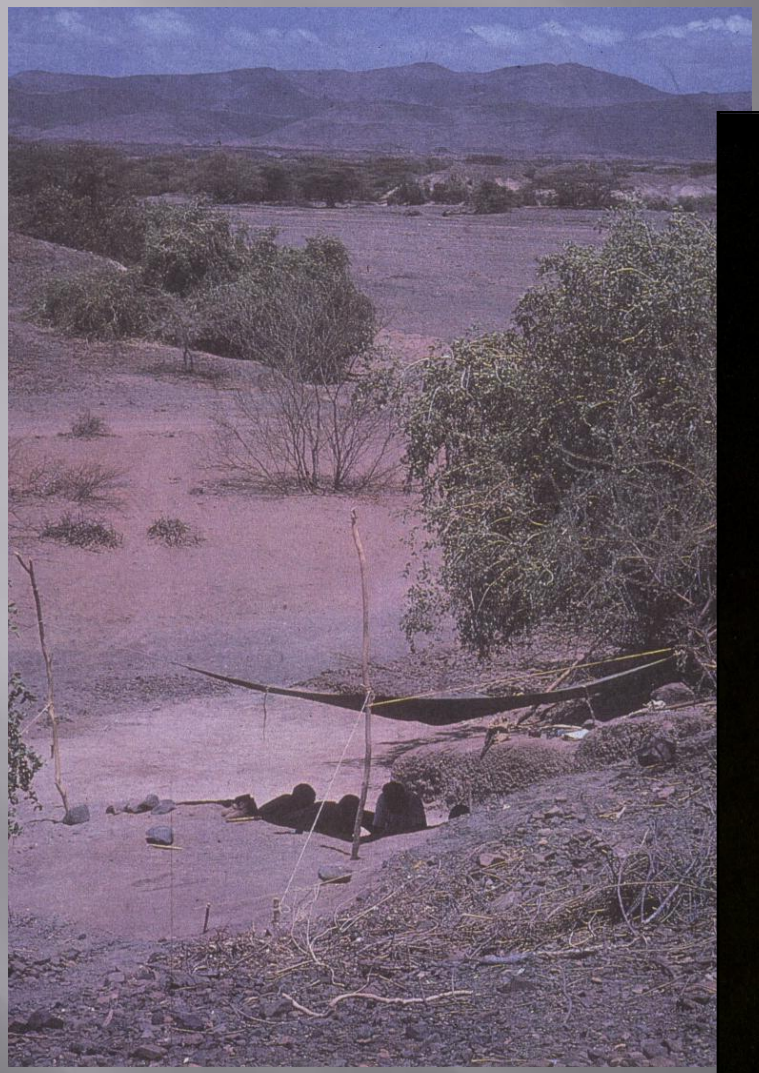
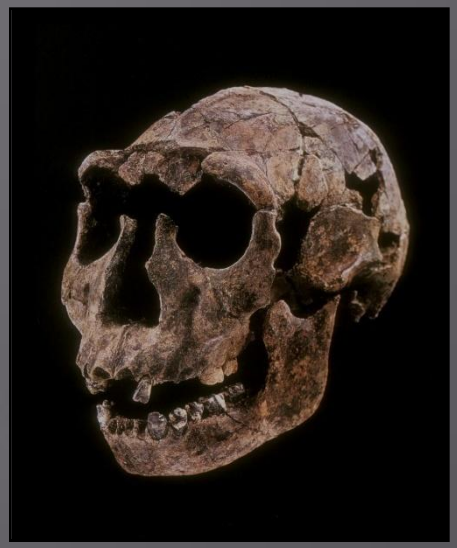
A. ramidus
Holistic, manipulative, multimodal, musical communication system
COMMON ANCESTOR





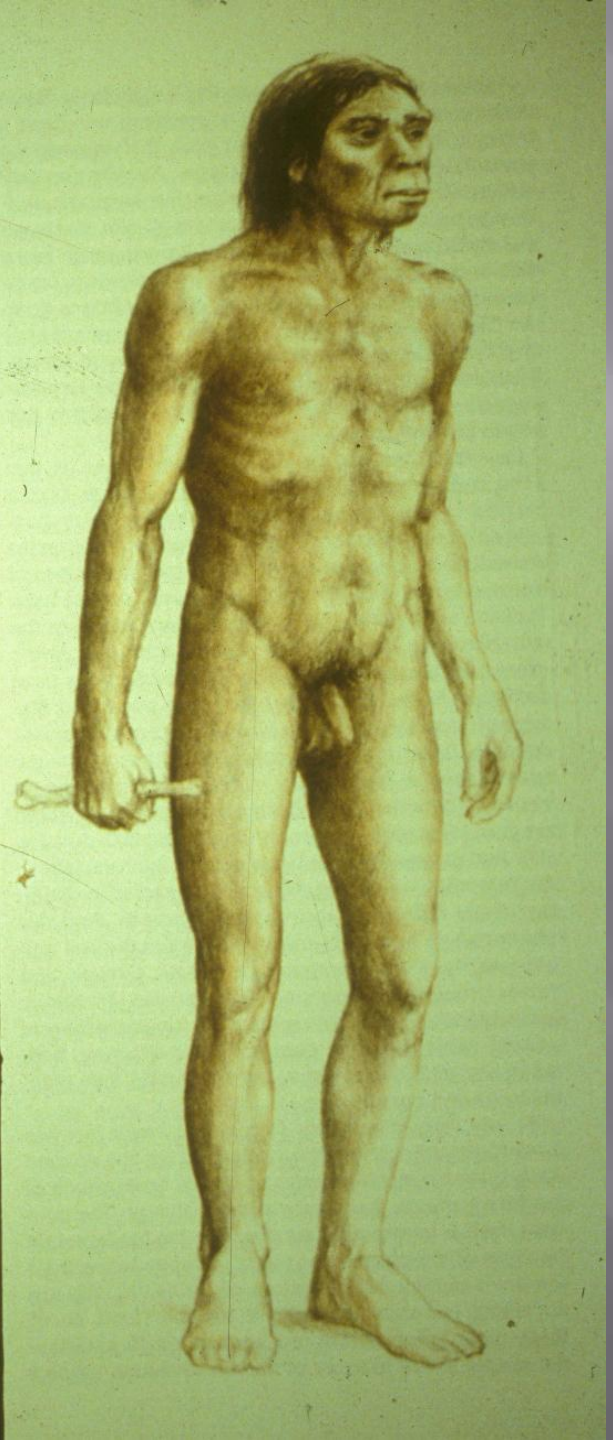
Full bipedalism required:

Descended larynx

Enhanced breathing control

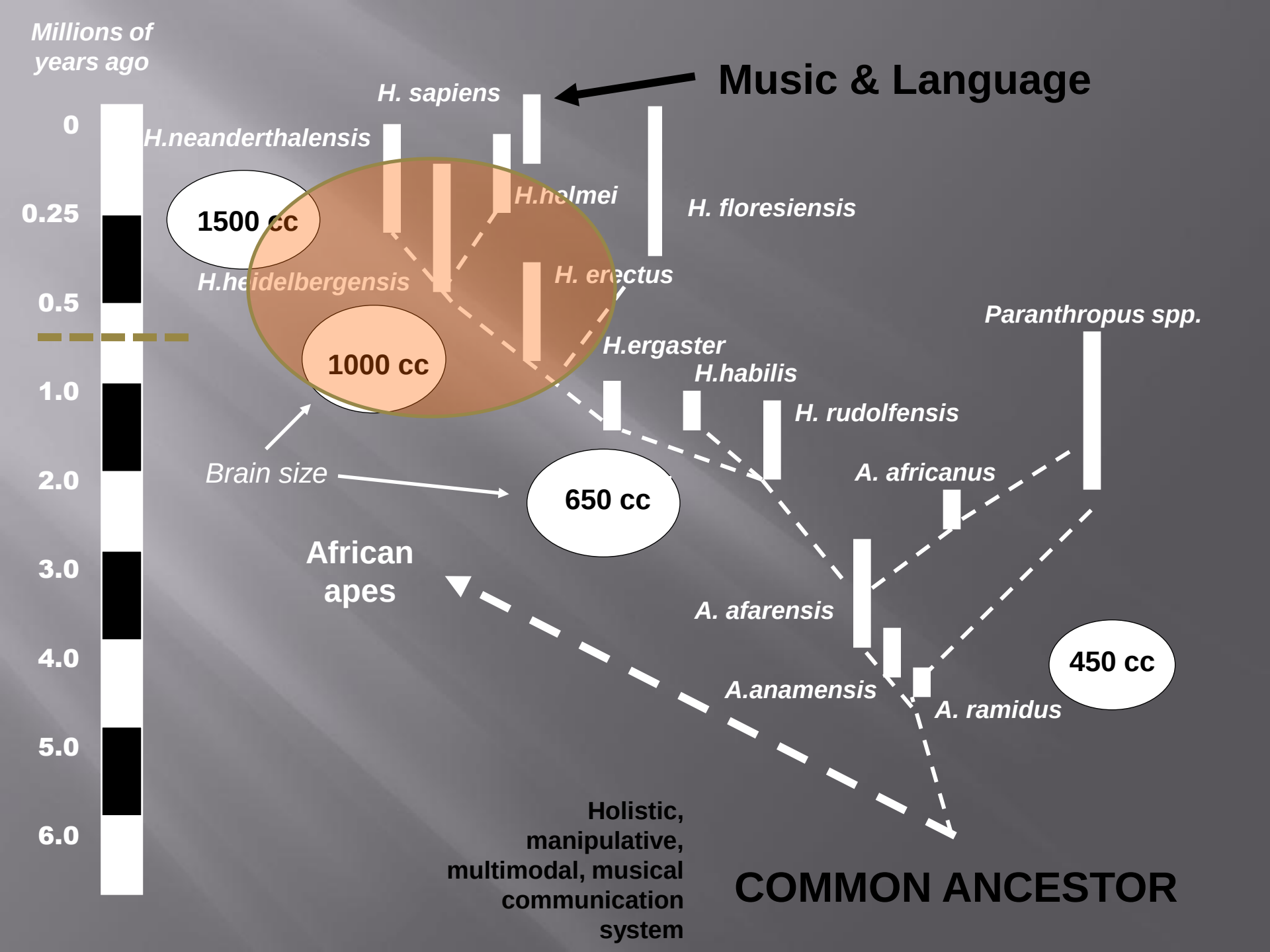
WT 15000 *H.ergaster*

‘The Nariokotome Boy’



The muscular control required for bipedalism enhanced the potential for gesture and body language, and dance

Further consequences of bipedalism were enhanced rhythm and the phenomenon of bodily entrainment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Holistic, manipulative, multimodal, musical communication system
COMMON ANCESTOR

Four evolutionary developments with consequences for the evolution of music & language

1. The big helpless baby problem

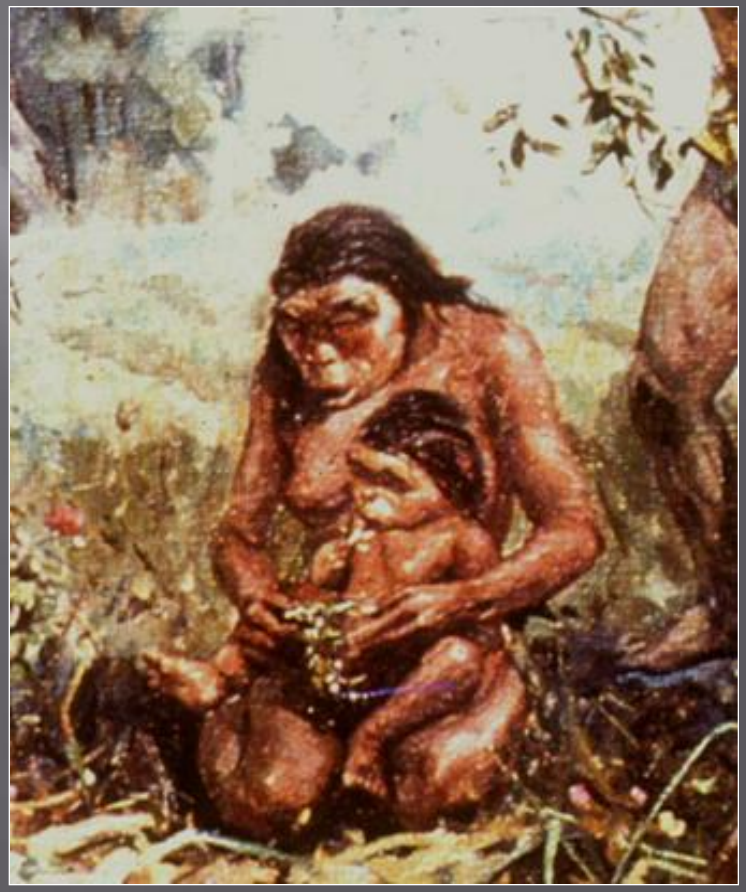
Ellen Dissanayake

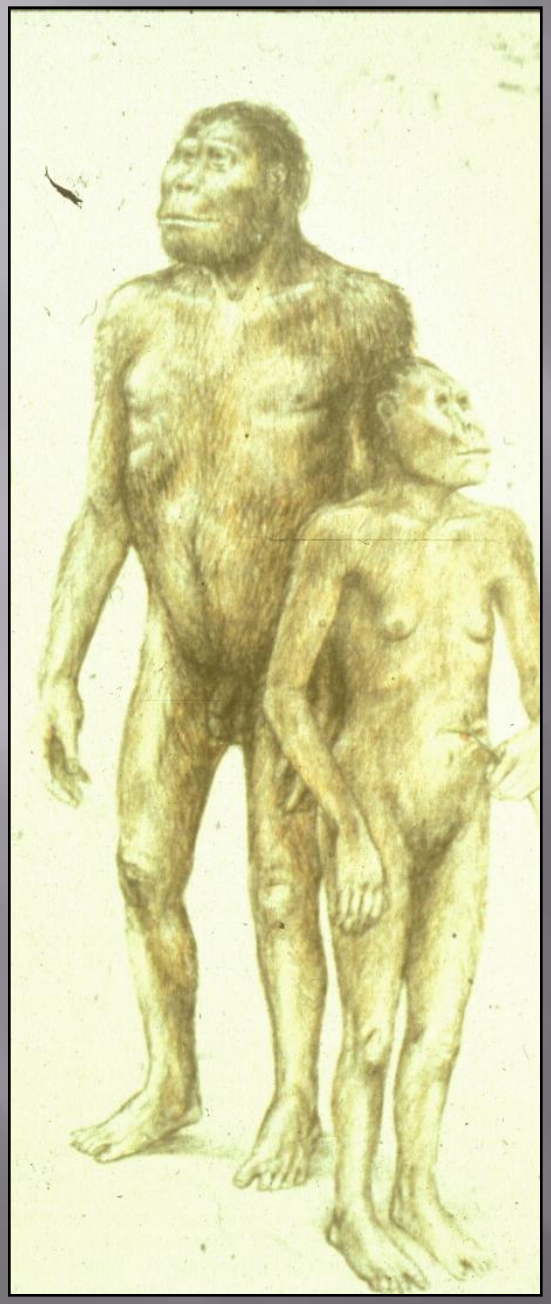
‘coevolution in infants and mothers of rhythmically patterned, jointly maintained communications’

Dean Falk

Putting baby down

The importance and great antiquity of singing to baby





2. The reduction of sexual dimorphism

c. 50% increase in male body size and 70% increase of female body size from *A.afarensis* to *H.ergaster*, change of size ratio from c. 1.4 to 1.2

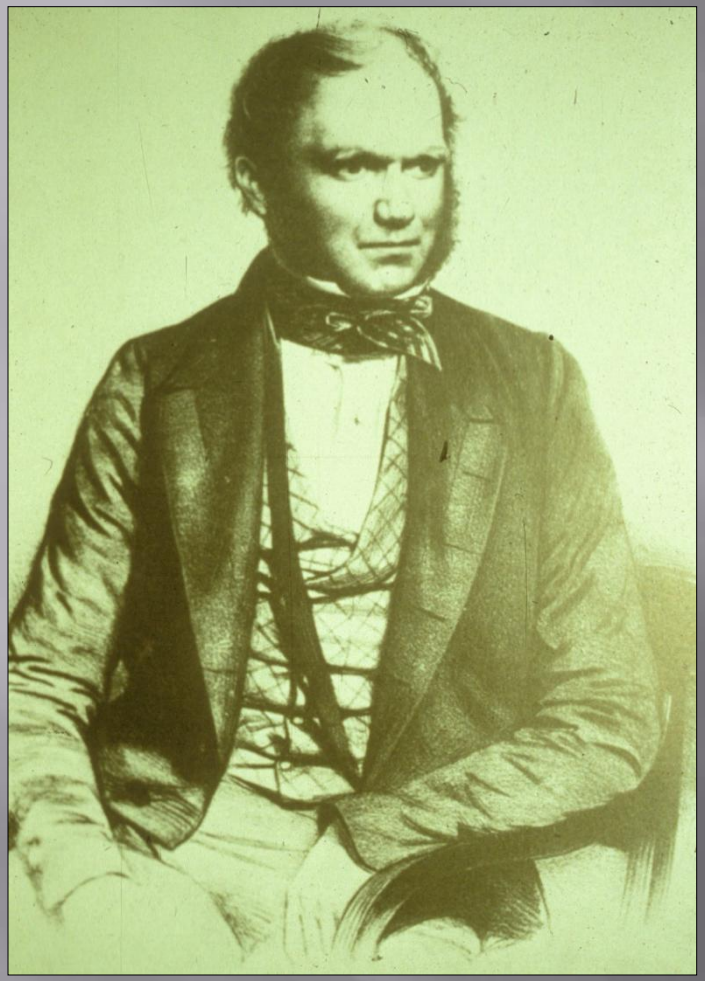
What would the consequences have been for social organisation and mating patterns?

Possibly:

Reduced male-male competition

Increased female choice

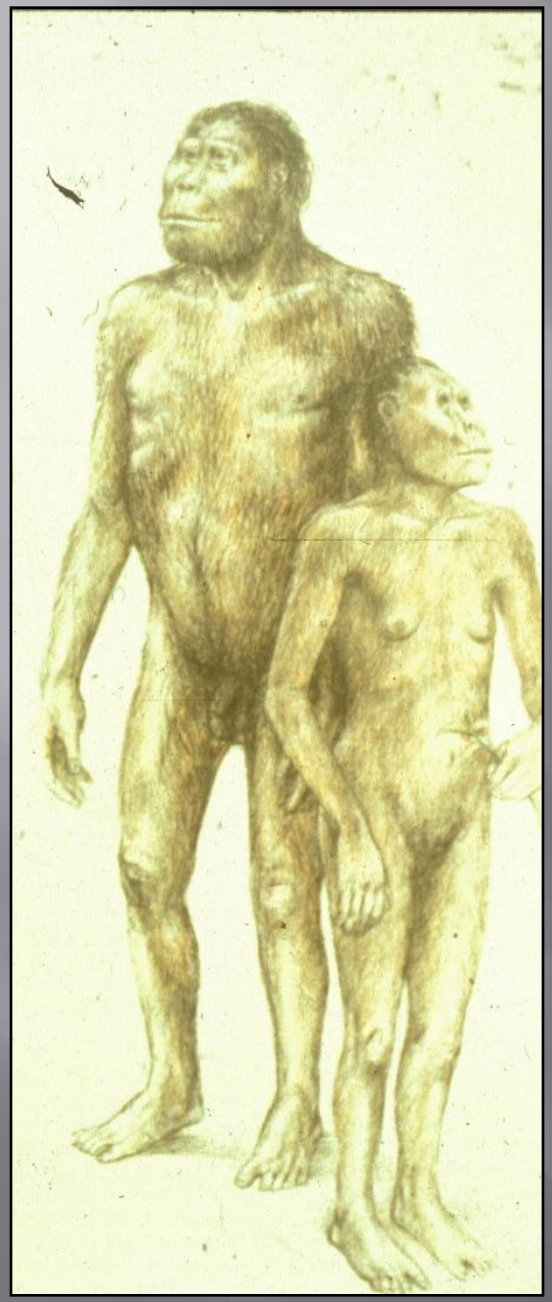
Pair bonding and male provisioning



Charles Darwin 1871

"… *it is probable that the progenitors of man, either the males or females or both sexes, before acquiring the power of expressing mutual love in articulate language, endeavoured to charm each other with musical notes and rhythm*"

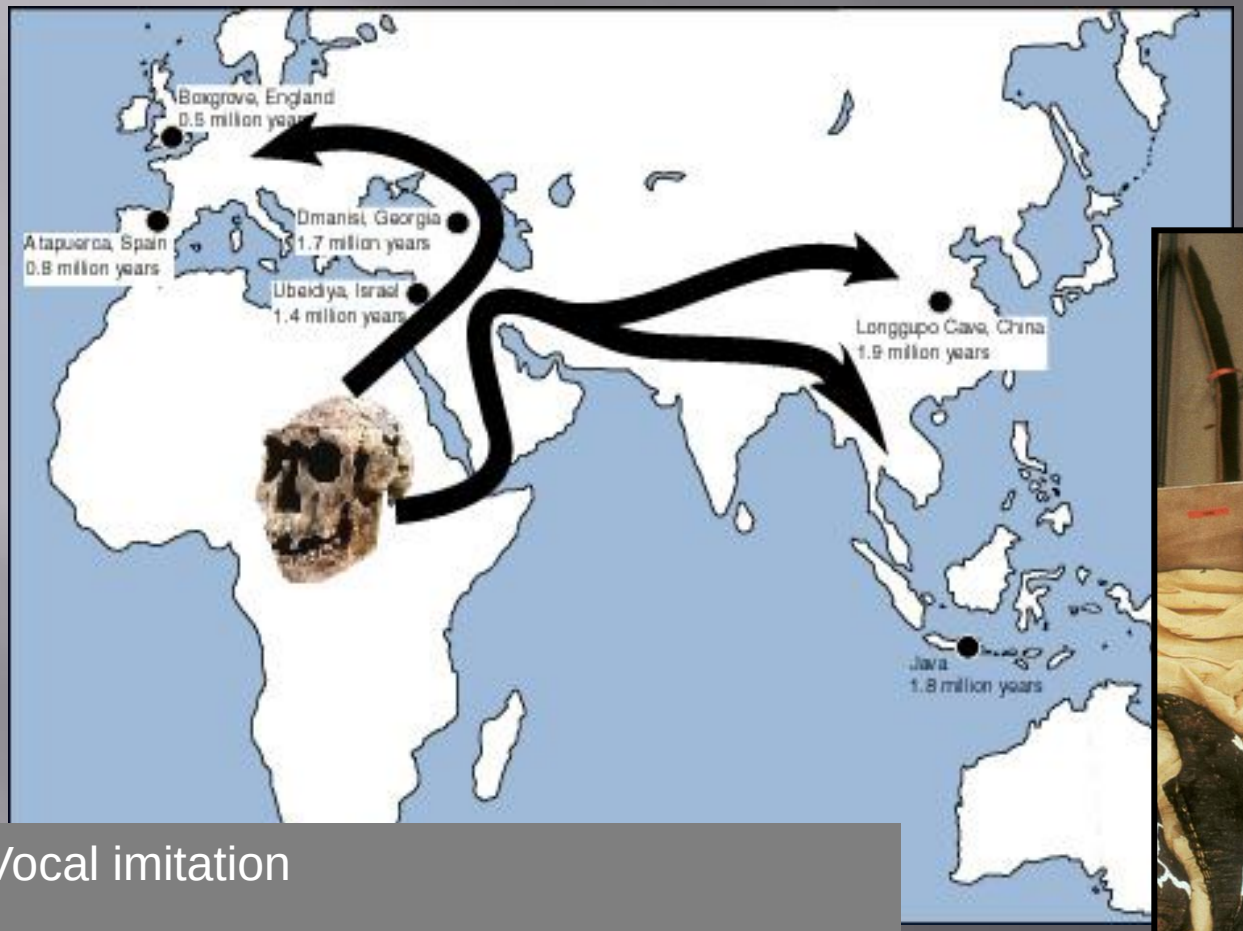
Such ideas led to the theory of sexual selection



Music and sexual display

3. Dispersal & big game hunting

Selective pressures to enhance communication about the natural world

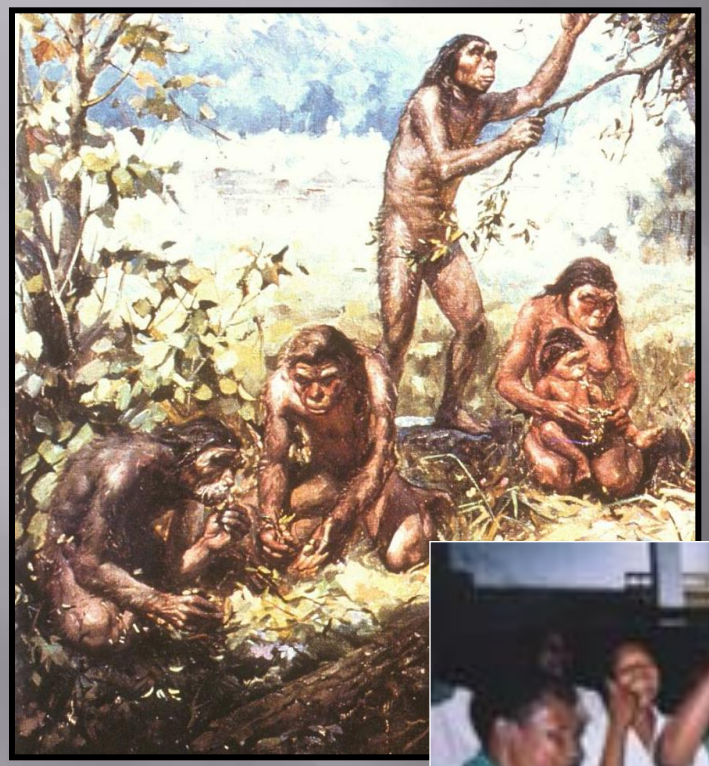


Vocal imitation

Mimesis – Donald 1991 ‘Mimetic culture’

Sound synaesthesia – Brent Berlin

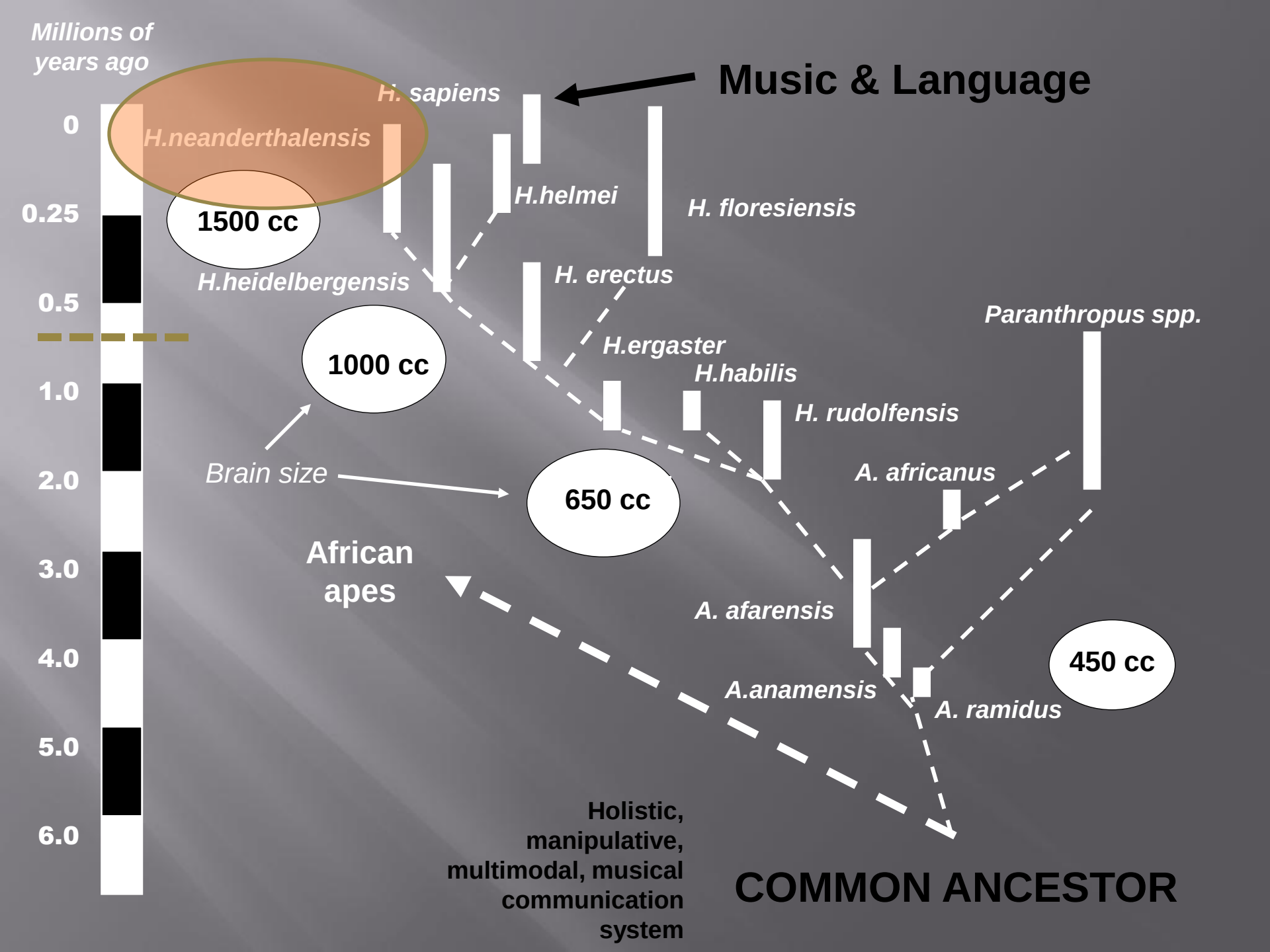
4. Significance of cooperation and group bonding



Group hunting of big game depended upon cooperation and trust

Group singing and dancing are the primary means to build such trust


Bilzingsleben, Germany, 300,000 years ago


Millions of years ago
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Music & Language
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H.helmei
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Holistic, manipulative, multimodal, musical communication system
COMMON ANCESTOR

Homo neanderthalensis

Arguments for language

Large Brains

Modern-like vocal tracts

Technological sophistication

Big game hunting

Ecological success

Arguments against language

Absence of symbolic artefacts

Cultural stasis

Neanderthal Communication

HOLISTIC

MANIPULATIVE

MULTI-

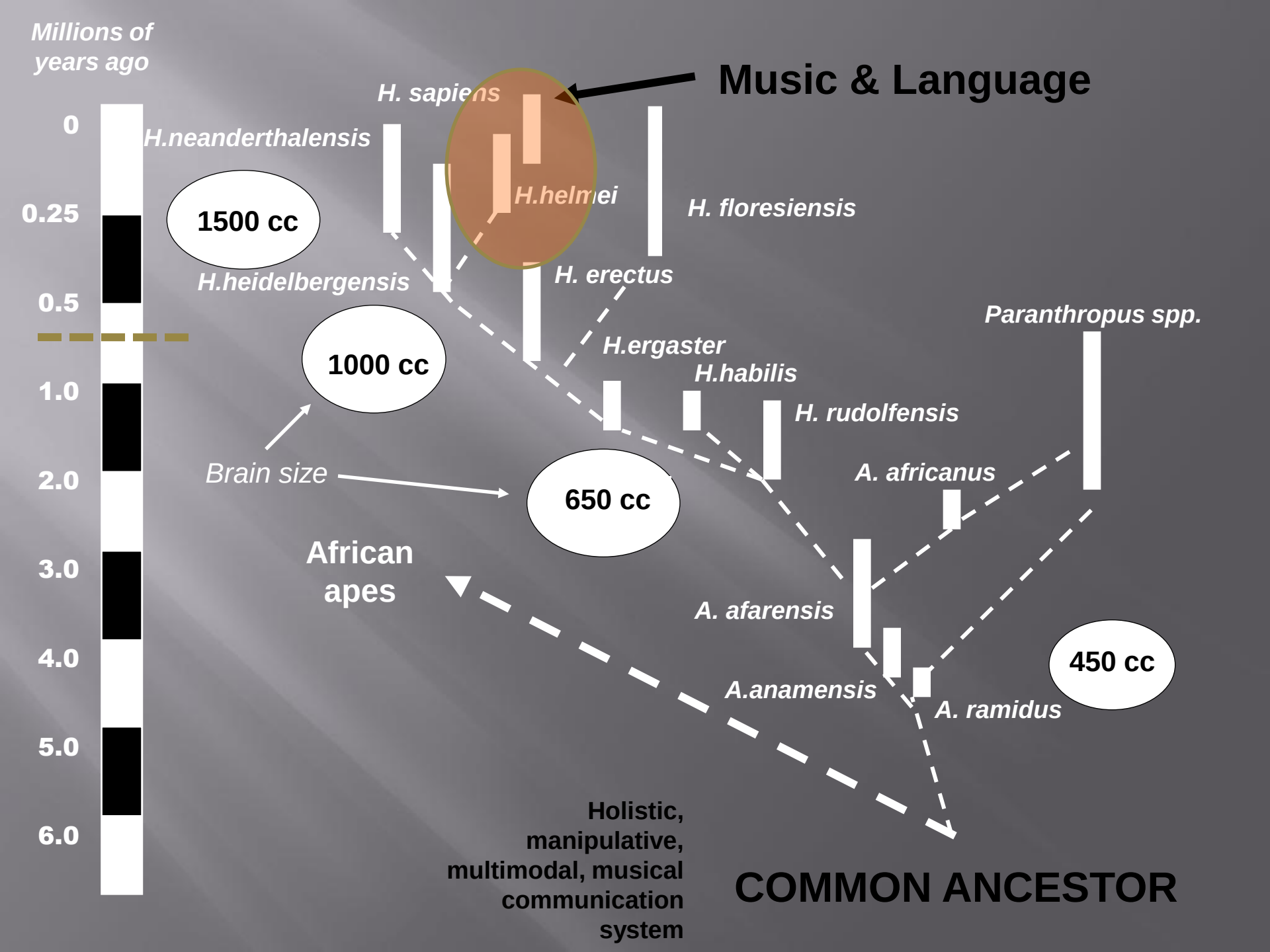
MODAL

MUSICALITY

MIMETIC

A relatively fixed set of formulaic utterances with complex semantic meanings, used for recurrent situations and events, used in conjunction with body language and moderated by variations in pitch, melody and rhythm to nuance their meaning and emotional content

Limited degree of compositionality & some words


Millions of years ago
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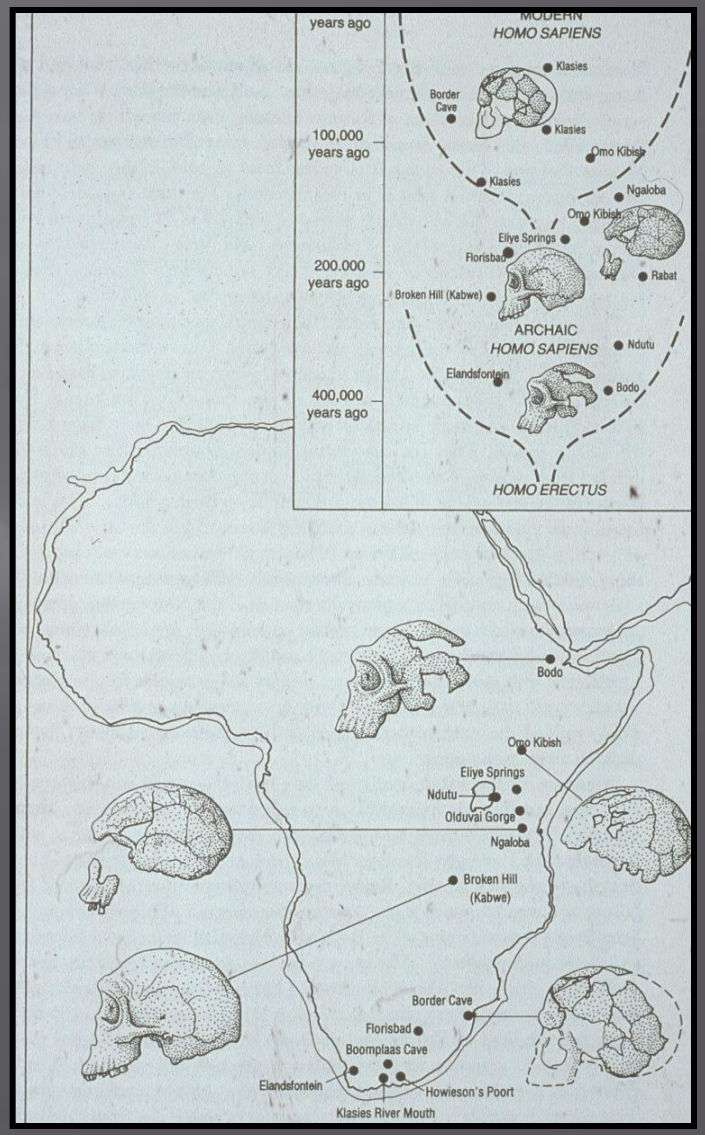
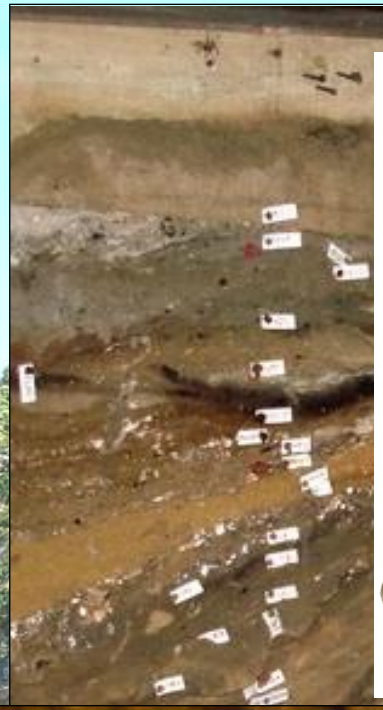
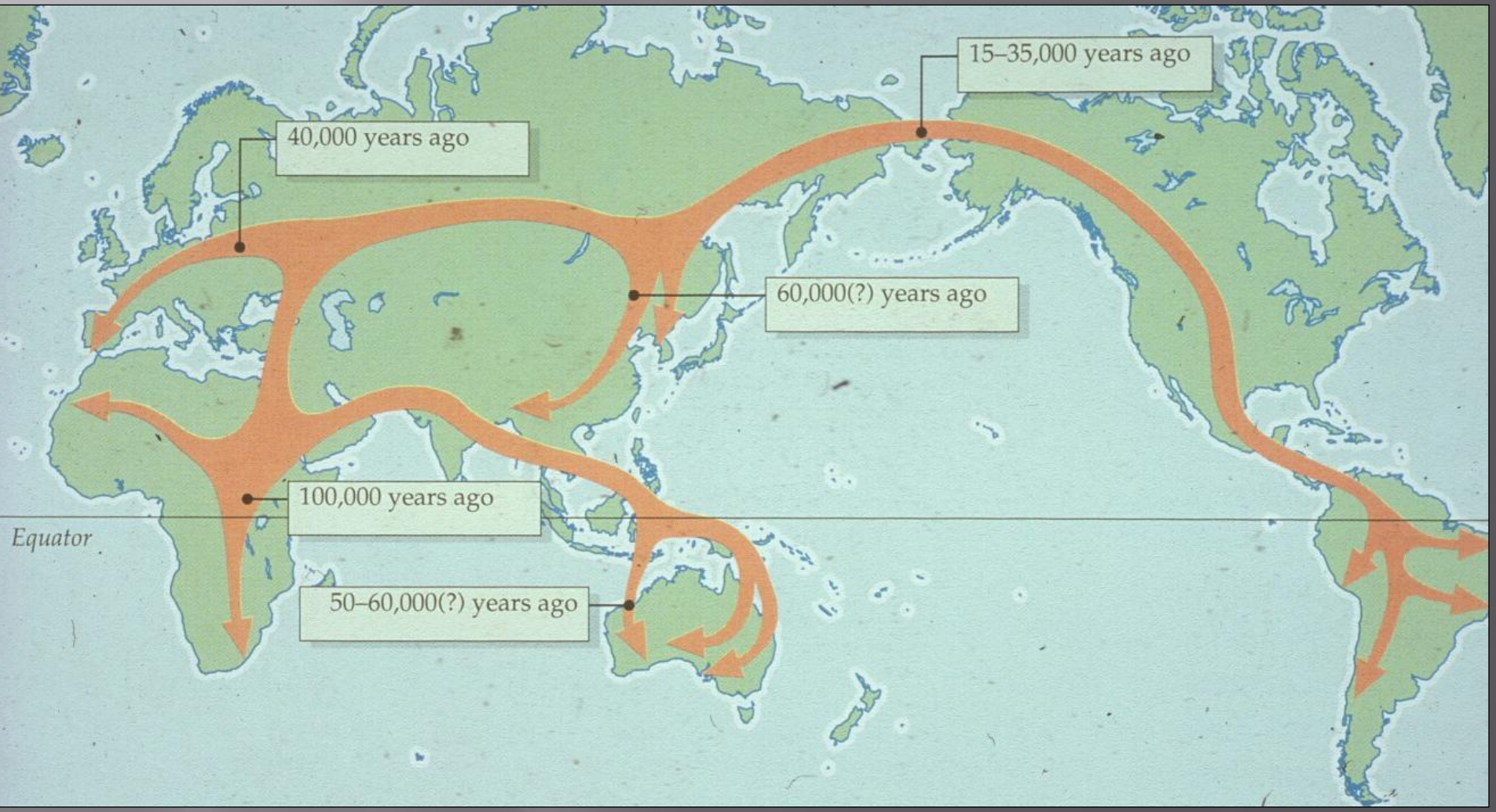
Holistic, manipulative, multimodal, musical communication system
COMMON ANCESTOR

Our species. *Homo sapiens*, evolved in Africa at c. 200,000 years ago



Blombos Cave,
South Africa,
Middle Stone Age,




15–35,000 years ago
40,000 years ago
60,000(?) years ago
100,000 years ago
Equator
50–60,000(?) years ago

Music becomes a communication system specialising in the transmission of emotion and facilitating social bonding

Language becomes a communication system specialising in the transmission of information and dominates communication

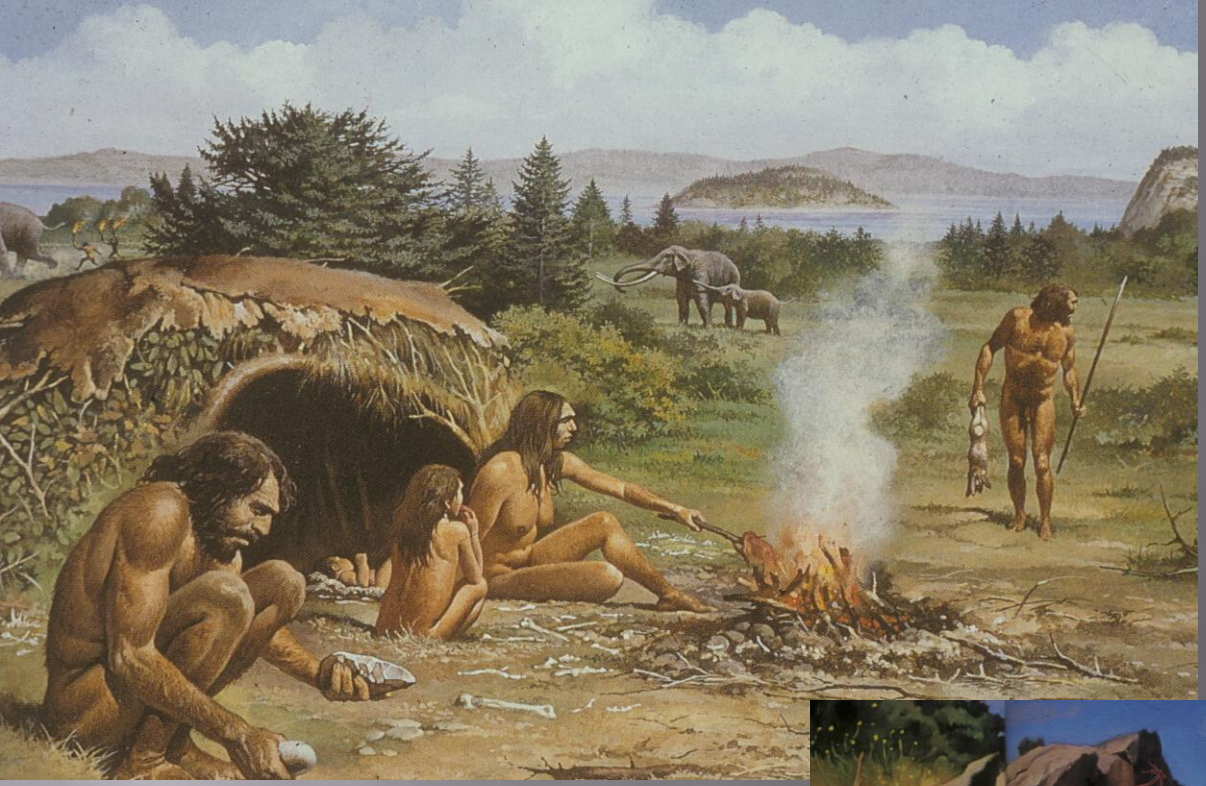
Music

Language

c. 200,000 – 70,000 years ago

Hmmmmm

A pre-linguistic ‘musical’ mode of thought and action (Blacking)



Hmmmmm using Neanderthals ….

…were outcompeted by language using modern humans

Why music?

Because we are the beneficiaries of a pre-linguistic but musical stone age past