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

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Why music?
Homo heidelbergensis, 500,000 years ago
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

BA 45
Inferior Frontal Gyrus

BA 38
Superior Temporal Gyrus

BA 22
Superior Temporal Gyrus

z = +18
z = -14
z = -6
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
Vervet alarm calls

Gelada chatterings

Grunts, barks, screams & hoots

Gibbon duets
Music & Language

African apes

H. neanderthalensis
1500 cc

H. heidelbergensis
1000 cc

H. sapiens
650 cc

H. floresiensis
450 cc

H. helmei

Paranthropus spp.

H. ergaster

Holistic, manipulative, multimodal, musical communication system

H. habilis

H. rudolfensis

A. afarensis

A. anamensis

A. afarensis

A. africanus

A. ramidus

COMMON ANCESTOR

Brain size

0.25
0.5
1.0
2.0
3.0
4.0
5.0
6.0

Millions of years ago

0
1.0
2.0
3.0
4.0
5.0
6.0
A pre-linguistic ‘musical’ mode of thought and action (Blacking)

200,000-70,000 years ago
A. ramidus
A. anamensis
A. afarensis
A. africanus
Paranthropus spp.
H. rudolfensis
H. habilis
H. erectus
H. helmei
H. sapiens
0
0.25
0.5
1.0
2.0
3.0
4.0
5.0
6.0
Millions of years ago

Music & Language

Holistic, manipulative, multimodal, musical communication system

African apes

Brain size

Paranthropus spp.

H. neanderthalensis

H. floresiensis

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H. erectus

H. ergaster

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H. helmei

H. sapiens

1500 cc

650 cc

1000 cc

600 cc

1500 cc

H. rudolfensis

A. afarensis

A. anamensis

A. africanus

A. ramidus

COMMON ANCESTOR
Australopithecines, 3.5 million years ago

A.L.288-1. *A. afarensis*, ‘Lucy’

KNM 1470 *H. rudolfensis*
Excavations at the HAS site, Koobi Fora

Faunal remains at FLK 22, Olduvai Gorge
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

Homo habilis 2.0 million years ago

The need to be emotional
Music & Language

African apes

Common Ancestor

Holistic, manipulative, multimodal, musical communication system

Millions of years ago

0
0.25
0.5
1.0
2.0
3.0
4.0
5.0
6.0

H. neanderthalensis
H. habilis
H. erectus
H. ergaster
H. rudolfensis
H. helmei
H. floresiensis
A. africans
A. afarensis
A. anamensis
A. ramidus

Brain size

1000 cc
650 cc
1500 cc
450 cc
Full bipedalism required:
Descended larynx
Enhanced breathing control

WT 15000 *H. ergaster*
‘The Nariokotome Boy’
Further consequences of bipedalism were enhanced rhythm and the phenomenon of bodily entrainment.
African apes: A. ramidus, A. anamensis, A. afarensis, A. africanus

H. habilis
H. rudolfensis
H. ergaster
H. erectus
H. helmei
H. floresiensis
H. neanderthalensis
H. sapiens

Brain size:
1500 cc
1000 cc
650 cc
450 cc

Holistic, manipulative, multimodal, musical communication system

Music & Language

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
African apes

- H. neanderthalensis
- H. habilis
- H. erectus
- H. rudolfensis
- A. ramidus
- A. afarensis
- A. anamensis
- A. africanus

Brain size:
- 450 cc
- 650 cc
- 1000 cc
- 1500 cc

Music & Language

Common ancestor

Holistic, manipulative, multimodal, musical communication system

Millions of years ago

0.25
0.5
1.0
2.0
3.0
4.0
5.0
6.0
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

Homo neanderthalensis
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
African apes

Music & Language

Holistic, manipulative, multimodal, musical communication system

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Millions of years ago

H. neanderthalensis

H. habilis

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H. helmei

H. floresiensis

H. sapiens

A. africans

A. afarensis

A. anamensis

A. ramidus

Paranthropus spp.
Our species, *Homo sapiens*, evolved in Africa at c. 200,000 years ago.
Blombos Cave, South Africa, Middle Stone Age,
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.

*Time*

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

Hmmmmm

c. 200,000 – 70,000 years ago
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