

THE DESCENT OF MAN*

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Abstract: The DM is a sonic simulation of the origin and evolution of human language inspired in Darwin's "The Descent of Man" (1871) and his conjectures on the evolution of hominid species descendant of ancestral homo. It focuses on the sounds allegedly uttered by 5 species: Australopithecus afarensis (4,2-2,6 mill.), Homo habilis (2,5-1,6 mill.), Homo erectus (1 mill.-100.000), Homo antecesor (800.000). Australopithecus afarensis uses barks, pant hoots, screaming vocalizations to express his emotions and to communicate with fellows. The syntax is holistic and the sentences are not articulated in simple units. The sentences express different type of emotions: whispers, growls, complaints, pleasure, acceptance, power, fear, danger alarm. The scream sentences have 2 peaks of frequencies of ca. 2 or 3 octaves. Homo habilis invents tools and develops a technique of hard percussion. We represent this specie by simple rhythms. Homo ergaster discovers symmetry and develops a technique for carving stone (Achealense Culture). We represent him by percussive sound with complex symmetric rhythms. Homo erectus lives in groups of hunter-gatherers. He discovers melody, and is capable of identifying intermediate points between the extreme frequency peaks of the scream-Sentences. He utters melody sentences within a range of 1 -2 octaves. Those sentences are not articulated in phonemes. They are uttered as mmm-sentences. Homo antecesor live in groups of hunter-gatherer. They bury the dead . They develop a more complex melodic-tonal language. Are capable of holding dialogues and narrating stories.

Instruments: violin soloist. **Duration:** ca. 20'

Structure

- | | |
|----------------------------------|------------------------------------|
| 1. The nothingness | 4. Homo ergaster.(complex rhythms) |
| 2. Diqinesh (scream sentences) | 5. Homo erectus (melody sentences) |
| 3. Homo habilis (simple rhythms) | 6. Homo antecesor (dialogue) |

Description

The D(escent of) M(an) is a sonic poem depicting the emergence of human language and its evolution. It focuses on the Phonetic and Acoustic aspects of natural language. It is composed as a simulation of the sounds we assume could have been used as language by fossil species of hominids. DM centers on the world of sounds of 5 species: Australopithecus afarensis (4,2-2,6 mill.), Homo habilis (2,5-1,6 mill.), Homo ergaster (1,9-1,4 mill.), Homo erectus (1 mill.- 100.000), Homo antecesor

(800.000).

Australopithecus afarensis uses barks, pant hoots, screaming vocalizations to express his emotions and to communicate with fellows. The syntax is holistic and the sentences are not articulated in simple units. The sentences express different types of emotions: whispers, growls, complaints, pleasure, acceptance, power, fear, danger alarm. The scream sentences have 2 peaks of frequencies of ca. 2 or 3 octaves.

Homo habilis invents tools and develops a technique of hard percussion. We repre-

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sent this specie by simple rhythms. Homo ergaster discovers symmetry and develops a technique for carving stone (Achealense Culture). We represent him by percussive sound with complex symmetric rhythms.

Homo erectus lives in groups of hunter-gatherers. He discovers melody, and is capable of identifying intermediate points between the extreme frequency peaks of the scream- Sentences. He utters melody sentences within a range of 1-2 octaves. Those sentences are not yet articulated in syllables. They are uttered as hum-sentences.

Homo antecessor lives in groups of hunter-gatherer. They bury the dead. They develop a more complex melodic-tonal language, and are capable of holding dialogues and narrating stories.

The research underlying DM

The DM is based on Charles Darwin's proposal about the musical origin of human language:

"Language owns its origin to the imitation and modification of various natural sounds...It is probable that imitation of musical cries by articulated sounds may have given rise to words expressive of various complex emotions." [3, chap.3]

What could have been the repertoire of sounds produced by our ancestors?

In our sonic simulation we use two types of data: (a) studies on the voicing of chimpanzees and (b) studies on the auditory capacity of early hominids.

a) Chimpanzees voicing. We follow the research done by [1] on barks, and pant hoots [2].

Barks are context-specific calls, which are functionally referential, They convey information to fellows about objects and events in the external world. They are uttered in the following contexts: predator alarm calls, hunting, travel, aggression. Crockford and Boesch conclude that chimps learn from experience.

Pant hoots are long distant calls. A pant hoot comprises to up to 4 phases, with a fixed order: (1) the introduction phase (1 or more tonal elements with a fundamental of 300-600 Hz.) (2) The build-up phase with up to 25 shorter tonal exhaled elements inter-dispersed with broad-band, noisy inhaled elements of similar duration. The phrase has a rapid, rhythmic quality. The fundamental frequency is between 200-500 Hz. It rises towards the end. (3) The climax contains 1 or several screams, with a high freq 800-2000 Hz, and many harmonics. All elements are inter-dispersed with low frequency voiced inhaled elements. (4) The let-down phase, similar to the built-up but with fewer elements and with decreasing, rather than a rising pitch.

b) Auditory capacities of fossil hominids and chimpanzees There was an increase of the auditory capacities of hominids for intermediate frequencies in the Pleistocene. [5] propose that Australopithecus afarensis and Homo habilis probably had an enhanced ability to detect higher frequencies compared to modern humans (similar to non-human primates). [4] (Pleistocene Hearing): chimpanzee audiograms show a W-shaped pattern characterized by 2 peaks of high sensibility at ca. 1000 Hz and at 8000 Hz. They have a relative loss of sensitivity in the midrange freq. between 2000 and 4000 Hz. Species-specific pant-hoots of wild chimps, for communicating with co-species over long distant, concentrates the acoustic information at ca. 1000 Hz. From the skeletal data analysis, Martinez et al. [4] conclude that human audiograms show a high sensibility at ca. 1000 Hz, but they maintain high sensitivity within the frequency range of 2000 to 4000 Hz.

Our proposal

We propose the following stages in the origin and evolution of human language: see table 1

- (1) Screaming, rumbling >
Rhythmic compositionality >
Melodic quantization >
Dialogue

The discovery of rhythm

Rhythmic compositionality could have emerged influenced by tool making activities. Rhythm could have originated as imitation and modification of the sounds heard from the working activity while making stone tools, or using stones to smash plants. First, as hard percussion when striking the stone, after, as periodic recurrent patterns while flaking the stone core into symmetrical biface tools. Rhythmic Complexity would have come from: (a) Rhythmic re-

cursion. From reiterated hitting, which produced recursive rhythms. (b) Polyphonic rhythmic patterns. From simultaneous no synchronized percussive voices coming from the stone work of many people.

The discovery of Melody: From screams to micro-intervals

We suggest that the faculty for melody could have emerged from a stage of tonal shift of the intermediate intervals between 2 peaks of a scream: (a) Screams (2 peaks of 3-octaves interval range). (b) Tone shifting (glissandi): up, down, complex. (c) Vibrato (periodic fluctuation of 1/2 tone of 1/4 tone).

Table 1: Stages in the language of hominids

	Afarensis	Habilis	Ergaster	Erectus	Antecesor
technique		Olduwan culture	Achealean culture		
hearing capacity	2 peaks 1 kHz, 8 kHz	hard percussion	complex percussion patterns		2-4 kHz
what they heard	predator's voices	striking stone	carving stone		
language		simple rhythm	complex rhythm	discovery of melody	development of melody
rhythmic patterns		> (+ resonance)	trochaic, yambic		
articulated sounds	r-sound; growl sound			vibrato, glissando	

References

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For Florian Vlashi

The Descent of Man

Homage to Charles Darwin

The Nothingness

Helena Palma

duration: ca. 15'

♩ = ca. 70

Violin

sonidos muy indefinidos y lejanos

frecuencias resonantes del pedal electrónico

tremolo

normal

Vln.

un arco muy lento

incremento de presión de arco oscilante

oscilación de cuerda (como la lahuta)

aumentar presión del arco

presión normal

(sonidos-r)

Vln.

(imitar el rugido/gruñido de un oso)

aumentar presión del arco

disminuir presión del arco

presión normal

sonido-r (similar a la risa de una r-velar)

subarmónicos

la nota más grave posible

arco muy lento y oscilante

sobresale el 2 armónico

Australopithecus afarensis

Vln.

♩ = ca. 100

f < fff

(grito: socorro!)

no glissato

mp

eco (uuy, uuy!)

mf

mp

(huhuuuur!)

Vln. 34

f *ffff* (grito) *mf* *f* *ffff* (grito) *mf*

sfz *sfz* *sfz* *sfz*

Vln. 40

gettato gettato ricochet ricochet ricochet

(cuenta lo que le ha pasado) *sf* 3 (sonido-r) (risa) *sf* 3 (sonido-r) (risa) *sf* 3 (sonido-r) (risa)

Vln. 45

sf 3 (sonido-r) (risa) *sf* 3 (sonido-r) (risa) *sf* 3 (sonido-r) (risa)

Vln. 50

gettato *sf* 3 (sonido-r) (risa) *sf* 3 (sonido-r) (risa) *sf* 3 (sonido-r) (risa)

Vln. 56

arco normal *sf* 3 (sonido-r) (risa) *sf* 3 (sonido-r) (risa) *sf* 3 (sonido-r) (risa)

(sonido-r) aumentar la presión del arco (gemidos suaves) (gemidos algo más fuertes)

Vln. 63

(grito: peligro en tierra) *sf* 3 (sonido-r) (risa) *sf* 3 (sonido-r) (risa) *sf* 3 (sonido-r) (risa)

(preámbulo de grito)

Vln. 68

(sol-3) (ca.200Hz) (sol-2) 97Hz (fa-4) *sfz* (fa-6) (1397Hz) *fff* (grito: peligro en el aire)

scordatura (sonido-r) *fff*

Homo habilis

Homo descubre la utilidad de la piedra como herramienta y elabora una técnica percusiva rudimentaria para afilar el canto de la piedra y convertirlo en un instrumento cortante.

$\text{♩} = 80$

ricochet
vibrato (frecuencia ondulante que resulta del cambio de velocidad)

vibrato microtonal
ricochet

74 Pizz (m.s.)
+ arco

5 3

Vln.

fff *pp* *fff* *pp* *fff*

este sonido imita el ruido de
fuerte golpe las partículas que caen
resonante requebrajadas por el golpe

79 ricochet

5 3

Pizz (m.s.)
+ arco

ricochet

pp *fff* golpes *mp* *ff*

84 ricochet

3 3

mp *mp*

88

3 3

mp *mf*

$\text{♩} = 216$ muy
resonante

93

5

mf *mf* *ff* *mf*

rítmo marcado

103

muy
resonante

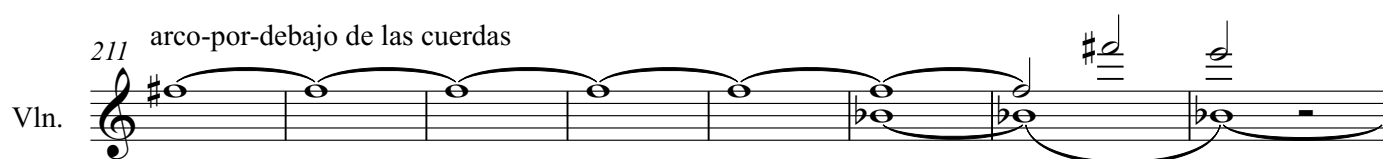
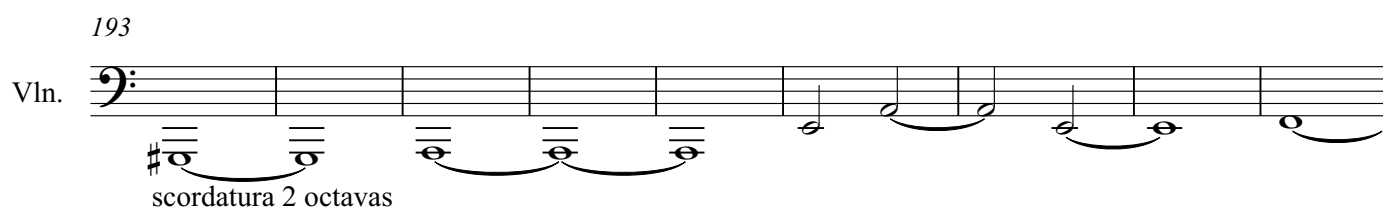
fff *mf*

Homo descubre el ritmo aditivo y aprende a contar.
La nueva destreza le permite tallar piedras simétricas de un grosor más fino,
que luego ensamblará para construir puntas de lanza.
El poblado resuena con la polirritmia del trabajo.

[illegible]

El explorador (*Homo erectus*)

sonido-r
♩=100 scordatura (Opcionalmente, sonidos subarmónicos sin scordatura)
162 tiempo impreciso, titubeante



(armónico)

219

Vln.

grito energético gritos de entusiasmo

♩=60

227

Vln.

8^{va} 8^{va} 8^{va}

sul sul
D A
(junto al puente)

232

Vln.

8^{va}

♩=100

ricochet ricochet

(risas) (risas)

(risas)

234

Vln.

ricochet

♩=70

El descubrimiento de la melodía
(trino > vibrato microtonal)

Trinos violentos que poco a poco se transforman en trinos suaves
(intervalos de tritono, 4, 3M, 3m, 2M, 2m, microtono, con/sin trémolo).
Progresivamente, *Homo erectus* es capaz de identificar puntos aislados (no glissando
más pequeños en el continuo del sonido).

Vln. 237 $\text{♩} = 100$
molto furioso

Vln. 244
(reflexionando) (vibrato 1/4 tono muy lento) (idea)

Vln. 251
glissando no vibrato

Vln. 256 ricochet (risa) ricochet ricochet gettato

Vln. 260
(grito)

Vln. 268

275 *trm trm* *8va* *(grito)* *trm*

282 *ricochet*

286 *(vibrato-presión sobre cuerda como lahuta)* *(sonido-"mmm". Todavía no se articulan sílabas)*

293 *(sonido-"mmm")*

300

Homo antecesor El pre-lenguaje

Un funeral

Violin

Pedal de "la nada"

gliss. gliss. gliss.

15^{mb}

Vln.

316

armonicos

eco

eco

Vln.

324

gliss. gliss.

armonicos

gliss.

eco

Vln.

331

gliss. gliss.

vibrato muy lento 1/4 tono

muy sutil

Vln.

339

glissando con vibrato

vibrato muy lento

Vln.

346

gliss.

gliss.

Vln.

351

355 $\text{♩} = 100$

Vln. ricochet

362 8^{va}---

(sonido mágico)

sul D
arcos muy rápidos

368 (risa) ricochet (risa) ricochet (eco con electrónica) (no!)

Vln. gliss

(no!)

373 (risa) ricochet $\text{♩} = 90$
sonido-r

(pobre!)

(glissandos descendentes muy rápidos y sin vibrato de 3, de 5 y de 8)

378 (yo quiero!; yo!, yo!;
yo!, yo!)

Vln.

384

Vln.

391

Vln.

Palabras de amor

Violin

$\text{♩} = 100$

gliss

vibrato muy lento

6

glis

flag

percutir la cuerda (flag)

tonos

(llamada)

Vln.

401

vibrato muy lento

Poderoso.
Pasos que se acercan
(tema de *homo erectus*)

405 *fff* muy resonante

oscilación de arco.
Se oye el 3 armónico

mf

(habla la mujer)

molto vibrato

Vln.

413

molto vibrato

armónicos

Vln.

418

gliss.

(el narrador describe la hermosura del hombre y de la mujer)

422

(aparece el hombre)

(habla el hombre)

trino de armónico

glissando

Vln.

427

glis

433

439 Vln. trino de armónico

446 Vln. tono bajar-subir

451 Vln. (la mujer habla para sí) tono (ella se siente muy atraída) (wauuu...)

diálogo hombre-mujer

456 Vln. (hombre) (le contesta la mujer) (hombre)

463 Vln. (habla el narrador) trino misterioso (mujer)

469 Vln. deslizamiento microtonal

473 Vln. (duo hombre-mujer)

478 Vln. movimiento S.T. a S.P.

482 Vln. trino de armónico $\delta^{va} \text{---} |$ Origen Especies