
PRELIMINARY RESULT OF THE ” ORIGINS OF SPEECH ” PROJECT

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Résumé

The speech abilities of fossil hominins are one of the oldest and most challenging questions in palaeoanthropology. The theory of "laryngeal descent" has long been used to explain human singularity. However, recent work has shown that some non-human primates were "speech ready". The organs and soft tissues of the vocal apparatus are not preserved in the fossil record.

This is why, to understand human-like speech capacity, we have developed a project untitled "Origins of speech", mainly supported by the institute of computing and data sciences (ISCD) of Sorbonne University, based on the bony articulators of speech. It aims at inferring soft tissue of the vocal tract (mainly the tongue and the pharyngeal walls) in fossil hominins based on the bony structure of the head, using transformation models from soft tissues (recorded with MR imaging) and bony structure (CT scans) of a living *Homo Sapiens*. These transformation models are evaluated and validated on data recorded from non-human primates, in which both soft tissues and bony structure are preserved.

This multidisciplinary research involves palaeoanthropologists, biomechanicians, specialists in speech sciences, mathematical modeling and mathematicians. We present the preliminary results of this work, which aims at generating a Finite Element tongue model of the La Chapelle-aux-Saints Neanderthal specimen by transforming an existing model of a modern *Homo sapiens* using 3D image registration. Then we expect to quantify the parametric uncertainties resulted from the tongue model generation by a non-intrusive approach.

Moreover, we are seeking to test the consequence of a vertical posture on human elocution faculty. We focused on an anatomical study (2D-3D) to test the relationships between bone structures within primates using a series of skeletons from the collections of the *Muséum national d'Histoire naturelle* to understand the geometry of the vocal apparatus (bone substrate) within the cranial complex and regarding the cervical spine (head position), and to carry out comparisons between genus (*Homo/Pan/Gorilla/Papio*) and species (*Homo sapiens*/Neanderthals).

Mots-Clés: palaeoanthropology, speech abilities, origins of speech, *Homo sapiens*