

DEMONSTRATION ECHOGRAPHIQUE DU CODE LINGUAL

ECHOGRAPHIC DEMONSTRATION OF THE LINGUAL CODE

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RESUME

Le code lingual a été mis en évidence par une analyse biométrique fondée sur la paramétrisation de quatre phénomènes phoniques (l'acoustique glottale, l'acoustique orale, les flux d'air phonatoires, les convolutions de la langue), qui ont été montrés dans leurs corrélations morphologiques synchrones. L'échographe n'a pas servi seulement comme capteur métrique pour la clinique mais encore en cinématique analogique puis digitalisée linguale en cours de phonation, il a permis la visualisation anatomique princeps, en 3D notamment, des reliefs formant canaux de codage morphologique et barométrique de l'air pharyngé, dans la réalisation de la parole-résultat.

SUMMARY

Transverse tomography of the tongue using High Resolution Echography in TM Mode (HREM) gives delicate features of the dorsum linguae during speech.

A biometric analysis of this phenomenon associates a parametrisation of oral acoustic utterances, air outflux and laryngophone sounds with HREM and 3D echographies of the tongue. These measurements show anatomical coding moulding the pharyngeal airflow and producing word emission.

Key-words - Anatomo-physiology of speech - tongue.

Mots-clés - Anatomo-physiologie du langage - langue.

The concept of lingual code (1) (2) has been presented some years ago, before the invention of high-resolution echography in TM mode (3). The present status dealing with the HREM 1D, as well as 3D echographic imagery, can be displayed as such :

While transverse tomography of the tongue (at the mylo-hyoidian site) using a 3,5 MHz analogic echograph system delivers noisy traces of the dorsum during speech or relaxation, the numerical treatment of the signals -macroscopic and grafted mesoscopic convolutions of the tongue when speaking - , according to HREM which operates on 50 samples/s, permits to obtain lineal

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traces without noise. The geometrisation, of the part of the moving organ one has to focus the outline - here the dorso-lingual anatomy-, reveals large as well as tiny convolutions. The figure 1 shows the type of records I routinely use for examining the phonatory black-box.

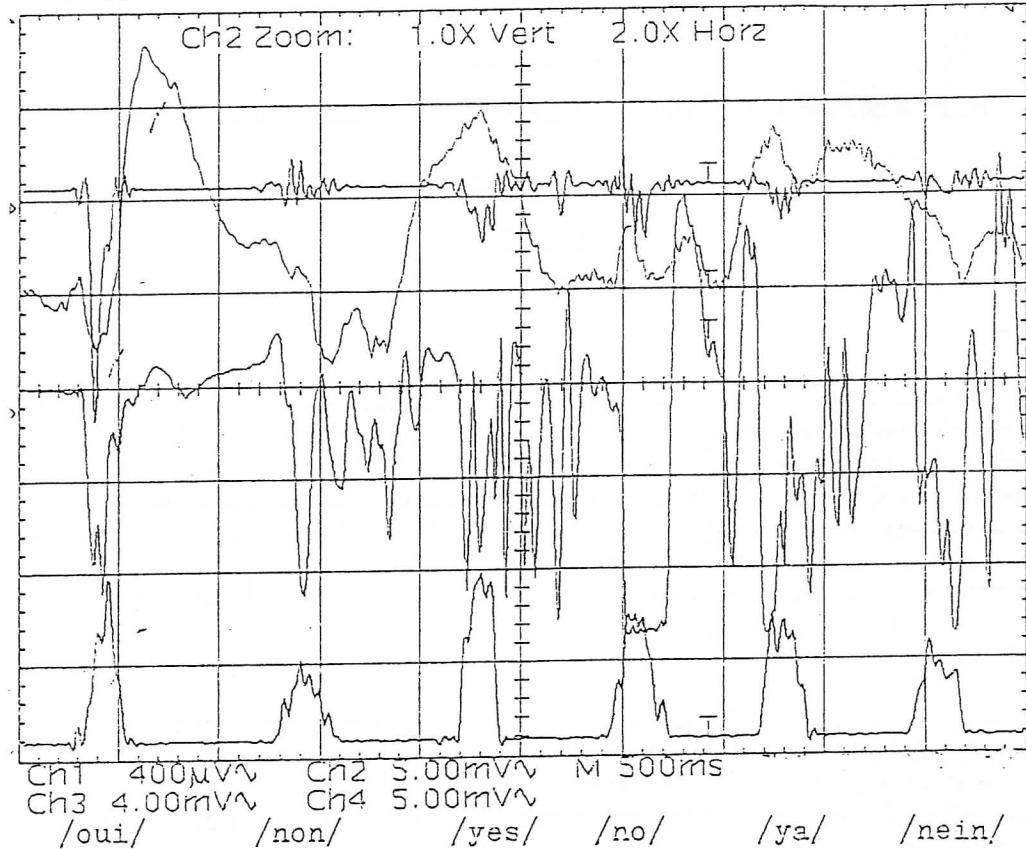


Fig. 1 - Records during pronunciations of oui/non, yes/no, ya/nein.

The example shows the successive pronunciations of /oui/non/, /yes/no/, /ya/nein/ from the left to the right of the figure : the upper trace belongs to the oral articulate utterances (microphone), followed by, below, the HREM trace then, belower, the trace of the air outflux - VAP technique (4) - and the lowest trace corresponds to the laryngophone sounds. This permits to establish the kinetic correlations between the parameters (convolutions, including tangents).

As for 3D imaging, figure 2 gives the results of the set of pronunciations of the figure 1 in a distinct prestation of the same locutor. It uses an ATL «APOGEE 800» analogic echograph working with a TOMTEC software («Echo-Scan Version 3.0»). The morphological specificity of the different channels (figure 2 : at left 3D expressing the 1D frontal cross-section at right) is moulding the pharyngeal airflow which prints the resulting coded air on the membrane of the microphone according to the pressure gradient, giving words.

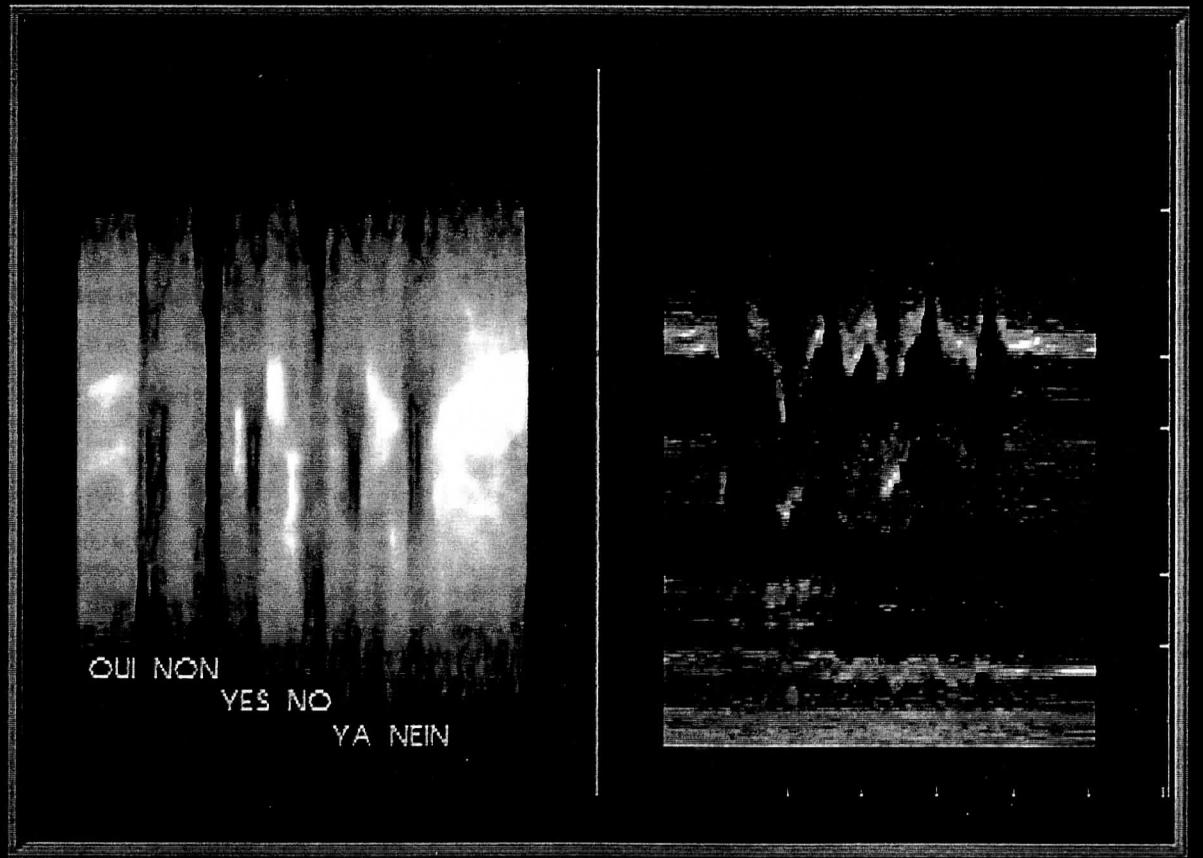


Fig. 2 - 3D and cross-section morphology of the dorsum linguae, obtained during a similar experiment by echography : the morphological specificity of channels is coding the airflow, to produce sounds of words

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