

Acoustical Analysis of Initial Transients in Flute-Like Instruments.

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Pour lire l'article avec les exemples sonores il faut consulter **Acta acustica** :

N°85 (3)pp.387-400 [1999] pour le texte de l'article;

N°87 (2)[2001] pour le disque d'exemples sonores;

N°87 (3) pp. V-VII [2001] pour la liste des exemples sonores;

N°87 (4) pp. 519-520 [2001] pour les errata de la table des exemples sonores.

Errata

Acoustical Analysis of Initial Transients in Flute-Like Instruments, Sound Samples

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In Acustica 87(3), V-VII, a table of contents of the Audio-CD enclosed in that issue has been given. Unfortunately, the following contribution which had been submitted by the author for clarification was erroneously omitted and is therefore repeated here completely. We deeply apologize for this error.

All figure numbers refer to the original article except Figures I and II which can be found here on the next page.

The sound examples presented here are related to the analysis presented in the paper "Acoustical Analysis of Initial Transients in Flute-Like instruments" printed in a previous issue of Acta Acustica, Vol. 85 (1999) p.387-400. The figure numbers given in parenthesis refer to the corresponding sound analysis of this paper. In addition, two new analyses are proposed.

Sample 71 – The sound of the organ pipe (Figure 1) is repeated twice.

Sample 72 – The beginning (600 ms) of the same diaphragm pipe sound (Figure 2) has been stretched, by means of a phase vocoder analysis and synthesis software (Audiosculpt). This time makes it possible to hear all the complex events occurring during the transient. We hear successively: a) the normal transient; b) the transient expanded twice; c) the transient expanded 3 times.

Sample 73 – Comparison between the tone quality of a recorder's transient and the corresponding edge tone produced at the same pressure. The recorder is played with the help of a windchest (Figures 3 and 4). We hear first the sound produced by the whole recorder (parts A+B), then the edge tone produced by the part A alone (the mouth) and finally the recorder again. Each part is repeated 3 times.

Sample 74 – On this experimental recorder (Figure 4) it is possible to separate the mouth (part A) from the tube. By increasing air pressure, we hear the mouth edge tones growing in frequency and in intensity, with a jump from the first to the second hydrodynamic mode. On the Figure I below, one may compare the mouth graphs (left) and the spectral analysis of the edge tone glissando.

Sample 75 – Mouth tones which appear during the transient are, like the edge tones, very sensitive to the pressure variations. In this example we have recorded the same pipe organ played at three different static pressure, and the corresponding edge tones produced when the pipe is filled with cotton wool (Figure 6). For each pressure value we hear first

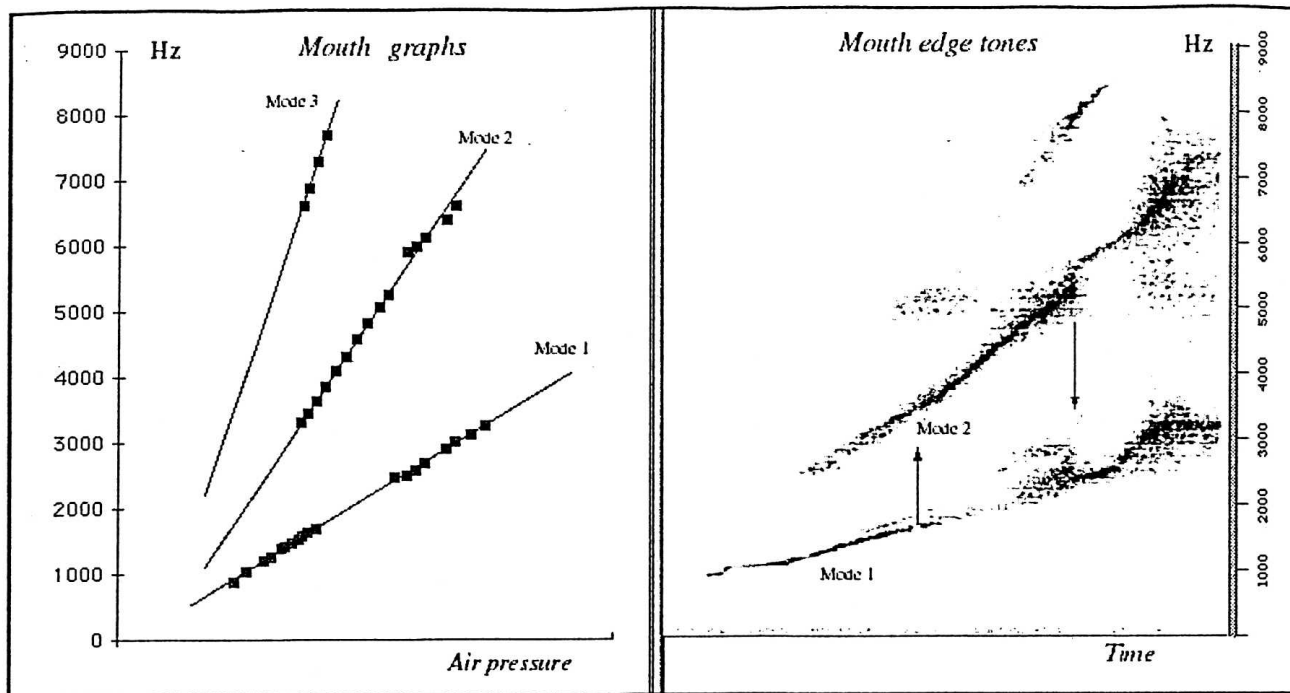


Figure I. Comparison between the mouth graphs (measurements of hydrodynamic modes frequencies for different air pressure values) and the acoustical analysis of the mouth edge tones produced by blowing with air pressure gradually increasing.

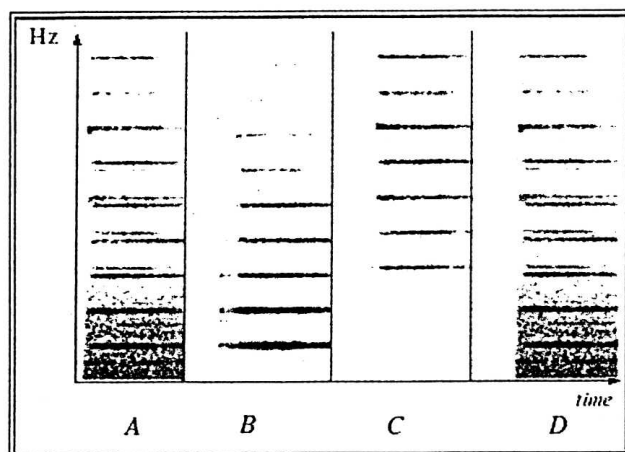


Figure II. Separation between periodic and residual parts of an organ pipe sound of the viola 4' stop. The inharmonic C spectrum results from non-linear interaction between the initial mouth tone locked on the 7th pipe eigenmode, and the fundamental frequency of the first pipe mode. The inharmonic mouth tone persists during the whole sound. This remarkable phenomenon is conscientiously realised by the voicer in order to imitate the bowed string sound quality of the baroque viola, a long noisy transient and a slight grating sound. See Figure 11 of the paper for a detailed analysis.

the edge tone alone (twice) and then the pipe tone (twice), in order to compare, through the changes of the transient tone quality, frequencies similarities between edge tones and mouth tones of the pipe transient.

Sample 76 – This musical example introduces the extraordinary sound of the viola 4' stop of the Italian organ. The acoustical characteristics of the sound are intense mouth tones and inharmonic spectra (see no.3.3 of the paper). Introduction to "Casta Diva" played on La Brigue Organ (France) by R. Cognazzo.

Sample 77 – Viola 4' stop recorded on the Italian organ of Tende (France). Descending chromatic scale. The spectral analysis of the two first tones are presented in Figure 11.

Sample 78 – Analysis (made by V. Rioux) of the first pipe (B4) of the viola 4' stop chromatic scale (sound example #77). We give the spectral analysis of this new sound example in Figure II

Successively: A - the normal sound; B - the harmonic part of the sound; C the residual inharmonic components of the sound; D the whole sound reconstructed. (Notice that residual background noise is not shown)

Sample 79 – Variability of the initial transient of a recorder (Figure 13) The same note is played via an organ chest for three different pressure rise times. Each sound is repeated twice. Notice that the first utterance (slower rise time) produces the more faster impression of the transient.

The following sound examples are recorded on some real organs: Sample 80 – (Figure 15a) Excerpts of the chromatic scale played on the Montre 16' – St Maximin (France) Great organ; J.E. Isnard, 1774

Sample 81 – (Figure 15b) Excerpts of the ascending diatonic scale: Bourdon 8' and Flûte à cheminée (Hartmann organ). Notice the prominent mouth tones of these two stops. - Small chamber organ made by Ph. Hartman.

Sample 82 – On a little mechanical organ, the initial transient may be controlled by key action. With a Bourdon 8' stop, D4 key is repeated with fast keying (5 times) and slow keying (5 times)..

Sample- Introduction of the "Muste" of Dandrieu on the Bourdon 8' of the St. Maximin Organ. Mouth tones are particularly prominent on this stop.

Sample 84 – The diatonic scale of the Flûte à cheminée stop (sample #81) is played first lower (2 octaves) and slower (4 times), and then normal. Notice the clear mouth tones preceding the fundamental sound.