

DOUBLE-REEDS IN THE WIND CAPSULE – TIMBRAL CONSEQUENCES OF THE MISSING ACCESS OF THE MUSICIAN

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Background

The Bernoulli principle is responsible for the sound of woodwind and brass instruments, as well as for the singing and speech voice. Connected with the periodic opening and closing of the (double) reeds or lips is a characteristic cyclic structure of the spectra of these tones.

However, the Bernoulli principle is not responsible for the frequency-constant position of the spectral maxima and minima, which are typical for the (double) reed instruments of the modern orchestra.

Aims

In the case of modern double-reed instruments, sound organization is controlled by the musician because he can influence the movement of the double-reeds and the air-flow pressure with his lips. If this controllability is made void by the use of a wind capsule, the spectra should not have frequency-constant maxima. It is the aim to prove this with wind capsule instruments.

Method

Tones from the scales of a Krummhorn, Kortholt, Rackette and Rauschpfeife have been analyzed via FFT and compared with reference to their spectral envelopes.

Results and Conclusions

The proof that the spectra of these instruments have irregular or pitch-dependent structures instead of frequency-constant maxima and minima, leads to the conclusion that the removal of the wind capsule did not only enable a new dynamic play for the musician, but also a completely new and constitutive feature of the timbre.

The principle of pitch-independent formant areas, which is not at all natural for double-reed instruments, was realized here. Without this principle, the differentiation and blending of timbres of the instruments of the modern orchestra would not be imaginable.

In the renaissance age, the voice differentiation of instruments playing together followed another principle, which consists of phenomena such as residue, stream segregation and continuity illusion.