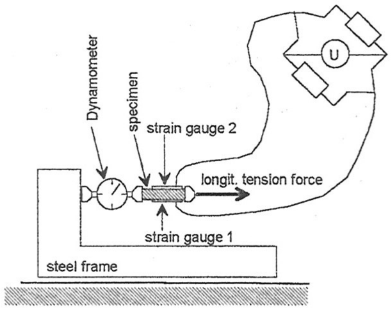
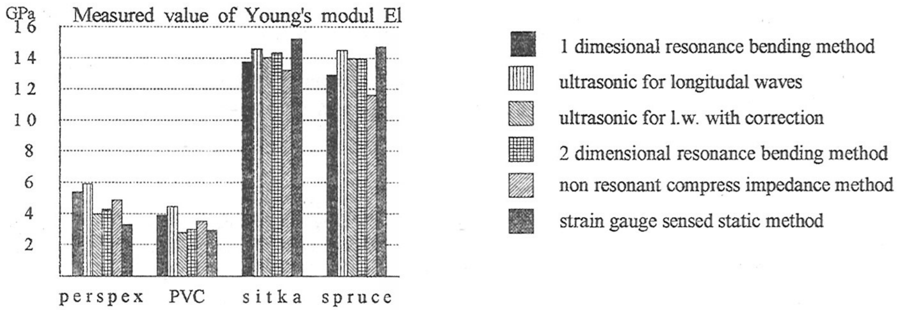
This fact protectes us not only from large systematic errors, but is giving good measurement reproducibility, because of independency of quality contacting surfaces.
We also can obtain elastic modul in wide range of stretch value.
The biggest disadvantage of this method follows from time consumingity of connecting gauges with glue.
Neglecting influences of other constants, brings some systematic error, which is not (in case of measuring El only) very important.
Building of measuring equipment is not pretended.



3. MEASUREMENT RESULTS

Here are given measurement results, which have been obtained for two isotropic and two orthotropic samples. As isotropic we consider perspex (plexiglass , polymetyl metacryllate) and duroplast (PVC, polyvinyl chlorid) and as orthotropic resonant spruce and sitka spruce.



4. DISCUSSION

Comparing one and two dimensional resonance bending method, we can say tham not to be in a perfect agreement. Ultrasonic results without correction are systematically higher, as mentioned above. Corrected results for isotropic material are in a amazing agreement with results from two - dimensional resonant bending method. Values from tensometric static method are smaller from low modul materials then average while for high - modul materials are bigger. This surprising fact is given by inverse properties of strain sensor compared for instance to properties of impedance sensor (strain gauge senses better small deformations then big ones).

5. CONCLUSION

From results, shown in this paper, is perceptible, that we can use two dimensional resonance benging method measured results. Keeping possibile error of Young modulus El, magnitude up to 10% , in mind, is necessary. In case of measuring at wood, all the time , we are missing some universal, quick and simple elastic constants measuring method, which results we can relay on with 95% reliability.

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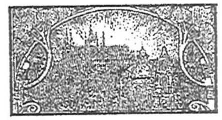

On the sound of horns and oboes - typical properties of Viennese orchestras

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Abstract: The Viennese horn and the Viennese oboe are special types of the respective instruments; they are essential for the Viennese orchestra sound. This paper compares the stationary part of the sound of these instruments to their counterparts - the internationally used double horn and French oboe - and shows that there is a significant difference in the structure of the partials: for the Viennese instruments the intensity of the higher partials is higher. By linear or exponential regression the decrease of the higher partials can be condensed into a number whose absolute value and course with respect to pitch and volume is discussed.

1. Introduction: Both the Viennese horn and the Viennese oboe are not as safe to play as their counterparts, the double (or triple) horn and the French oboe. There is only one reason why they are preferred in Vienna: they have a typical sound, especially in the well known combination of two oboes and two horns, of which Harnoncourt says that it is "the last intact backbone of the Viennese Classics and the ideal sound for Bruckner and Brahms" (HAR92). This paper deals with the ques tion why they blend so well. It is based on parts of two reports, one on the horn (WID87), the other on the oboe (SON95). For both of these the sound recordings (from professional musicians) were made in our anechoic chamber to avoid resonances coming from the room. From the recordings the spectrum of partials was produced using the program package S_TOOLS (NOL90). These spectra formed the base of our analyses.

2. Viennese Horn - Double Horn: Our report Vienna Horn versus Double Horn (WID87) describes a number of differences between these two horn types, especially when slurring two notes or in the stationary part of a sound. As a consequence of the homogeneous concept of Viennese playing technique the legato must be very similar for Viennese and French oboes; therefore only the spectrum of the partials is of interest in this paper. Our first approch was to use the concept of the formants to discriminate between the horn types, but without result, because the formants of horn-sound depend highly on the source spectrum of the player.

Looking at the spectra at large, however, it can be seen that the decrease of the partials after the biggest partial (which is mostly the first or second partial) is much slower for the Viennese horn.

As an example the partials of the sound c'' *forte* blown on a Viennese horn (left) and a double horn (right) can be seen in Fig.1. If one tries to draw a line through the top of the partials it can be seen that the line for the double horn is much steeper than for the Viennese Horn. Mathematically this can be done by a regression using the formula

$$y = a \exp(b * x)$$

As the curve is always decreasing "b" will always be negative and a higher absolute value for "b" means a faster decrease.

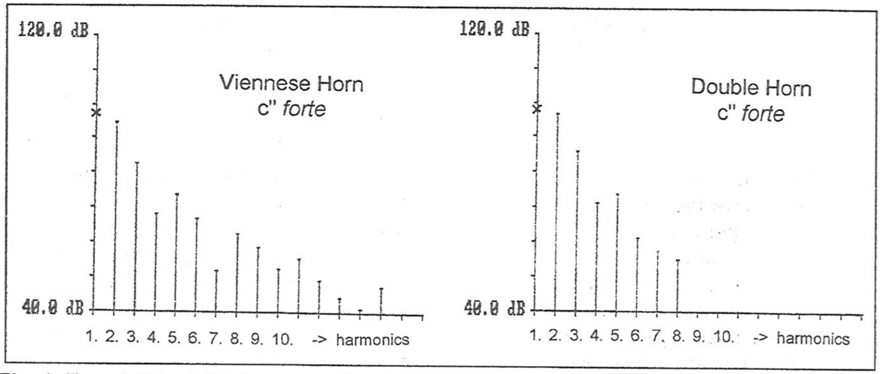

Fig. 1: From left to right: frequency (log.), from the bottom to the top: intensity of the partials.

Fig. 2 shows the mean values for - b * (exp -3) for the two horn types resulting from the analysis of 71 sounds. The black dots are the Viennese horns and the white dots the double horns. For both instruments the absolute value of "b" is always decreasing from *piano* to *forte* which means that the slope of the curve becomes less steep. For all sounds the values for the double horn are the higher ones - the regression curves are always steeper. This effect is more pronouced for blown notes in the high register of the instruments.

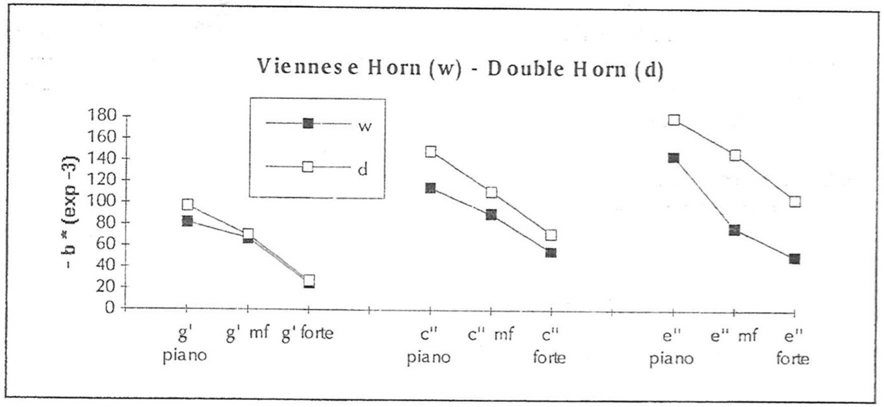

Fig. 2: Linear regression of horn sounds.

3. Viennese Oboe - French Oboe: For the oboe (SON95) the concept of the formants is not useful as well as for the horns. Analyzing oboe sounds it can be shown that the decrease of the partials after the partial with the highest amplitude is slower for the Viennese instruments than for the French. We started the regression process at the partial with the highest amplitude. Here we used a regression with the form

$$y = k * x + d$$

which is similar to the exponential regression used above. Again "k" is always negative and a higher absolute value for "k" means a faster decrease. Fig. 3 shows the spectrum and the regression curve for the sound e' *mezzoforte* for four Viennese (w1, w2, w4, and w5) and two French (f1 and f2) oboes. As the slope of the French oboes is much steeper, the absolute value for "k" (in the upper right corner) is about twice as high as for the Viennese instruments

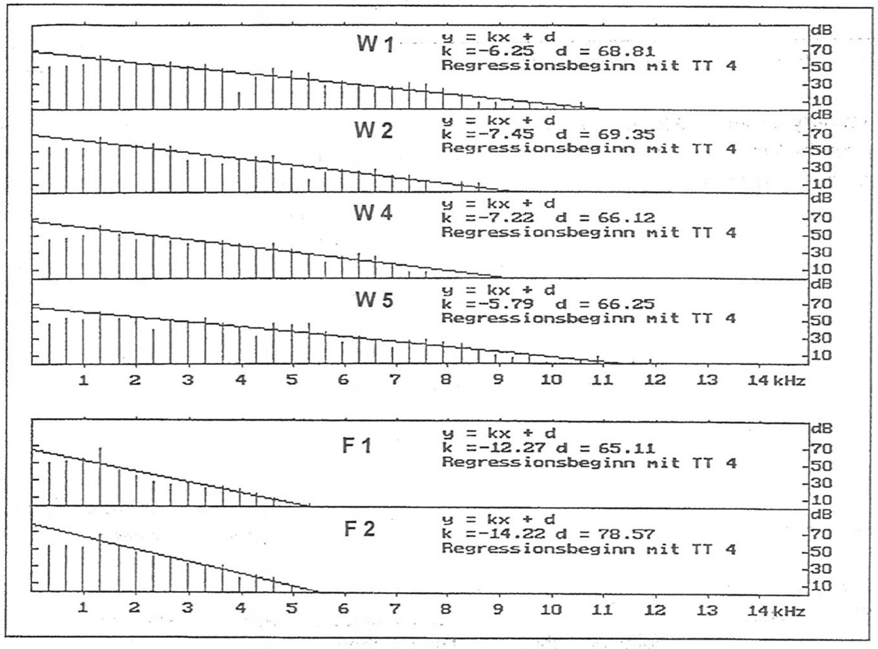

Figure 3: Spectra and regression curves of oboe sounds (e' *mezzoforte*).

Fig. 4 on the next page shows the mean absolute values of "k" for the Viennese (w) and the French (f) oboes together with the respective maximum and minimum values taken from a total of 90 sounds. It can be seen that:

- the absolute values of "k" are nearly always higher for the French oboe - the slope of the curve is steeper.
- for the French instruments the absolute value of "k" is always decreasing from *piano* up to *forte* which means that the slope of the curve becomes less steep.
- for the Viennese Oboe this slope is about the same from *piano* up to *forte* - at least up to g''. This means that the sound colour does not change much, the sound becomes only louder. Therefore the effect of changing sound color depending on the musical dynamic of is less.

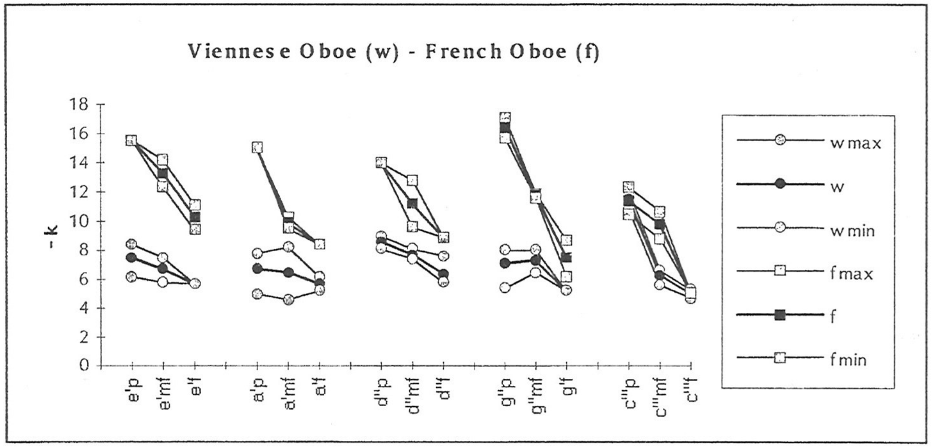

Figure 4: Values of " -k " (Viennese and French oboes) for different tones and dynamic levels.

4. Summary: From the above it can be seen that the decrease of the partials is significantly less steep for the Viennese instruments. This means that for these instruments the higher partials - which are crucial for hearing an instrument when the whole orchestra plays - are more dominant. Therefore in the same situation the musician using a Viennese oboe and horn an play "softer" than the one using a French oboe or double horn. In other terms: with the same radiated sound energy, Viennese instruments sound "louder", which of course makes a difference in the overall sound of an orchestra.

The higher partials are said to make the sound more "interesting" - the content of "information" is higher. As a hypothesis we might add, that this could be a reason why the vibrato (which is also possible on the Viennese instruments, of course) is used so seldomly on the Viennese oboe and horn.

Concluding we have shown that the persistance to use the Viennese oboe and horn (despite their technical shortcomings) is well founded on the acoustical qualities of these instruments.

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Methods of investigation of creation of tones in playing wind instruments in laryngology and phoniatric practice

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Abstract: The author sums up the results of research into the physiology of wind instrument play, and clinical experience from the treatment of musicians, obtained in collaboration with specialists of related disciplines. Using examples of examination focused on the physiology and pathology of tone creation in playing wind instruments, he demonstrates that similarities with voice creation and knowledge of special diagnostic methods predetermine the phoniatrician to assume care for wind instrument players. Physicians who concern themselves with this range of problems must be able to make detailed phoniatric examination of the activity of the speech organs and the communication abilities of musicians.

Both the human organs of speech and wind instruments are sources of sound, which, in principle, are arranged in a very similar way.

The entire phonatory system contributes to the production of tones by a wind instrument player, that means not only the lungs, as the source of energy, but also the resonance-producing spaces which change the articulating movements of the speech organs. The music instrument itself controls the motoric system. The central nervous system controls the co-ordination of these activitis and brings it to perfection by means of the senses and a series of feedback mechanisms.

Comparison of the mechanism of the origin of the basic tone showed many analogies. The primary tone originates either from