

## Oberlin Acoustics Workshop 2007



Oberlin Conservatory Pond

Under the tolerant but firm direction of Fan Tao, students, makers and wizened pioneers of instrument acoustics met for the sixth year at the Violin Society of America's Acoustics Workshop at Oberlin College, Ohio.

This year was characterized as the year of "coalescence" by many, meaning that the rigors of acoustic physics and the intuitions of makers were really coming together, guiding research toward repeatable practical results. New programs and new testing equipment designed specifically for string instrument analysis were introduced, new recordings of great instruments were being collected, and much of the information is going to be available on a new members web site organized by Hans Johannsson. Many makers were clearly ready to employ these tools in the shop.



George Stoppani

George Stoppani, violin maker, programmer and acoustic researcher, presented his beta version FFT Acoustic Analysis Program. The graphic presentation of data is so legible, and so visually engaging that one felt in the presence of a new and wonderful work of art. Because of this presentation of a wide swath of the salient information derived from impact hammers and accelerometers, whole new territories of analysis were glimpsed, just waiting to be explored.

To many of the makers the most alluring new tool is the modal modeling software used to do “mode analysis.” This program allows one to build computer models that reveal the minute movements of the various parts of the instrument when it is emitting sound. (The Jackson Strad, a Del Gesu and a Bergonzi were all analyzed on the spot.) Curiously, only the lightest tap is required to create a richly detailed sample of the complete array of sound vibrations the instrument is capable of.

At one point in the explanation of the types of data provided, Mr. Stoppani raised the hoary concept of imaginary numbers. The makers met the challenge and accepted the fact that they just don’t get it. Thanks to programs like Spectraplus and the new work of Geo. Stoppani, however, the makers won’t ever need to come into direct contact with imaginary numbers, even when attempting Modal Analysis. As Stoppani says, “This is supposed to be the cheap and cheerful program!”

Joseph Curtin gave tutorials on his Impact Hammer Rig which has become the standard by which all others were judged. Nine of his new apparatus were assembled in one room and in this forest of rigs everyone got down to perfecting their technique under his direction. After some consternation over the subtleties of adjustment and the complexities of the computer



Bill Scott and Joseph Curtin with rig

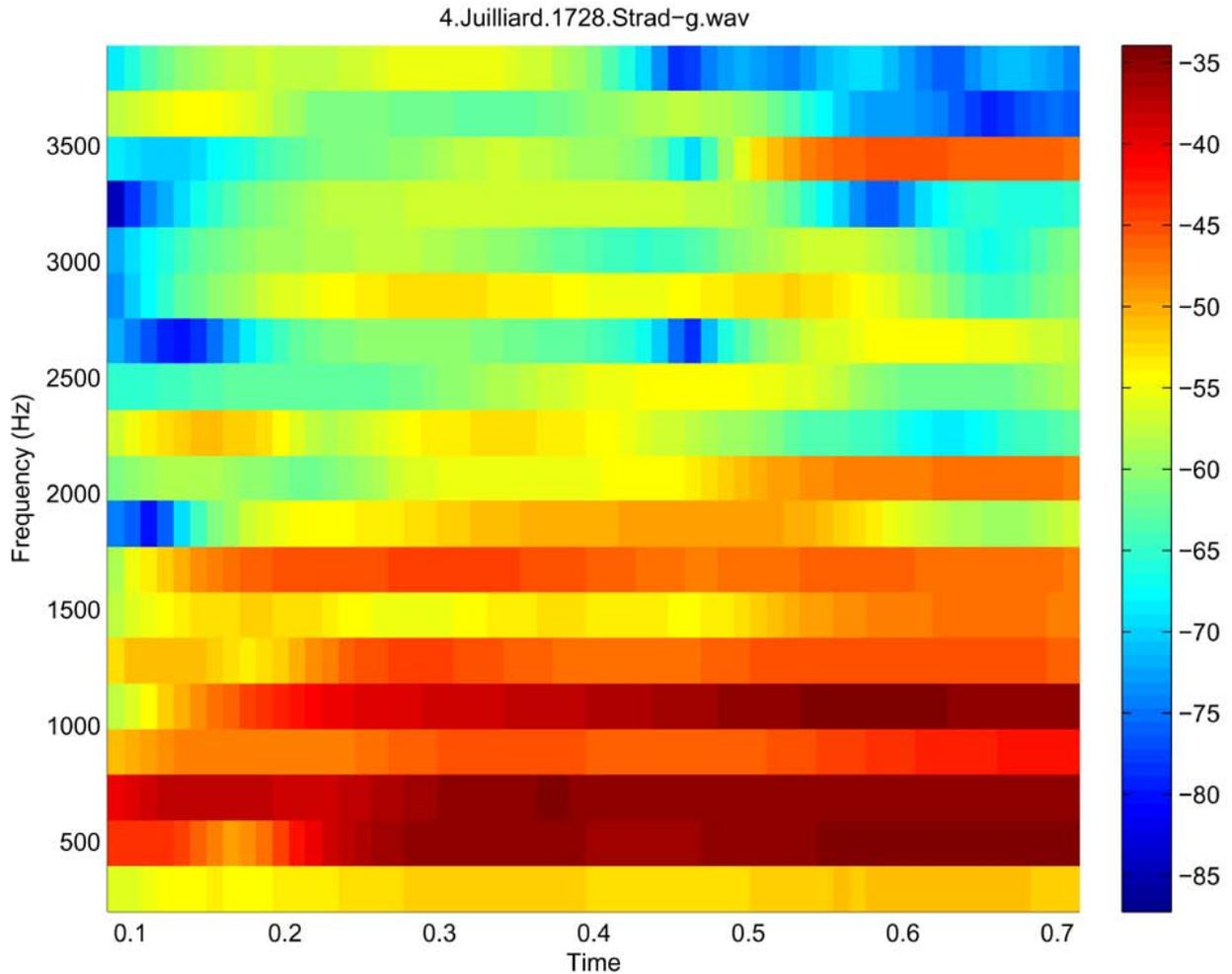
programs everyone got the hang of the equipment and began speculating on how they were going to employ this powerful new tool. As usual several experiments were begun immediately. Fan Tao organized a “damping” test, George Yu tested George Bissinger’s theory concerning rib heights (see below) and a study of the effects of various chinrest types was begun by Brian Newnam, all on the new Curtin rigs.

Sam Zigmuntowicz gave a presentation on his approach to making set up adjustments. His comments were wonderfully informative and sane, on a subject full of alternative medicine-like suppositions, many of which are none the less correct. As he said “I’m a great believer in anecdotal information, especially since there’s so little else.”



Sam Z., Fan Tao and Joe Curtin

He said that the basic question he is trying to answer is, “is the instrument too strong (stiff) or too weak” and he demonstrated the bow stroke that he uses to get an immediate impression of an instrument’s sound and playability. Zygmuntowicz proposed several new terms like “click and splash” and “pop and bloom” to describe the sounds created by this particular bow “attack”. He noted that this abrupt bow stroke creates a percussive click containing the whole sonic spectrum, much like the hammer tap of the new Curtin Rig, but with the maker as the “analyzer.” ‘Click and splash’ are his terms for the critical parts of this sound. ‘Pop and bloom’ refer to another revealing sound he generates with the bow. He proposed that the group settle on and use such terms consistently, so that they can be confident that they are all speaking about the same phenomena. While there is no way (and no desire) to eliminate the subjective experience in our analysis of an instrument’s sound we can standardize our search for the illusive “Strad factor” a bit more. After all, he said “Click and pop *are* the desirable part of the ‘Strad factor’.”



Professor George Bissinger presented some of the data from the Strad 3D project where several of the finest Cremonese instruments including the Titian Strad were recorded in George Bissinger's Laboratory. After studying the results he took special interest in the bending of the ribs at the frequency of the B1- mode (about 440Hz or "A"). This was a newly documented observation, "a discovery", and he stressed that the C- ribs have been of comparatively little concern to makers but that the "mode analysis" reveals that the C-bouts are very mobile in this range and so must be a vital part of the sound.

George Yu bravely began a rigorous test of Bissinger's theory by lowering the ribs of one of his wonderful sounding violas. As might be expected the results lead to some controversy and demonstrated that our subjective (varying) experience cannot be analyzed away or avoided, indeed as Zygmuntowicz said, "the human mind is the ultimate testing machine, just not as reliable as we would like."

Underlying the thoughts of everyone attending was the realization that we are treading on sacred ground, scrutinizing Beauty and Perfection to a degree never before possible. Not only are the acoustic scientists organizing experiments and giving guidance, but many more people now have access to fine analytical equipment and their individual efforts will greatly increase the variety and speed of the research. To Music lovers such a scheme may be almost sacrilegious, but the goal is to more completely satisfy the non-digital “ultimate” analyzers, the player and the audience.

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