

Cymatics and the Singer

by: Rebecca Wing

I'm sitting on my living room carpet in Saco, Maine. The woodstove is glowing, and my plump, black cat is purring contentedly by my side. It's late December, and contrary to this bucolic scene, I'm filled with excitement and anticipation.

Jeff Volk gets to play Santa that evening, thanks to the creativity of his Vermont colleague, inventor and musician, Erik Larson. Jeff had brought an early prototype of an acoustic device that would allow me to see the actual vibratory patterns of my voice. I had seen videos of this amazing phenomenon before, and I had been aware of Hans Jenny's work with Cymatics (wave science) for 15 years, but now I would finally be able to try creating these fascinating soundforms with my own voice.

I watched with interest as Jeff assembled a rubber membrane onto a round wooden frame and then pressed it over the "bell" of this instrument. He sprinkled a fine coating of sand on the membrane. I began to sing a long tone into the hose that was connected to the device, which began to excite the membrane and consequently the sand. It became apparent that the more focused the vocal sound, the more excited the sand became. After a few seconds a lovely shape appeared in the sand. I started to experiment with singing higher and lower sustained tones and was able to get a wide variety of shapes by vibrating the sand with my voice.

As a professional singer I am acutely aware of how sound resonates in my body, as well as the many different colors and textures that the voice can create. As a vocal teacher my students must learn how to direct the sound into various parts of their body in order to produce a pleasing vocal sound. This kind of vibrational manipulation is called placement.

Placement refers to where the singer lets the sound reverberate in their body. Some singers have a nasal placement, others sing more from their throat or chest. As a teacher it is my job to bring awareness to a student's vocal sound and to encourage them to have a placement that is more forward in the jaw area. This manner of singing is appropriate for the jazz and pop musical styles that I teach. With proper breathing, forward placement gives the bright edgy sound that popular music calls for, without straining the voice.

My niece happened to be visiting us that night, and as a musician she was fascinated by this whole affair, so she eagerly gave it a try. She is an accomplished violinist and has dabbled in singing for years. Her biggest challenge as a singer is her nasal sound. As she began to sing a long tone into the mouthpiece she quickly realized that her normal nasal placement did not adequately excite the membrane, so the shapes formed in the sand were not as distinct. As she watched the design on the membrane struggle to take coherent shape, she intuitively brought her placement more forward. Right before her eyes she was able to see an immediate reflection of how her more forward-focused sound created a more well-defined shape!

This was just the beginning, and this device has evolved greatly since then. My early experience here has shown me that there is much more to be explored using a more precise version of this instrument, now called the CymaScope, especially regarding vocal placement. And once the CymaScope is available for sale, I am sure that many new discoveries and applications will arise for vocalists and their teachers.



It's a few months later, mid-April, and we're all delighted to be dazzled by Atlanta's azaleas. British acoustic engineer John Reid has brought his elegant electroacoustic CymaScope from the UK for a series of presentations. This custom built device had a speaker installed underneath the rubber membrane so that I could sing into a microphone, thus vibrating the membrane. Vibrating the sand on the membrane with an electronic boost from the microphone and speaker took my experience into another vocal realm.

John asked me to sing a high-pitched note into the microphone. I took a deep breath and sang a fairly high, long tone. I did not add vibrato, the wavering sound caused by a fluctuation of pitch and breath, to the tone. A fairly complicated pattern emerged in the sand that lay on the membrane. The CymaScope plainly demonstrated a fundamental law of physics, the higher the pitch, the more intricate the pattern.

Soon, another woman in the room asked to take a turn. She sang a high tone that was full of vibrato, which was her normal singing style. Vibrato is a technique that skilled singers use occasionally as a vocal embellishment. For many vocalists, trying to sing without any vibrato is challenging. This woman was unable to control her vibrato and consequently the shapes were less defined. The pattern in the sand struggled to find a single form. Her fluctuation in pitch and airflow did not allow enough consistency for the pattern to stabilize.

The application of Cymatics to what I call 'chronic vibrato' holds much promise. A stable, more consistent design in the sand means the singer has a stronger more supported vocal tone. Sight is a very strong sense for many people; hearing tends to be less well developed. A vocal student could benefit greatly from being able to actually see their voice create form with the CymaScope. I believe that we've just scratched the surface of the potential uses of Cymatics as an aid to enhancing voice production!

[Ed. note: In the 1960's Hans Jenny had designed a simple plastic acoustic device, which he called a tonoscope, that was mass-produced for a few years as a toy. It was also used in Waldorf education to teach deaf children how to properly articulate their vowels.]

Rebecca Wing is a pianist, vocalist and music teacher living in Saco, Maine. She leads Maine's only all-women's big band, The Edith Jones Project, and has her own group, the Rebecca Wing Ensemble. She has released three CDs of original music, the most recent of which is entitled Unfolding.

Learn more about her on www.rebeccawing.com.