

THE KITCHEN

CENTER FOR
VIDEO, MUSIC,
DANCE AND
PERFORMANCE

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Arnold Dreyblatt

THE ORCHESTRA OF EXCITED STRINGS presents "NODAL EXCITATION"
with:

ARNOLD DREYBLATT and MICHAEL HAUENSTEIN
Bass Viols with Excited Strings

PETER PHILLIPS
Midget Upright Princess Pianoforte

KRAIG MASON HILL
Portable Pipe Organ and 10-String Bass

GREG LEWIS
Hurdy Gurdy

BOB BIELECKI
Sound

"Proposition IX: To explain why an open string when sounded makes many sounds at once.

Proposition XV: To determine whether it is possible to touch the strings of an instrument or their keys so fast the ear cannot discern whether the sound is composed of different sounds, or if it is unique and continuous."

- Marin Marseenne, 1637

In Nodal Excitation we excite the oscillations of a string. The continuous rhythmic pulse of the bows striking the nodes of the strings on the basses initiates the resonant texture of a fundamental tone and its natural harmonics. The "scaled" instruments reinforce and sustain tonal areas within this texture. We select from the harmonic series "families of pitches" which are mathematically and tonally related. The "scaled" instruments (organ, piano, and hurdy gurdy) sound these groups of frequencies together with the fundamental tone of which they are a part. The different sections of Nodal Excitation explore the production and isolation of harmonics on the strings of the basses, and the formation of specific harmonic regions related to the third, fifth, seventh, and eleventh overtones. In the largest sense, the music always functions inside the complex of the Fundamental Tone (1). Nodal Excitation is really all about One. More detailed information follows.

In my short solo performance of Nodal Excitation for solo bass in 1979 in N.Y.C., I first began experimenting with creating a music through isolating and exciting the nodes of a vibrating string. From the program notes of that concert: "The integrity of a fundamental vibration is maintained for each string; all movement of pitch occurs in the overtone structure. A shorter speaking length is never created through 'stopping' and 'fretting' techniques. Harmonic (partial) vibrations are occasionally isolated." The current performance had its beginning in this concept and performance technique.

Timbre or Tone Colour may be understood as being dependent on the greater or lesser presence of the various overtones. Whereas in my solo piece for double bass all pitches were derived as they fall in the harmonic series generated by one string, it seemed interesting to me to transpose the pertinent pitches of this series and to arrange them in a kind of scale which might be utilized to reinforce a particular vibrational mode in a complex sound. Here, scale and timbre would become interdependent concepts. Two double basses, strung and played in the manner described above, would supply a fundamental tone enriched by strong overtone content; while the "scaled" instruments (a miniature rebuilt piano and a hurdy gurdy) would sound selections from the pitches of the harmonic series. In early 1981, a year after formation of the original ensemble, a portable pipe organ was added, enabling us to sustain almost three octaves of frequencies tuned to overtones of the fundamental.

The tuning system is derived from the first six odd harmonics of the overtone series, (1 fundamental, 3,5,7,9,11). All but the ninth harmonic are prime numbers which represent new pitch identities. Even numbered harmonics are considered octaves of the fundamental. These root pitches themselves may generate their own series of multiples. When transposed down from their position in the overtone series these "families" of related frequencies are sounded within a rich and unchanging fundamental ONE, realizing a distinct system of tonalities. The following table, which illustrates the pattern of transposed harmonics in their respective tonal families is of course merely a selection from an infinite series.

1	3	5	7	9	11
3	9	15	21	27	33
5	15	25	35	45	55
7	21	35	49	63	77
9	27	45	63	81	99
11	33	55	77	99	121

These pitches are found in the octave in this order:

1/33/35/9/77/5/81/21/11/45/3/49/99/25/27/55/7/15/121/63/1

Each of the components of a tonal family has its own identity, deduced by the factors which result in that product. Many pitches represent different scale degrees in two different families and are points of movement (a kind of modulation) from one family to another. While some of the higher harmonics (the 121st harmonic, for example) are not actually audible in the partials supplied by the basses, they do realize a tonal potential that I believe is somehow implied and as a family actualize a relationship to the fundamental.

THE INSTRUMENTS

The Midget Upright Princess Pianoforte is approximately 32" high, 26" wide and originally had a range of 3½ octaves. With the means of calculating string lengths, tensions, diameters and frequency relationships provided for me by Bob Bielecki, the piano has been completely restrung with thick, unwound wire and the felt has been taken off the hammers for brighter harmonic content. All of the dampers were snipped right off, and there is one string per hammer. It is tuned to the scale above (20 notes per octave), and it now spans a little over one octave.

The Three Bass Viols with Excited Strings are strung with thin piano wire rather than thick wound bass strings since thinner strings are capable of vibrating in the shorter (partial) lengths necessary for the production of higher harmonics. Double basses had been of interest to me because of their large resonating cavities and the long speaking length of their strings. I chopped off the neck of the blonde bass and extended its speaking length 10" against the advice of a reputable acoustic bass luthier. The third bass was completely rebuilt, a steel rod runs from the heel of the neck through the instrument eventually becoming the endpin. It is fitted with ten strings in five double courses tuned to harmonics 1,3,5,7,11.

The Portable Pipe Organ was designed and built by myself under the direction of Harold and Aliene Westover of Walpole, N.H. The 41 flue pipes were originally from an old church organ in Mass. and they were cut-up and voiced a number of times, first by Mr. Westover, then by Dan Kingman of Austin Organ Co., and finally by John Hupalo and John Westcoate of the Hupalo Organ Pipe Co., who replaced a few pipes and scaled the rest to their present form. They also built for me six additional reed pipes (beating brass reeds with resonators). The organ spans two full octaves plus the six reeds add a third lower octave of prime numbers. It has a mechanical pin action, comes apart for transport, and all its keys are capable of being locked in the "on" position. A new keyboard was designed, compressing the twenty-note octave into a normal handreach for twelve notes and incorporating raised appendages in a pattern which accurately expresses the tonal families and their locations in my tonal system. This keyboard will eventually be adapted to my other keyboard instruments.

The Hurdy Gurdy is one of a group of instruments developed from the medieval monochord. Originally known as the Organistrum, it often measured five or six feet long and required one player to depress the tangents (a most primitive action) which stops the melody string and another to turn the rosined wheel which bows the strings. The instrument used here is a copy of a smaller 14th century minstrel type built for me with programmable tangents for variable intonation. Only two of its three strings are used here - a drone on 1 and a melody string tuned to 5 which can then be stopped to 11/3/7/1/35/3/5/21/3/49/27.

The Pedal Tone Box was built for me by Bob Bielecki. It is used occasionally to supply a low, continuous fundamental tone of no harmonic content at 87.7 Hz (8 foot pitch) and 43.85 Hz (16 foot pitch).