

1988

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The title LEMNISCATES derives from the Latin word "lemniscus", meaning "with hanging ribbons". In mathematics, the word refers to the figure-of-eight shape, and is defined as follows: "the locus of the foot of the perpendicular from the center of a conic on its axis". The dance theorist, Rudolph von Laban, uses the word to describe figure-of-eight energy shapes drawn by the body in space. I use the word in all of the above contexts - to describe "ribbons of sound", to illustrate techniques of bowing, and to provide metaphor for the spectral motion of the sound ribbons, and the choreographed sonic sculpture created by the Kronos Quartet.

The ideal performance space for LEHNISCATES is enclosed, resonant and free of mechanical and other ambient sounds (such as blowers). This allows the performers and audience to hear the sound fields created by variations in bow speeds, bow tilts, and positions of the bow on the instrument as well as the pressure of the hair on the strings. I am interested in magnifying stillnesses so that the sounds around the sound can be more clearly experienced.

LEMNISCATES basically uses all the sounds around the fundamental, the more volatile partials and the sonic choreography of bows on strings. The players constantly balance and counterbalance each other with respect to dynamics, to create the sculptural "sonic cluster" nature of the piece.

LENNISCATES can only be notated skeletally, in relation to what actually happens in performance. The basic pitches are notated; the techniques for eliciting sounds are described in words and graphics, and larger time-fields are indicated. With a few clearly noted exceptions, the relationship of each instrument to the others is heterophonous.

TIME - Time is "biological" (the time it takes to do something) rather than incremental (measured in bits; "clock" time). The use of breathflow is very important. The figure-of-eight pattern (lemniscate) is also a metaphor for breathflow.

Each page is about one minute long, subject to variation. The lengths of notes are very proportional, when notated as "whole notes". Notated rhythmic patterns should be observed, and when metronome markings are written, they should be used as guides, not "cast in stone" directives

BOWINGS - In most cases, the players are asked to bow very slowly, and, using a figure-of-eight motion, to move between *ponticello*, *ordinario* and *tasto*. The time spent in these string areas is *ad lib.* A single figure-of-eight design indicates a slow bow, with slow changes between the string areas. Connected figures-of-eight indicate faster, rhythmic bowings, and often cover more than one string, and denote a resultant field which includes pitch "glints" mixed with "air" sounds. The illustrations of text, slow bowing figures-of-eight, show how the figures connect with *pont - ord - tast*, *ordinando* and *grando* tones; figures with respect to upbow and downbow; and use of shading to denote energy variations in figure-of-eight bowing.

Figures-of-eight may be notated directionally as side-to-side; on a bias (diagonally across strings) or up-and-down. The bow may be angled or flat.

LEMNISCATES is unusually concerned with harmonics rather than fundamentals, and the intention is that the player coax the sound out of the instrument and shape it continually. Be very conscious of breath-flow and being centered while taking the time it takes to elicit and articulate the sounds.

FUNDAMENTAL/HARMONIC TREMOLOS AND GLISSES - These create a hollow, dovelike or "yodel" sound. They should be played very softly, allowing the "hollowing" around the fundamental. Bow speed should be slow, and changes of position on the string (tasto - ord - pont.) should be slow, allowing colors to unfold.

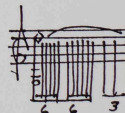
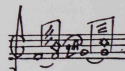
HARMONICS - get as "disembodied" a tone as possible for "long tone" harmonics.

FUNDAMENTAL/HARMONIC RHYTHMIC PATTERN = Touch the harmonic notated quickly and release in the rhythmic pattern notated. Use a figure-eight bowing and work especially the ponticello area. Bow very slowly, to allow all of the overtones in the field to speak.

∞ - Slow
 888 - faster
 Rhythmic

$\text{fasto}(v/v_A) \quad \text{pont}(v_C)$
 $\text{--} \quad \text{-- ord.}$
 $\text{pont}(v/v_A) \quad \text{fasto}(v_C)$

p_1 or p_2 motion



Dance

$\text{♩} = \text{ca. } 12.6 \text{ mm (non-rigid, flowing)}$
 light slow bow - Allow overtones
 touch harmonic + release
 slowly bow (pont-ord-taste) ∞

$\text{P}^{\text{P}}\text{P}$ tempo

vln 1
 vln 2
 vla
 vlc

gliss lightly around harmonics, ad lib
 very slow, light bowing - allow "air sounds" + overtones to create texture + spatial field
 Sust ∞ (taste-ord - pont ∞) ----- simile, slowly, ad lib -----
 allow overtones to sound, ad lib

$\text{P}^{\text{P}}\text{P}$

Dance

∞ pont-ord-taste

vln 1
 vln 2
 vla
 vlc

$\text{P}^{\text{P}}\text{P}$ Sust ∞ tremolo
 slow gliss ad lib
 taste (hollow, reedy sound)
 (simile) P^{P}

$\text{P}^{\text{P}}\text{P}$ Sust ∞ (pont-ord-taste ∞) Allow overtones + "Air sounds"
 touch harmonic + release
 $\text{P}^{\text{P}}\text{P}$

(taste-ord - pont ∞)

Dance

Handwritten musical score for "The Great Wall" by John Williams, featuring four staves: Violin 1, Violin 2, Viola, and Violoncello. The score includes handwritten annotations in Italian and English.

Violin 1 (vln 1): The first staff shows a melodic line with a fermata over a measure. A handwritten note below the staff reads: "Rhythmic pressure on (7 → 1) brings out written pitch while other quadrants of the ♩ elicit overtones, 'air'".

Violin 2 (vln 2): The second staff shows a melodic line with a fermata over a measure.

Viola (vln 3): The third staff shows a melodic line with a fermata over a measure. A handwritten note below the staff reads: "♩ = ca. 46".

Violoncello (vln 4): The fourth staff shows a melodic line with a fermata over a measure. A handwritten note below the staff reads: "Depress silently".

Annotations:

- Violoncello:** "bowing: bias on 2 strings (first-ord-pent)"
- Violoncello:** "Rhythmic pressure on (7 → 1) brings out written pitch while other quadrants of the ♩ elicit overtones, 'air'" (This annotation is written across the bottom of the page, spanning the Violoncello and Viola staves).

Dance	
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Vln I
 Vln II
 Vla
 Vlc

Sulf G (pent-ord-tasto ∞) allow overtones
 Touch harmonic + release

Sulf G (pent-ord-tasto ∞) (vary bow pressure ad lib)

Handwritten musical score for five staves (Vln I, Vln II, Vln A, Vln B, Vln C) featuring "quasi-harmonics" and tremolos. The score includes handwritten notes like "Sweet as possible", "pont (hollow, reedy sound) - slow bow", and "tremolo". It also contains musical notations for tremolos, slurs, and dynamic markings like "ppp".

Handwritten musical score for four staves, labeled V/n1, V/n2, V/A, and V/C. The notation includes various musical symbols and performance instructions:

- V/n1:** Features a large bracketed section with notes and rests, followed by a section marked "pp" (pianissimo) and "f" (forte).
- V/n2:** Includes a section with a large bracket and notes, followed by a section marked "pp" and "f".
- V/A:** Shows a section with notes and rests, followed by a section marked "pp" and "f".
- V/C:** Contains a section with notes and rests, followed by a section marked "pp" and "f".

The score is written in a single system, with each staff having its own key signature and time signature. The notation is dense and includes many accidentals and dynamic markings.

Dance

slow gliss ad lib
pont ord ∞

12:10 (tasto - ord - pont) ∞

Appoggiato. light bow over all strings ∞
all sounds & gliss of pitch are
resultant field. soft, but high energy
(facet) ∞ = ca. 72 mm
(bowing)

ppp possible

slow gliss, ad lib

mm = ca. 132 (17)
(tasto - ord - pont) ∞

pp < f > pp

Dance

ppp possible

light bowing over all strings ∞ - soft, but high energy
all sounds & gliss of pitch are resultant field

ppp possible

mm = ca. 132 (17)
(tasto - ord - pont) ∞

pp < f > pp

start long crescendo

start long crescendo

Dance

2 minutes

Vln I

(1/2) ca. 132 mm
(taste - oral - pant ∞)

trem ad lib

ff

Vln 2

(1/2) ca. 132 mm
(taste - oral - pant ∞)

trem ad lib

mp sempre

mp

Vla

mp

trem

ff

Vlc

mp

crescendo

ff

Dance

8va

Vln I

ff

ff

(don't slow tempo here)

"air" glaci harmonics

taste - oral - pant ∞

pp

nieate

Vln 2

mp

pp

nieate

Vla

ff

ff

Thp open string just above nut
(pant - oral - taste ∞)

ppp

nieate

Vlc

ff

ffs

5 minutes

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