

# ***Bowing Synthesis***

**For Cello and Electronics**

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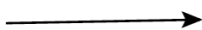
This piece was commissioned and supported by the Art Zoyd Studios and conceived in collaboration with Séverine Ballon and Oudom Southammavong during a residency in Valenciennes at the “ART ZOYD STUDIOS” Centre de Création Musicale in October 2023

The resulting composition is dedicated to them.

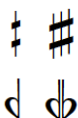
## PERFORMANCE NOTES



crescendo from-to complete silence



gradual change from one playing technique to another



quarter tones

### Left Hand



Normal pressure



Harmonic pressure



Mute the strings



Unmute the strings

### Right Hand

#### Bow position

s.t. / m.s.t.

Sul tasto / Molto sul tasto

s.p. / m.s.p.

Sul Ponticello / Molto sul ponticello

ord.

Ordinario

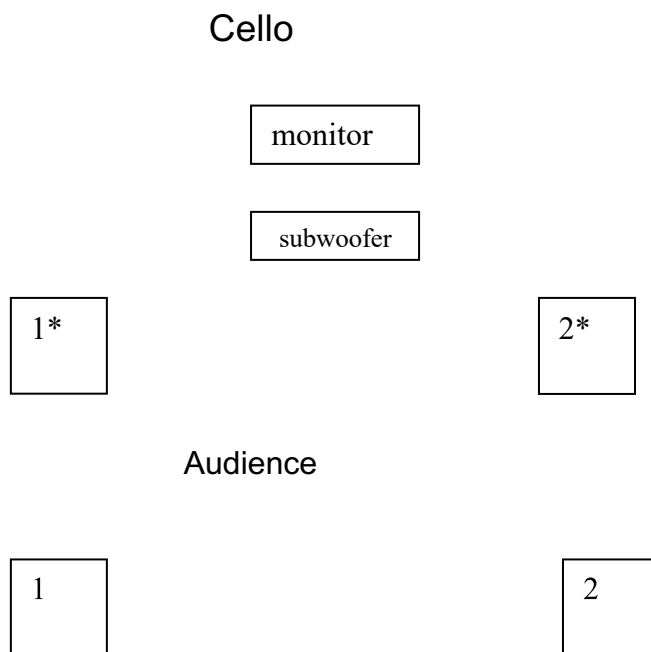
**Bow pressure**

- Heavy pressure (distortion)
- Light pressure (flautando)
- Middle pressure with little distortion
- NP Normal Pressure, no distortion

## Technical requirements:

1. MacBook or Laptop equipped with an audio interface compatible with Max/MSP to run a patch including stereo hard disk playback of sound files.

2. Channels disposition:



3. Stereo amplification of the violoncello (channels 1 & 2.)

\*The violoncello must be amplified through the loudspeakers placed towards the audience. Depending on the size of the Hall four speakers in double stereo can be used.

## STAGE SETTING



**Mic 1**

\* Mic 1 to audio interface (for live processing), amplification direct to mixer



\*LS: Loudspeaker

## Patch

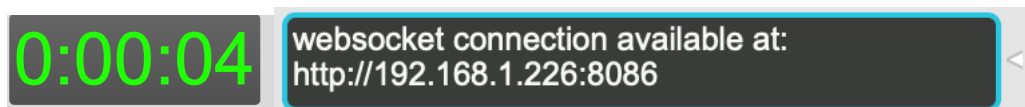
The Max/MSP Patch programmed for this piece contains two parts:

### A) Sample Player

1. Make sure that all the Audio files are contained in the same folder as the main patch
2. Follow the score and press the space button, a MIDI device or activate manually the audio samples every time it is indicated on the score.
3. There are two separate faders for the Pedals and for the Cello's Echo or Resonance ("NK" as in German "Nachklang"). Use them to balance the sound.
4. For rehearsal: You can set the event at the desired number or reset them at any time



5. The Patch includes a stopwatch to facilitate the synchronization with the electronics. To connect type the given IP Address on your smartphone or tablet.



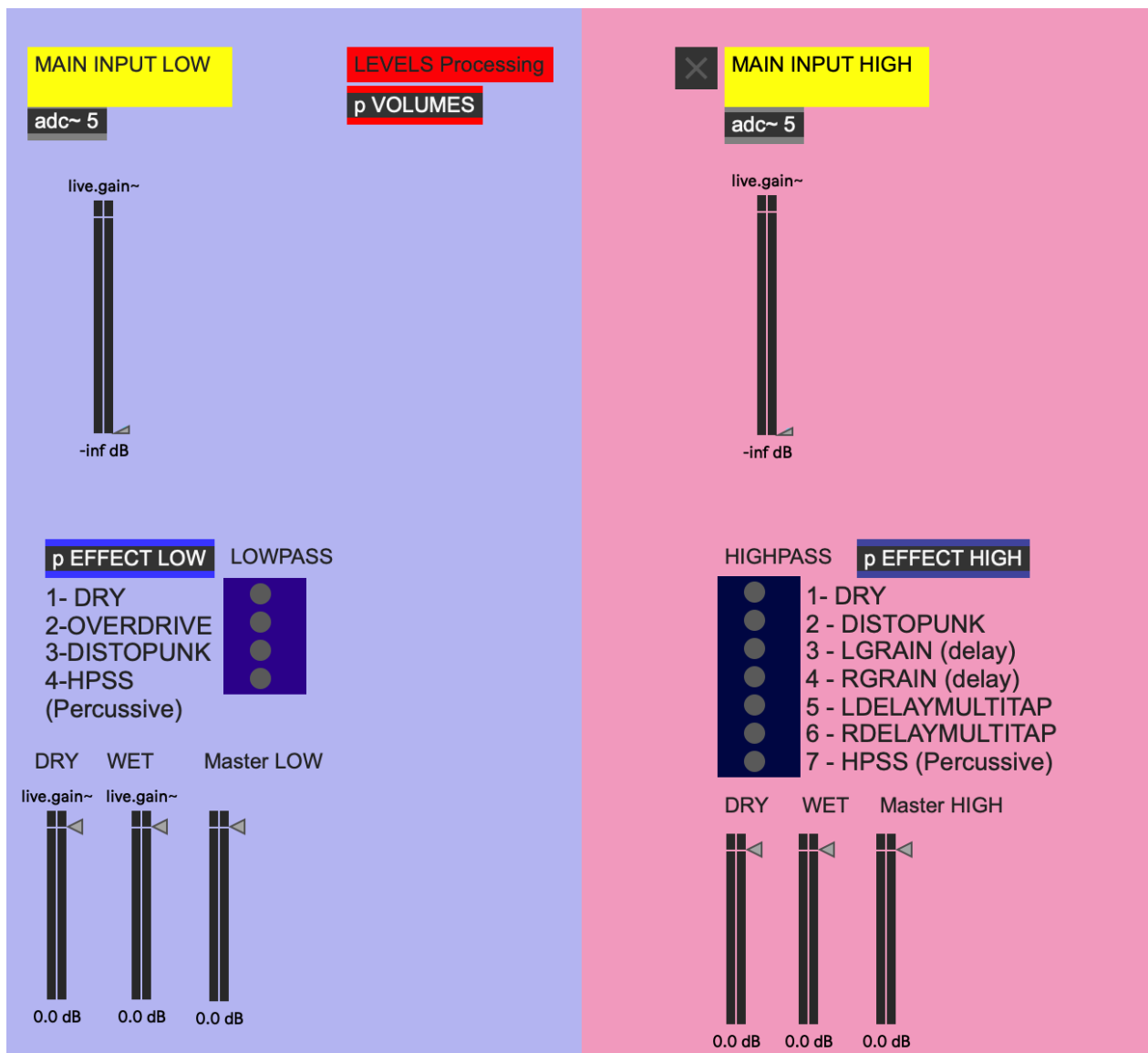
## B) Live Processing

This part of the patch takes the live signal of the cello and processes it through a Low pass and a high pass filter.

The patch is separated accordingly into two blocks, each one of which has a series of live-processing effects:

- Dry: Only the filtered sound
- Overdrive (for “pushing” soft sounds)
- Distopunk (a type of distortion)
- HPSS (gives a more percussive character to the sound)
- Grain (Granulation with Delay)
- Multitap Delay

The patch is equipped with a Dry a Wet and a Main Master level for every filter.



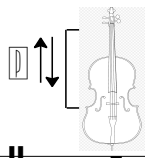


# Bowing Synthesis

Helga Arias

**A**

0'00" white noise, almost "air"



Bow position

Violoncello (l.h.)

Tape

Live Electronics

1 LOWPASS  
Open:  
"Dry"  
"Distopunk"  
"Overdrive"

2 Sample 1  
"Pedal 1"

*ppp*

III  
IV  $\phi$

Detailed description: This block contains the first part of a musical score for 'Bowing Synthesis'. It features four staves: 'Bow position', 'Violoncello (l.h.)', 'Tape', and 'Live Electronics'. The 'Bow position' staff shows a waveform starting at 0'00" with a box labeled 'white noise, almost "air"'. A violin diagram with a vertical double-headed arrow indicates the bow's movement. The 'Violoncello (l.h.)' staff has a bass clef and a circled 'phi' symbol. The 'Tape' staff has a box labeled '1' and 'LOWPASS' with sub-options: 'Open:', '"Dry"', '"Distopunk"', and '"Overdrive"'. It also has a box labeled '2' and 'Sample 1 "Pedal 1"' with a wedge-shaped symbol and the dynamic marking '*ppp*'. The 'Live Electronics' staff has a box labeled '1' and the same sub-options as the 'Tape' staff. The 'Bow position' staff has a circled 'A' at the beginning and a circled '0'00"' at the start of the waveform. The 'Violoncello (l.h.)' staff has a circled 'III' and 'IV' above it, and a circled 'phi' symbol.

0'24"

8

bow.

Vc.

Tape

L.E.

Gradually add pressure and pitch content  
(soft glissandi through the strings)

*pp*

Detailed description: This block contains the second part of the musical score, starting at 0'24". It features four staves: 'bow.', 'Vc.', 'Tape', and 'L.E.'. The 'bow.' staff has a circled '8' at the beginning and a waveform. The 'Vc.' staff has a bass clef and a circled 'pp' at the end. The 'Tape' and 'L.E.' staves have horizontal lines. An arrow points from the text 'Gradually add pressure and pitch content (soft glissandi through the strings)' to the right, ending at a circled '0'24"' box. The 'bow.' staff has a circled '8' at the beginning. The 'Vc.' staff has a circled 'pp' at the end. The 'Tape' and 'L.E.' staves have horizontal lines.

0'52'

15

bow.

Vc.

Tape

L.E.

1'20"

22

Gradually add bow speed and smaller movements  
(smaller glissandi)

bow.

Vc.

Tape

L.E.

*p*

1'48"

29

\*) bow in the middle of the string.  
Bow slowly to produce a distorted sound

\* Exact bow position

(III IV)  $\phi$   $\rightarrow$   $\circ$   $\circ$   $\rightarrow$   $\phi$

bow.

Vc.

Tape

L.E.

3 LOWPASS  
Close:  
"Overdrive"

35 2'12"

bow.

Vc.

Tape

L.E.

42 2'40"

bow.

Vc.

Tape

L.E.

49 3'08"


Vc.


Tape


L.E.

3'28"

54

Vc. 

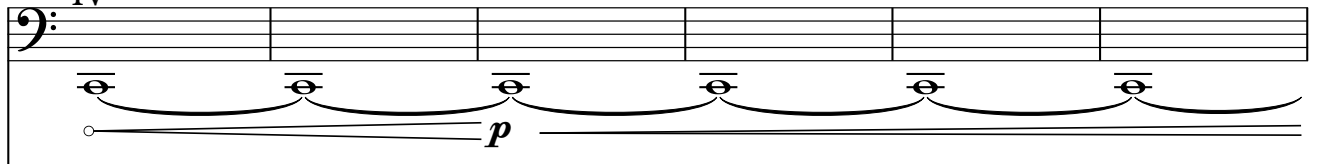
Tape 

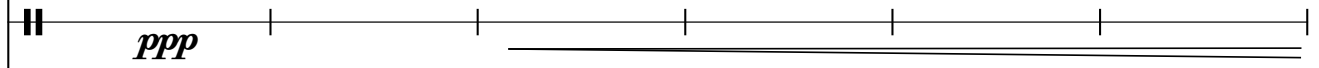
L.E. 

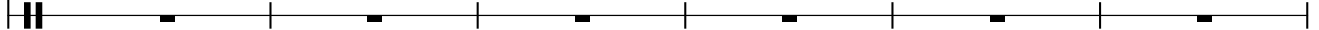
3'48"

Gradually change the colour of the open string  
(soft, rich in harmonics)

59  
m.s.p  
  
IV

Vc. 

Tape 

L.E. 

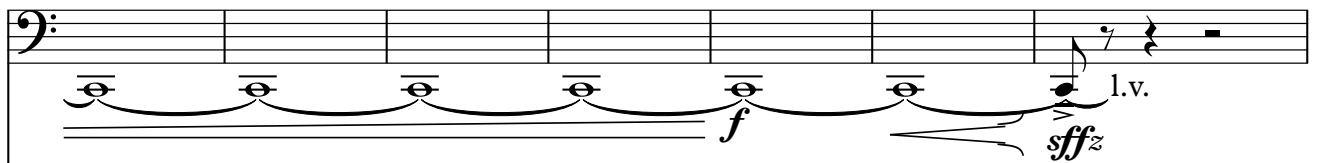
4'12"

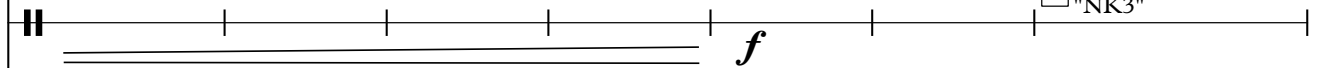
→ (more fundamental sound,  
melt with harmonic content)


→ (fuller-bodied fundamental)

65 → ord.

→ NP (rich resonance)

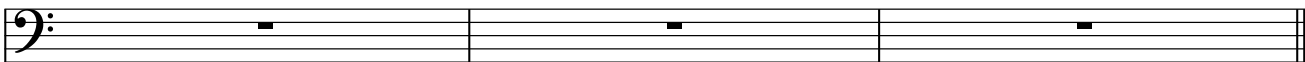
Vc. 


Tape 


L.E. 

4'41"

72

Vc. 

Tape 

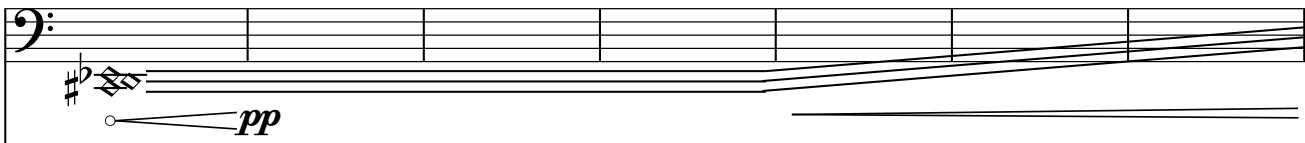
L.E. 


7 LOWPASS HIGHPASS  
Close All Open:  
"Dry"  
"Distopunk"

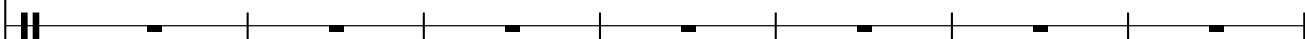
**B**

4'52"

75 (+ fundamental and open string sound) → (+ fluttering harmonics)  
IV s.p. → m.s.p

Vc. 

Tape 

L.E. 

5'20"

82

Vc. 

Tape 

L.E. 

5'48" (m.s.p)

89

Vc.

Tape

L.E.

(bow speed/dist)

(overpressure, distorted sound rich in harmonics, metallic)

6'16" (m.s.p)

96

Vc.

Tape

L.E.

6'44"

→ (distorted sound less harmonics, drier and more stringy)  
→ ord.

103

Vc.

Tape

L.E.

8 **HIGHPASS**  
Close:  
"Distopunk"  
Open: "HPSS"

C

7'08"

109 III bow shortly, slowly, with a lot of pressure close to the frog to produce a **granular sound**  
IV\*) mute the strings in this position

Vc. *p*

Tape

L.E. **9** **HIGHPASS**  
Open: "LG Grain"  
"RG Grain"

7'32"

modulate the pitches with the bow to produce glisandi

115

Vc. *mp*

Tape

L.E. **10** **HIGHPASS**  
Close: "HPSS"

7'56"

Change freely  
III / I  
IV / II

121

Vc.

Tape

L.E.

8'28"

129

Vc.

Tape

L.E.

8'56"

136

Vc.

Tape

L.E.

**p**

11 **HIGHPASS**  
Open: "HPSS"

9'20"


142

Vc.

Tape

L.E.

ord. → (m.s.t.) → gradually bowing upper in the fingerboard following the l.h.

\*) approx bow positions 

gradually lower down the l.h.



9'44"

148

bow.

Vc.

Tape

L.E.

**D**

10'04"

153

\*) bow in the middle of the string.  
Bow slowly to produce a distorted sound

\* Exact bow position

bow.

Vc.

Tape

L.E.

12 Sample 5  
"Pedal 2"

13 **HIGHPASS**  
Close All  
**LOWPASS**  
Open: "Dry"

*mp*

10'24"

158

bow.


Vc.

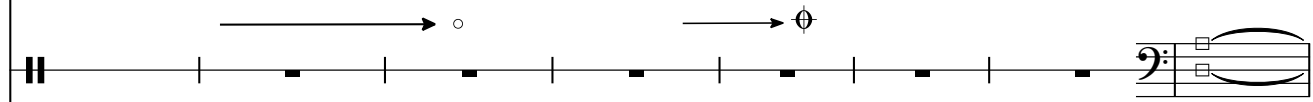
Tape

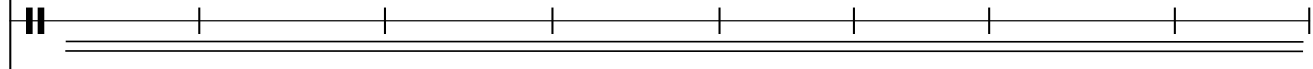
L.E.


10'52"

165

bow. 

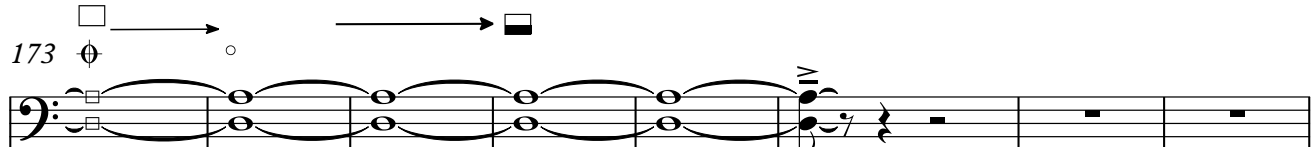
Vc. 

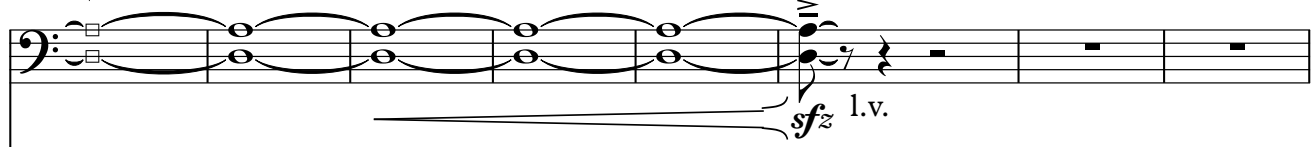
Tape 

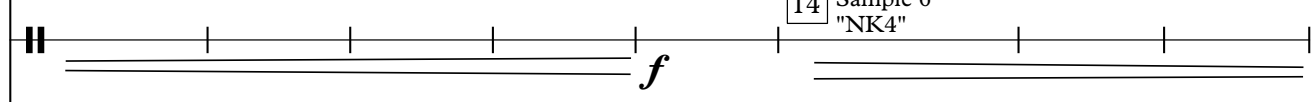
L.E. 

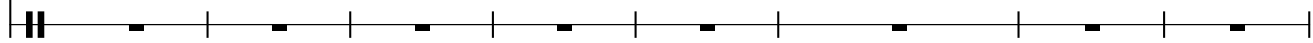
*ppp* (ord.)

11'24"

173 


Vc. 


Tape 

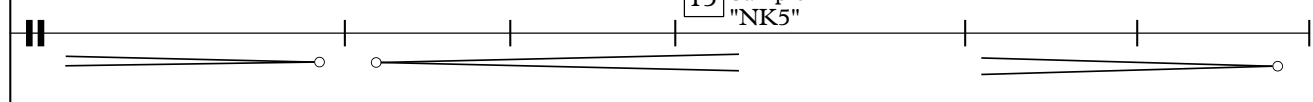
L.E. 

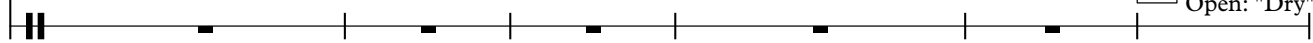
*f* *sfz* l.v. 14 Sample 6 "NK4"

11'56"

181 

Vc. 

Tape 

L.E. 

*sfz* l.v. 15 Sample 7 "NK5" 16 HIGHPASS Open: "Dry"

**E**

Gradually change the colour of the open string

12'20"

(airy, with a soft shadow of pitch)  
e.s.p

→ (soft, rich in harmonics)  
→ m.s.p

187

I

Vc. *pp*

Tape

L.E.

12'48"

→ (more fundamental sound, melt with harmonics content)

194

■

Vc. *p*

Tape

L.E.

13'17"

→ (fuller-bodied fundamental)

→ ord.

201

■

→ NP

(rich resonance)  
l.v.

Vc. *f* *sffz*

Tape *f*

L.E.

17 Sample 8 "NK6"

13'44"

208

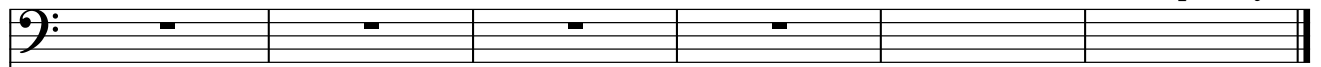
Vc. 

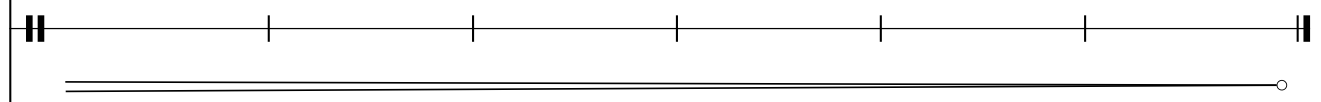
Tape 

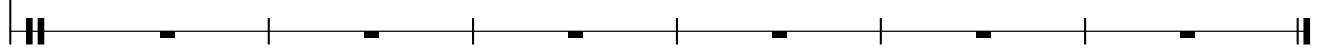
L.E. 

213

Wait until electronics  
fade out completely

Vc. 

Tape 

L.E. 

ca. 14'30"