

Yongwoo Lee

Permeation

for Clarinet and
Modalys Clarinet

2023

PROGRAM NOTE

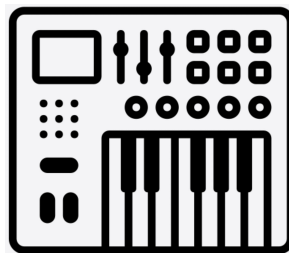
Permeation is a composition written for solo clarinet and live performance or tape version of the clarinet created using Modalys, a coding language of Physical Modeling Synthesis developed by IRCAM. It explores a variety of sounds by manipulating the pipe radius and pipe length, which are parameters of the closed-open tube representing the reed and the clarinet body in the Modalys script. When the radius decreases, the size of the air passage decreases, resulting in a sharp sound with increased air pressure and tension, and the pitch changes according to the length. Especially, I incorporated wind sounds generated by manipulating the air pressure through a small hole in the pipe. I also utilized the physical sound resulting from rapid changes in the pipe's radius while injecting air, emphasizing the connection to the principles of physics. This piece specifically examines the diverse musical applications of Modalys coding as an instrument, drawing a parallel to how contemporary music utilizes extended playing methods with traditional instruments.

The performance is controlled and played using Max and a MIDI keyboard, synchronized with the actual clarinet player, and incorporates elements of accidental randomness. The piece expresses the intertwining permeation of these two clarinets as a duet. The composition is divided into two methods of performance: real-time performance by two players, including the clarinet player and a MIDI keyboard player, and a tape part using fixed media with only one clarinet player. This score is written for the real-time performer version.

The tape part of the composition is created solely using the manipulated Modalys Clarinet sound. This unique sound source is processed using sound editing techniques and algorithms within MAX/MSP. Additionally, it is possible to incorporate reverb and delay effects during the live performance on stage.

MAX PATCH

The max objects below set as default, can be replaceable to the other faders or knobs. And It should be open the attached *.mly file which is export from Modalys script to run this max patch.



bendin 1 (pitch bend) / for pitch bend

ctlin 1 (modulation wheel) / for air-pressure (breath)

ctlin 11 (expression) / for radius size (radius)

NOTATION

The score is written in transposed including Modayls clarinet and live electronics. Electronics (E in Bb) indicates notes created in live situations, and Radius for radius size for the modalys clarinet. And also Max cues controlled by pedaling (ctlin 64) include various informations which are breath, effects, pitch etc.



6 Faders are basically marks to distinguish uncontrolled notes from Max cues, meaning the position of the modulation wheel. The higher the fader mark, the higher the air-pressure of the modalys clarinet.



key clicks with air sound
(upper side of cross note is
metronome symbol)



air sound with pitch



random granular

TONALITY SYSTEM



48 Equal Temperament is used in the notation of modalys and live electronic scores.
The table above divides pitches based on units of 25 cents (1200 cents/48).

MODALISP SCRIPT AND MAX PATCH

```
;;--*Mode: Lisp; Package: MODALYS *-
(new)

:ctl-for-max
(setq freq-ctl (make-controller 'dynamic 1 -1 220. "freq"))
(setq air-density-ctl (make-controller 'dynamic 1 -1 1.2 "air-density"))
(setq listenin-loc-ctl (make-controller 'dynamic 1 -1 0.5 "listenin-loc"))

:specif-ctl-for-max
(setq modes-ctl (make-controller 'dynamic 1 -1 80 "modes"))
(setq radius0-ctl (make-controller 'dynamic 1 -1 0.01 "radius0"))
(setq radius1-ctl (make-controller 'dynamic 1 -1 0.01 "radius1"))
(setq length-ctl (make-controller 'dynamic 1 -1 1. "length"))
(setq air-elasticity-ctl (make-controller 'dynamic 1 -1 .00000721 "air-elasticity"))
(setq freq-loss-ctl (make-controller 'dynamic 1 -1 1.5 "freq-loss"))
(setq const-loss-ctl (make-controller 'dynamic 1 -1 1. "const-loss"))

:make-tube
(setq my-tube (make-object 'closed-open-tube
  (modes modes-ctl)
  (radius0 radius0-ctl)
  (radius1 radius1-ctl)
  (length length-ctl)
  (air-elasticity air-elasticity-ctl)
  (air-density air-density-ctl)
  (freq-loss freq-loss-ctl)
  (const-loss const-loss-ctl)))

(set-pitch my-tube 'length freq-ctl)

:make-reed
(setq my-reed (make-object 'rect-plate
  (modes modes-ctl)
  (length0 .7e-2)
  (length1 2e-2)
  (thickness 2e-5)
  (density 700)
  (freq-loss 400)
  (const-loss 200)
))

:make-reed-tube-interaction
(setq breath-env (make-controller 'dynamic 1 -1 0 "breath"))

(setq my-tube-blowin (make-access my-tube (const 0) 'long))
(setq my-tube-listenin (make-access my-tube listenin-loc-ctl 'long))

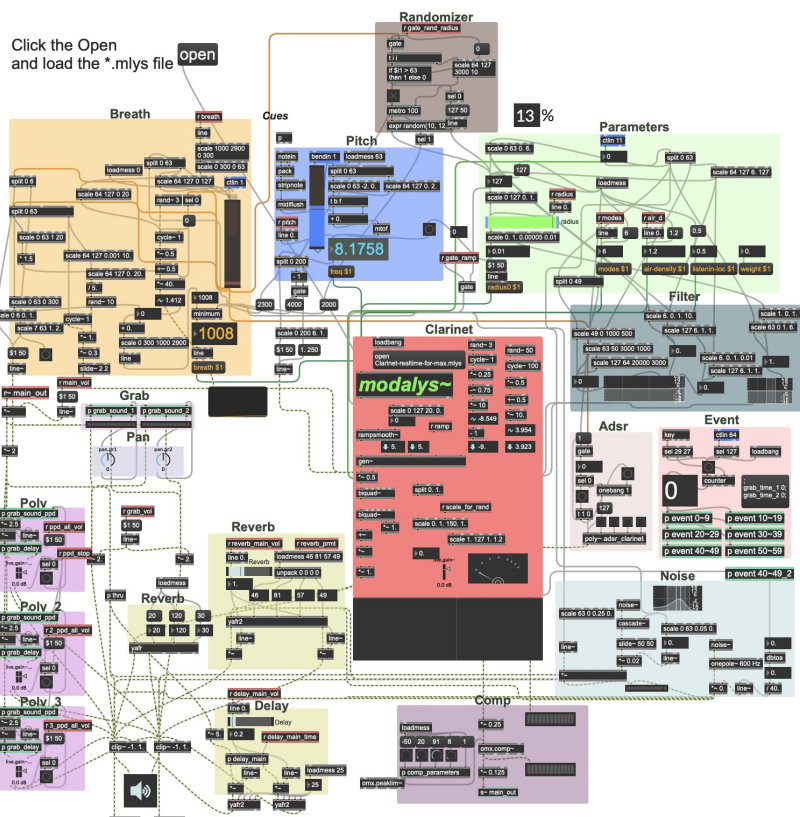
(setq my-reed-tip (make-access my-reed (const 1 .2) 'normal))

(setq weight-ctl (make-controller 'dynamic 1 -1 1. "weight"))

:make-connection
(make-connection 'reed my-tube-blowin my-reed-tip 0.001
  (make-controller 'arithmetic 1 * (list (const 6) breath-env))
  (const 0.000276)
)
```

The modalys clarinet used in this piece was implemented using a physical modeling method as a script of IRCAM software Modalys, and Max/msp has been specified so that it can be used effectively in Live situations. In the clarinet creation stage through Modalys, I used objects that control parameters related to length and quality of air. In Max, the patch was composed of detailed manipulation of these parameters, work related to harmonics and white noise for sound processing, humanization work by filter and LFO method, and adding various effects.

* The script on the left is an excerpt from the entire script.



Permeation

Transposed Score

for Clarinet and Modalys Clarinet

Yongwoo Lee

♩ = 120

Clarinet in B \flat

hi-hat(metronome) counts 4 times before start

air sound

ppppp
(mf)

Modalys in B \flat

Electronics in B \flat

Radius

Modalys Tape

Modalys Tape in B \flat

0.1

radius: 0.1
breath: 1000 ~ 1100 (2 ~ 3)

6

Cl. in B \flat

M. in B \flat

10

Cl. in B \flat

M. in B \flat

E. in B \flat

Max cue: 1
pitchshift [100 375 350]*

* above the numbers are the cent from the modalys clarinet's sound

14

Cl. in B \flat

mp

M. in B \flat

E. in B \flat

pitchbend: -0.25

Two double bar lines with a repeat sign are located to the left of the first and second systems of the score.

21

Cl. in B \flat

ppppp

M. in B \flat

R.

pitchbend: +0.25

0.1

Two double bar lines with a repeat sign are located to the left of the first and second systems of the score.

28

air: 50%

Cl. in B \flat

M. in B \flat

R.

1

Two double bar lines with a repeat sign are located to the left of the first and second systems of the score.

Permeation

3

34

air sound

Cl. in B \flat

M. in B \flat

R.

ppp

Max cue: 2
reverb on

1

40

air: 50%

air -> ord. sound

Cl. in B \flat

M. in B \flat

E. in B \flat

ppppp

ppp

Max cue: 3
pitchshift [100 375 350]

Max cue: 4
pitchshift [100 -100]

47

air: 50%

key clicks with air sound

air -> ord. sound

(ord.)

Cl. in B \flat

M. in B \flat

E. in B \flat

R.

p

ppppp
(*mf*)

ppp

mp

Max cue: 5
pitchshift [100 375 350 1200]

0.2

Permeation

4

53

Cl. in Bb

M. in Bb

R.

pitchbend: -0.25

0.2

1

mp

58

Cl. in Bb

M. in Bb

E. in Bb

R.

m.p. 1(multiphonic)

ppp

Max cue: 8
grab_1
breath: 900 (0)

Max cue: 7

1

0.2

1

65

Cl. in Bb

M. in Bb

E. in Bb

R.

m.p. 2

air sound

ppppp

Max cue: 9
grab_2
breath: 900 (0)

Max: 10
pitchshift [1100, 2350 -> 2400]

Max cue: 11
flush!

gliss.

gliss.

0.2

gliss.

Permeation

72

Cl. in B \flat

M. in B \flat

E. in B \flat

R.

M. T. in B \flat

1

m.p. 1 ord.

1.p. 2

ppp

Max cue: 12
pitchshift [1975]

Max cue: 13
pitchshift [1375]

vib. by BRIGADE CHORUS

78

Cl. in B \flat

M. in B \flat

E. in B \flat

M. T. in B \flat

f

air sound

Max cue: 14
pitch: 453
breath: 900 (0)

gliss.

85

Cl. in B \flat

M. in B \flat

E. in B \flat

M. T. in B \flat

ord.
m.p. 4

m.p. 2

m.p. 5

m.p. 6

m.p. 3

pppp

Max cue: 16
pitchshift

Max cue: 15

pitchbend: 0 -2

gliss.

93

Cl. in B \flat

m.p. 6

m.p. 4

M. in B \flat

gliss

E. in B \flat

98

Cl. in B \flat

air

fppp *fppp*

ord.

change the pitches during playing the note by pressing random keys

M. in B \flat

Max cue: 17 random radius on

E. in B \flat

8^{va}

M. T. in B \flat

105

Cl. in B \flat

m.p. 3

ppp < *fp*

change the pitches during playing the note by pressing random keys

Max cue: 18 random radius pitchshift

Max cue: 19 reverb on

M. in B \flat

E. in B \flat

M. T. in B \flat

Permeation

112

Cl. in B \flat

m.p. 5

m.p. 6

ppp mp ppp mf ppp

Max cue: 20
random radius
pitchshift [875 2075 1200-1150]

M. in B \flat

E. in B \flat

118

Cl. in B \flat

f ppp ppp mp pp

Max cue: 21
pitchshift [100 375 350]

Max cue: 22
random radius on
pitchshift [1300 1575 1550]

M. in B \flat

E. in B \flat

pp

M. T. in B \flat

126

Cl. in B \flat

mf mp

change the pitches
during playing the note
by pressing random keys

Max cue: 23
pitchshift [100 375 350]

Max cue: 24
random radius on
pitchshift [1300 1575 1550]

M. in B \flat



145

Cl. in Bb

M. in Bb

E. in Bb

M. T. in Bb

change the pitches during playing the note by pressing random keys

Max cue: 30 pitchshift

gliss.

Permeation

148

Cl. in Bb

mf

mf

m.p. 5

Max cue: 31
pitchshift

M. in Bb

E. in Bb

M. T. in Bb

gliss

153

Cl. in Bb

mf

p *mp* *p*

M. in Bb

158

Cl. in Bb

mp

mp

M. in Bb

pp

R.

0.2

0.2

1

gliss

163

B

Cl. in Bb

M. in Bb

M. T. in Bb

mp

169

Cl. in Bb

M. in Bb

M. T. in Bb

p

Max cue: 33
delay pitchshift on

173

Cl. in Bb

M. in Bb

E. in Bb

M. T. in Bb

mp

Max cue: 34
delay pitchshift off
delays [1050 2350]

8^{va}

Detailed description: The image shows a page of a musical score for a piece titled 'Permeation'. The page number is 10. The score is for four instruments: Clarinet in Bb, Mellophone in Bb, Mellophone/Trombone in Bb, and Eb Euphonium. The score is divided into three systems. The first system (measures 163-168) includes a rehearsal mark 'B'. The second system (measures 169-172) includes a cue box 'Max cue: 33 delay pitchshift on'. The third system (measures 173-176) includes a cue box 'Max cue: 34 delay pitchshift off delays [1050 2350]' and an octave marking '8va' for the Eb Euphonium. Dynamics include mp and p. The score uses various time signatures (3/4, 4/4, 2/4) and includes articulation marks like 'x' and 'p'.

Permeation

11

177

Cl. in Bb

mp

Max cue: 35
delay pitchshift on

M. in Bb

E. in Bb

182

Cl. in Bb

Max cue: 35
delay pitchshift on

play the notes after the electronics sound comes

Max cue: 36
delay pitchshift off

M. in Bb

E. in Bb

R.

186

Cl. in Bb

p *f* *mp* *f*

M. in Bb

M. T. in Bb

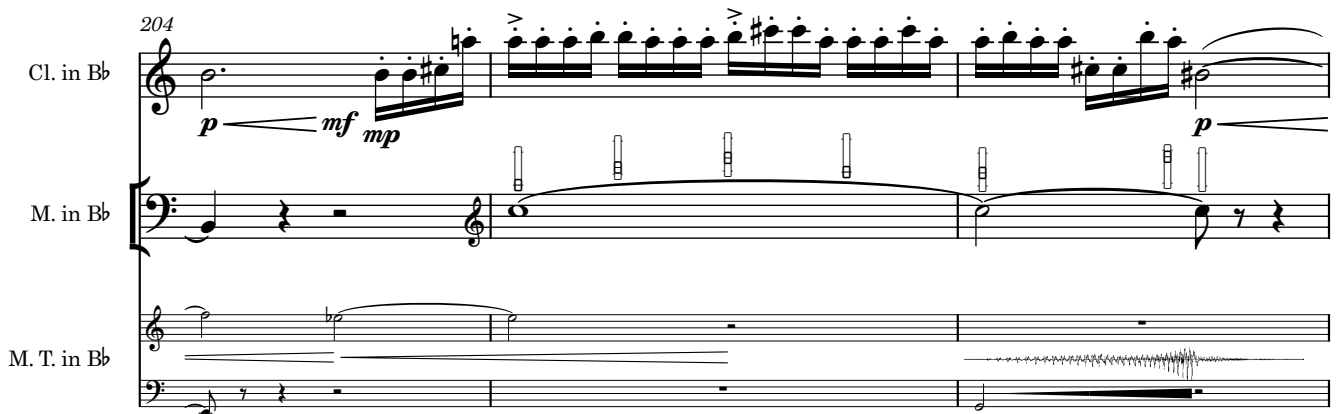
204

Cl. in Bb

p *mf* *mp* *p*

M. in Bb

M. T. in Bb



207

Cl. in Bb

flt. (growling) ord.

mf *p* *f*

M. in Bb

M. T. in Bb

gliss

Max cue: 37
pitchshift [500 -400 -1100]



213

Cl. in Bb

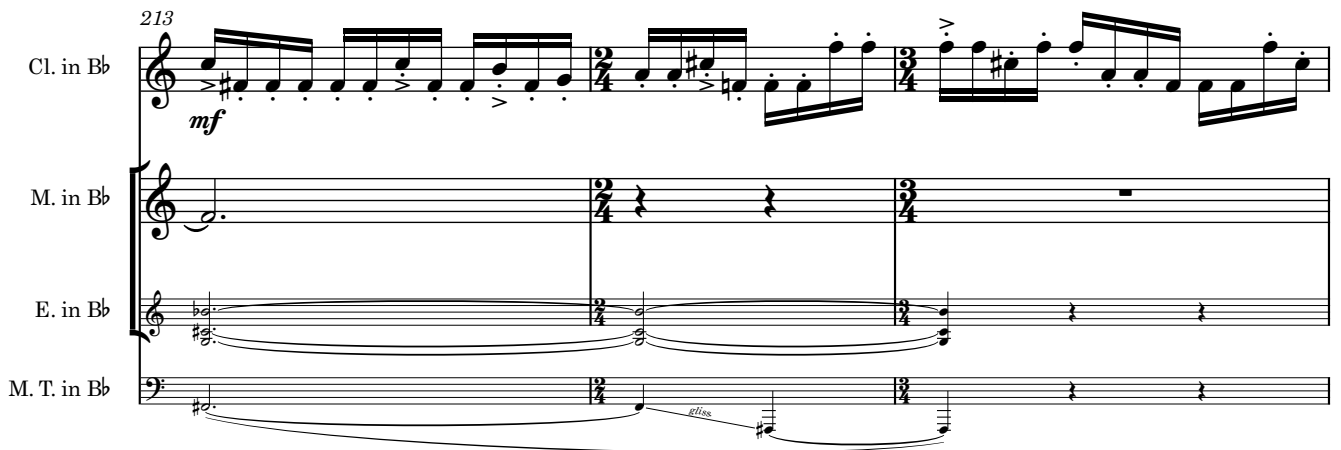
mf

M. in Bb

E. in Bb

M. T. in Bb

gliss



216

Cl. in B \flat

p < *f*

ft. (growling)

Max cue: 38
(various random control randomly)

M. in B \flat

M. T. in B \flat

Turn the 1/8th Delay on
by 120 bpm

ord.

221

Cl. in B \flat

mf *mp* *sf*

p *f*

Turn the 1/4th Delay on
by 120 bpm (pingpong)

M. in B \flat

M. T. in B \flat

226

Cl. in B \flat

sf *mf* *mp* *f*

M. in B \flat

M. T. in B \flat

Permeation

15

231

Cl. in Bb

mf

Max cue: 39
pitchshift [1000 1300 2400]

M. in Bb

E. in Bb

M. T. in Bb

233

Cl. in Bb

Max cue: 40
pitchshift [700 -300 -800]

Turn the 1/8th Delay on
by 120 bpm

p

M. in Bb

E. in Bb

M. T. in Bb

236

Cl. in Bb

mf

Max cue: 41
stop 0

mf

Max cue: 42
pitchshift [-400 -100 1000]

gliss.

M. in Bb

E. in Bb

M. T. in Bb

Permeation

Turn the 1/8th Delay on by 120 bpm

Cl. in B♭

M. in B♭

M. T. in B♭

240

gliss.

ft. (growling)

mf

Max cue: 43
random radius off

Cl. in B♭

M. in B♭

R.

M. T. in B♭

246

air sound

f

ord.

mp

0.1

Cl. in B♭

M. in B♭

M. T. in B♭

251

gliss.

253

Cl. in Bb

sf *mp*

Max cue: 44
reverb delay on
pitchshift [-1000 -1100]

M. in Bb

E. in Bb

M. T. in Bb

256

Cl. in Bb

Max cue: 45
reverb delay on
pitchshift [-1100 -900]

M. in Bb

E. in Bb

M. T. in Bb

263

Cl. in Bb

p

D

Max cue: 46
reverb delay on
pitchshift [-600 600]

M. in Bb

E. in Bb

270 air sound

Cl. in B \flat

mp

M. in B \flat

R.

0.1

276

Cl. in B \flat

M. in B \flat

280

Cl. in B \flat

M. in B \flat

283 rit.....

Cl. in B \flat

dim.

M. in B \flat