

Yongwoo Lee

Permeation

for clarinet and
Modalys clarinet

2023

PROGRAM NOTE

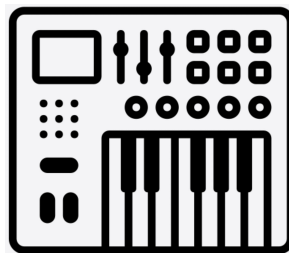
Permeation is a composition written for solo clarinet and live performance or tape version of the clarinet created using Modalys, a coding language of Physical Modeling Synthesis developed by IRCAM. It explores a variety of sounds by manipulating the pipe radius and pipe length, which are parameters 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.



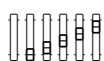
bendin 1 (pitch bend) / for pitch bend

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)

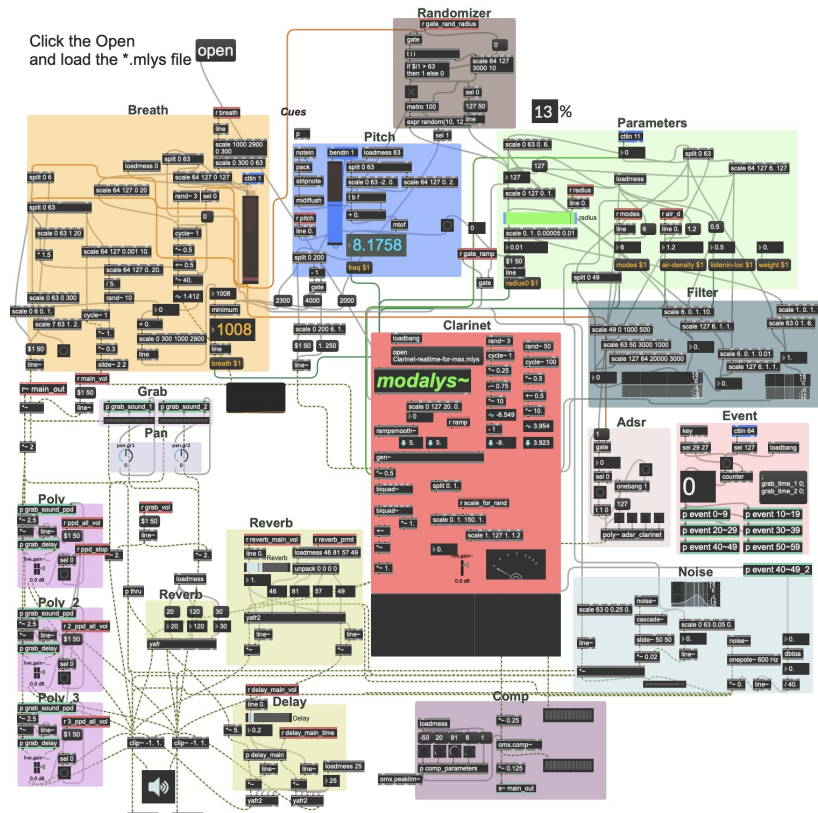
:make-reed
(setq my-reed (make-object 'rect-plate
  (modes modes-ctl)
  (length0 .7e-2)
  (length1 2e-2)
  (thickness 2e-5)
  (density 700)
  (freq-loss 400)
  (const-loss 200)
))

: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 Modalisp script.



Permeation

Transposed Score

for Clarinet and Modalys Clarinet

Yongwoo Lee

Tranquillo e sospeso ♩ = 120

Clarinet in B \flat

hi-hat (cue) counts 4 times before start

air sound

pppp
(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

hi-hat (cue)

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

sim.

21

Cl. in B \flat

ppppp

M. in B \flat

R.

pitchbend: +0.25

0.1

28

Cl. in B \flat

M. in B \flat

R.

air: 50%

1

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.

B Misterioso e sospeso ♩ = 120
m.p. 1(multiphonics)

ppp

Max cue: 8
grab_1
breath: 900 (0)

Max cue: 7

1

0.2

1

2/4

2/4

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

2/4

4/4

2/4

4/4

Permeation

72

Cl. in B \flat

M. in B \flat

E. in B \flat

R.

M. T. in B \flat

vib. by BRIGADE CHORUS

m.p. 1 (multiphonics)
ord.

1.p. 2

ppp

Max cue: 12
pitchshift [1975]

Max cue: 13
pitchshift [1375]

78

Cl. in B \flat

M. in B \flat

E. in B \flat

M. T. in B \flat

air sound

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

gliss.

f

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

gliss.

Max cue: 15

Max cue: 16
pitchshift

pitchbend: 0 -----> -2

Permeation

6

93

Cl. in Bb

M. in Bb

E. in Bb

m.p. 6

m.p. 4

gliss

98

Cl. in Bb

M. in Bb

E. in Bb

M. T. in Bb

air

fppp

fppp

ord.

change the pitches during playing the note by pressing random keys

Max cue: 17 random radius on

8va

105

Cl. in Bb

M. in Bb

E. in Bb

M. T. in Bb

m.p. 3

ppp < *fp*

Max cue: 18 random radius pitchshift

Max cue: 19 reverb on

change the pitches during playing the note by pressing random keys

Permeation

112

Cl. in B \flat

m.p. 5

m.p. 6

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

ppp mp ppp mf ppp

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

Misterioso e sospeso, più tensione

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

Permeation

132

Cl. in B \flat

f

f

mp

Max cue: 25
pitchshift [1200 -2375 -25]

Max cue: 27
grab_2
random on

M. in B \flat

gliss.

Max cue: 26
grab_1

E. in B \flat

139

Cl. in B \flat

f

mp

mf

mp

change the pitches during playing the note by pressing random keys

Max cue: 28
flush!

Max cue: 29
pitch shift [500 - 400 -1100]

M. in B \flat

E. in B \flat

M. T. in B \flat

gliss.

Turn the 1/8th Delay on by 120 bpm

145

Cl. in B \flat

change the pitches during playing the note by pressing random keys

Max cue: 30
pitchshift

M. in B \flat

E. in B \flat

M. T. in B \flat

gliss.

Permeation

Musical score for measures 148-152. The score is for four staves: Cl. in Bb, M. in Bb, E. in Bb, and M. T. in Bb. The key signature is Bb. The time signature is 4/4. The score includes dynamic markings *mf* and *mp*. A box labeled "Max cue: 31 pitchshift" is present. A vertical line with a downward arrow and the text "m.p. 5" is located above the Cl. in Bb staff. The Cl. in Bb staff has a slur over measures 148-150 and a slur over measures 151-152. The M. in Bb staff has a slur over measures 148-150 and a slur over measures 151-152. The E. in Bb staff has a slur over measures 148-150 and a slur over measures 151-152. The M. T. in Bb staff has a slur over measures 148-150 and a slur over measures 151-152.

Musical score for measures 153-157. The score is for two staves: Cl. in Bb and M. in Bb. The key signature is Bb. The time signature is 4/4. The score includes dynamic markings *mf*, *p*, *mp*, and *p*. A box labeled "E" is present. The Cl. in Bb staff has a slur over measures 153-155 and a slur over measures 156-157. The M. in Bb staff has a slur over measures 153-155 and a slur over measures 156-157.

Musical score for measures 158-162. The score is for three staves: Cl. in Bb, M. in Bb, and R. The key signature is Bb. The time signature is 4/4. The score includes dynamic markings *mp*, *pp*, and *mp*. The Cl. in Bb staff has a slur over measures 158-160 and a slur over measures 161-162. The M. in Bb staff has a slur over measures 158-160 and a slur over measures 161-162. The R. staff has a slur over measures 158-160 and a slur over measures 161-162.

163

Cl. in Bb

M. in Bb

M. T. in Bb

mp

164 165 166 167 168

169

Cl. in Bb

M. in Bb

M. T. in Bb

p

Max cue: 33
delay pitchshift on

170 171 172

173

Cl. in Bb

M. in Bb

E. in Bb

M. T. in Bb

mp

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

174 175 176

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

F

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

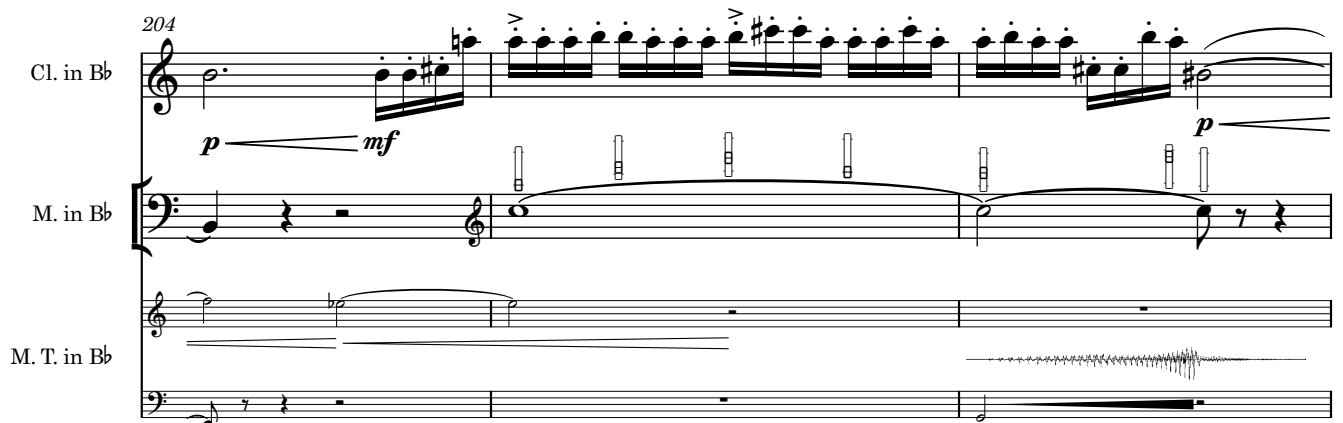
204

Cl. in B \flat

p *mf* *p*

M. in B \flat

M. T. in B \flat



207

Cl. in B \flat

mf *p* *f*

flt. (growling) ord.

M. in B \flat

M. T. in B \flat

gliss. gliss.

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



213

Cl. in B \flat

mf

M. in B \flat

E. in B \flat

M. T. in B \flat

gliss.

H



216

Cl. in Bb

ft. (growling)

$p < f$

Max cue: 38
(various random control randomly)

M. in Bb

M. T. in Bb

221

Cl. in Bb

Turn the 1/8th Delay on by 120 bpm ord.

Turn the 1/4th Delay on by 120 bpm

mf p f mp sf

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

M. in Bb

M. T. in Bb

226

Cl. in Bb

sf mf mp f

M. in Bb

M. T. in Bb

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]

M. in Bb

E. in Bb

M. T. in Bb

Permeation

Turn the 1/8th Delay on by 120 bpm

gliss.

ft. (growling)

mf

Max cue: 43
random radius off

240

Cl. in Bb

M. in Bb

M. T. in Bb

246

air sound

f

ord.

f

0.1

R.

M. T. in Bb

251

gliss.

M. in Bb

M. T. in Bb

253

Cl. in Bb

sf *f*

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

M. in Bb

E. in Bb

M. T. in Bb

256

Cl. in Bb

f

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

M. in Bb

E. in Bb

M. T. in Bb

262

Cl. in Bb

p

J Tranquillo e sospeso

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

M. in Bb

E. in Bb

270

Cl. in B \flat

p

M. in B \flat

R.

0.1

276

Cl. in B \flat

rit.

dim.

M. in B \flat

284

Cl. in B \flat

M. in B \flat