Nicolas Brochec

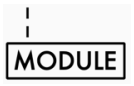
Traversée III

for flute, live electronics and Somax AI agents

Paris 2025 @IRCAM

Note for the Performance

Following and Recognition Modules



Indicates performance events to be detected by Antescofo and the corresponding modules to trigger. A real-time playing-technique recognition module is coupled with Antescofo to track complex techniques beyond the scope of its listening machine. The monitoring of the following is achieved by a computer music designer.

Indicates that the audio input of a specific playing technique is mapped dynamically to the corresponding module. Acts like an automatic gate.

Processing Modules

FRZ The freezing module captures and holds the indicated note or sound.

GRN Granular synthesis using live flute input. Grain size in milliseconds (ms), density is qualitatively described (sparse, medium, dense), attack and release in milliseconds (ms)

RVB 5 seconds long reverb applied to live flute input.

H1 Harmonizers from 1 to 2. Transposition in MIDI cents (cts), delay in milliseconds (ms), transposition modulation in MIDI cents (cts) over 1 second.

CHR Chorus. Rate in Hertz (Hz), depth, and feedback are indicated between 0 and 1.

RING Ring modulation. Rate in Hertz (Hz).

Synthesis Modules

SYN Synful synthesis is used to generate realistic flute sounds. Indicated pitches are repeated continuously; when they differ from the flute part, they are specified using MIDI note names (e.g., C4). Accents are probabilistically inserted within the repetitions.

BELL An additive synthesis based on the harmonic series that reproduces bell partials. Attack in milliseconds (ms), release in milliseconds (ms), harmonic distortion (%), range of used partials, fundamental described with MIDI letters (e.g. C4).

Composition Module

SOMAX Somax improvisational AI agents are indicated as 'P1' and 'P2' (Player 1 and Player 2). The agents improvise using a recorded sound corpus derived from the score, indicated by ranges of measures. They interact with the live audio input and are informed by the playing technique recognition module.

Sampling Module

SMP Sampler. Plays a pre-recorded audio file. Double quotation marks describe the content of the audio file.

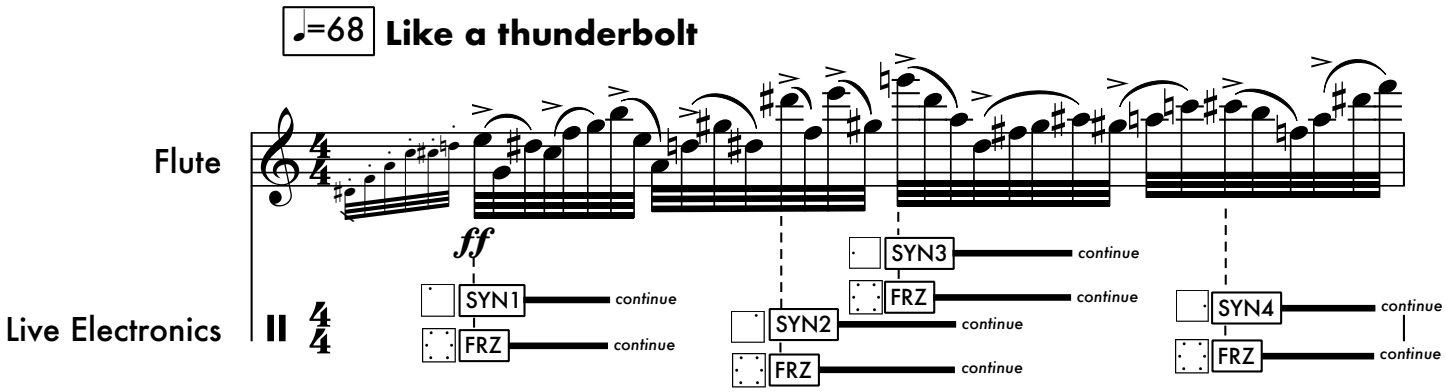
Spatialisation Module

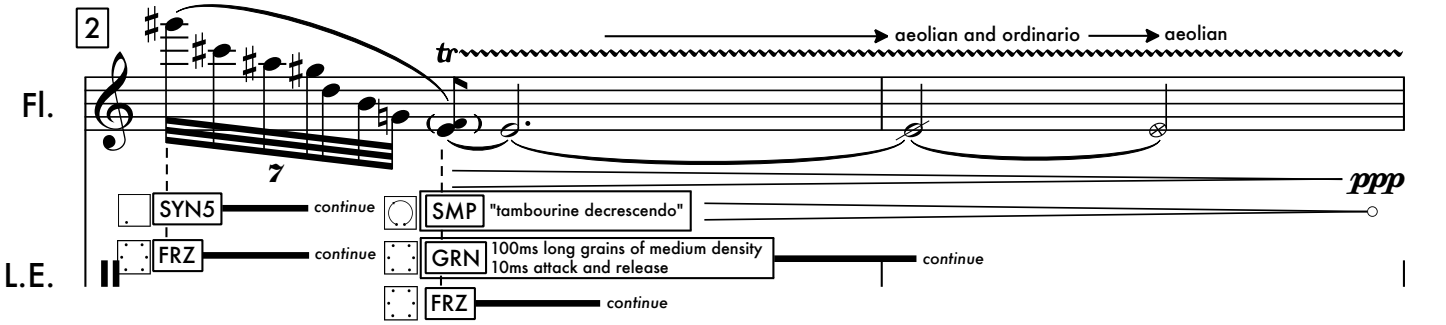
 Spatial trajectories of the above-mentioned modules are indicated on the left of the notation of modules. The frames indicate the walls of the performance venue.

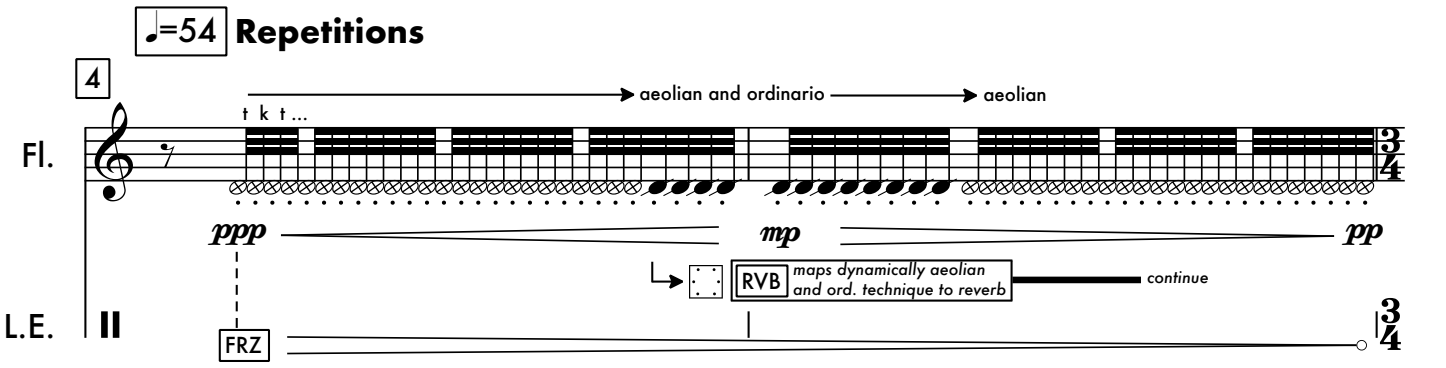
Traversée III

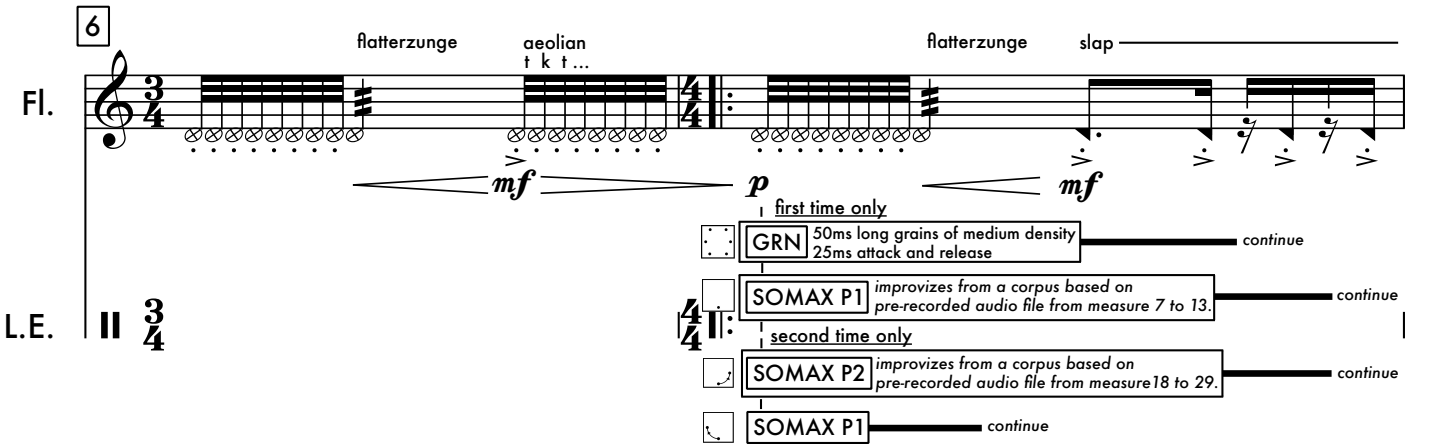
for flute, live electronics and Somax AI agents
to Kanami Koga

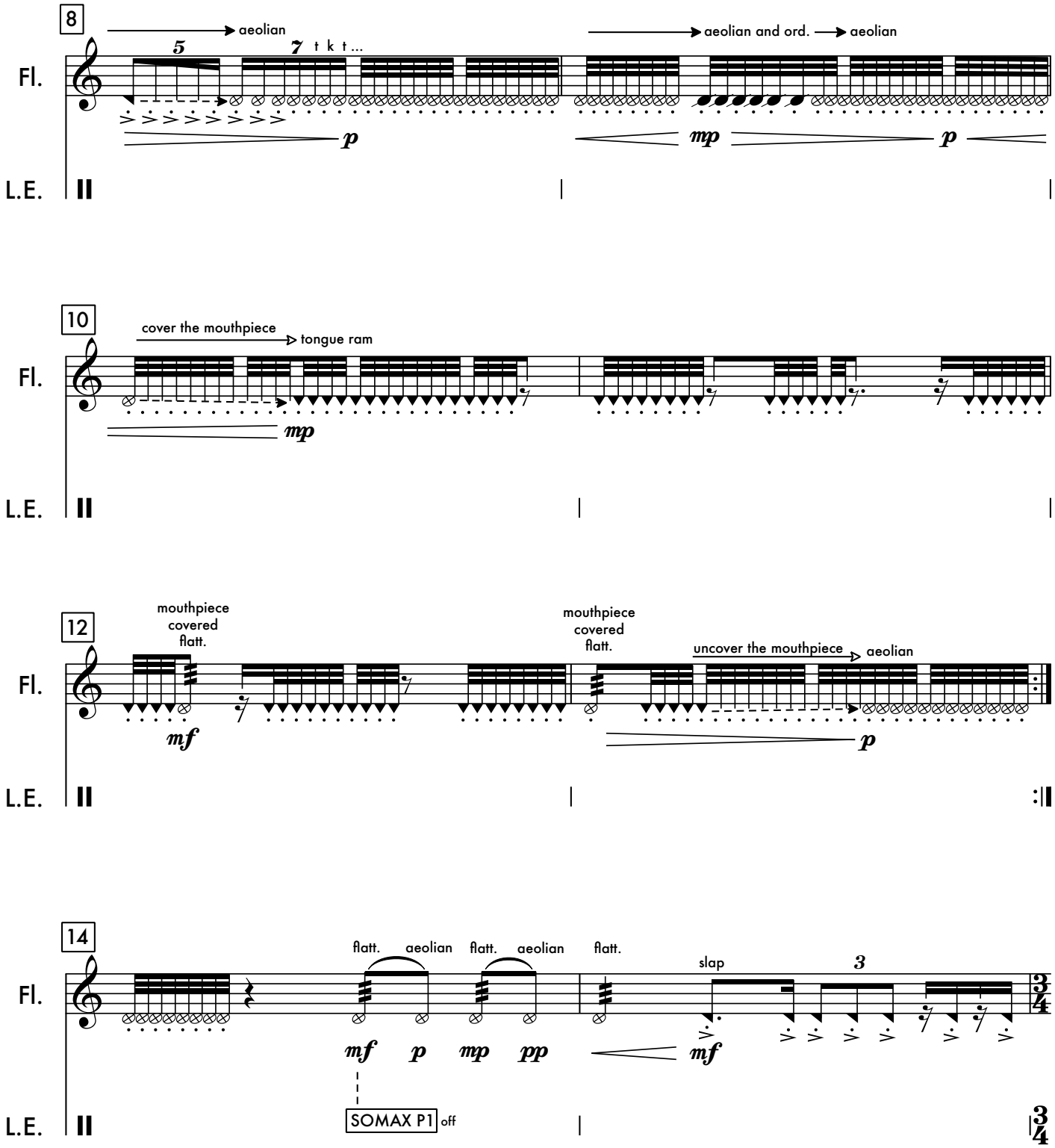
Nicolas Brochec (2025)

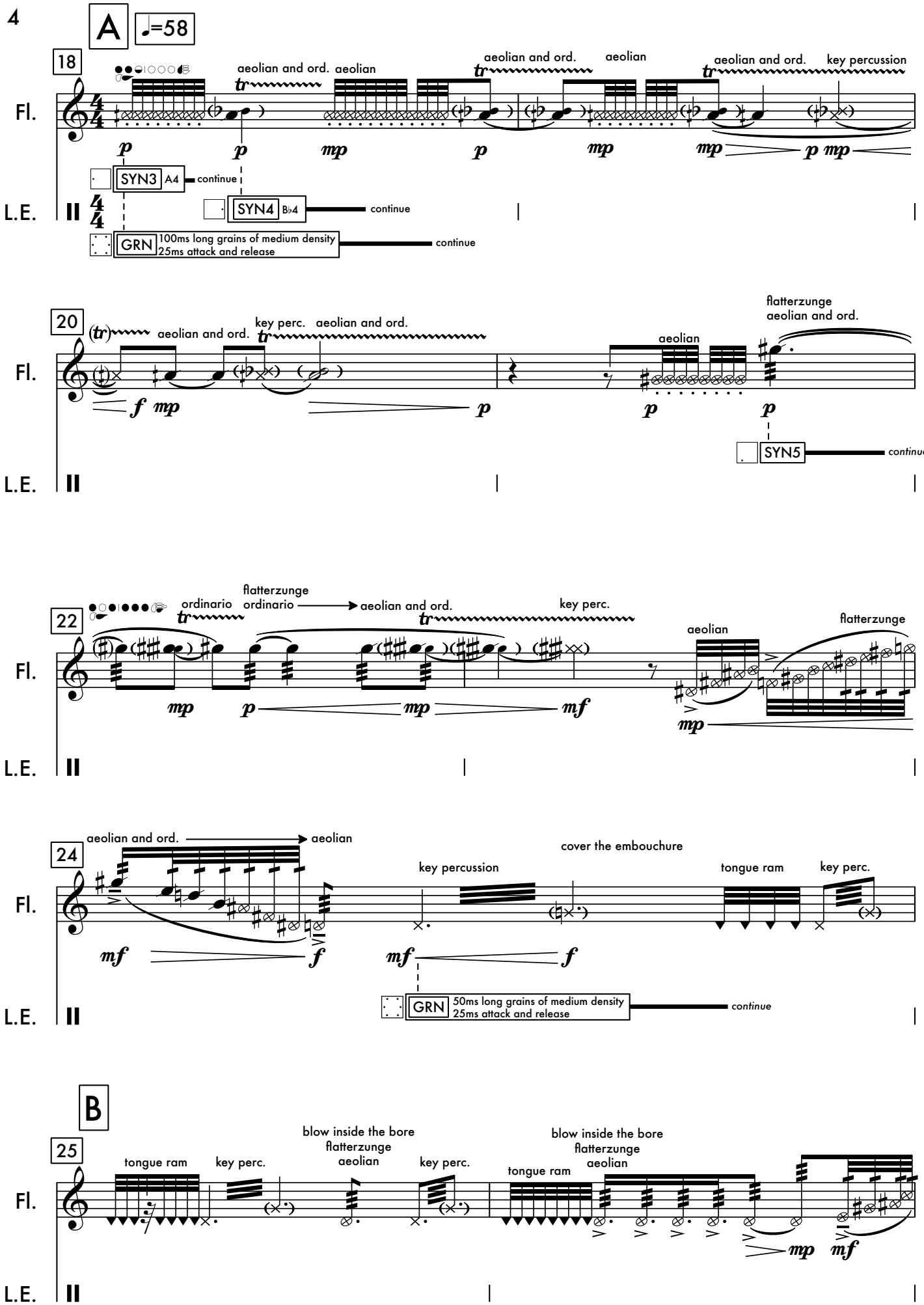


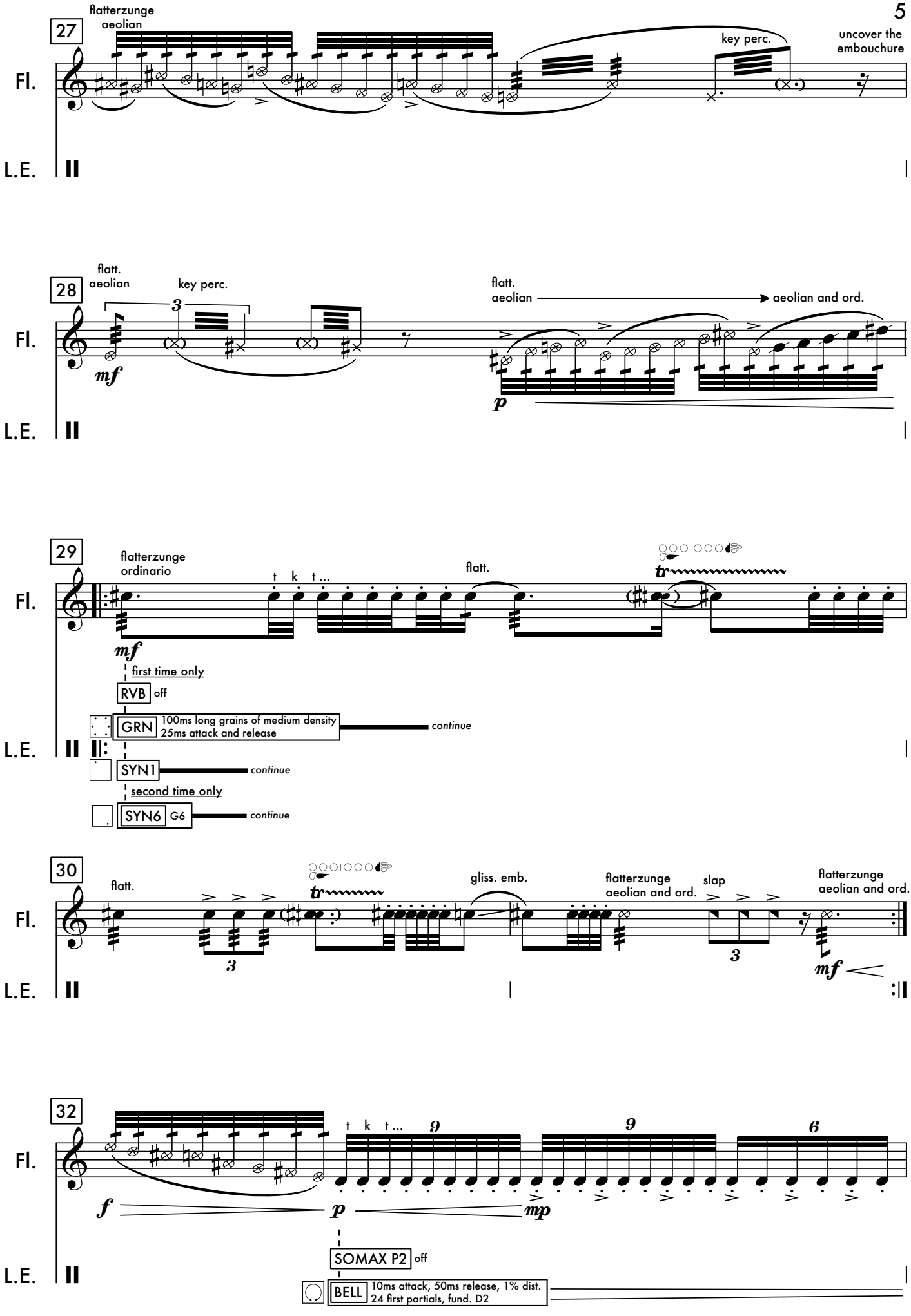


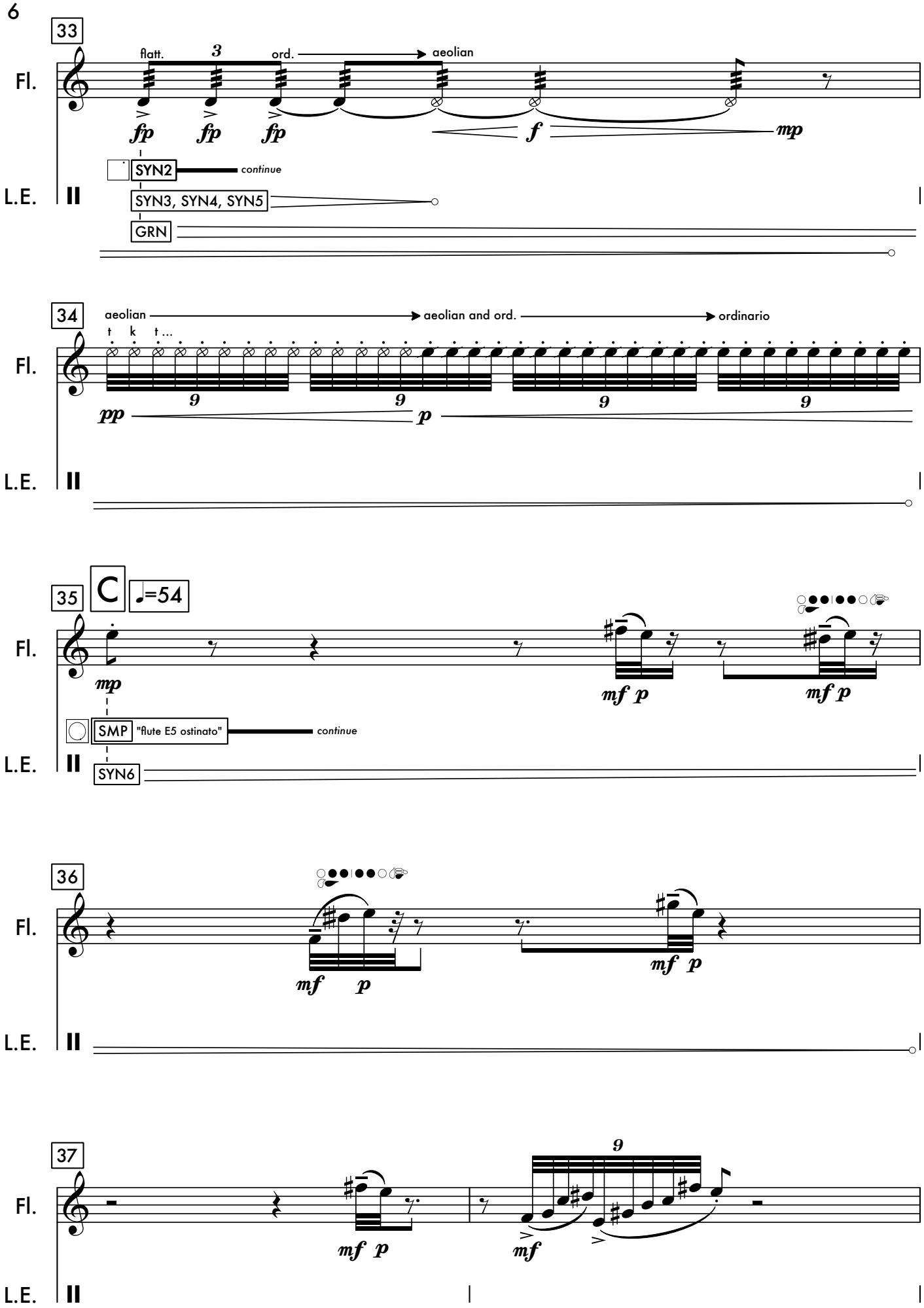





8
aeolian
5
7 t k t ...
aeolian and ord.
aeolian
Fl.
p
mp
p
L.E.
10
cover the mouthpiece
tongue ram
Fl.
mp
L.E.
12
mouthpiece covered flatt.
mouthpiece covered flatt.
uncover the mouthpiece
aeolian
Fl.
mf
p
L.E.
14
flatt.
aeolian
flatt.
aeolian
flatt.
slap
3
Fl.
mf
p
mp
pp
mf
SOMAX P1 off
L.E.
16
9
tr
Fl.
mf
pp
L.E.

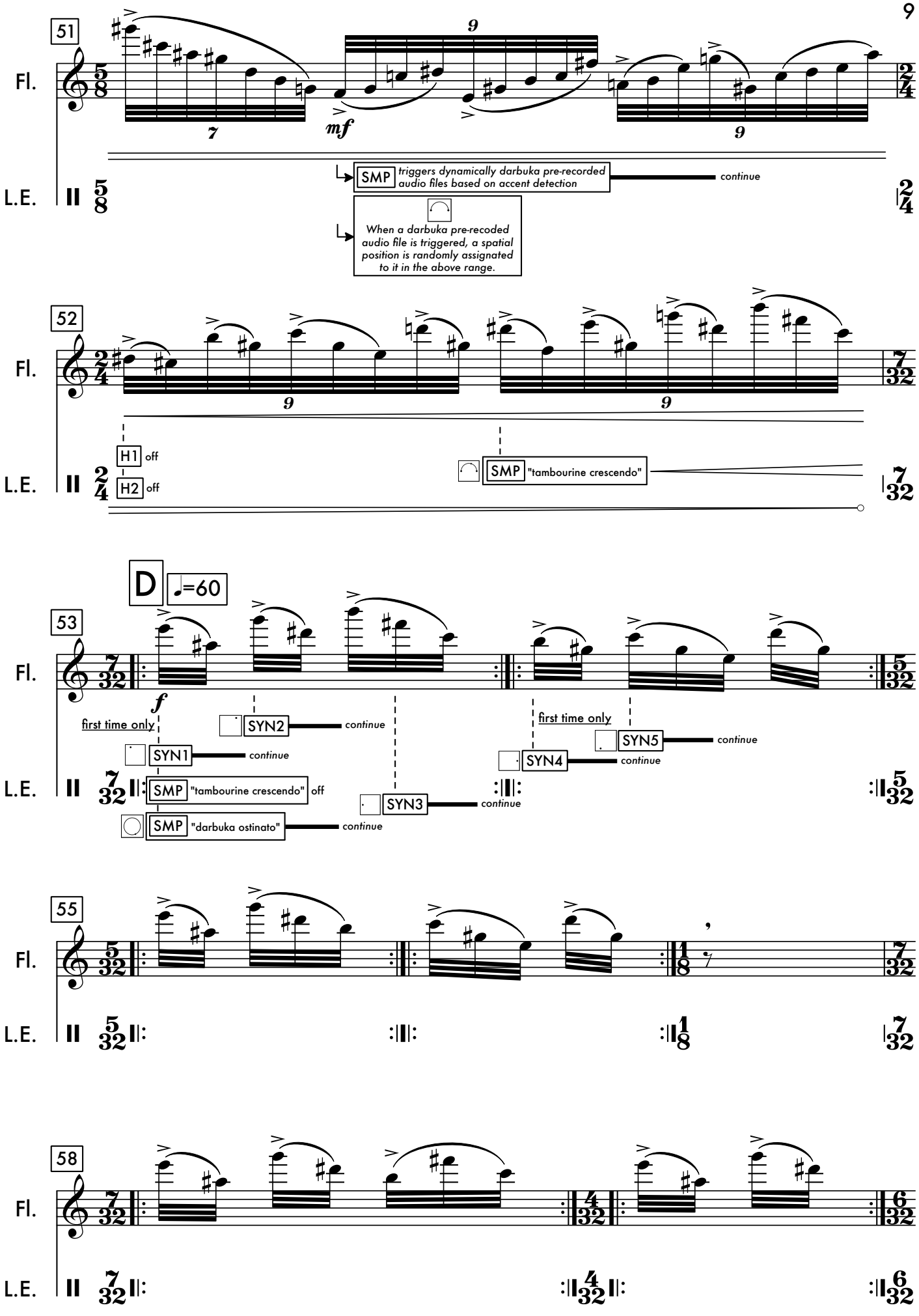

A
♩=58
18
Fl.
L.E.
aeolian and ord.
aeolian
aeolian and ord.
aeolian
aeolian and ord.
key percussion
SYN3 A4 continue
SYN4 B♭4 continue
GRN 100ms long grains of medium density
25ms attack and release
continue
20
aeolian and ord.
key perc.
aeolian and ord.
flatterzunge
aeolian and ord.
aeolian
SYN5 continue
22
ordinario
flatterzunge
ordinario
aeolian and ord.
key perc.
aeolian
flatterzunge
24
aeolian and ord.
aeolian
key percussion
cover the embouchure
tongue ram
key perc.
GRN 50ms long grains of medium density
25ms attack and release
continue
B
25
tongue ram
key perc.
blow inside the bore
flatterzunge
aeolian
key perc.
tongue ram
blow inside the bore
flatterzunge
aeolian

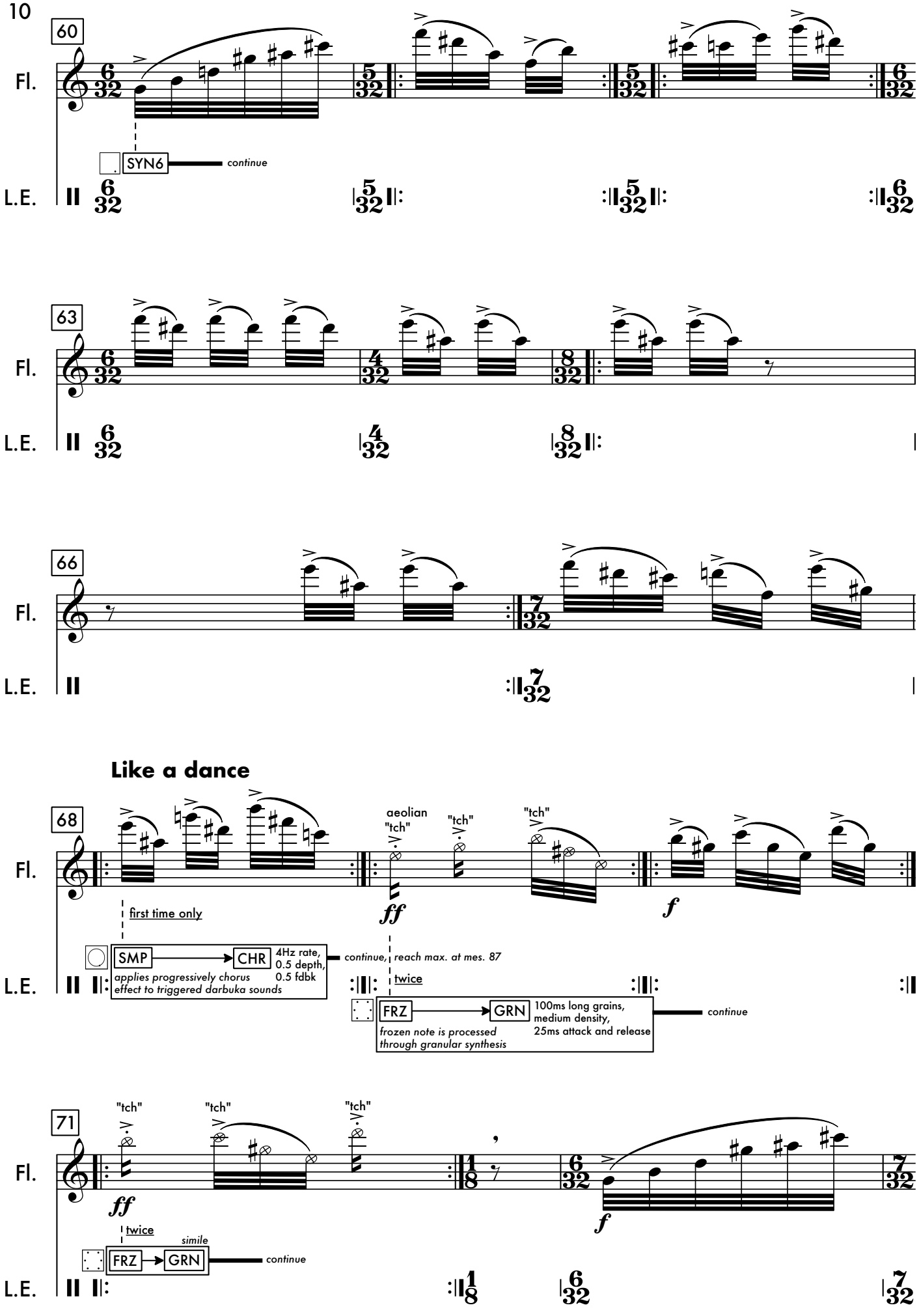

27
flatterzunge
aeolian
key perc.
uncover the
embouchure
Fl.
L.E.
28
flatt.
aeolian
key perc.
flatt.
aeolian
aeolian and ord.
mf
p
29
flatterzunge
ordinario
t k t ...
flatt.
mf
first time only
RVB off
GRN 100ms long grains of medium density
25ms attack and release
continue
SYN1
continue
second time only
SYN6 G6
continue
30
flatt.
gliss. emb.
flatterzunge
aeolian and ord.
slap
flatterzunge
aeolian and ord.
3
mf
32
t k t ...
9
9
6
f
p
mp
SOMAX P2 off
BELL 10ms attack, 50ms release, 1% dist.
24 first partials, fund. D2

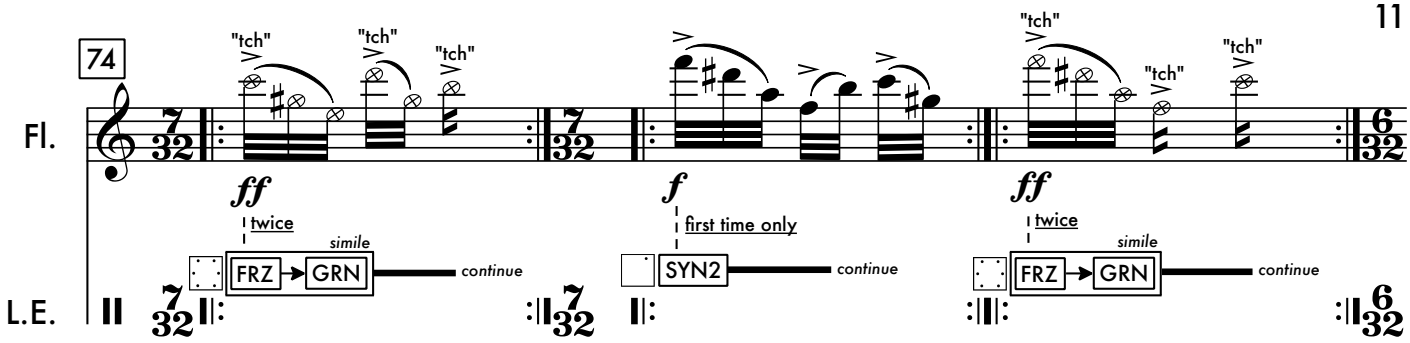

33
Fl.
flatt.
3
ord.
aeolian
fp
fp
fp
f
mp
L.E.
SYN2
continue
SYN3, SYN4, SYN5
GRN
34
aeolian
aeolian and ord.
ordinario
t k t ...
9
9
9
9
pp
p
35
C
♩=54
mp
mf p
mf p
SMP
"flute E5 ostinato"
continue
SYN6
36
mf p
mf p
37
9
mf p
mf

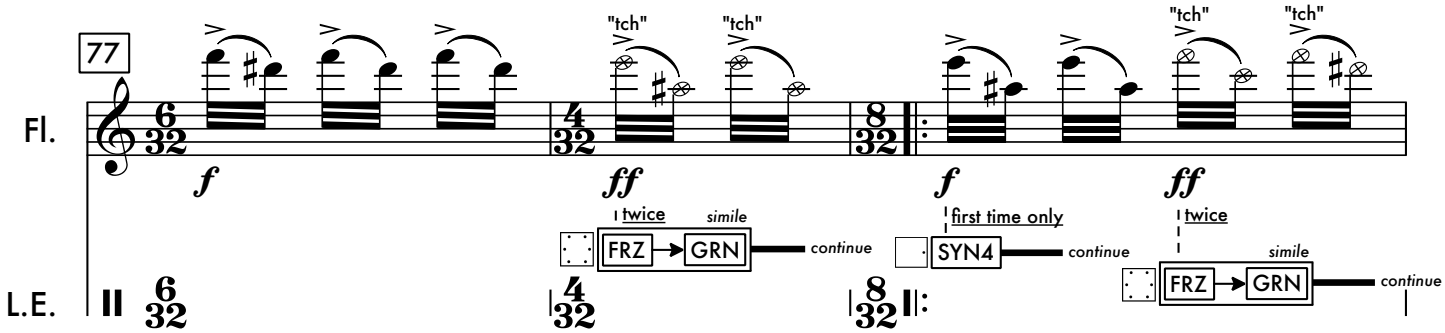

39
Fl.
L.E.
9
H1 +350cts transp.
1125ms delay
40
mf p
mf p
mf
9
H1 -450cts transp.
1125ms delay
continue
42
mf
9
mf p
SMP "flute F#5 ostinato"
continue
SMP "flute E5 ostinato"
off
H1 +150cts transp.
1125ms delay
43
mf
9
H1 +175cts transp., 1125ms delay
±100cts transp. mod.
continue
44
mf
9
9
H1 +255cts transp., 1125ms delay
±150cts transp. mod.
continue

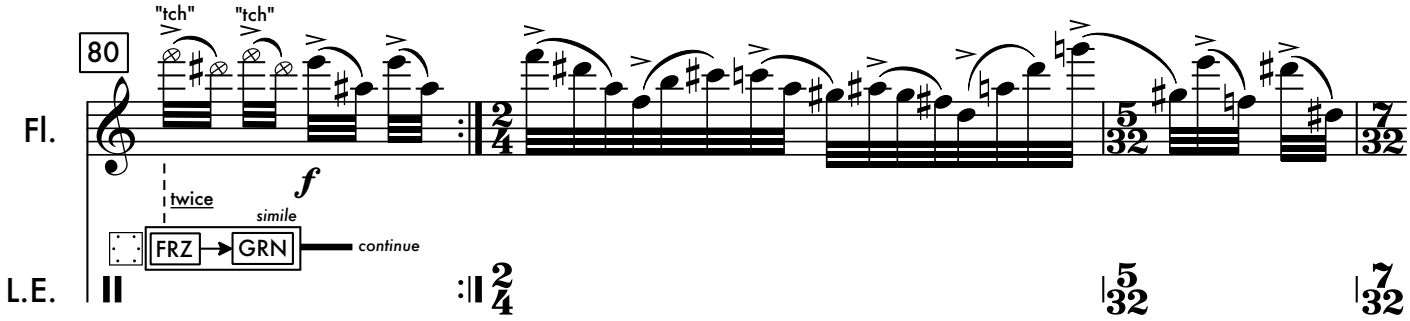

45
Fl.
mf
9
H1 +255cts transp., 1125ms delay ±50cts transp. mod.
continue
H2 -255cts transp., 563ms delay ±50cts transp. mod.
continue
L.E.
47
Fl.
9
L.E.
48
Fl.
mf
9
9
9
L.E.
49
Fl.
9
9
9
H1 +255cts transp., 1125ms delay ±150cts transp. mod.
continue
H2 -255cts transp., 563ms delay ±150cts transp. mod.
continue
L.E.
SYN1, SYN2
50
Fl.
9
9
9
9
SMP "flute F#5 ostinato"
L.E.

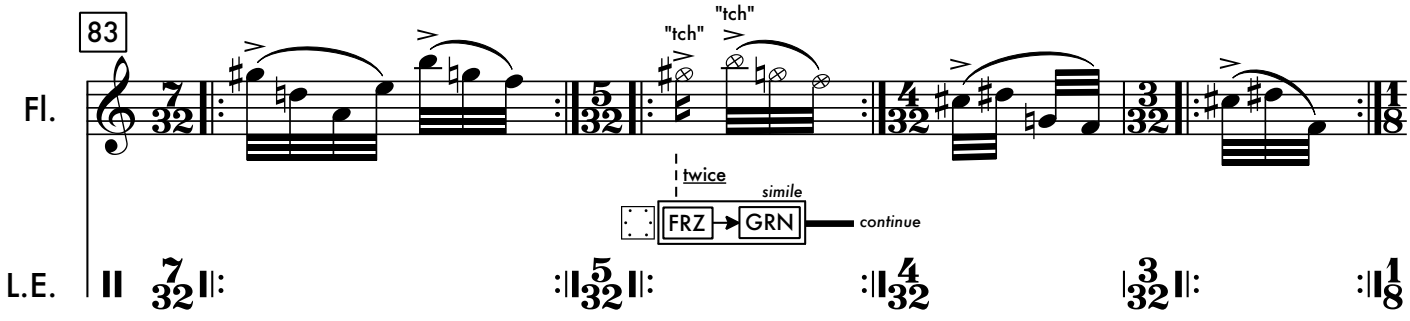

51
Fl.
L.E.
mf
SMP triggers dynamically darbuka pre-recorded audio files based on accent detection
continue
When a darbuka pre-recoded audio file is triggered, a spatial position is randomly assigned to it in the above range.
52
H1 off
H2 off
SMP "tambourine crescendo"
D
♩=60
53
f
first time only
SYN1 continue
SYN2 continue
SYN3 continue
SYN4 continue
first time only
SYN5 continue
SMP "tambourine crescendo" off
SMP "darbuka ostinato" continue
55
58

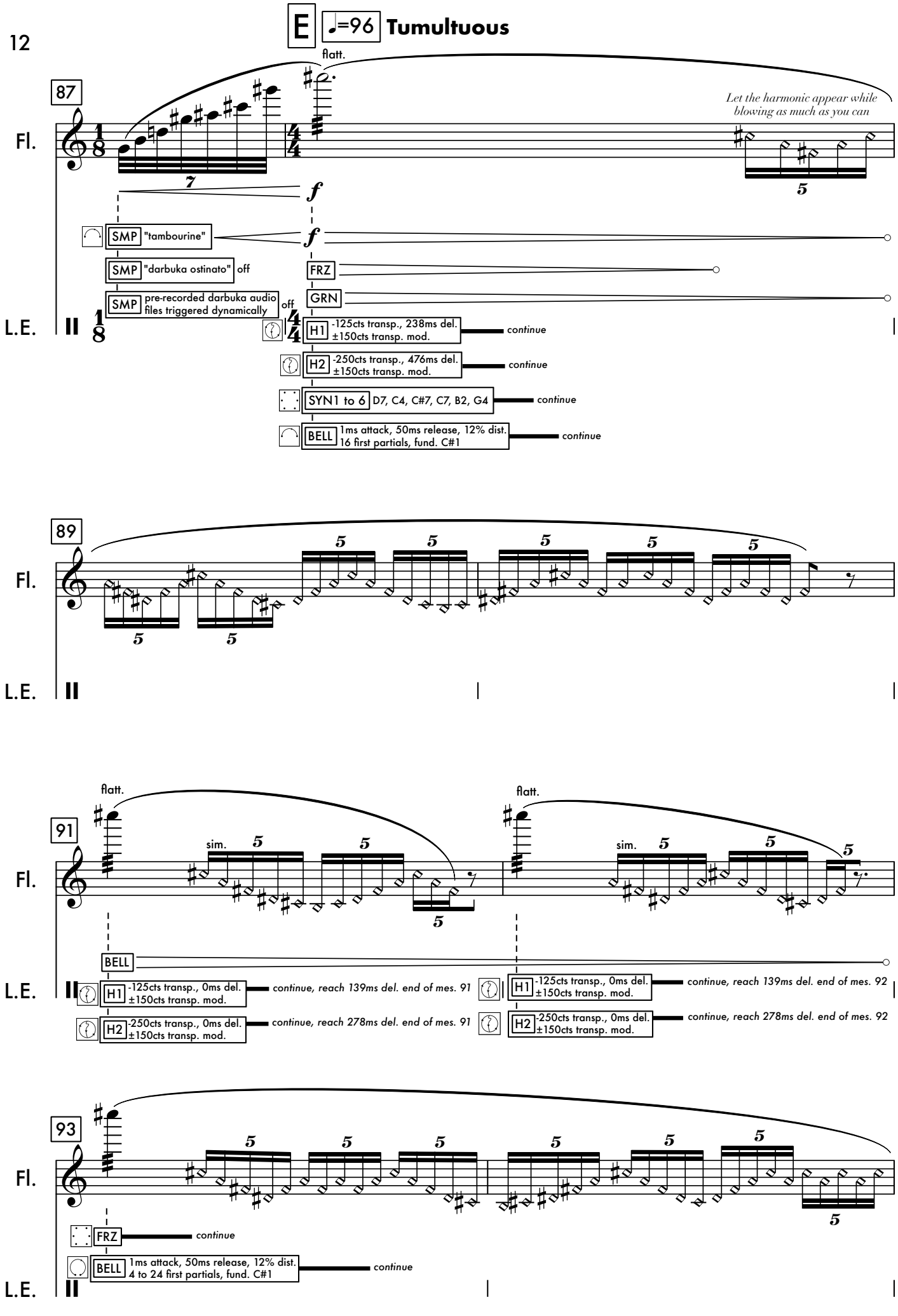

60
Fl.
SYN6
continue
L.E.
63
Fl.
L.E.
66
Fl.
L.E.
Like a dance
68
Fl.
aeolian
"tch"
"tch"
"tch"
ff
f
first time only
SMP
CHR
4Hz rate,
0.5 depth,
0.5 fdbk
applies progressively chorus
effect to triggered darbuka sounds
continue,
reach max. at mes. 87
twice
FRZ
GRN
100ms long grains,
medium density,
25ms attack and release
frozen note is processed
through granular synthesis
continue
L.E.
71
"tch"
"tch"
"tch"
ff
f
twice
simile
FRZ
GRN
continue
L.E.

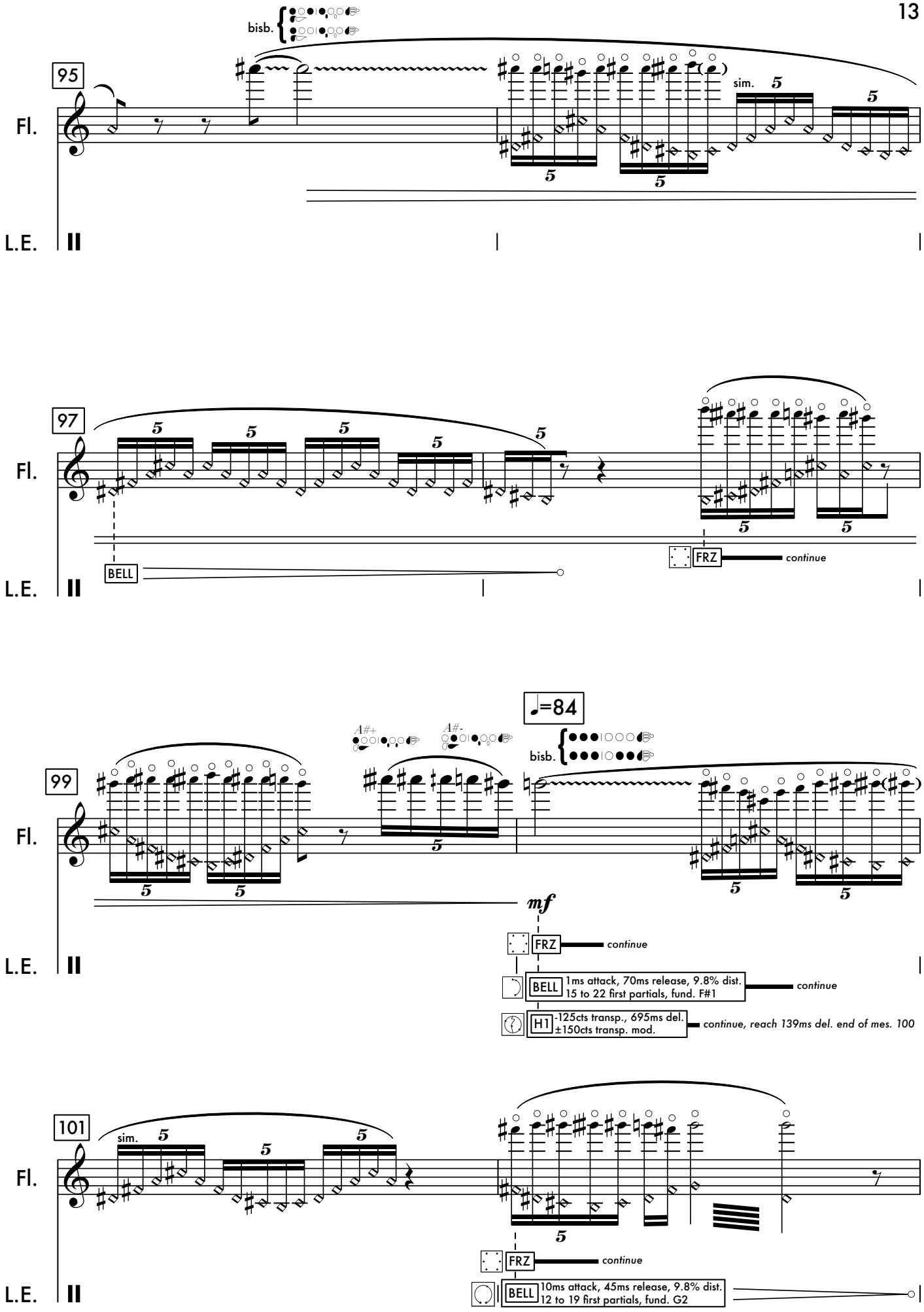

74
Fl.
"tch"
"tch"
"tch"
"tch"
"tch"
"tch"
ff
f
ff
twice
simile
FRZ
GRN
continue
first time only
SYN2
L.E.

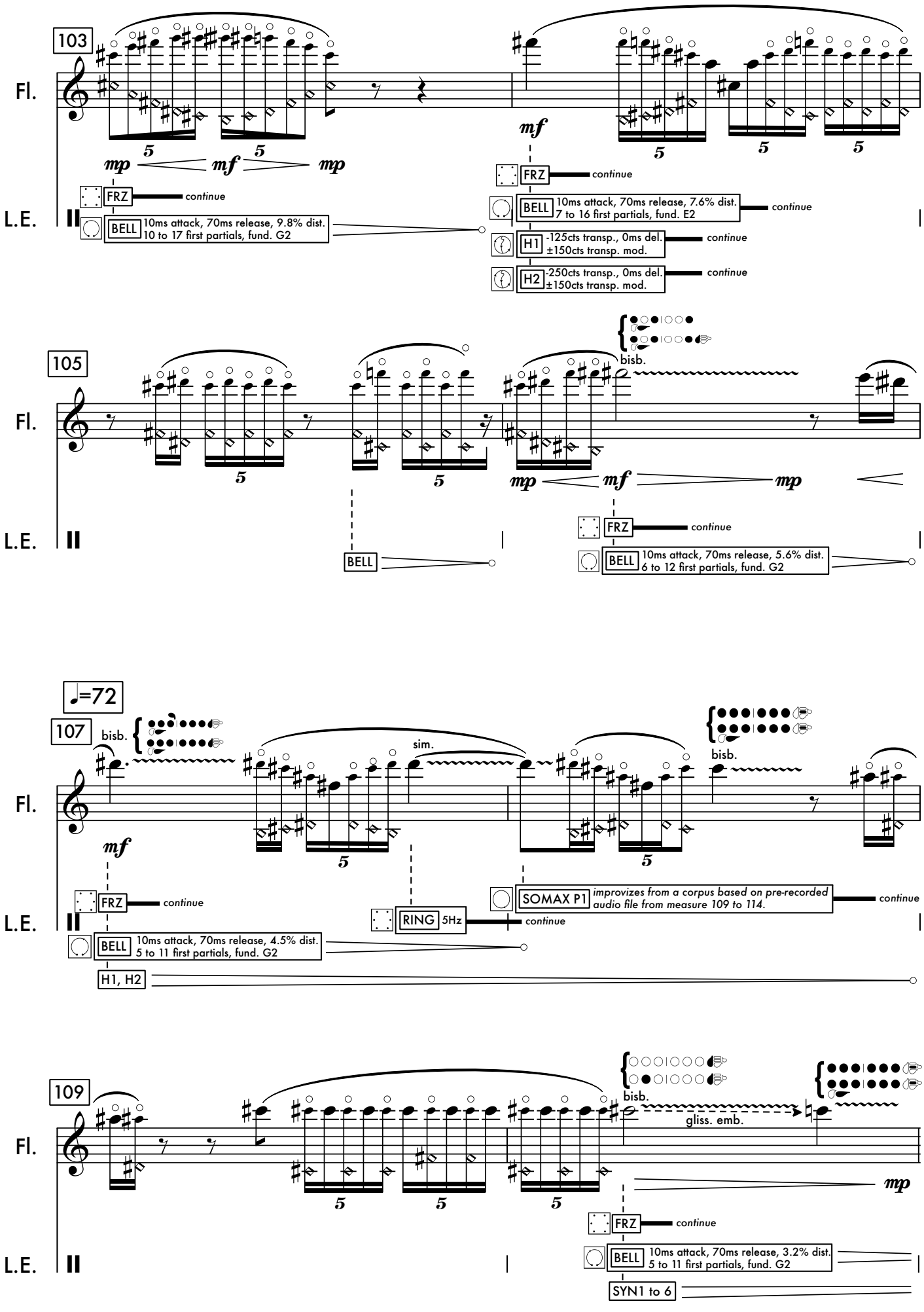

77
Fl.
"tch"
"tch"
"tch"
"tch"
f
ff
f
ff
twice
simile
FRZ
GRN
continue
first time only
SYN4
L.E.

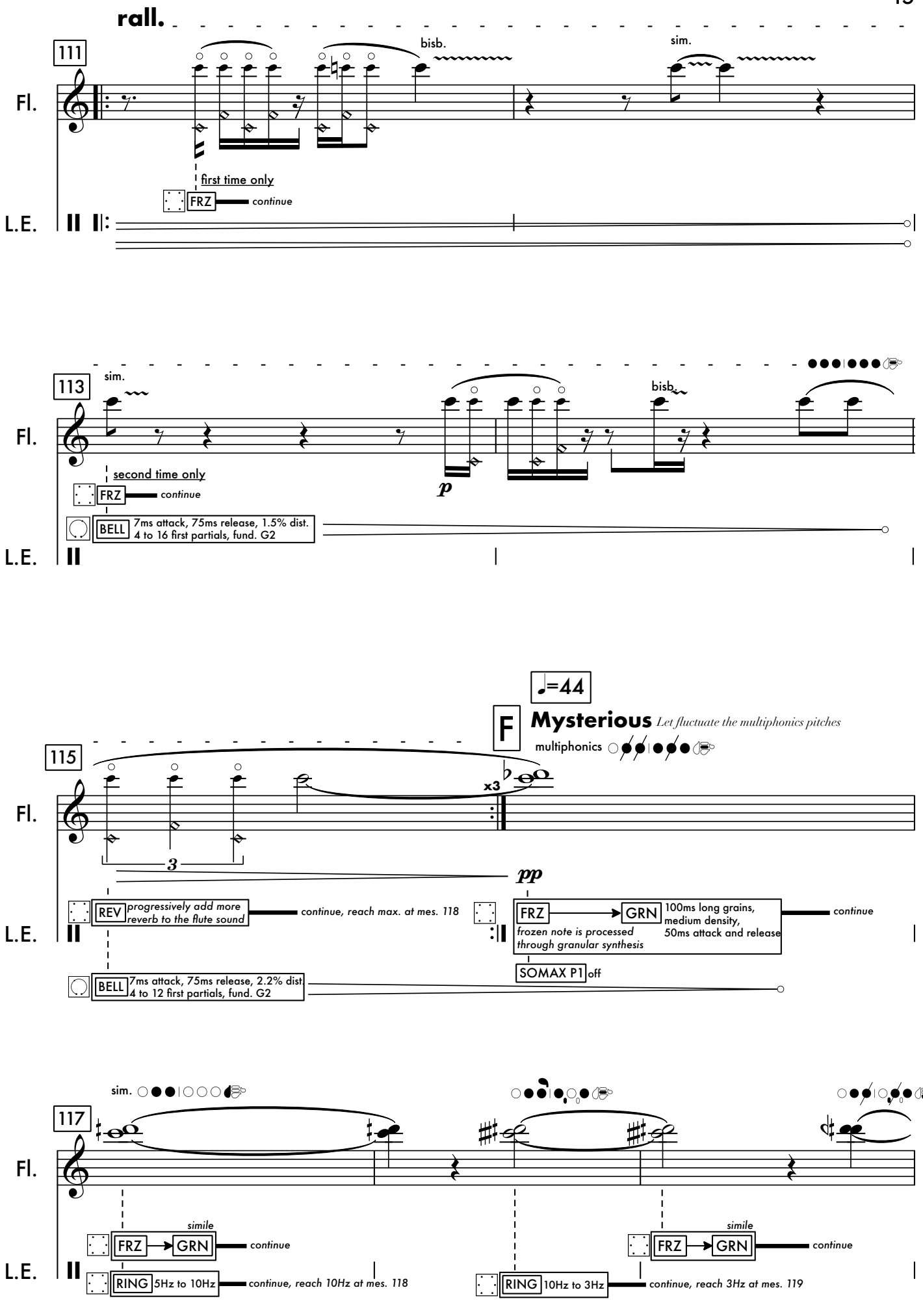

80
Fl.
"tch"
"tch"
f
twice
simile
FRZ
GRN
continue
L.E.

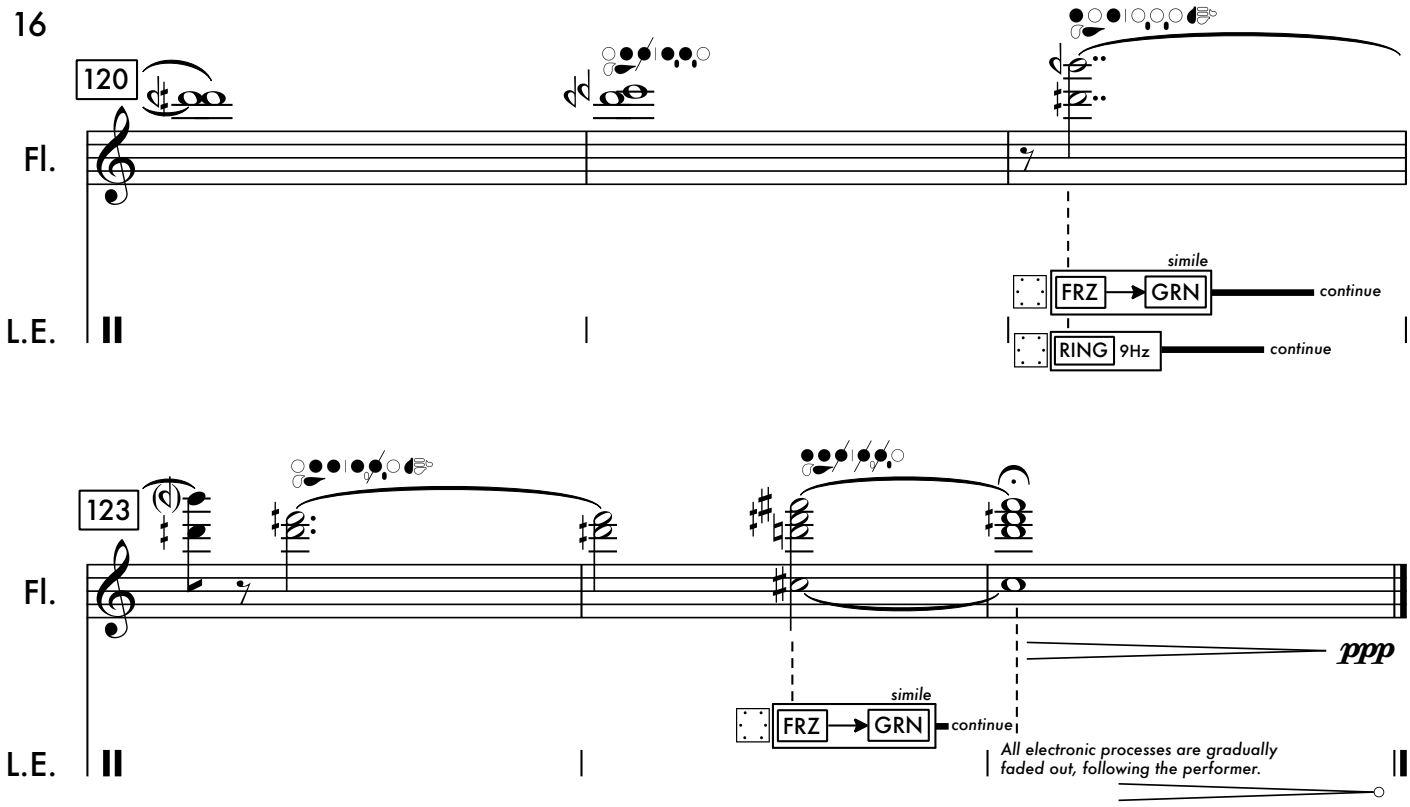

83
Fl.
"tch"
"tch"
twice
simile
FRZ
GRN
continue
L.E.


E
♩=96 Tumultuous
flatt.
87
Fl.
Let the harmonic appear while blowing as much as you can
f
SMP "tambourine"
SMP "darbuka ostinato" off
SMP pre-recorded darbuka audio files triggered dynamically off
FRZ
GRN
L.E.
H1 -125cts transp., 238ms del. ±150cts transp. mod. continue
H2 -250cts transp., 476ms del. ±150cts transp. mod. continue
SYN1 to 6 D7, C4, C#7, C7, B2, G4 continue
BELL 1ms attack, 50ms release, 12% dist. 16 first partials, fund. C#1 continue
89
91
sim.
BELL
H1 -125cts transp., 0ms del. ±150cts transp. mod. continue, reach 139ms del. end of mes. 91
H2 -250cts transp., 0ms del. ±150cts transp. mod. continue, reach 278ms del. end of mes. 91
H1 -125cts transp., 0ms del. ±150cts transp. mod. continue, reach 139ms del. end of mes. 92
H2 -250cts transp., 0ms del. ±150cts transp. mod. continue, reach 278ms del. end of mes. 92
93
FRZ continue
BELL 1ms attack, 50ms release, 12% dist. 4 to 24 first partials, fund. C#1 continue


95
bisb.
sim.
Fl.
L.E.
97
BELL
FRZ
continue
99
A#+
A#-
bisb.
♩=84
mf
FRZ
continue
BELL
1ms attack, 70ms release, 9.8% dist.
15 to 22 first partials, fund. F#1
continue
H1
-125cts transp., 695ms del.
±150cts transp. mod.
continue, reach 139ms del. end of mes. 100
101
sim.
FRZ
continue
BELL
10ms attack, 45ms release, 9.8% dist.
12 to 19 first partials, fund. G2


103
Fl.
mp
mf
mp
mf
FRZ
continue
BELL
10ms attack, 70ms release, 9.8% dist.
10 to 17 first partials, fund. G2
BELL
10ms attack, 70ms release, 7.6% dist.
7 to 16 first partials, fund. E2
continue
H1
-125cts transp., 0ms del.
±150cts transp. mod.
continue
H2
-250cts transp., 0ms del.
±150cts transp. mod.
continue
L.E.
105
Fl.
bisb.
mp
mf
mp
FRZ
continue
BELL
BELL
10ms attack, 70ms release, 5.6% dist.
6 to 12 first partials, fund. G2
L.E.
♩=72
107
Fl.
bisb.
sim.
bisb.
mf
FRZ
continue
RING
5Hz
continue
SOMAX P1
improvizes from a corpus based on pre-recorded audio file from measure 109 to 114.
continue
BELL
10ms attack, 70ms release, 4.5% dist.
5 to 11 first partials, fund. G2
H1, H2
L.E.
109
Fl.
bisb.
gliss. emb.
mp
FRZ
continue
BELL
10ms attack, 70ms release, 3.2% dist.
5 to 11 first partials, fund. G2
SYN1 to 6
L.E.


rall.
111
bisb.
sim.
Fl.
first time only
FRZ
continue
L.E.
113
sim.
bisb.
Fl.
second time only
FRZ
continue
p
BELL
7ms attack, 75ms release, 1.5% dist.
4 to 16 first partials, fund. G2
L.E.
♩=44
F
Mysterious
Let fluctuate the multiphonics pitches
multiphonics
115
x3
Fl.
3
pp
REV
progressively add more reverb to the flute sound
continue, reach max. at mes. 118
FRZ
GRN
100ms long grains, medium density, 50ms attack and release
frozen note is processed through granular synthesis
continue
SOMAX P1
off
BELL
7ms attack, 75ms release, 2.2% dist.
4 to 12 first partials, fund. G2
L.E.
sim.
117
Fl.
simile
FRZ
GRN
continue
RING
5Hz to 10Hz
continue, reach 10Hz at mes. 118
simile
FRZ
GRN
continue
RING
10Hz to 3Hz
continue, reach 3Hz at mes. 119
L.E.


120
Fl.
L.E.
simile
FRZ
GRN
continue
RING
9Hz
continue
123
Fl.
ppp
simile
FRZ
GRN
continue
L.E.
All electronic processes are gradually faded out, following the performer.