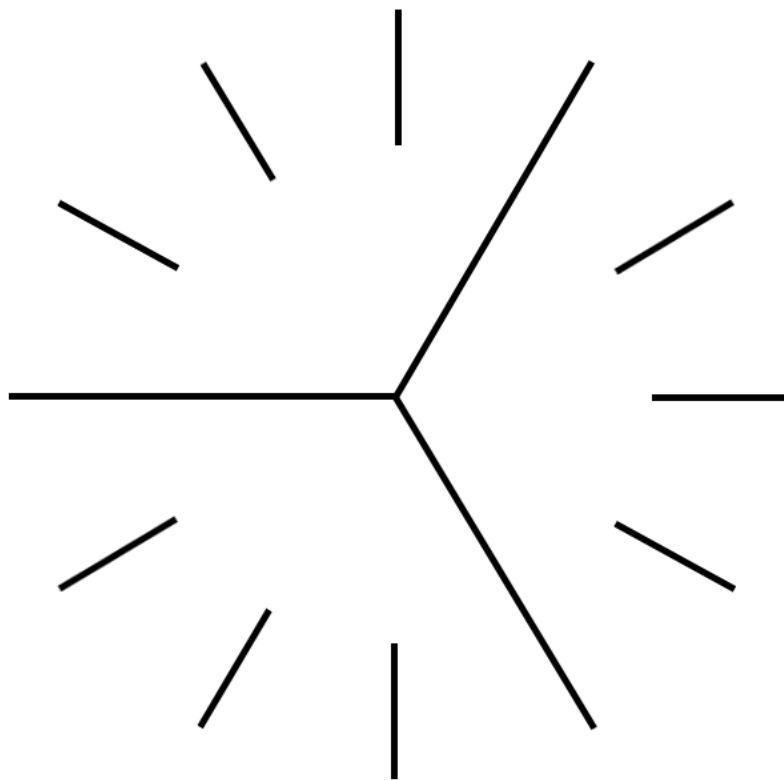


Giant Steps

for percussion trio & live electronics

Kier Hall

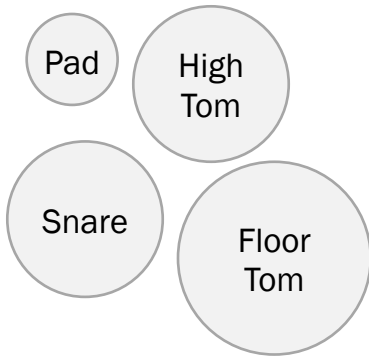


Giant Steps

Duration: c. 6 minutes

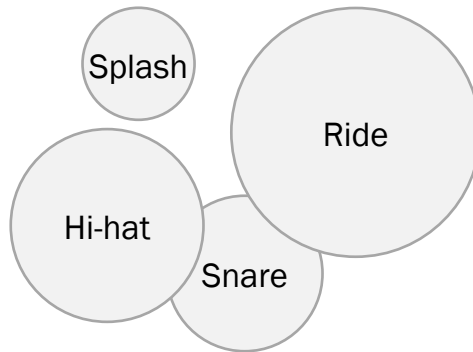
Percussion 1

Drumsticks
Brushes (wooden handles)
Mute (wallet / foam block)



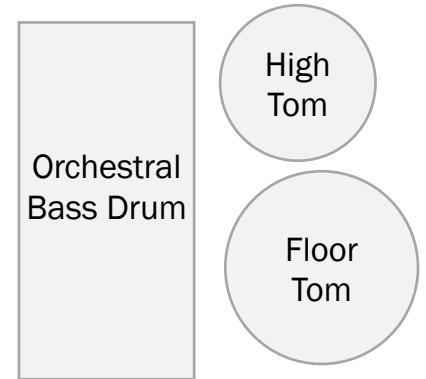
Percussion 2

Drumsticks
Vibraphone mallets
Chain for ride



Percussion 3

Drumsticks
Timpani beaters
Mute (wallet / foam block)

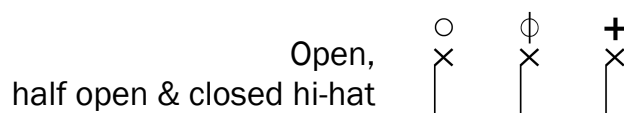
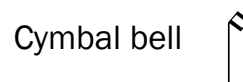
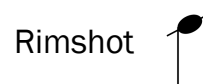
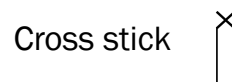
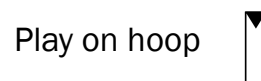
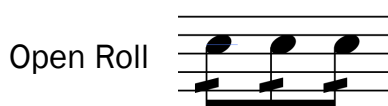
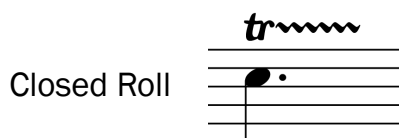
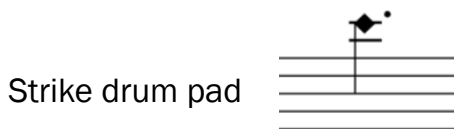


Electronic Equipment Required

Microphone, MIDI drum pad, Computer with Pure Data (vanilla) installed, *Giant Steps* electronic resource folder. Pure Data will require the following extensions: list-abs, maxlib, cyclone and freeverb.

Preparation

- Connect drum pad and microphone to Pure Data.
- Position microphone at percussion 1's snare head.
- Load *giantsteps.pd*.
- Enable audio processing (DSP on) in PD.
- Set mic threshold on the main page of the patch.
- Press 'Reset' to move the trigger counter back to zero (the start of the piece).
- To run the patch from partway through, select one of the letters in the 'Rehearsal Marks' box.



Programme Note

Giant Steps, written for three human percussionists and three virtual percussionists, is based on the 1959 John Coltrane standard of the same name. Over six minutes, the human percussionists interact with the virtual percussionists and vice-versa, offering both notated and improvised interplay. Each virtual percussionist has twenty six percussion instruments, each tuned to a different pitch. Together with the human percussionists, they reassemble modes and chords written by Coltrane and give their interpretation of the standard.

Giant Steps

Kier Hall

♩. = c. 140

Patch $\frac{12}{8}$ *sim.*

High Tom
Snare Drum
Floor Tom

Splash
Hi Hat
Ride
Snare Drum

High Tom
Floor Tom
Bass Drum

sticks snares on

sticks snares off

timpani mallets

ppp *p* *ppp*

ff *ppp* *mp*

ppp *mf*

f

5

P.

1.

2.

3.

p *pp* *fp*

p *pp* *fp*

p *pp* *fp*

tr *tr*

vibraphone mallets

to vib. mallets

8

P.

1.

2.

3.

ff *ppp*

ff *ppp*

(tr) *out of time* *sim.*

ff *p*

(tr) *to sticks*

ff *ppp*

2

11 *sim.*

P. *ffff* *p* *ppp*

1. *ff* *ppp* *mf* *ppp*
mute cymbals (vib. mallets) *to sticks* *sticks*
 4:6 5:6

2. *sticks* *p* *mf* *p* *f*

3. *p* *f* *p* *pp*

15

P. *sim.*

1. *p* *ff* *p*

2. *p* *f*

3. *mp* *ppp*
to timp. mallets

19

P. *sim.*

1. *mf* *p* *f* *p*
4:6 4:6 4:6 *to vib. mallets*

2. *p* *mp* *p* *ppp* *to sticks*

3. *p* *f* *p*

23

P. *ff*

1. *ff* *out of time* *sim.*
p

2. *p* *ff* *out of time* *sim.*
f

3. *f* *pp*
vibraphone mallets *to timp. mallets*

26

P. *p* *fppp*

1. *p*

2. *mute cymbals to sticks*

3. *timp. mallets*
p *f* *p*

29

P. *p* *ppp* *sim.*

1. *mp* *ppp* *4:6* *4:6* *p* *5:6* *5:6* *f* *5:6* *p*

2. *ff* *p*

3. *p* *f* *p*

33

P. *f* *mp* *p* *ff* *ppp*

1. *f* *mp* *p* *ff* *ppp*

2. *ppp* *f* *ppp*

3. *(tr)* *to sticks* *sticks* *f* *p* *4:6* *4:6* *4:6*

A

Musical score for measures 37-40, section A. The score is divided into four parts: P., 1., 2., and 3. Part P. features a series of notes with a dynamic marking of *ff* that transitions to *p*. Part 1. begins with a *mp* dynamic and includes a section marked "out of time" with a *p* dynamic, followed by a *sim.* section. Part 2. starts with a *ff* dynamic and includes a section marked "out of time" with a *f* dynamic, followed by a *sim.* section. Part 3. features a rhythmic pattern with time signatures 4:6, 4:6, 4:6, and 5:6, with dynamics *ff*, *p*, and *ff*. It also includes a section marked "out of time" with a *p* dynamic, followed by a *sim.* section.

Musical score for measures 40-43, section A. Part P. continues with a *ff* dynamic that transitions to *p*. Parts 1., 2., and 3. consist of rhythmic patterns indicated by diagonal slashes, suggesting a consistent rhythmic accompaniment throughout these measures.

B

Musical score for measures 43-46, section B. Part P. starts with a *p* dynamic, transitions to *fppp*, and then back to *p*. Part 1. features a *ff* dynamic and includes a section with a 4:6 time signature. Part 2. includes a section with a *ppp* dynamic that transitions to *ff*. Part 3. starts with a *p* dynamic and includes a section with a *f* dynamic. The score includes various time signatures such as 4:6 and 5:6.

46 *sim.*

P.

1.

2.

3.

50

P.

1.

2.

3.

54

P.

1.

2.

3.

6
58

P.

C

ff *p*

1.

2.

3.

ff *p*

ff *p*

ff *p*

out of time

out of time

out of time

Continue to improvise over approx. twenty seconds. Reduce activity/energy as you approach the next section. The patch will behave similarly.

D

♩. = c.150

Snare mic. triggers delay effect from the patch.
Delay will start with quavers and move to more complex beat divisions as the section proceeds.

60

P.

mp *mp*

RH: stick (over the snare)
LH: stick (cross-stick position, muting snare head)

1.

2.

3.

mp *p*

mp *p*

65

P.

1.

2.

3.

ppp *f* *ppp*

ppp *mp* *ppp*

on hoop

mute toms

69

P.

1.

2.

3.

73

P.

1.

2.

3.

77

P.

1.

2.

3.

81

P.

1.

2.

3.

P.

1.

2.

3.

add mute to snare

P.

1.

2.

3.

P.

1.

2.

3.

to sticks

sticks

4:6

P.

1.

2.

3.

to vib. mallets

vibraphone mallets

4:6

101

P.

1.

2.

3.

ff *p* *f* *p*

105

P.

1.

2.

3.

mp *p* *f* *ppp* *mp* *ff*

remove snare mute
to sticks
snare on
sticks

110

P.

1.

2.

3.

f *f* *ppp* *f* *p* *ff* *p*

snare off
timpani mallets

114

P.

1.

2.

3.

ppp *mp* *p* *mf* *f*

P.

1.
f ————— *p* *mp* *f* *5:6* *p*

2.
ff ————— *mp* *pp*

3.
p ————— *f*

to sticks sticks

P.

1.
f *4:6* *5:6* *5:6* *p* *pp*

2.
f ————— *pp* *ppp*

3.
pp *5:6* *5:6* *4:6* *4:6* *4:6* *ff*

P.

1.
f

2.
ff *4:6* *4:6* *ppp* *mf*

3.
p *ppp* *ppp*

to timp. mallets timpani mallets *tr*

P.

1.
ff *5:6*

2.
f *ff* *p* *4:6*

3.
f

tr

133

E patch solo

P.

1.

2.
to brushes
with shoulder
to vib. mallets
remove chain from ride

3.
4:6
ff
p

137

P.

1.
brushes

2.
vibraphone mallets

3.
slow roll, accel.
tr

141

P.

1.
ppp

2.
f
mp

3.
rit.
tr
to sticks

145

P.

1.
mp

2.
ppp

3.
p

P.

1.

2.

3.

P.

1.

2.

3.

P.

1.

2.

3.

P.

1.

2.

3.

165 **F** ♩ = c.160

P. $\frac{4}{4}$

1. $\frac{4}{4}$ *fff*

2. $\frac{4}{4}$ *fff* *p* *fp* *f* *mp*

3. $\frac{4}{4}$ *fff* *p* *fff* *p*

169

P. $\frac{4}{4}$

1. $\frac{4}{4}$ *f* *fff*

2. $\frac{4}{4}$ *f* *p* *fff*

3. $\frac{4}{4}$ *f* *p* *ff* *p* *fff*

Annotations: *snare off*, *mute cymbals*

Appendix A: Patch Notes Interface

Mode

- B ion
- D mix
- G ion
- Bb mix
- Eb ion
- A dor
- D mix
- G ion
- Bb mix
- Eb ion
- Fs mix
- B ion
- F dor
- Bb mix
- Eb ion
- A dor
- D mix
- G ion
- Cs dor
- Fs mix
- B ion
- F dor
- Bb mix
- Eb ion
- Cs dor
- Fs mix

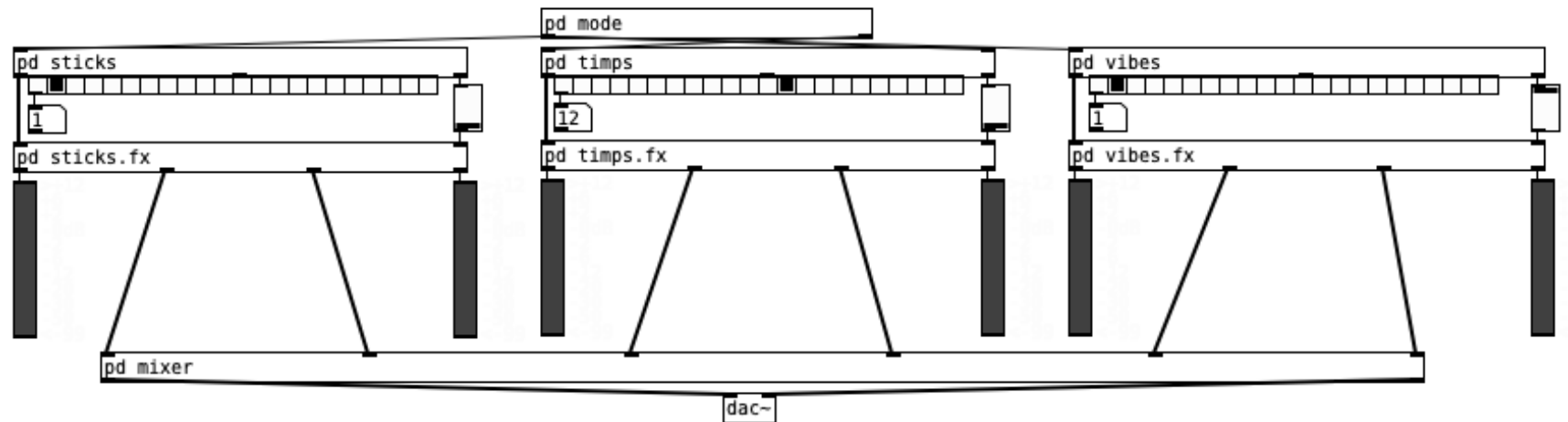
Interface

Mic Threshold

Patch Overall VU

Rehearsal Marks

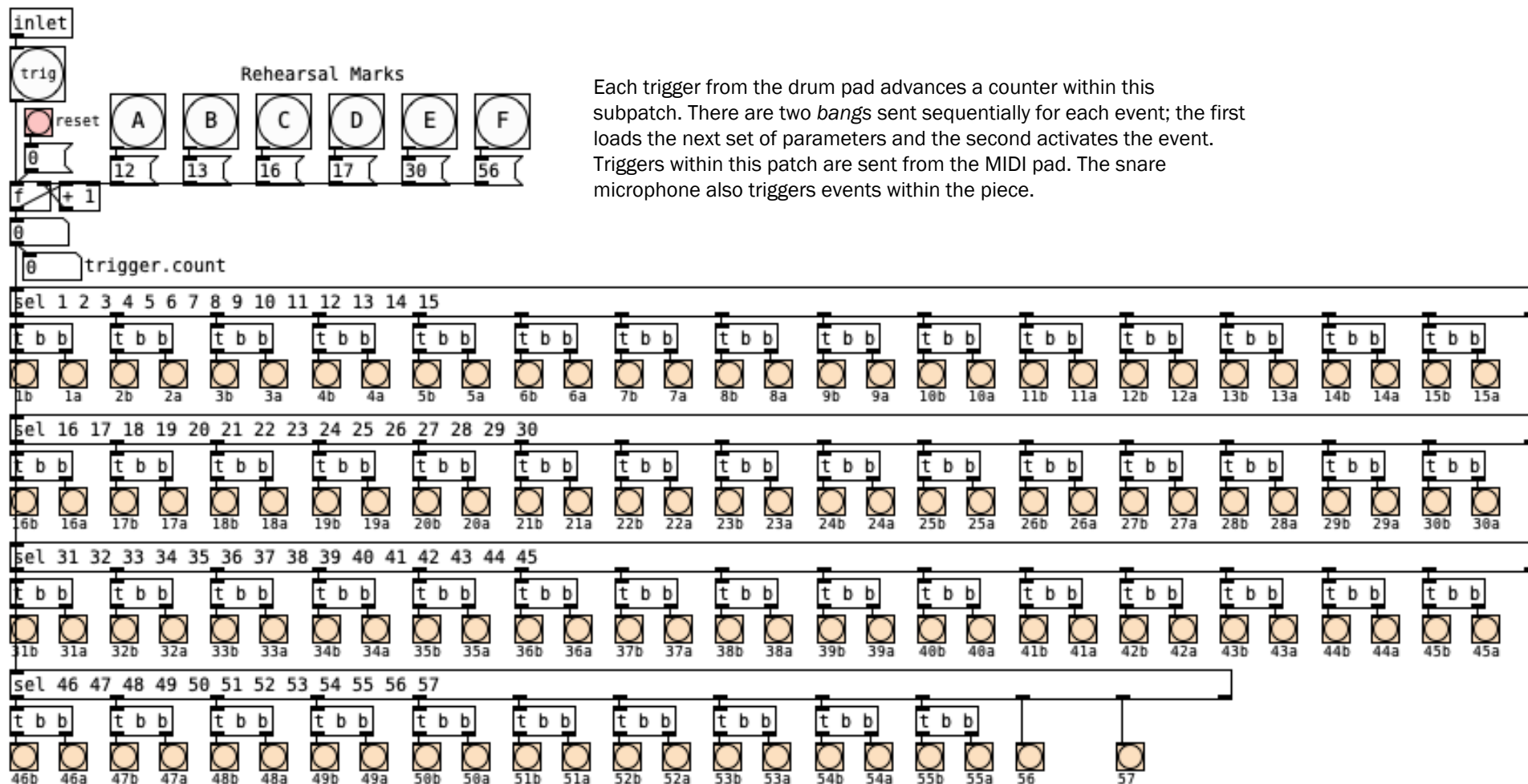
The performance can be rehearsed from different points by selecting one of these letters that correspond to rehearsal marks on the score.



The signal from the snare drum microphone is converted to a *bang* atom when it crosses a threshold (1). This allows the snare drum to activate events in the piece.

Each virtual instrument (*sticks*, *timps* and *vibes*) has its own signal pathway to the mixer.

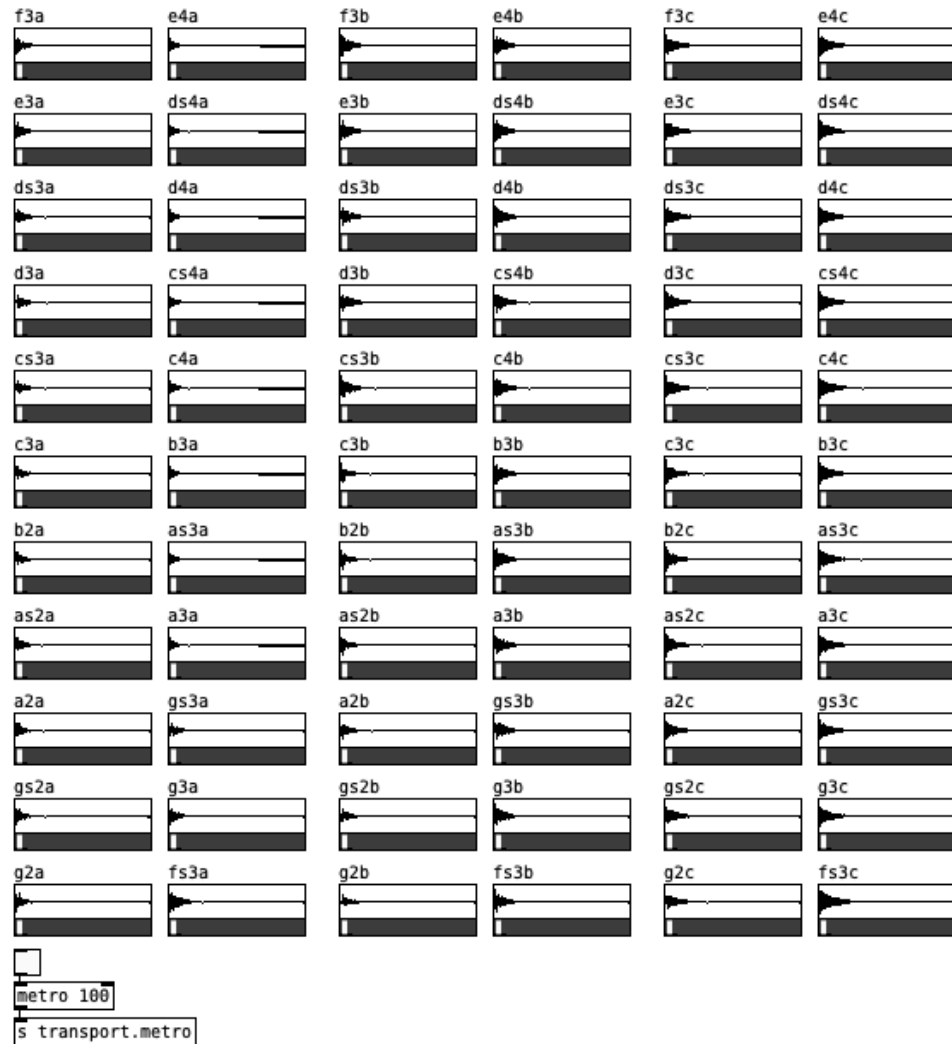
pd trigger



Each trigger from the drum pad advances a counter within this subpatch. There are two *bangs* sent sequentially for each event; the first loads the next set of parameters and the second activates the event. Triggers within this patch are sent from the MIDI pad. The snare microphone also triggers events within the piece.

pd tables

This patch loads audio samples and tabulates mode data to be interpreted by the patch throughout the piece.



```

loadbang
;
b.ion 0 1 3 4 6 8 9 11 13 15 16 18 20
table b.ion 12 0 0 1 0 1 0 1 0 1 1 0 1

loadbang
;
d.mix 0 0 2 4 5 7 9 11 12 14 16 17 19 21
table d.mix 13 0 1 0 1 1 0 1 0 1 0 1 1

loadbang
;
g.ion 0 0 2 4 5 7 9 11 12 14 16 17 19 21
table g.ion 13 1 0 1 0 1 0 1 1 0 1 0 1

loadbang
;
bb.mix 0 0 1 3 5 7 8 10 12 13 15 17 19 20
table bb.mix 13 0 1 1 0 1 0 1 0 1 1 0 1

loadbang
;
eb.ion 0 0 1 3 5 7 8 10 12 13 15 17 19 20
table eb.ion 13 1 0 1 0 1 1 0 1 0 1 0 1

loadbang
;
a.dor 0 0 2 4 5 7 9 11 12 14 16 17 19 21
table a.dor 13 1 1 0 1 0 1 0 1 1 0 1 0

loadbang
;
fs.mix 0 1 3 4 6 8 9 11 13 15 16 18 20
table fs.mix 12 0 1 0 1 0 1 1 0 1 0 1 0

loadbang
;
f.dor 0 0 1 3 5 7 8 10 12 13 15 17 19 20
table f.dor 13 0 1 0 1 0 1 1 0 1 0 1 0

loadbang
;
cs.dor 0 1 3 4 6 8 9 11 13 15 16 18 20
table cs.dor 12 1 0 1 1 0 1 0 1 0 1 1 0

loadbang
;
b.maj7 0 4 8 11 15
table b.maj7 4

loadbang
;
d.7 0 7 11 14 17
table d.7 4

loadbang
;
g.maj7 0 0 4 7 11
table g.maj7 4

loadbang
;
bb.7 0 3 7 10 13
table bb.7 4

loadbang
;
eb.maj7 0 8 12 15 19
table eb.maj7 4

loadbang
;
a.min7 0 2 5 9 12
table a.min7 4

loadbang
;
fs.7 0 11 15 18 21
table fs.7 4

loadbang
;
f.min7 0 10 13 17 20
table f.min7 4

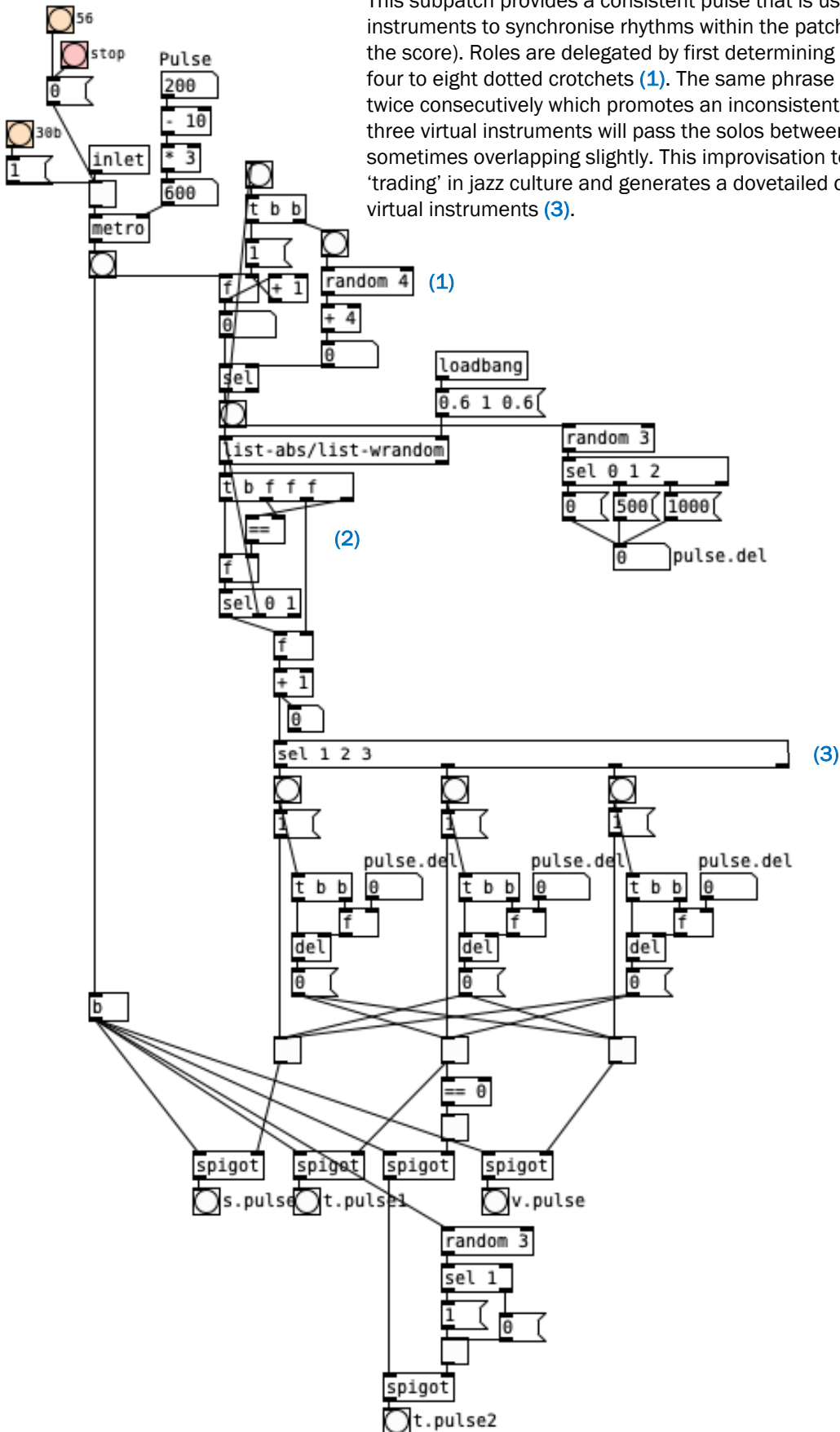
loadbang
;
cs.min7 0 6 9 13 16
table cs.min7 4

loadbang
;
0.8 0.85 0.9 1
s dr.amp.1 s dr.amp.2 s dr.amp.3 s dr.amp.4
;
b.ion 0 4 6 8 9 11 13 15
;
d.mix 0 7 9 11 12 14 16 17
;
g.ion 0 0 2 4 5 7 9 11
;
bb.mix 0 3 5 7 8 10 12 13
;
eb.ion 0 8 10 12 13 15 17 19
;
a.dor 0 2 4 5 7 9 11 12
;
fs.mix 0 11 13 15 16 18 20 21
;
f.dor 0 10 12 13 15 17 19 20
;
cs.dor 0 6 8 9 11 13 15 16

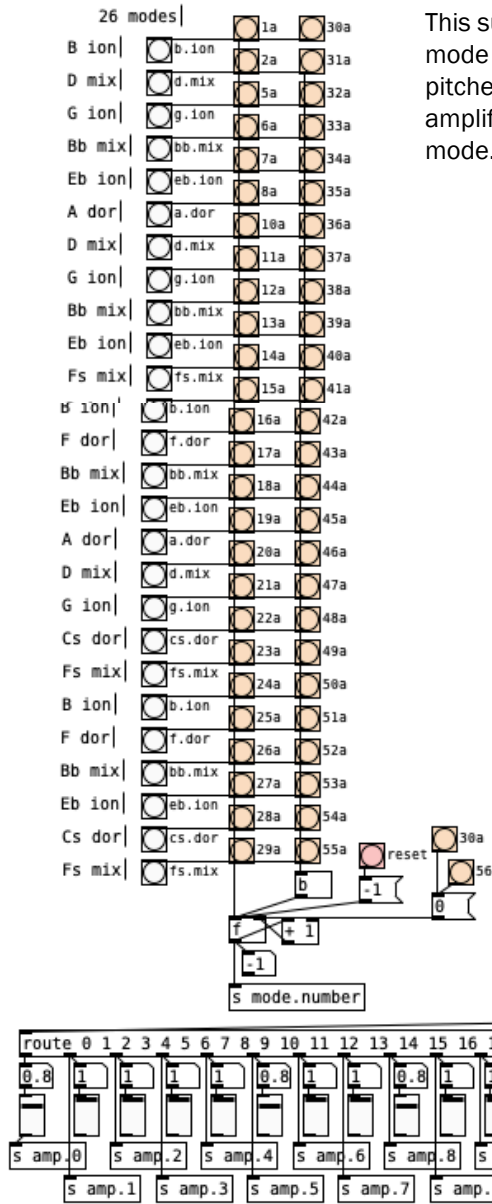
```

pd pulse

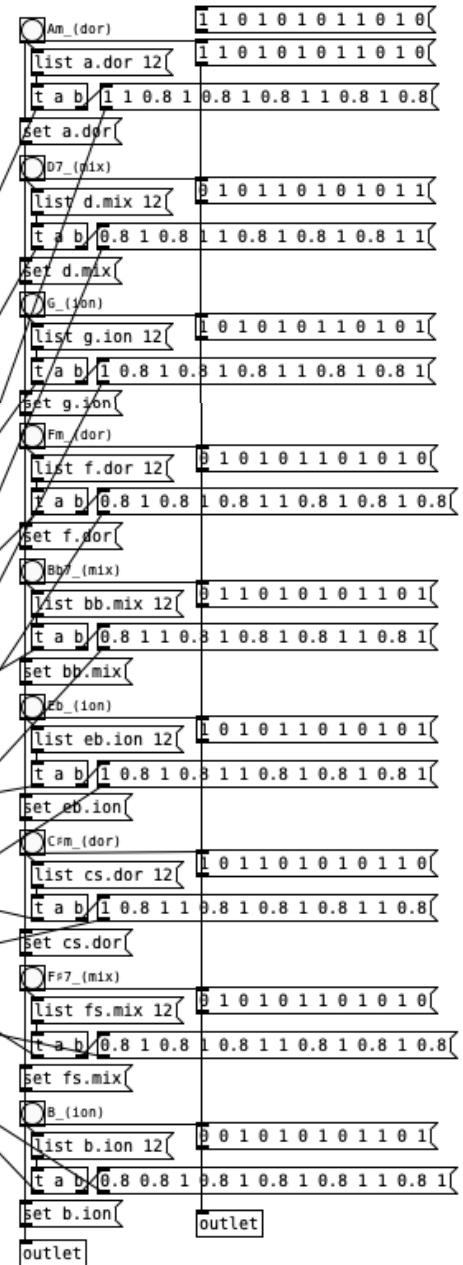
This subpatch provides a consistent pulse that is used by the virtual instruments to synchronise rhythms within the patch solo section (letter E on the score). Roles are delegated by first determining a phrase length from four to eight dotted crotchets (1). The same phrase length is never selected twice consecutively which promotes an inconsistent, natural sound (2). The three virtual instruments will pass the solos between one another, sometimes overlapping slightly. This improvisation technique resembles 'trading' in jazz culture and generates a dovetailed dialogue between the virtual instruments (3).



pd mode

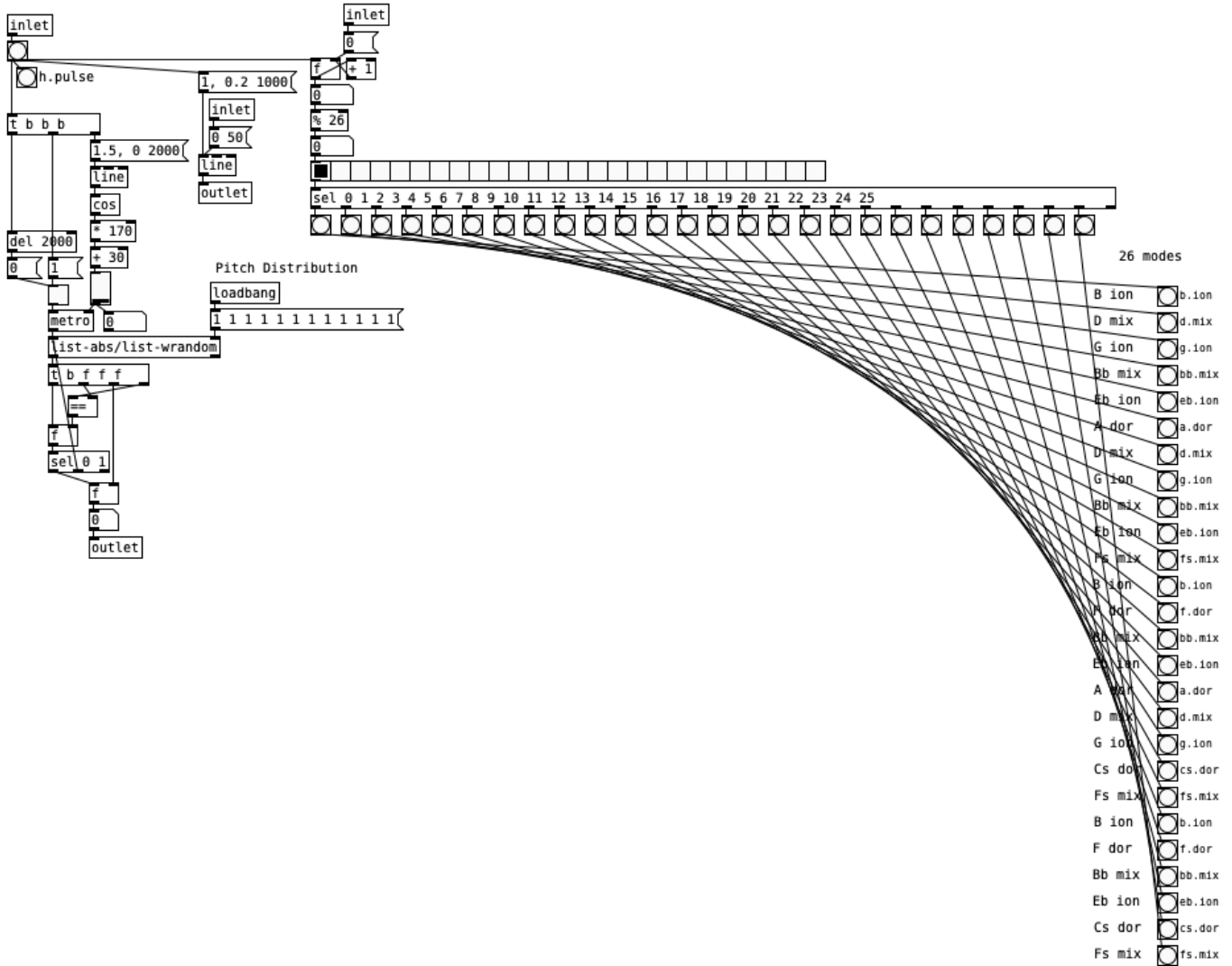


This subpatch governs the mode used within the piece. When a mode is called (dictated by the subpatch, *pd trigger*), the pitches from the active mode are routed through independent amplifier stages to allow chord tones to be accented within the mode.



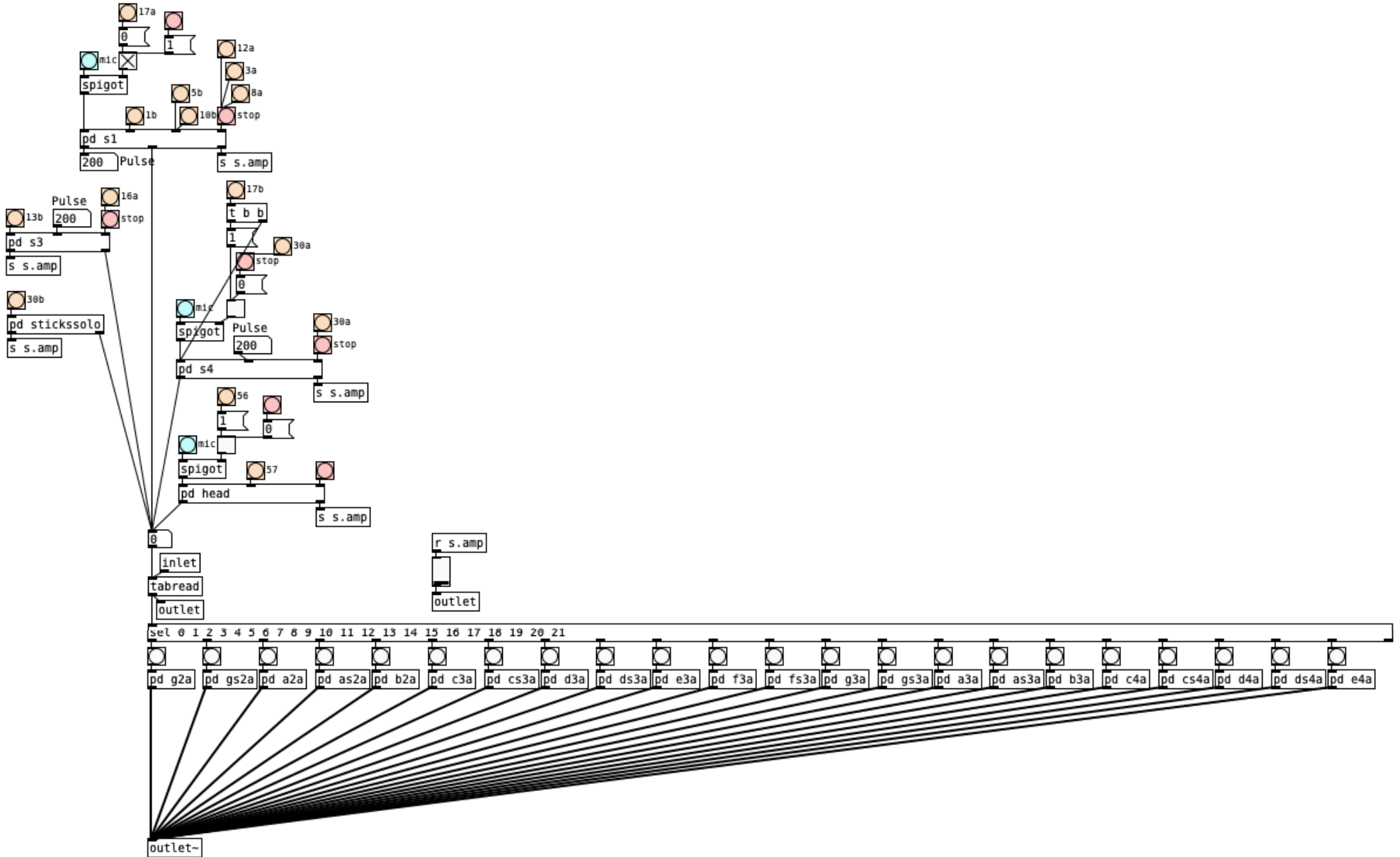
pd sticks: head

In this subpatch, each snare drum microphone impulse advances the harmonic rhythm played by the virtual instruments in the final section of the piece. The twenty six chords, and therefore their diatonically-appropriate modes are advanced sequentially, referencing the harmonic progression in the head of Coltrane's *Giant Steps*.



pd sticks

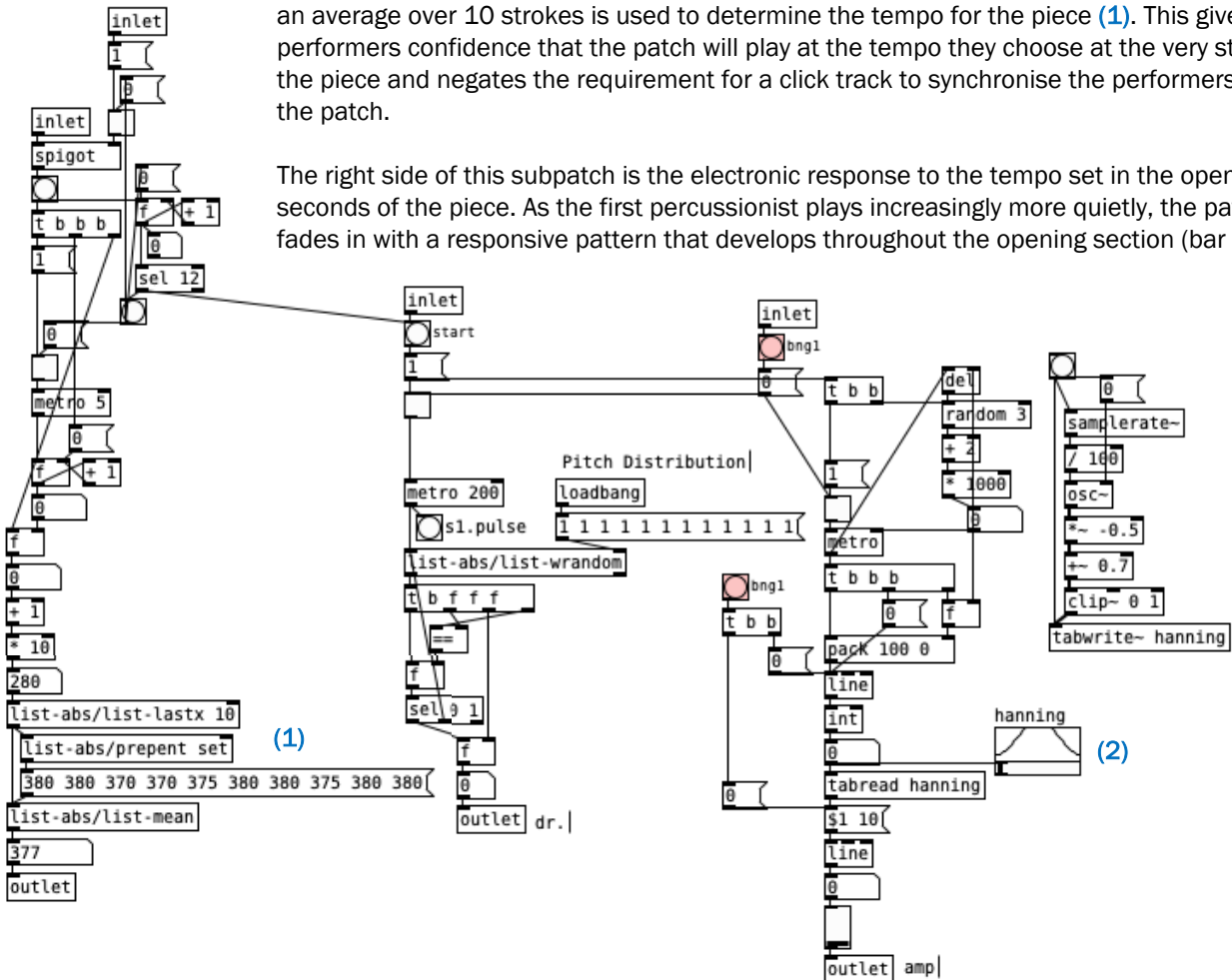
This is the first of three 'virtual percussionists'. Drum stick sounds are created by this subpatch. The orange *bangs* are triggers from the MIDI pad and the blue *bangs* are triggers from the snare drum microphone.



pd sticks: s1

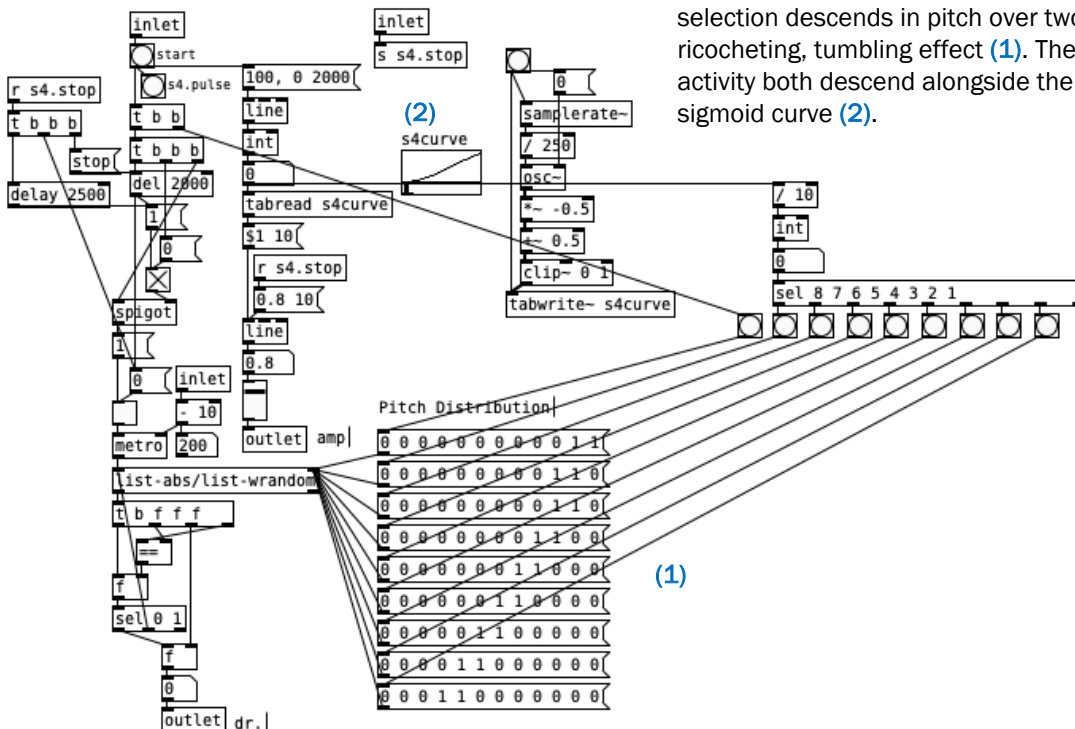
The left side of this subpatch calculates the tempo set by the first percussionist in the opening bar of the piece. The time between each stroke is recorded (to a 5ms tolerance) and an average over 10 strokes is used to determine the tempo for the piece (1). This gives the performers confidence that the patch will play at the tempo they choose at the very start of the piece and negates the requirement for a click track to synchronise the performers with the patch.

The right side of this subpatch is the electronic response to the tempo set in the opening seconds of the piece. As the first percussionist plays increasingly more quietly, the patch fades in with a responsive pattern that develops throughout the opening section (bar 2) (2).



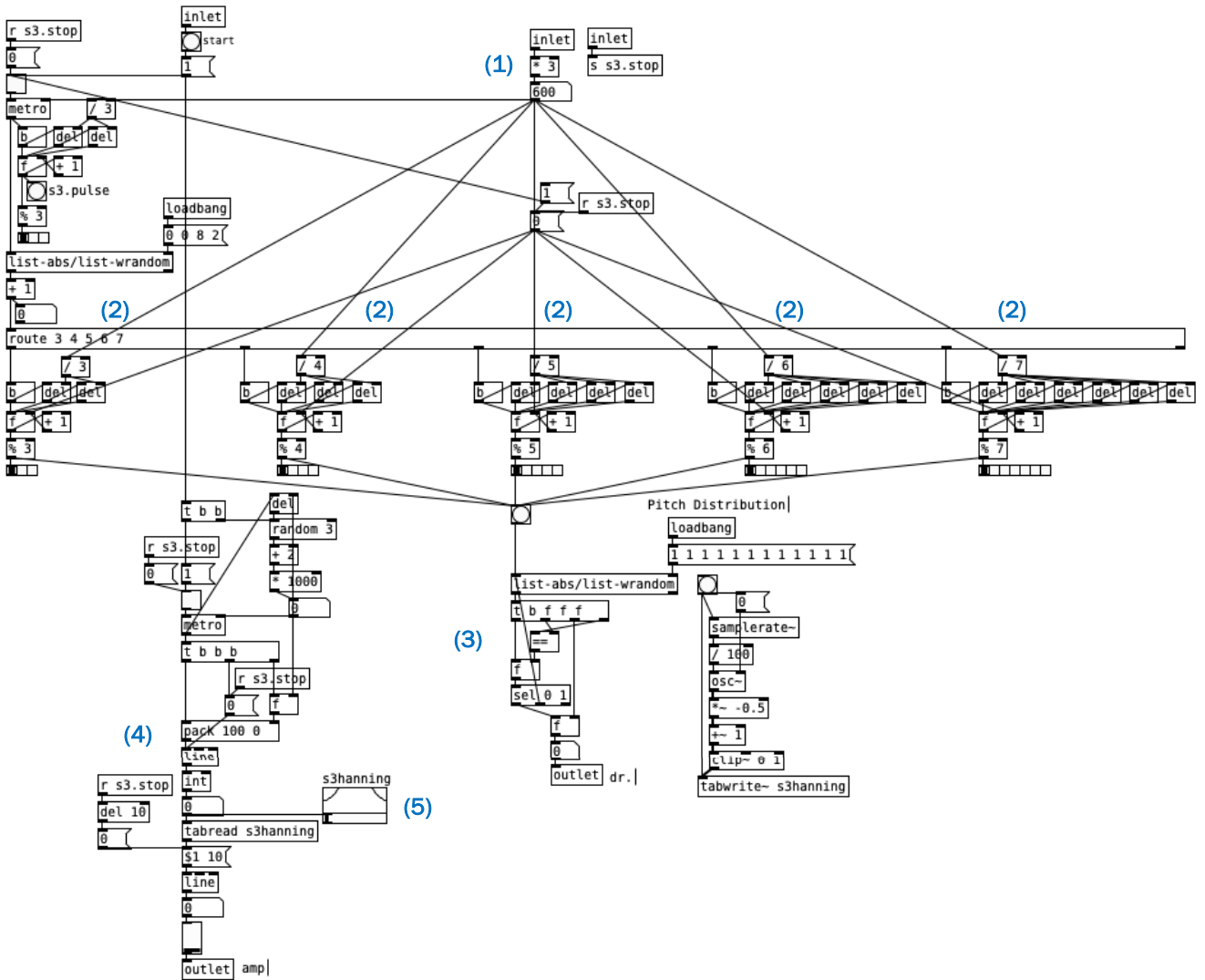
pd sticks: s4

This subpatch creates a descending pitch sequence. Pitches are randomly chosen from a pair. The pair that is available for selection descends in pitch over two seconds creating a ricocheting, tumbling effect (1). The volume and rhythmic activity both descend alongside the pitch, following the sigmoid curve (2).



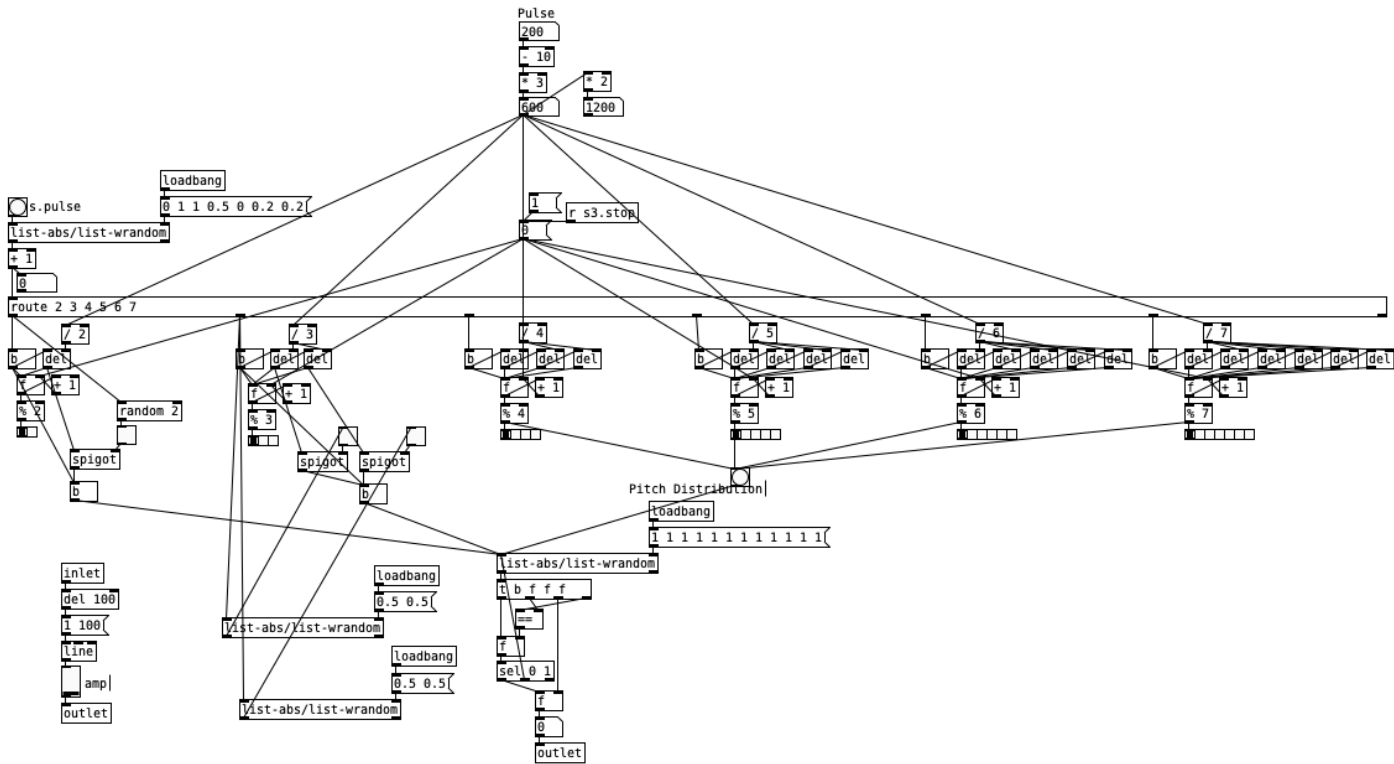
pd sticks: s3

This subpatch is used in the sections where the *sticks* virtual instrument has a supportive and varied role. The 'pulse' value that governs the piece's tempo in milliseconds equates to quavers on the score. This value is multiplied by three to create the millisecond value of dotted crotchets (1). The result then splits into five channels, each with a different division of the dotted crotchet from three to seven (2). The final stage converts the *bang* impulse into a number from zero to eleven, with equal probability of each value being produced (3). The left outlet controls the volume of this subpatch (4). The volume level follows a bell curve pattern to subtly bring the audience's attention to the patch's material (5). The volume fluctuation, which completes a cycle approximately every two seconds, is mimicked by the percussionists.

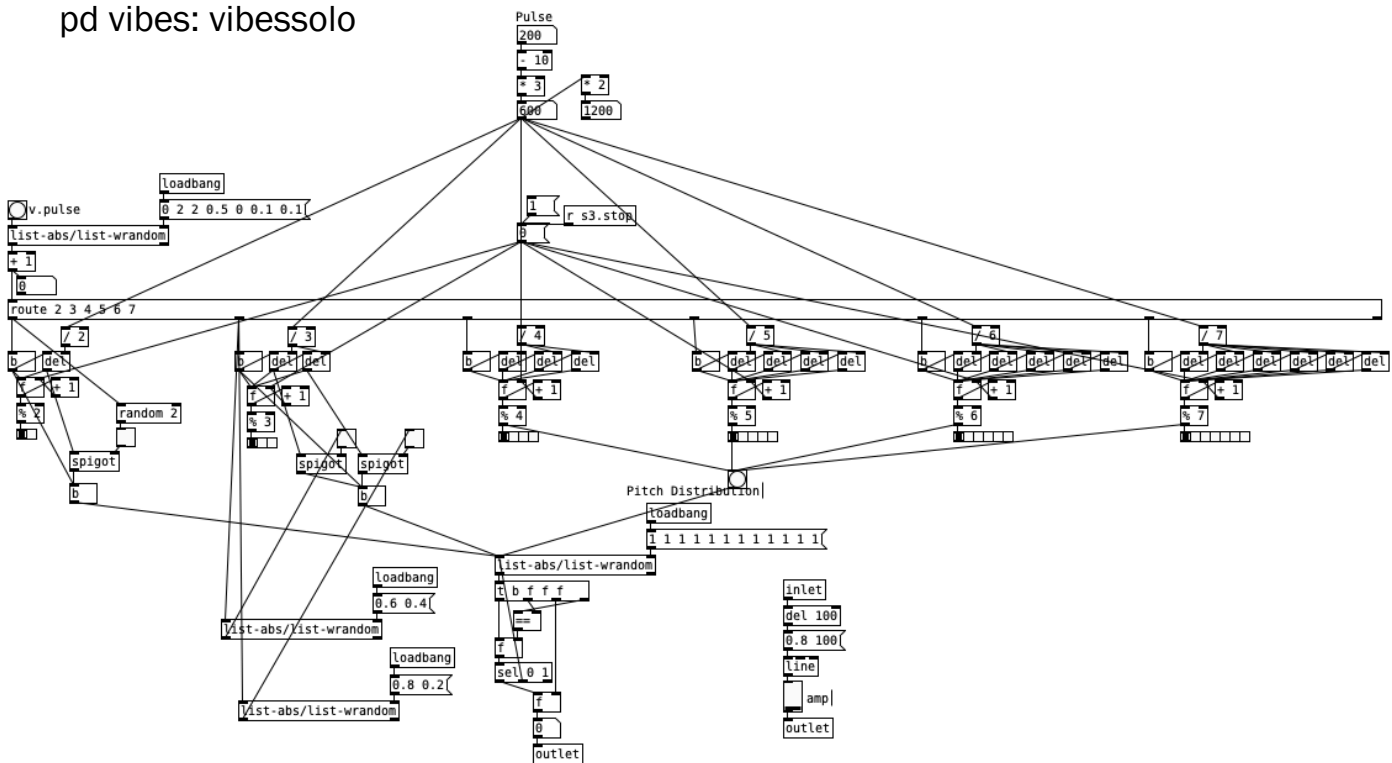


pd sticks: stickssolo

This subpatch, used in the sections where the *sticks* virtual instrument has an independent role, generates material based on the pulse in a similar fashion to **pd sticks: s3**. The signal pathways are configured to randomly generate short phrases similar to a jazz drum solo. Divisions of the pulse range from two to seven with rhythms created to maintain a sense of pulse, albeit sometimes heavily syncopated.

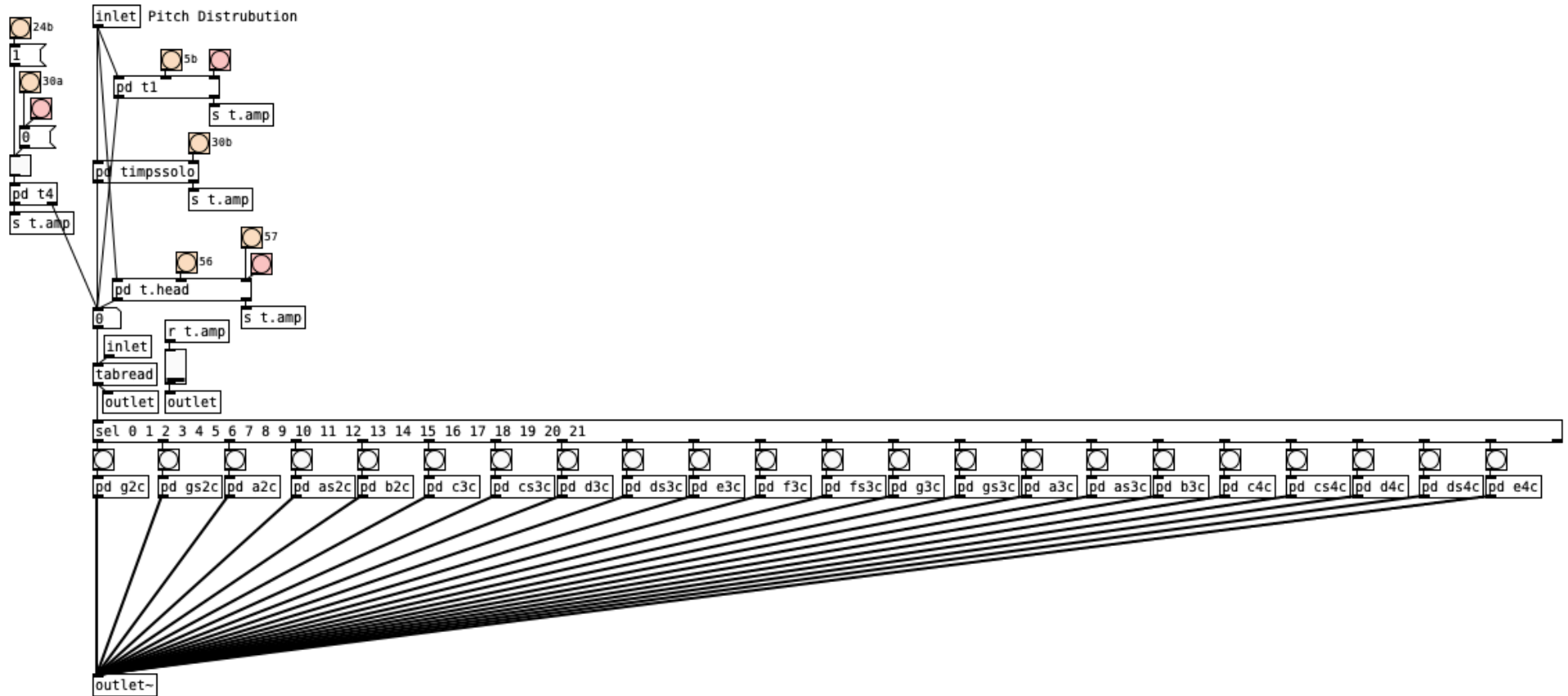


pd vibes: vibessolo



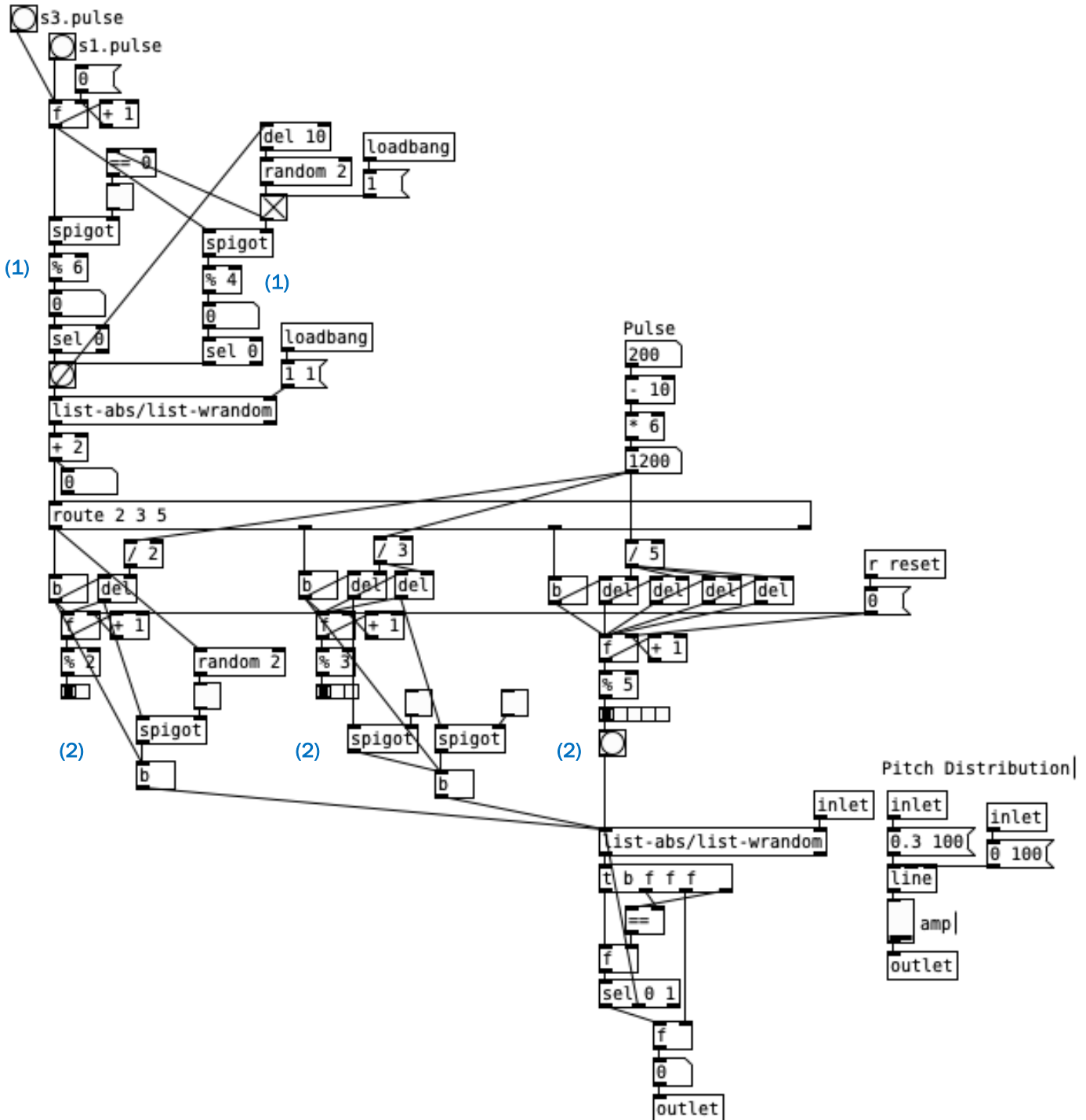
pd timps

This is the second of three 'virtual percussionists'. Timpani beater sounds are created by this subpatch.



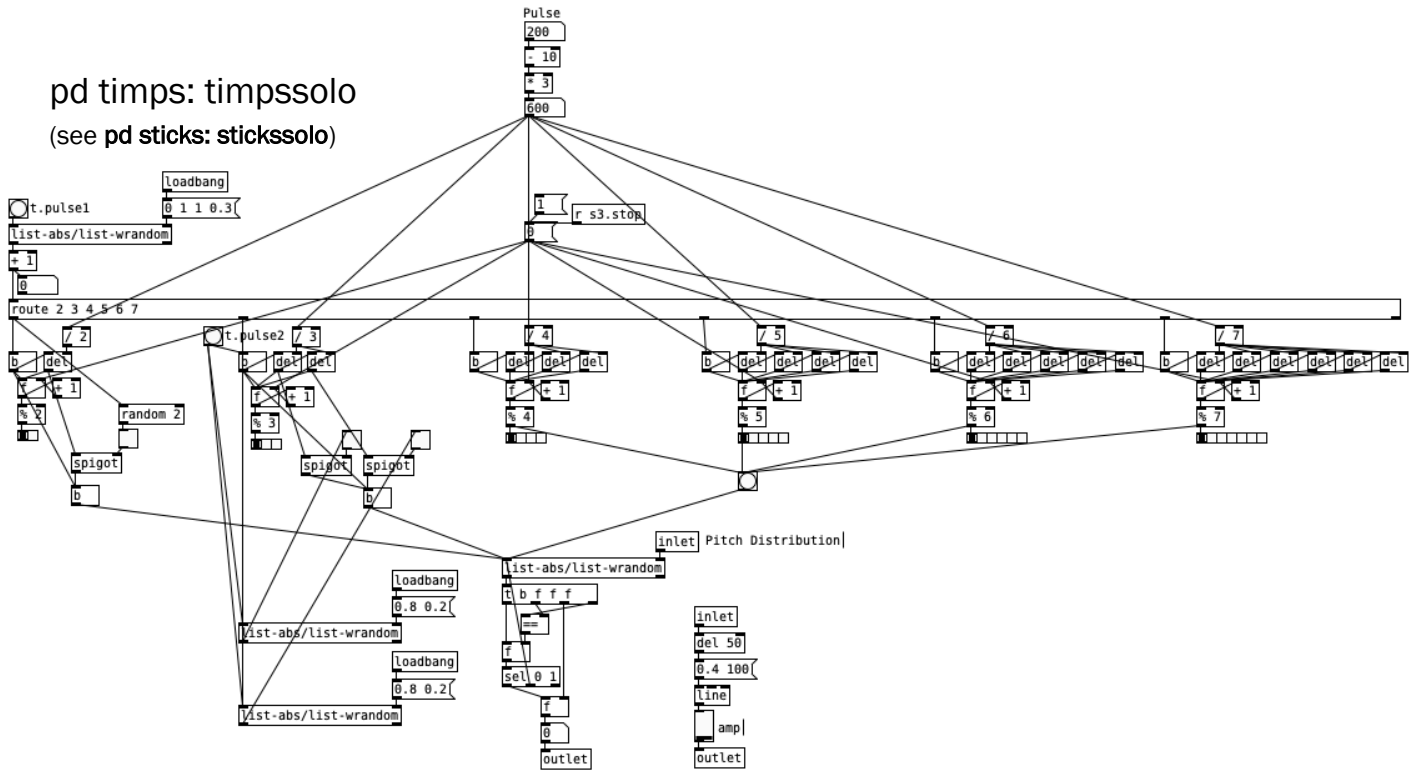
pd timps: t1

In this subpatch, supportive material using the *timps* sound library is randomly generated. This subpatch counts using a metre that randomly shifts between counting in four and six (1). The start of each cycle triggers a new phrase to be improvised by the subpatch. The rhythm of these short phrases is determined by dividing the pulse into either two, three or five. These beat subdivisions reference dotted quavers, quavers and quintuplet semiquavers (5:6) on the score.



pd timps: timpssolo

(see pd sticks: stickssolo)

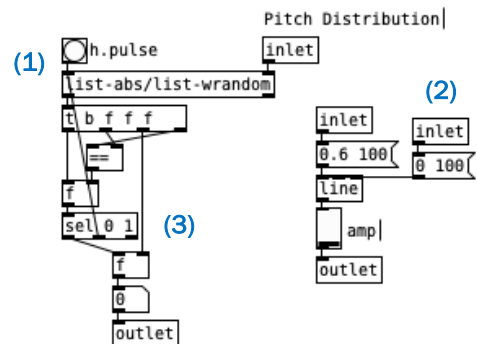
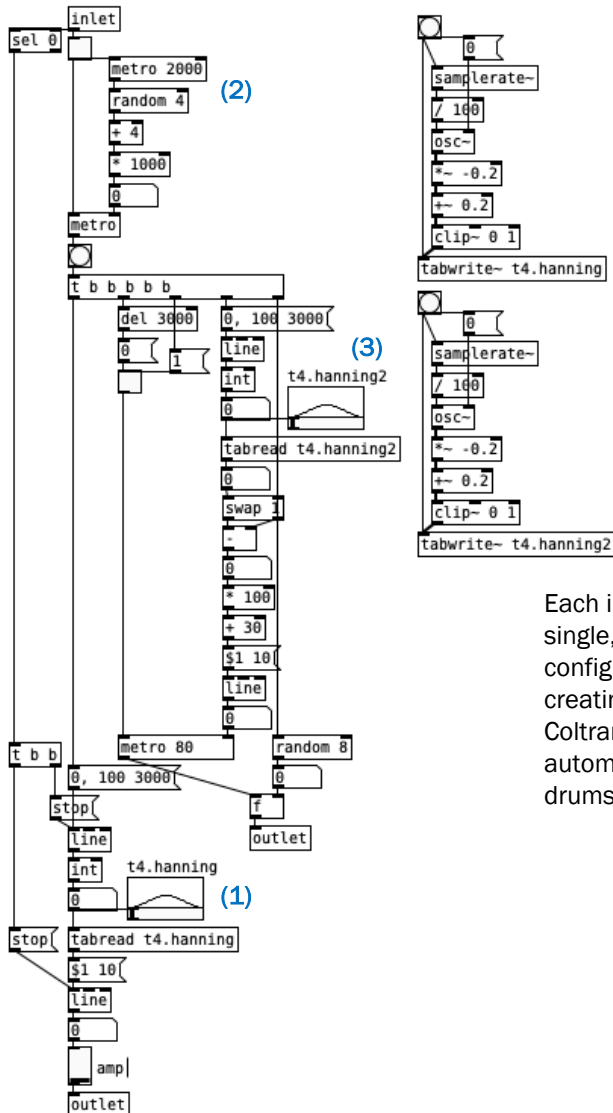


pd timps: t4

This subpatch creates rolls on a single pitch, randomly chosen from a chord tone of the appropriate chord. The rolls fade in and out (1) with a short pause of a few seconds between each gesture (2). To emulate a natural open roll, the tempo of the roll slightly increases and decreases in tandem with the volume (3). The pedal-like harmonic role of this subpatch grounds the otherwise-chaotic chord progression before the virtual instruments are showcased in their solo section (letter E on the score).

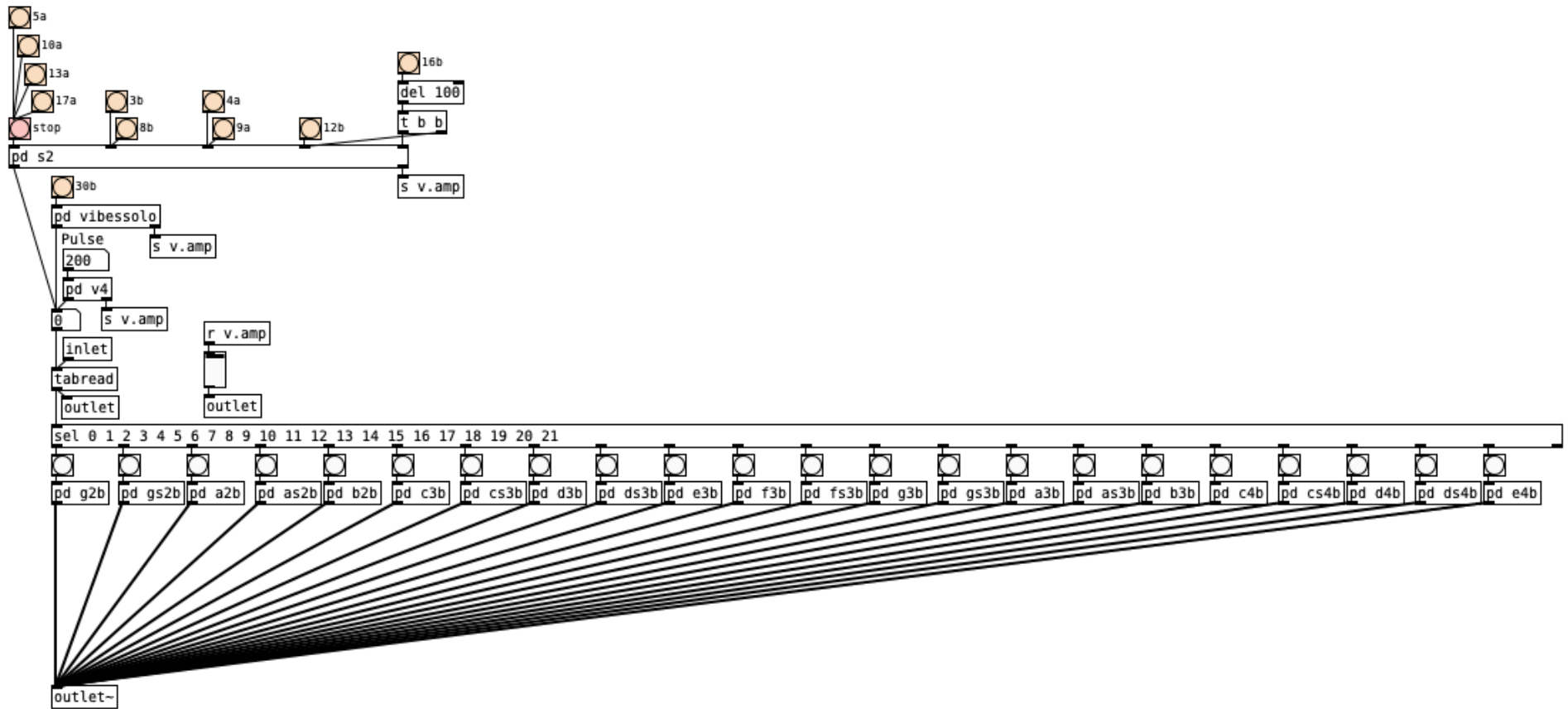
pd timps: t.head

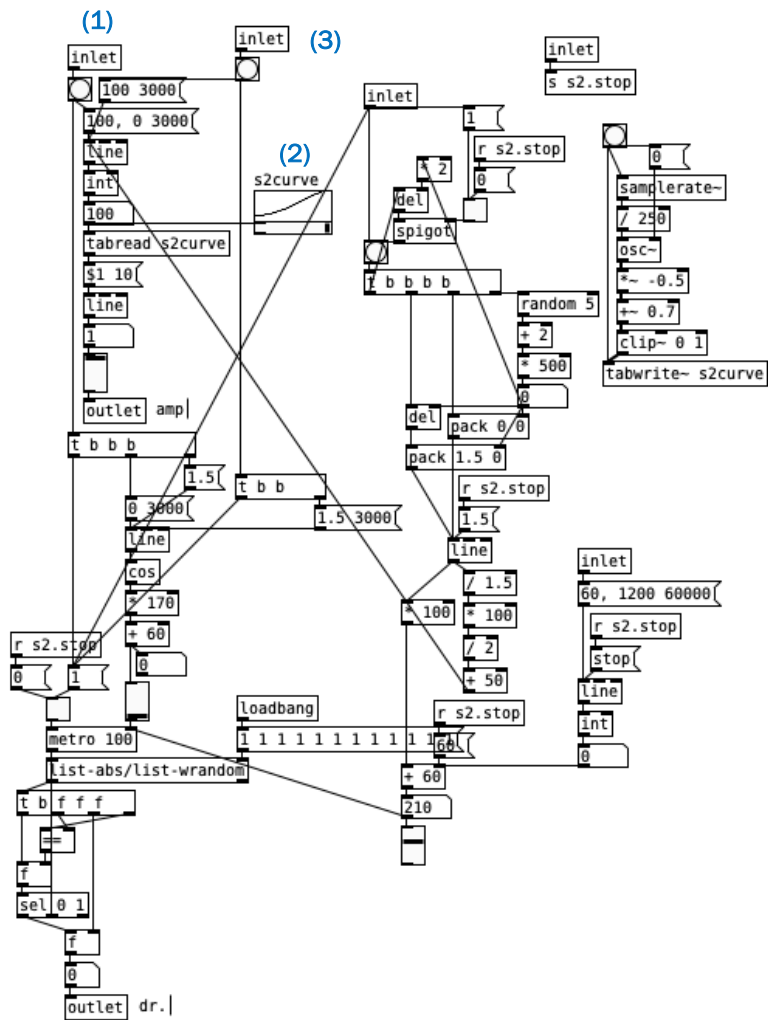
Each impulse from the snare drum microphone (1) triggers a single, random pitch from the correct mode. The subpatch is configured so the same pitch cannot be repeated consecutively, creating a winding melody that references the original head to Coltrane's *Giant Steps* (3). The final impulse of the piece automatically cuts the volume of the subpatch, resembling the drums being muted in unison (2).



pd vibes

This is the third 'virtual percussionist'. Vibraphone mallet sounds are created by this subpatch.



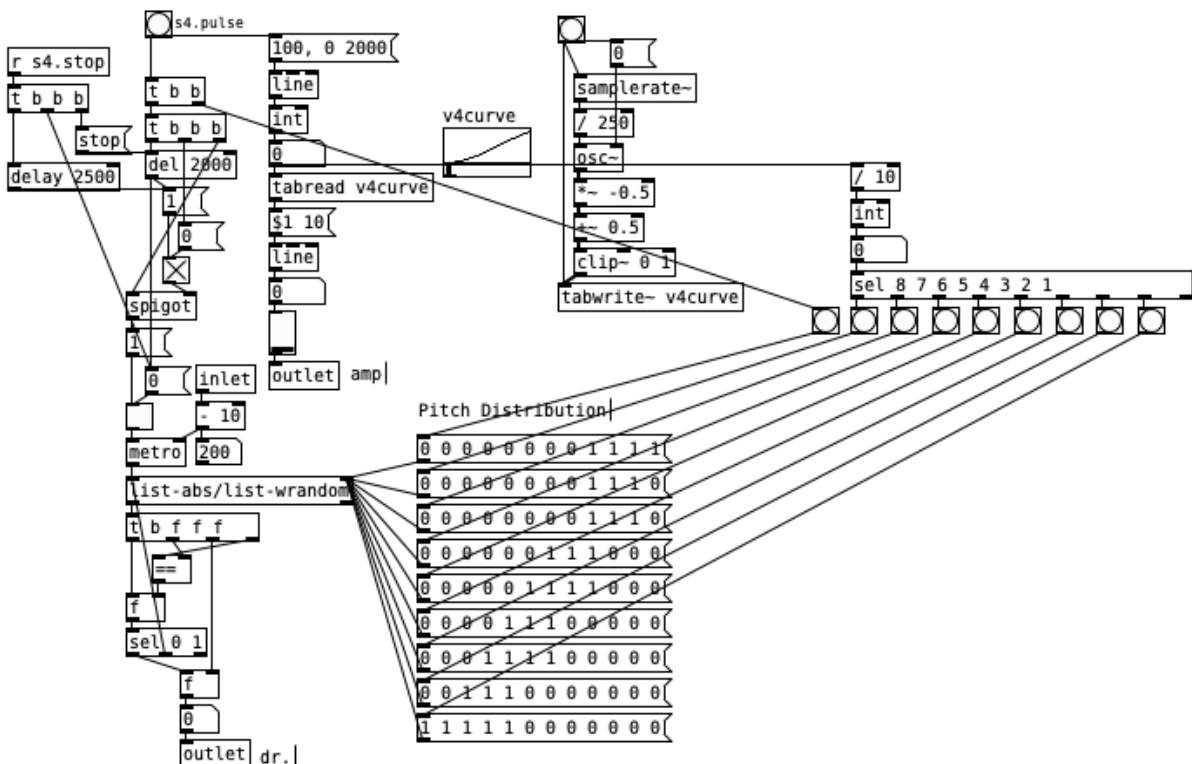


pd vibes: s2

This subpatch is used in the free-time bursts of improvisation increasingly found throughout the first half of the piece. The leftmost inlet (1) instructs the rhythmic activity and volume of the subpatch to follow the sigmoid curve (2) from right to left. When the second inlet from the left (3) is triggered halfway through the free-time section the rhythm and volume follow the curve in reverse, bringing the virtual instrument back into the foreground and signaling the return to a fixed tempo. The reverb level also follows the pattern of the curve for this subpatch (found in `pd vibes.fx`)

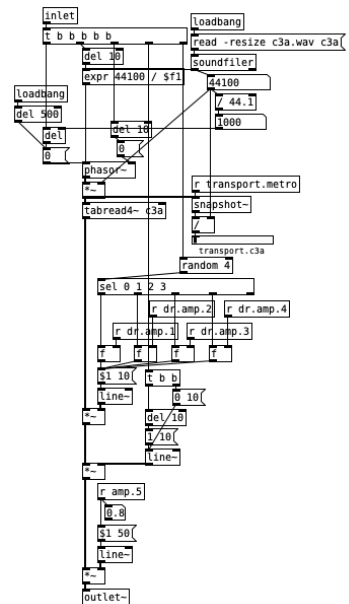
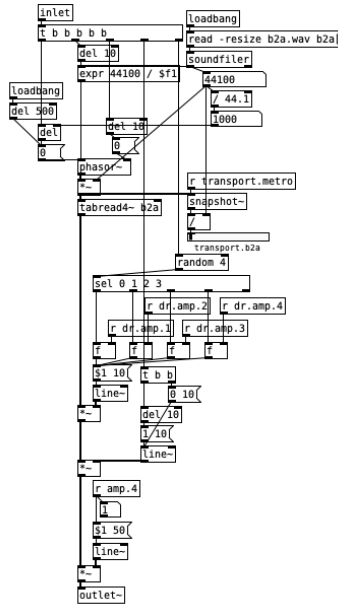
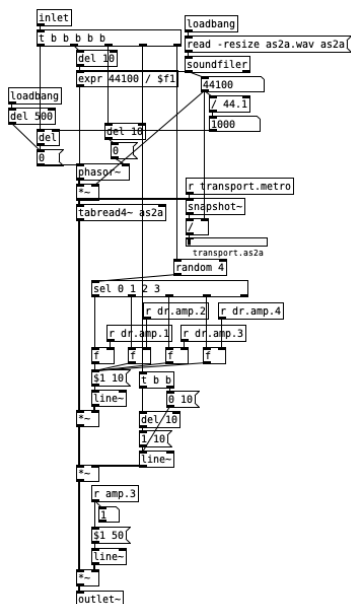
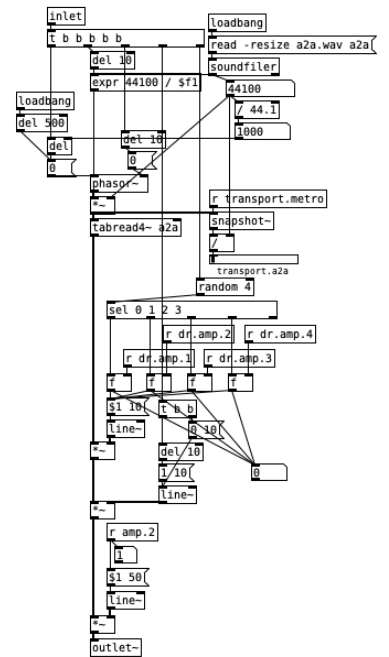
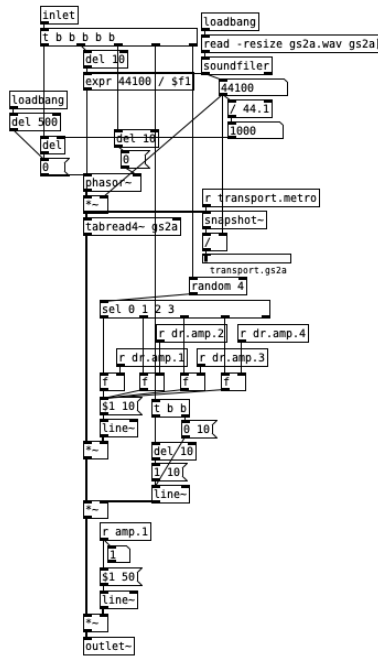
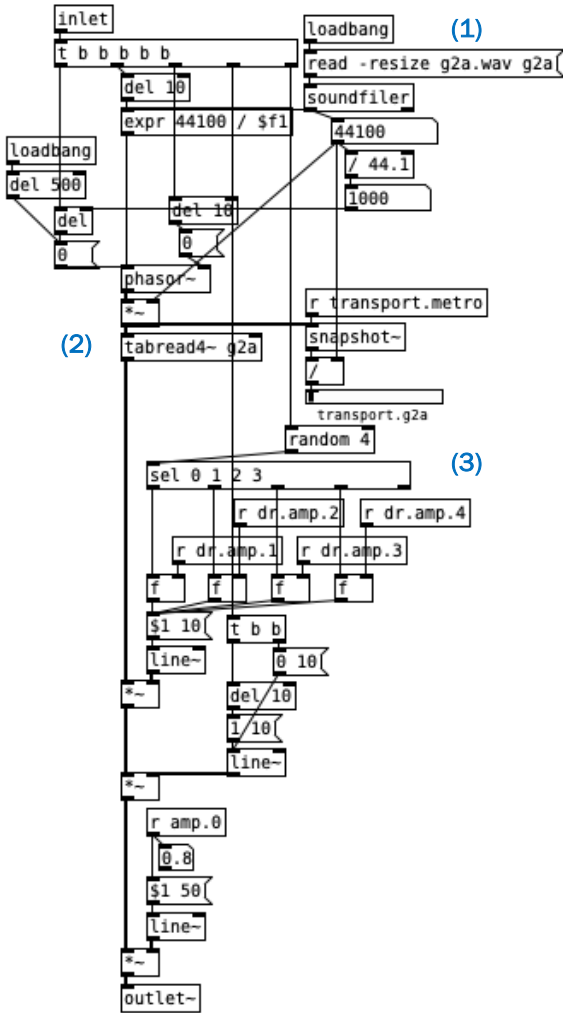
pd vibes: v4

(see `pd sticks: s4`)

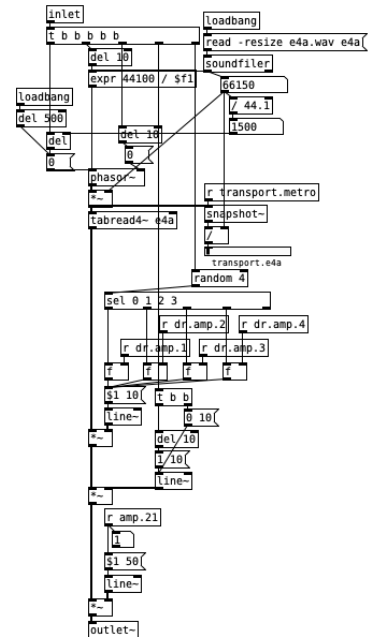
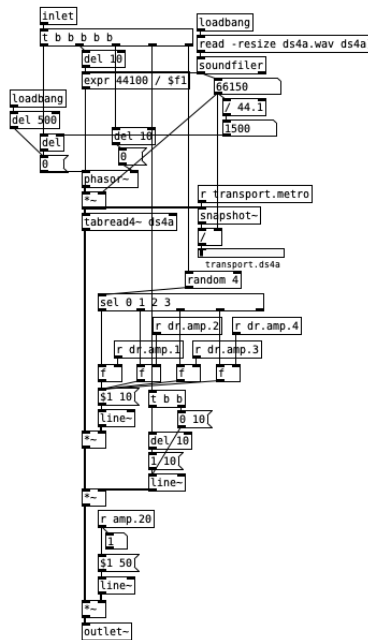
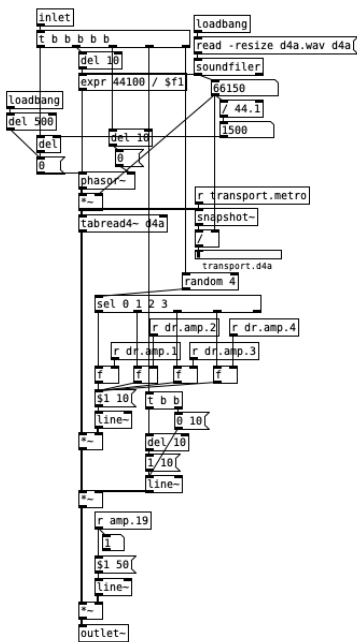
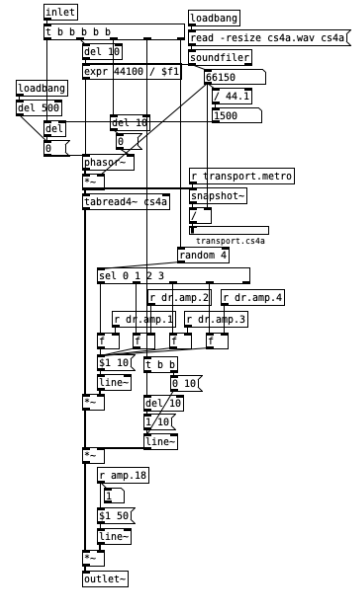
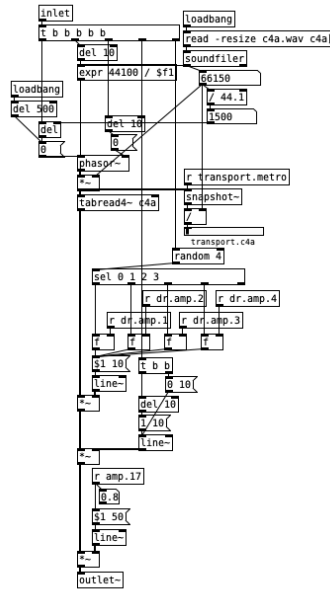
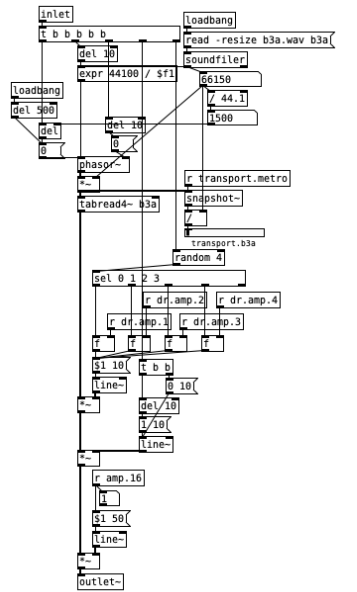


pd sticks: g2a - e3a

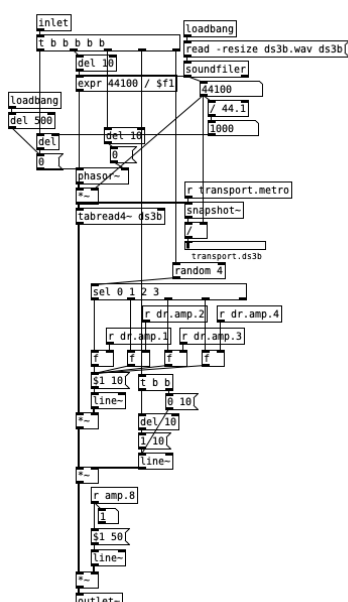
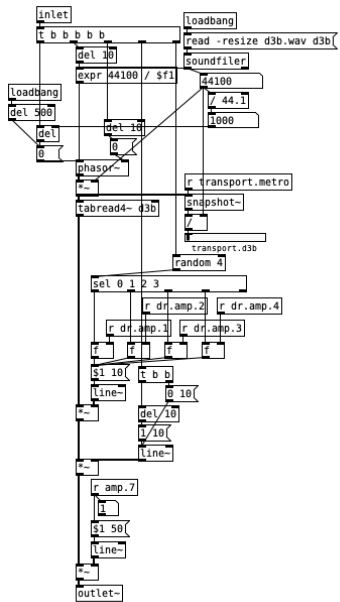
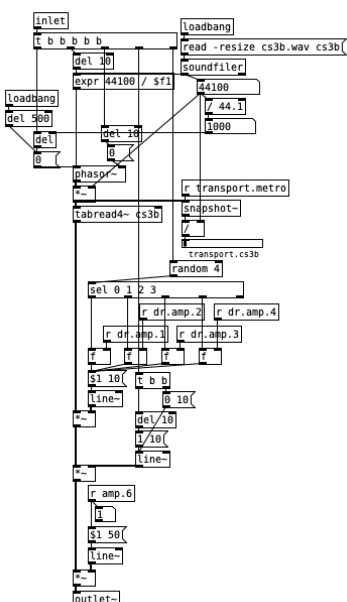
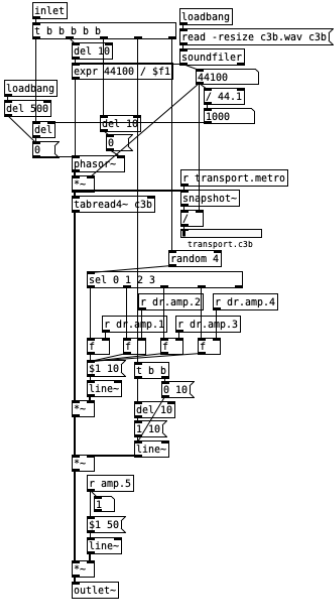
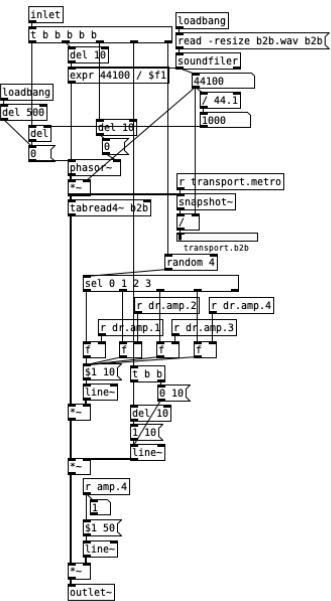
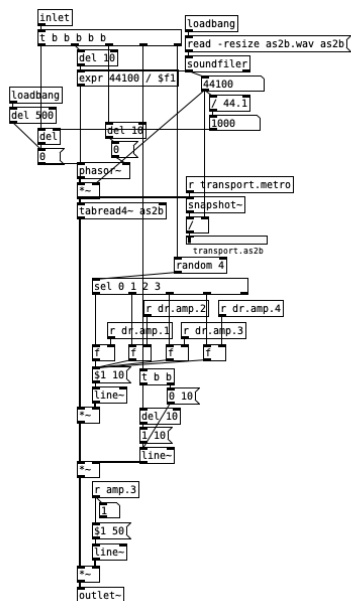
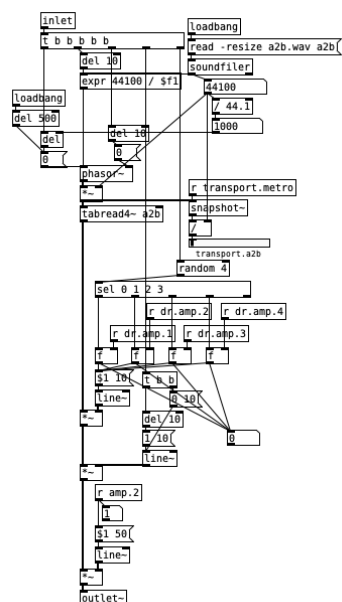
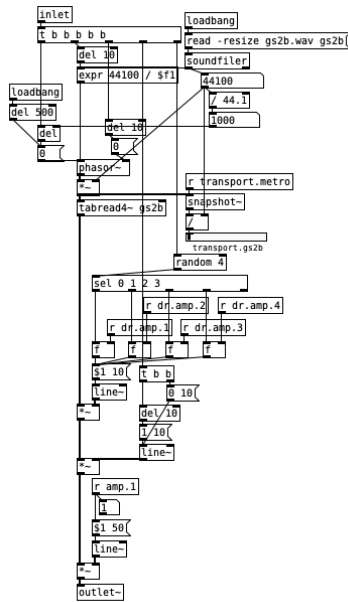
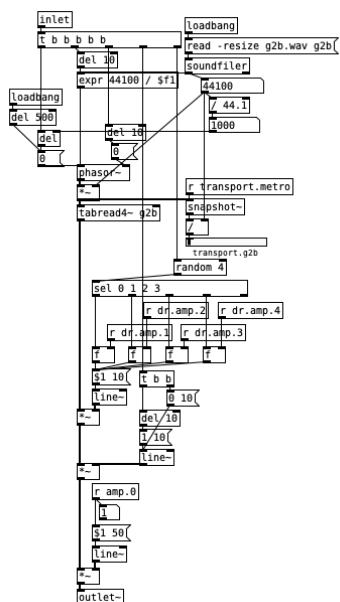
The following eight pages contain the subpatches that load (1), play (2) and control the amplitude (3) of the three sound libraries used in this piece. Each sound library contains twenty pitches within a single timbral profile, creating three virtual instruments named *sticks*, *vibes* and *timps* depending on the sticks/mallets used to record the original samples.



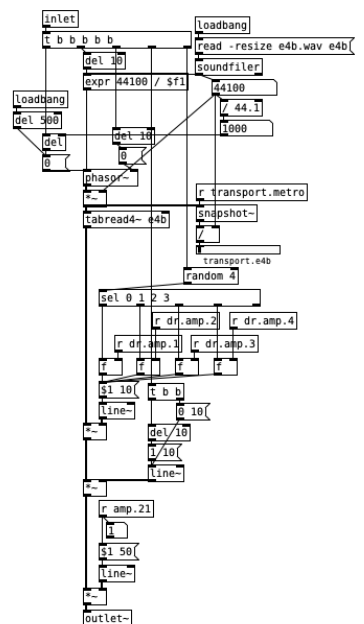
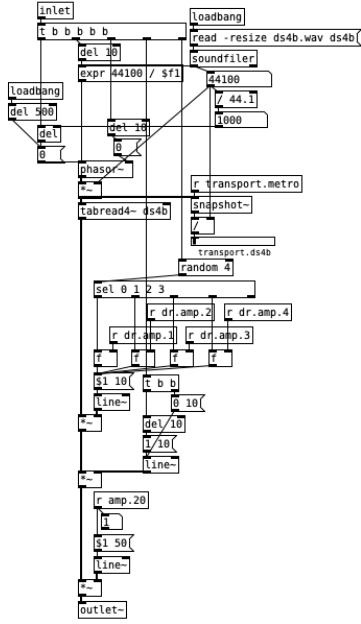
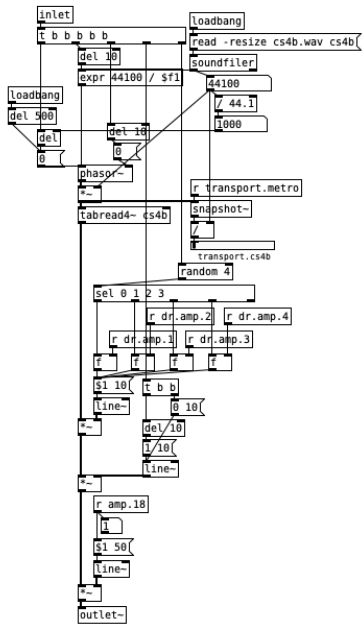
pd sticks: d4a - e4a



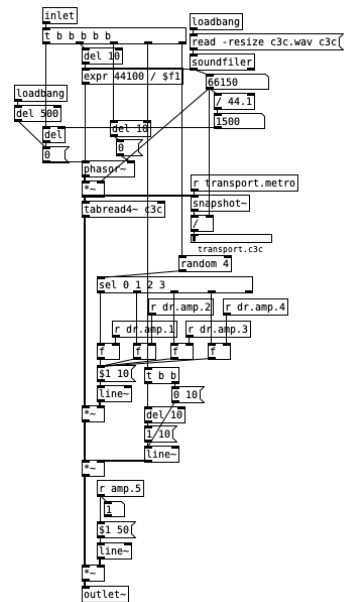
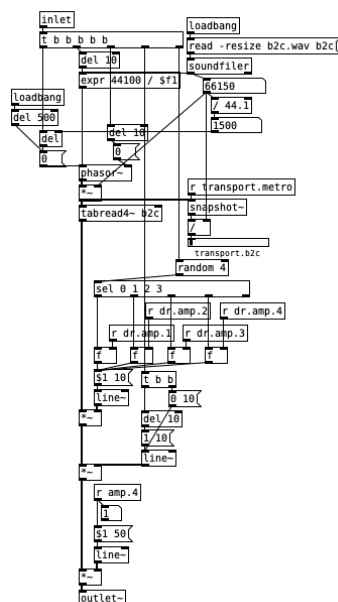
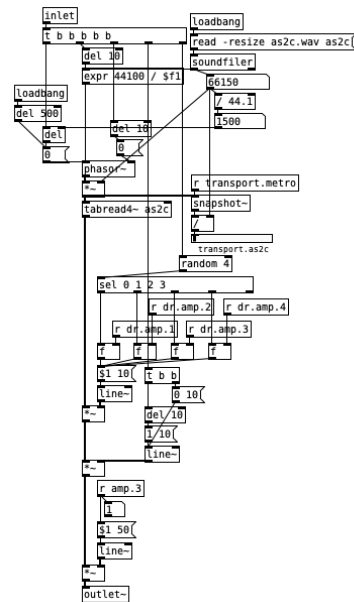
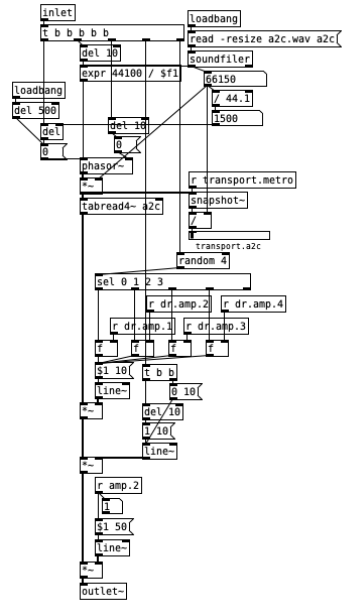
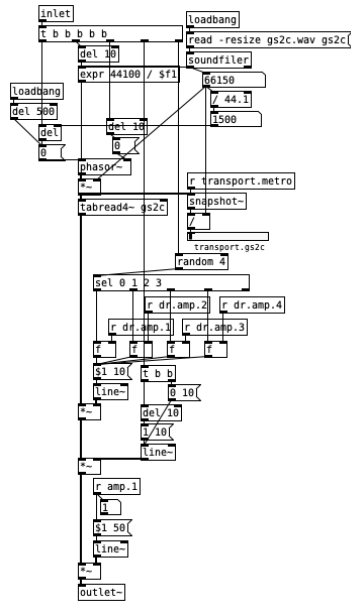
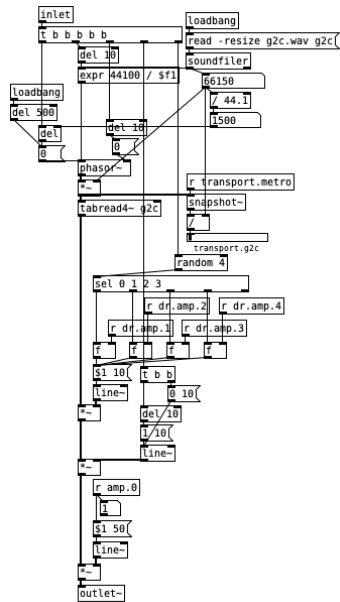
pd vibes: g2b - ds3b



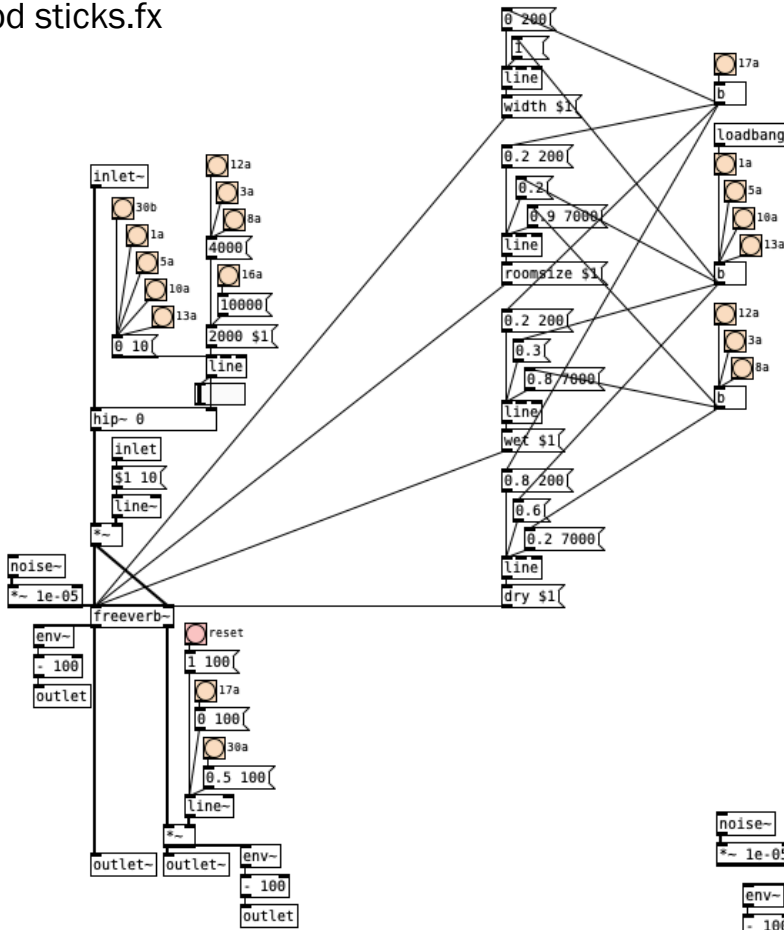
pd vibes: cs4b - e4b



pd timps: g2c - c3c

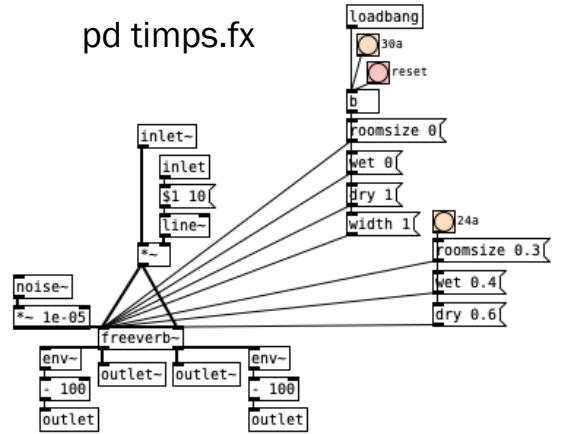


pd sticks.fx

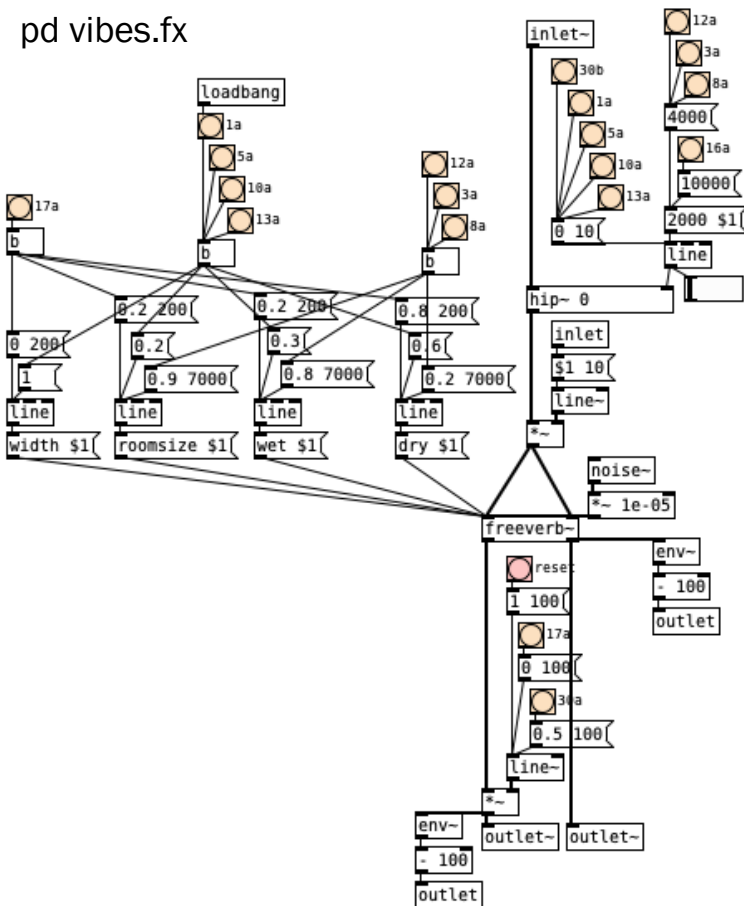


The outlet of each virtual instrument signal is processed through reverb and frequency filters in these three subpatches. The parameters change throughout the piece, triggered by the MIDI pad.

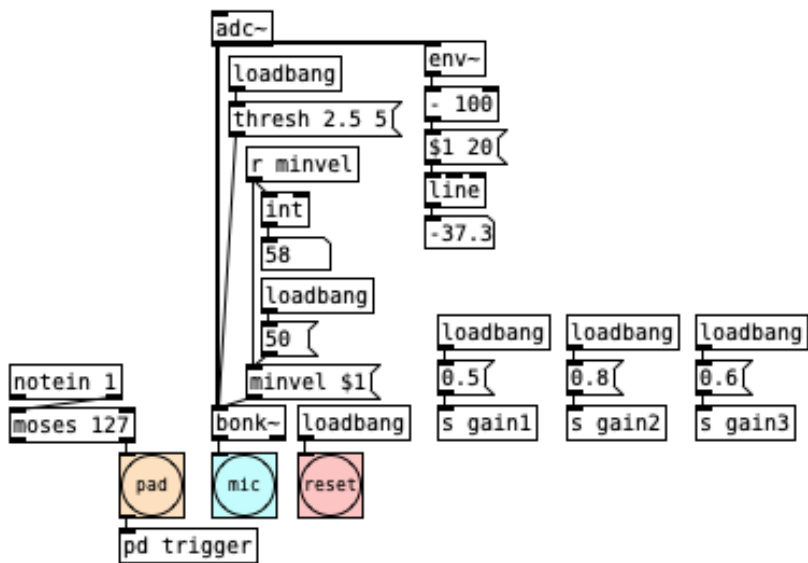
pd timps.fx



pd vibes.fx



pd midi/mic



pd mixer

The three virtual instrument signals are sent through this mixer subpatch. The grey sliders are from gain controls in the interface.

