

Unnatural Processes for Rhea, Piano, and Performer

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Unnatural Processes (2015) is a piece of music for RHEA, a Vorsetzer (robotic player piano) and live performer.

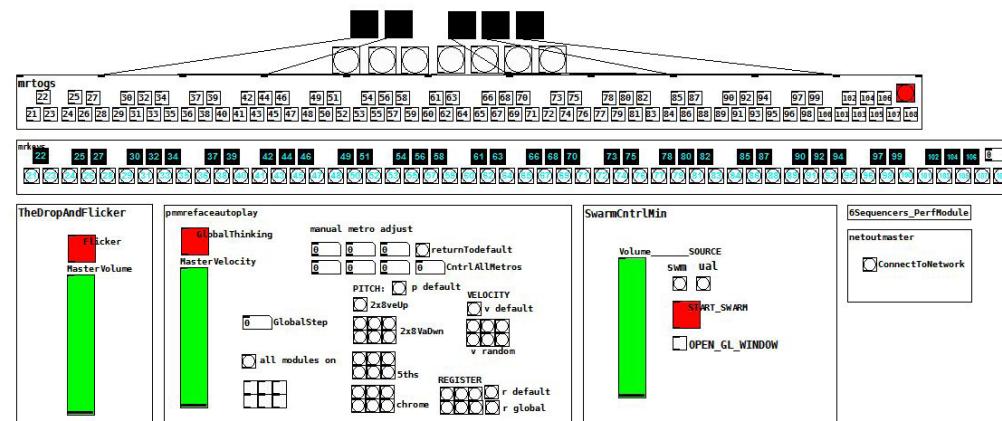
RHEA is an invention of Winfried Ritsch. His website describes it as
“...an incarnation of an “autoklavierspieler”...which is designed to play any...piano...with individual dynamics on each note as fast as possible, making up a high performance player-piano.”

Performance of this work requires a RHEA robot, a piano, this score, a stopwatch, and the included Pure Data (Pd) patch. Although familiarity with Pd is not required, it must be installed on a performer’s computer to play this piece. Furthermore, to connect to the RHEA robot over a network, it is necessary to configure the patch for the ip address and port numbers being used. The procedure required is not too complicated, and instructions are given in the text that follows for how to install this software and the required libraries, as well as to perform these configuration tasks.

Additionally, the piece comes with a Reaper session that will accept midi from the Unnatural Processes_PERFORMANCE patch. This allows for performers to practice the piece without Rhea, using any midi piano emulator or other synthesizer. Any software, such as Logic, Ableton Live, or Pro-Tools may be used for this purpose and the procedure for setting this up is given below.

I. Notes Regarding Performance of this Piece

Unnatural Processes is a piece in three movements that are performed continuously without pause. The piece is of variable overall duration, of a minimum of about twenty-two minutes. Performers enact the piece with the score and the accompanying Pure Data (Pd) patch. The control surface of this patch is pictured below:



Performers should be seated adjacent to the piano and may arrange themselves however they are comfortable. The performer must be able to reach the sustain pedal and damper (if provided). Additionally, the audience should be allowed a clear view of the piano keyboard and RHEA.

Each movement is controlled by a corresponding area of the Pd patch. These areas can be seen in the lower half of the image opposite. In each movement, the dynamics of control and the flow of information between performer, software, and RHEA is varied, and this is reflected in the interface and how the performer uses it.

The function of the performer throughout the piece is to listen for structures or patterns that emerge from the processes and materials that they initiate or terminate. These lower level sound materials and processes interact with one another across the piano keyboard, in their embodiment in air and with the acoustics of the performance space, and with the perceptual apparatus of performer and listeners. Through engaged listening and careful, purposeful action, a performer may encourage pattern development, and shift or foreground relationships within the overall musical texture.

II.Nomenclature

In addition to staff notation this score makes use of some special symbols and conventions.

In general time flows across the page, first left to right, and then down, as when reading in English.

However, the arrow symbol:



indicates that the previous event is connected to the event the arrowhead points to.

A double-headed arrow:



indicates that the actions connected by the arrow are performed repeatedly, before moving on.

A wavy line:



indicates improvisation, or more literally a performer-enacted interpolation connecting the modules joined by the wavy line. When these connect two number boxes, for example, it means to step through the numbers between them, in contrast to a straight arrow which indicated discrete change.

A wavy arrow:



indicates an interpolation from one event to another at the discretion of the performer.

Double-headed wavy arrows:

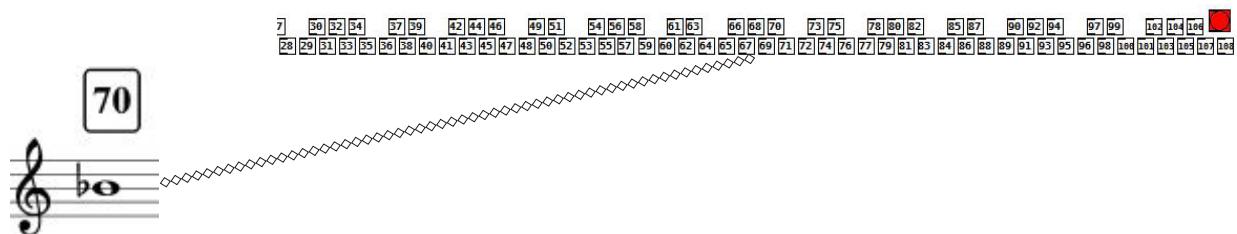


mean to interpolate back and forth between the two modules notated.

A line made of diamonds:



indicates that a notated task should be performed on the patch-instrument by activating the location connected by the line, for example at the beginning:



this shows the performer that midi note 70, the notated B-flat, is performed by engaging the toggle numbered 70 on the mr togs keyboard interface.

III. Controlling Objects in the Pd Patch

Pure data has two cursor modes, and performance mode and an edit mode. To activate and perform the piece, it is desired to remain in performance mode throughout. In performance mode the cursor appears as an arrow, and aspects of the patch can be clicked on and off. In edit mode the cursor appears as a hand and aspects of the patch can be opened and moved around. To get into Pure Data's edit mode either select it from the edit menu from the Pd window, or click ctrl E on windows or cmd E on mac.

With Pd in performance mode (see below) the performer makes their way downward, through the actions in the score, always listening. There are three main pure data objects that performers must know how to activate to begin, end, or alter processes or materials in this piece.



The above pictures a “toggle” in both active and inactive mode. This toggle happens to be the one used to turn on and off the main performance patch and run the piece. However, it functions the same manner as the slime green toggles to its right in the control module. These turn on and off each sequencing module individually, and feature prominently in the piece. Toggles function simply: click to activate an “X” that fills the toggle. Click to deactivate and the “X” disappears indicating that the process is inactive.

Buttons pictured below activate processes in Pure Data and may be repeatedly activated. In the score, performers are asked to activate some multiple times and others only once.



Number boxes, pictured below, allow for numeric input. Clicking and typing a number into a number box, then pressing return enters that value directly. This is the method of performance used for the number sequences in this piece. Number boxes with values in them may also be clicked and dragged up and down in value with the mouse. A combination of these methods are used with the manual metro adjustment tool, as will be directed in the score.



I* reflections move in both directions

I.

TheDropAndFlicker

Flicker

Master Volume

mrtoogs

22 25 27 30 32 34 37 39 42 44 46 49 51 54 56 58 61 63 66 68 70 73 75 78 80 82 85 87 90 92 94 97 99 102 104 106

21 23 24 26 28 29 31 33 35 36 38 40 41 43 45 47 48 50 52 53 55 57 59 60 62 64 65 67 69 71 72 74 76 77 79 81 83 84 86 88 89 91 93 95 96 98 103 105 107 109

70 62 67 72 58 81

0'00"

1'00"

89 91 90 74 55

2'00"

*At least one minute before piece begins, activate *Flicker* and let it run. To begin the piece activate the first note by toggling box 70 on, using the graphical keyboard interface. Then start stopwatch and bring fader up to the predetermined performance volume. Activate the notes one at time on the keyboard interface. Proportional notation, as constrained by the times given, suggests duration.

A musical score consisting of two staves. The top staff starts at 2'00" with a treble clef, a bass clef below it, and a brace. It contains measures for notes on the A, C, and E lines. Measure 1 has notes 60 and 69. Measures 2 and 3 have note 53. Measures 4 and 5 have note 65. Measure 6 has note 22. The bottom staff starts at 3'00" with a treble clef, a bass clef below it, and a brace. It contains measures for notes on the A, C, E, G, and B lines. Measures 1-3 have notes 26, 31, 36, 32, 38, 29, and 24 respectively. Measures 4-6 have notes 94 and 86. The score concludes at 4'00".

2'00"

60 69

53

65

22

3'00"

94

86

3'00"

26 31

36

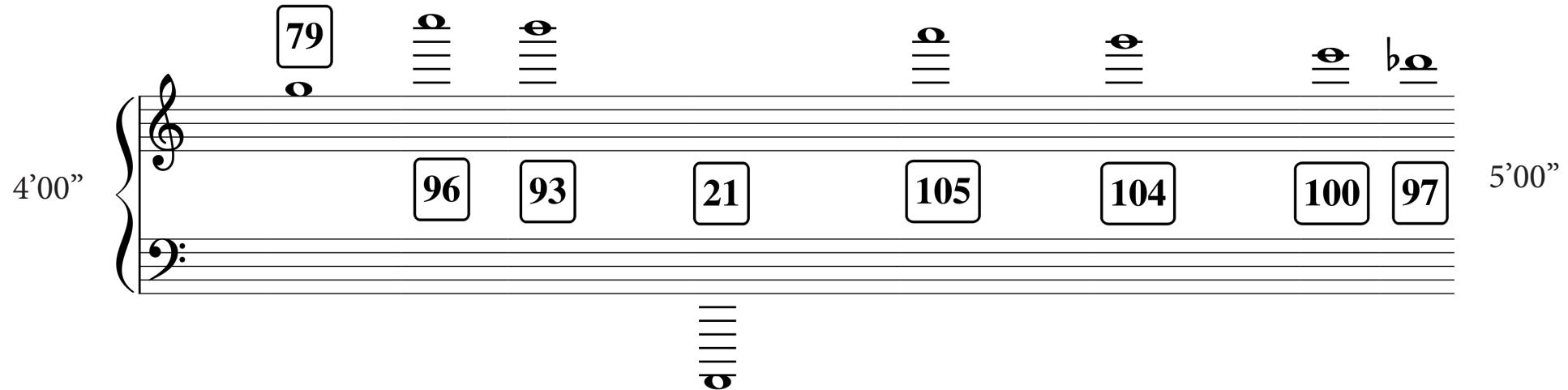
32

38

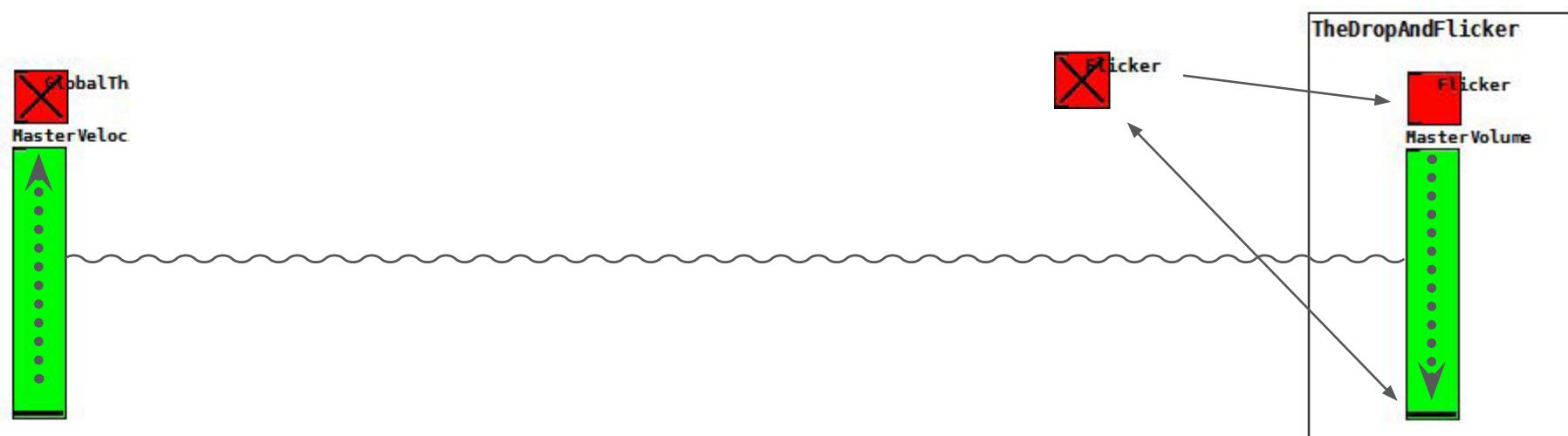
29

24

4'00"

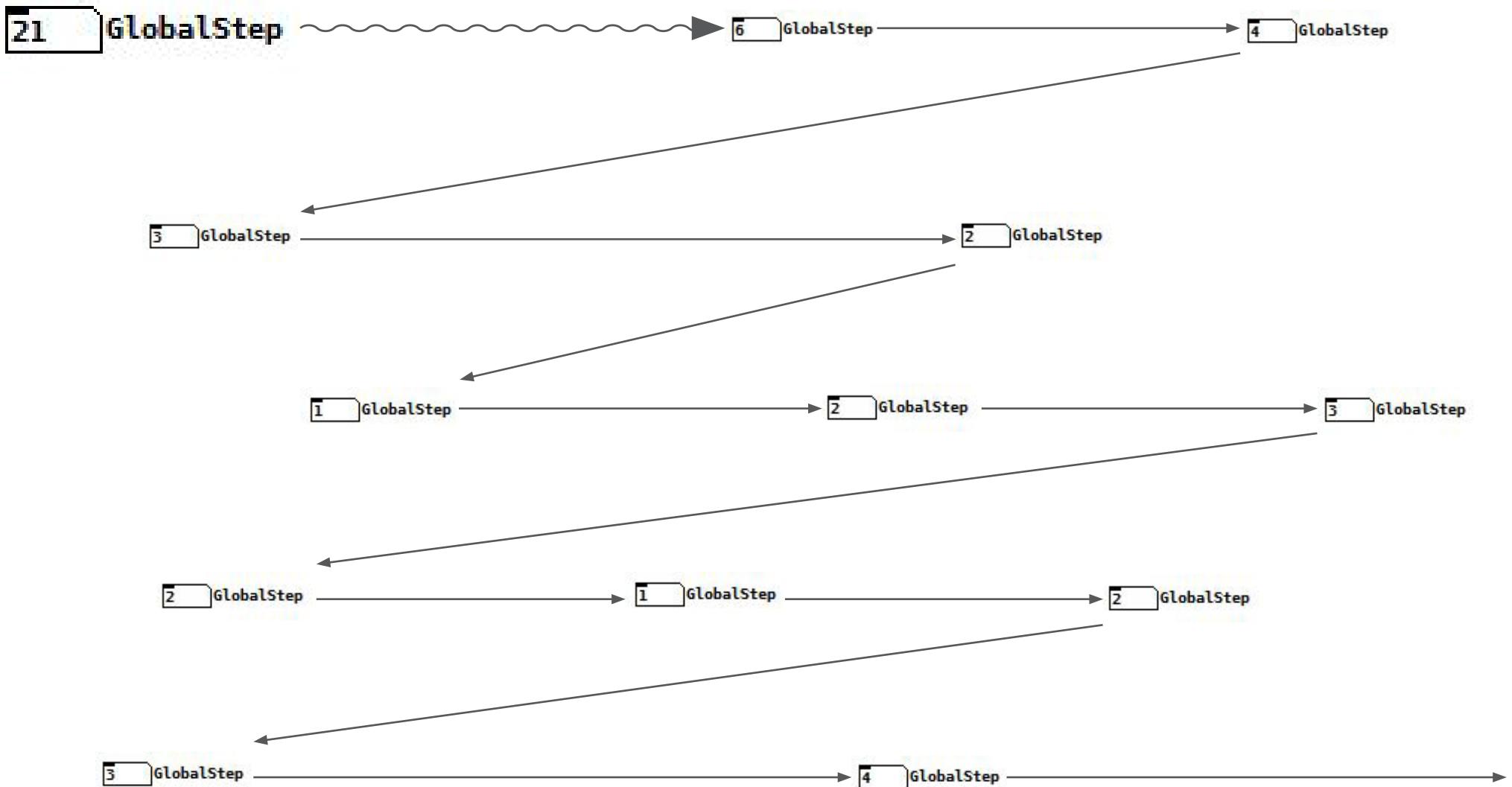


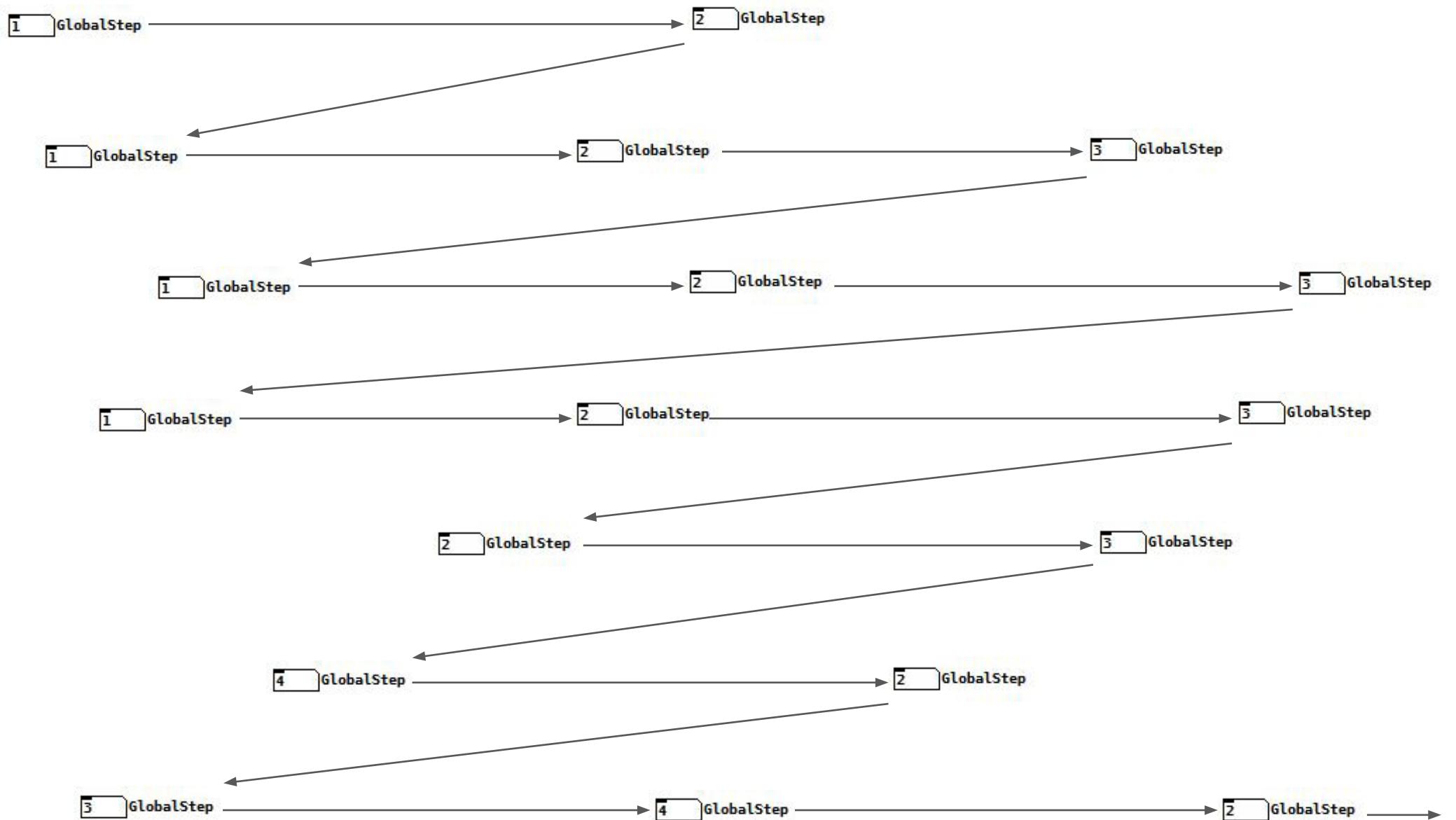
III. *border state's rights*

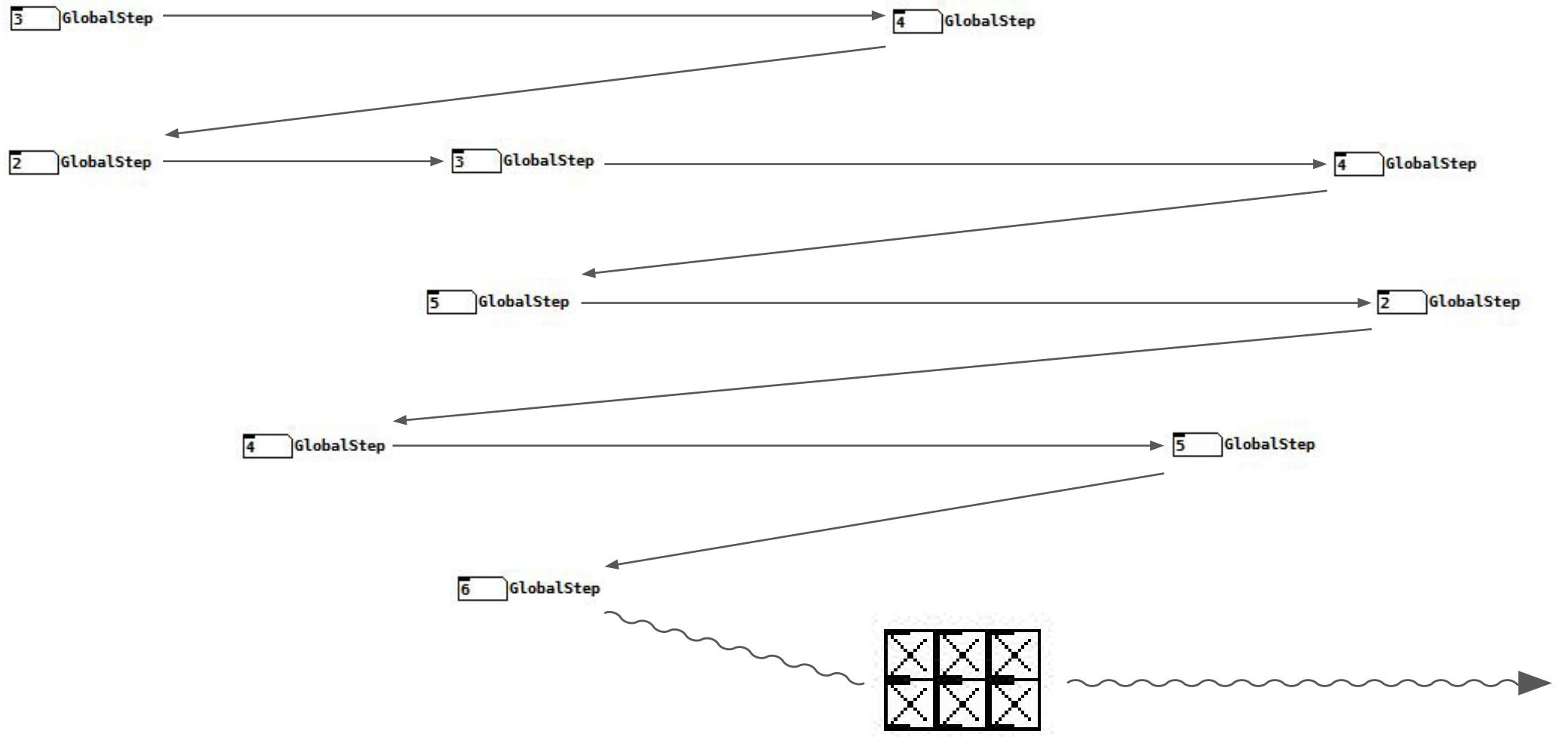


*Activate **GlobalThoughts** and very gradually fade up the attached fader (**MasterVelocity**) below the massed flicker texture. Then fade the **Flicker** control's attendant **MasterVolume**. When this reaches its lowest setting, click off the **Flicker** toggle.

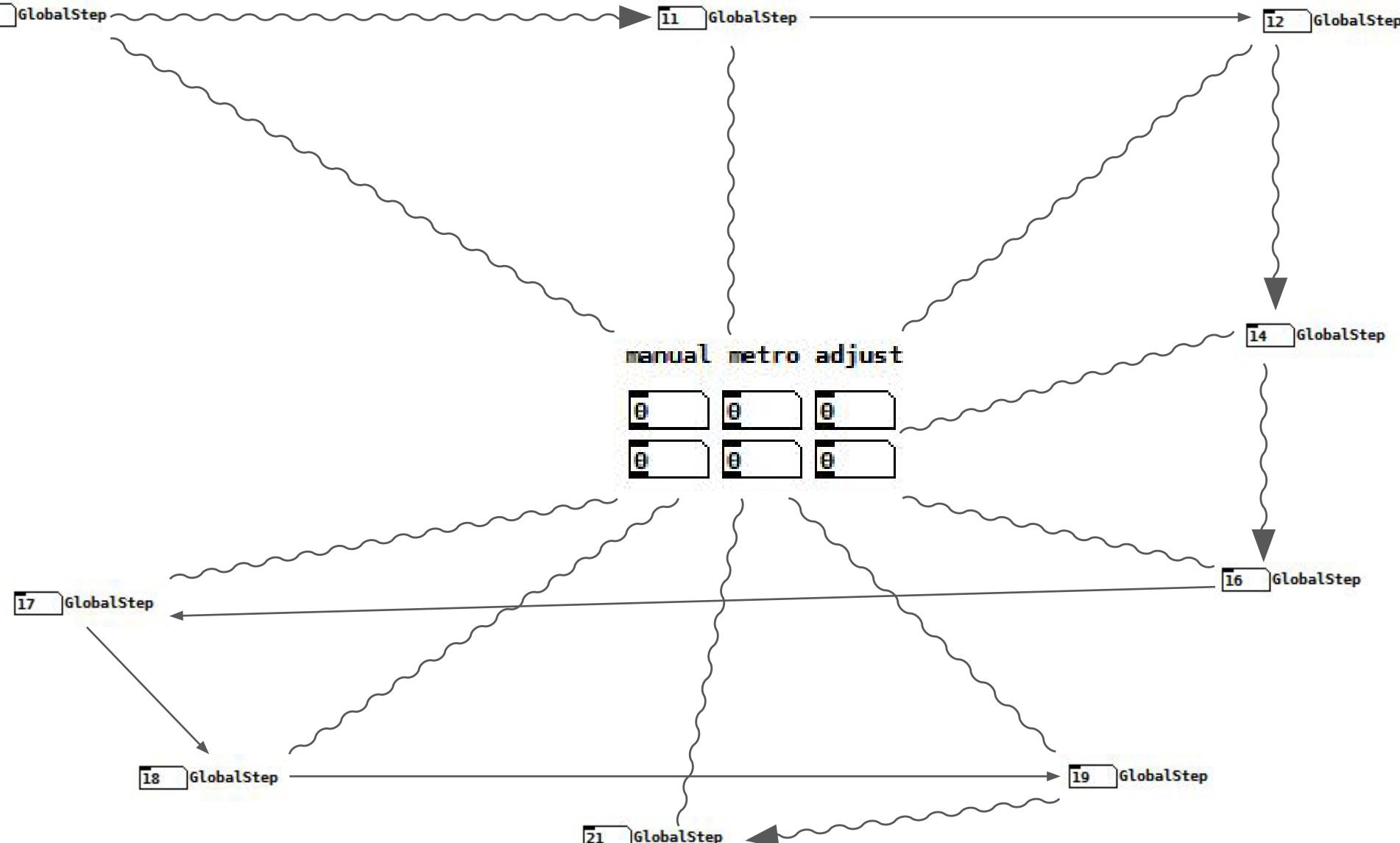
Begin this movement by gradually stepping downwards according to the lines given below. After **GlobalStep** 6 is reached the values given are to be entered in discrete fashion by clicking the number box in the patch, entering the new value, and pressing return. The arrows help to provide reference as to the order of events. Each step should last between 0'03" and 0'12". Relative duration is suggested by spatial placement of the values below relative to one another, and actual duration is determined by the performer.







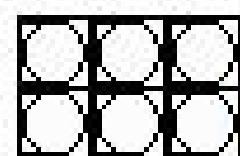
Toggle symbol indicates that at the performer's discretion, the sequencer modules are now to be toggled in and out one at a time, bringing them out of sync with one another and producing new relationships.



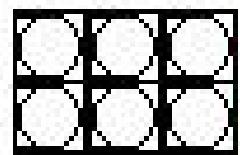
After each discrete **GlobalStep** is entered, and while listening for new structures or patterns emerging from the interaction of the sequencers, improvisationally adjust one or more sequencer step speed using the manual metro adjustment control. Values may be entered by entering numbers and pressing return or entering numbers and clicking and scrolling to new values. After step 21 is entered, increase the spread of the sequencers two octaves upward by activating the button shown.



*Listening to the sound of the sequencers in their expanded range, gradually bring the tempos back to their original values as shown on the face of the patch. Between 0'03" and 0'12" after the starting values have been reached, the **all modules on** button is activated two times very quickly. Immediately following this gradually activate the **2x8VaDown** control in the order given by the sequence of numbers shown to the right of the module. This expands the sequencer's octave reach two octaves downward.*



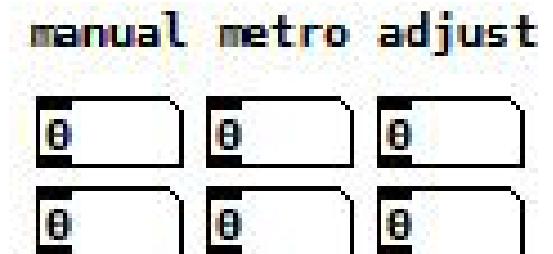
5ths



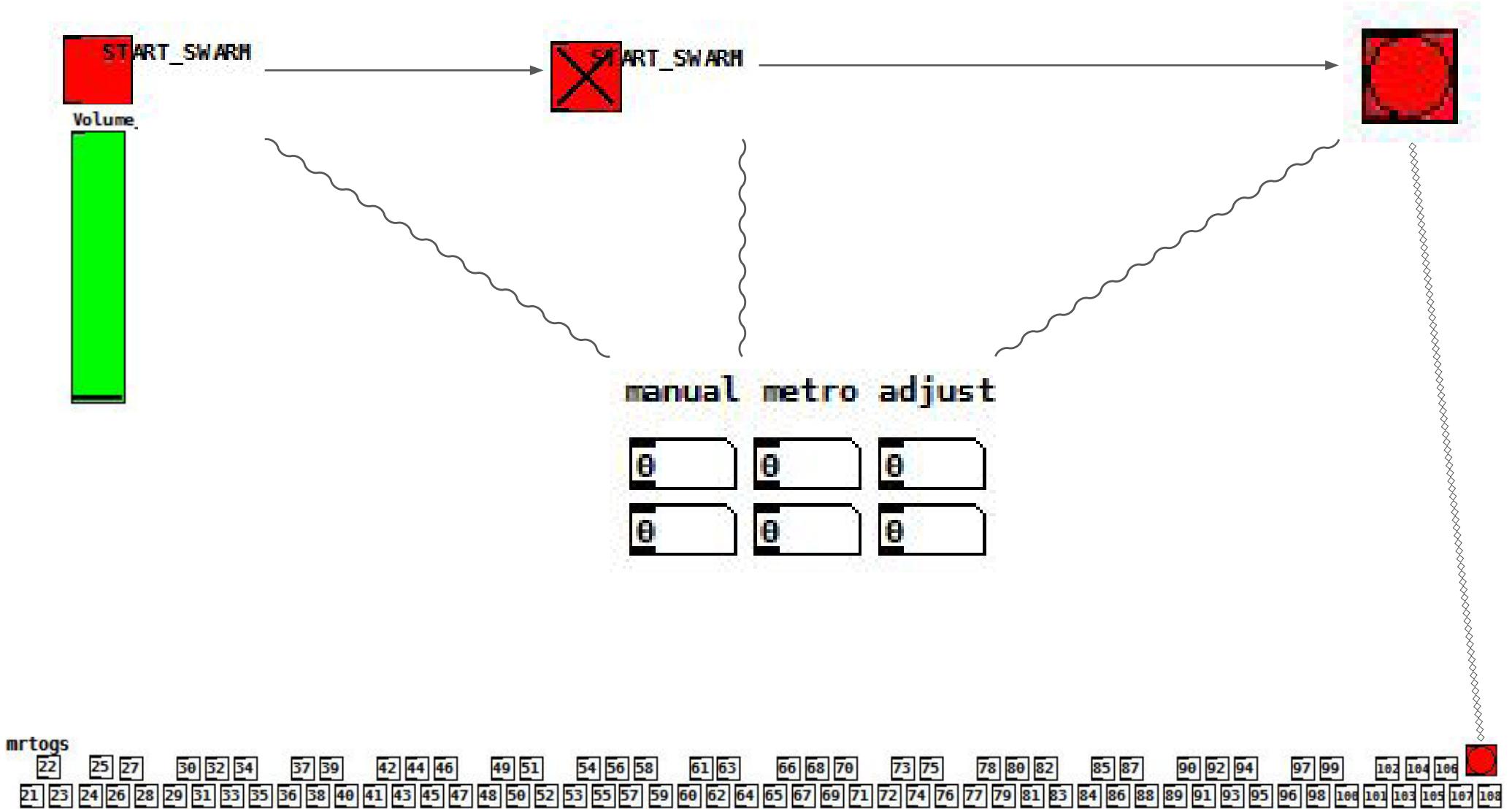
chrome

}6,4,5,3,2,1

Approximately 0'12" later the performer activates first the **5ths** and then the **chrome** buttons in the order given. Each activation should be 0'03" and 0'12" apart. Following this, the **chrome** buttons may be activated repeatedly and in any order, expanding or contracting the manual metro adjustment controls between each activation.

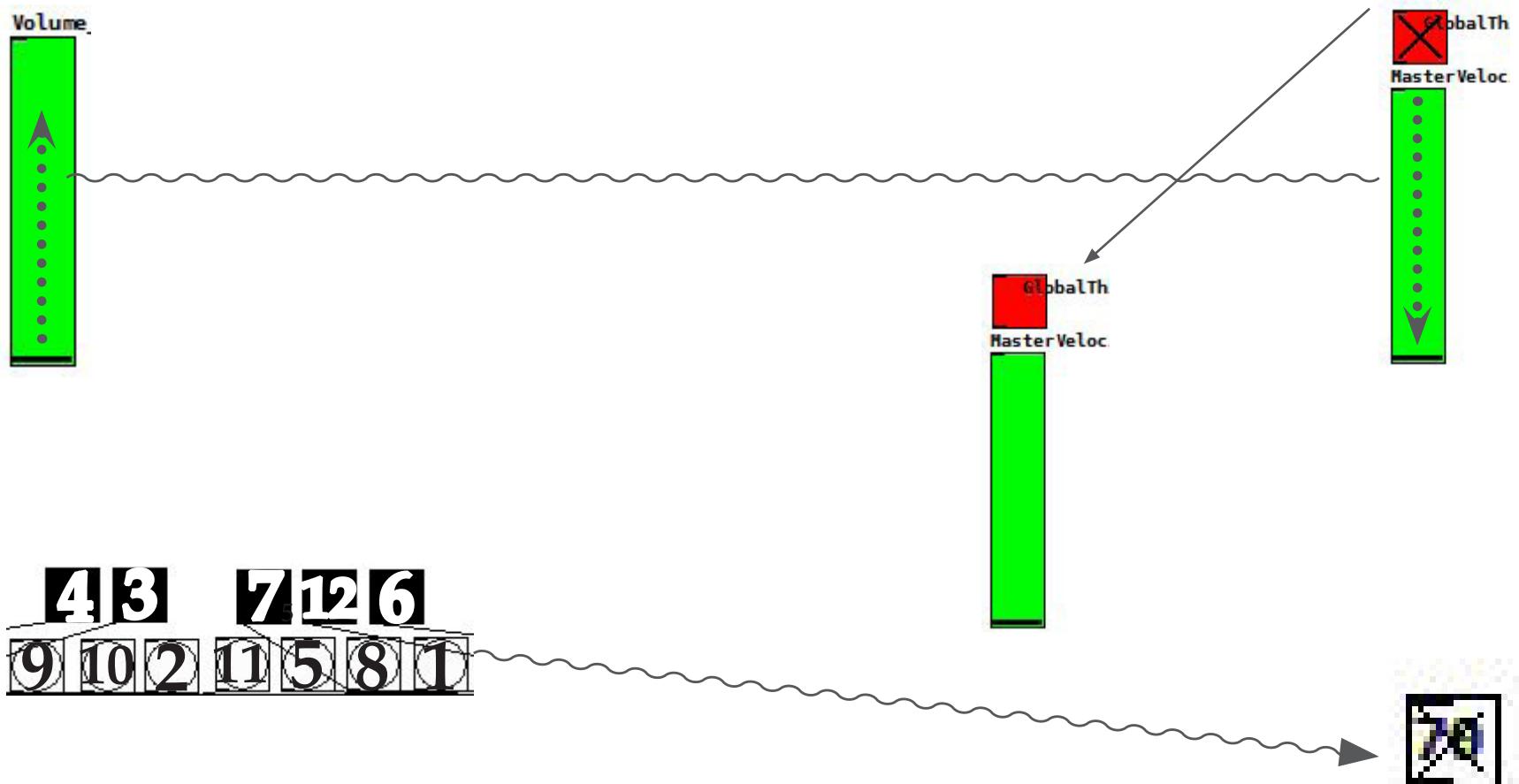


Continuing to adjust the *manual metro control*, activate the *start_swarm* button and press the large red button on the upper right side of the keyboard interface (*mr togs*).

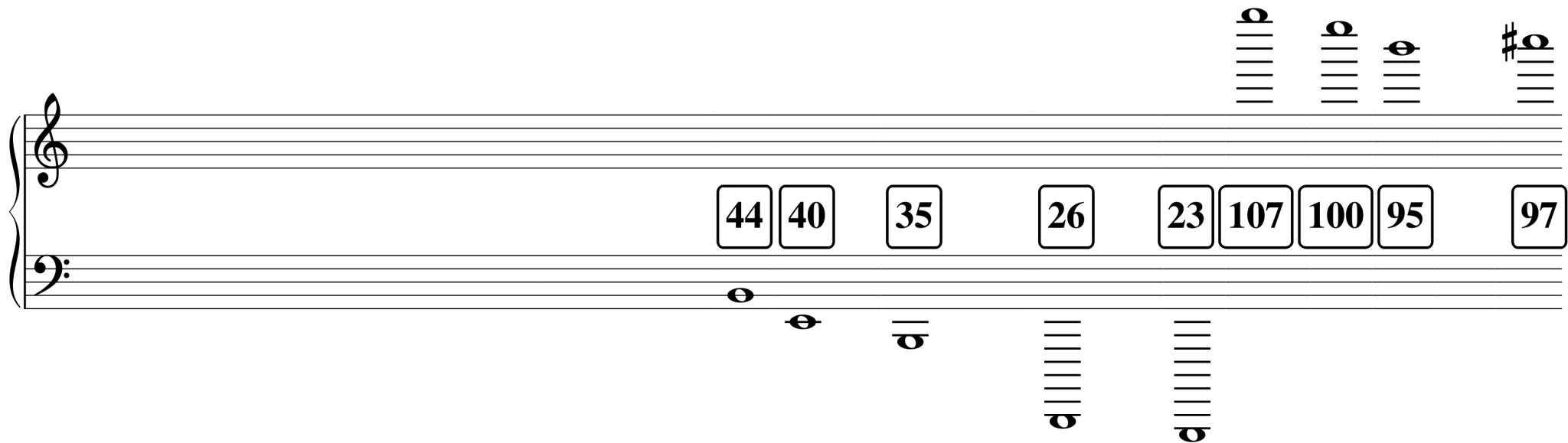
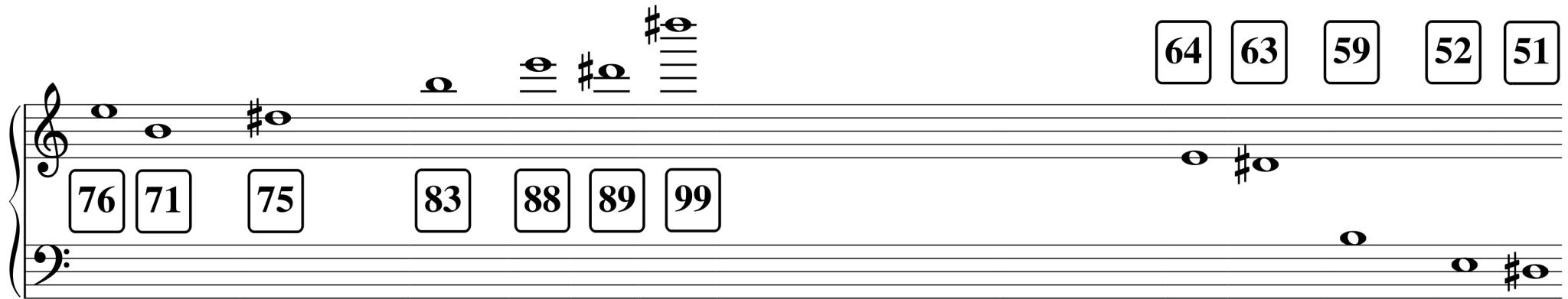


III.

the flock momentarily assumes an aspect of the head of Dmitri Shostakovich before departing into the distance



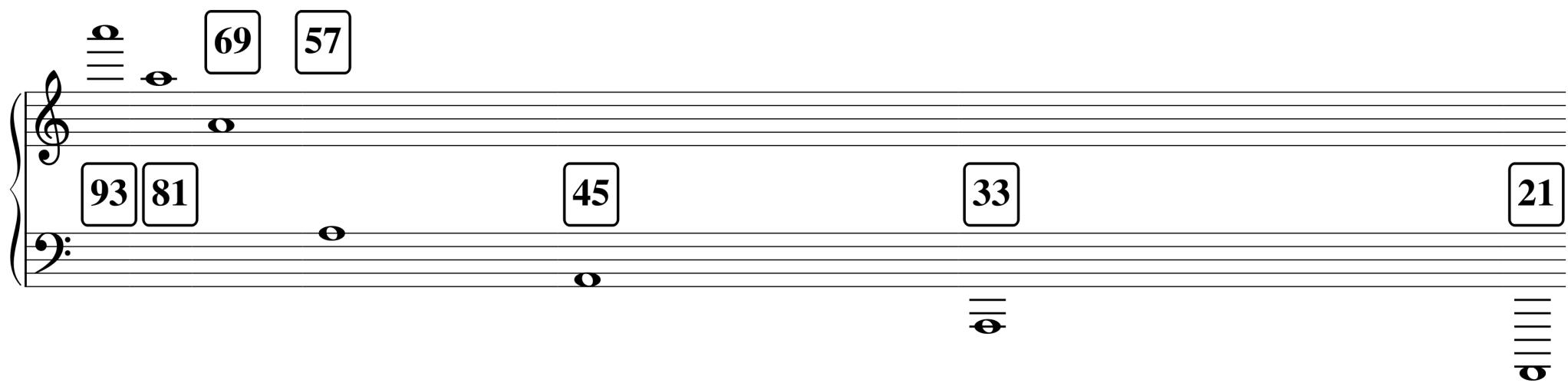
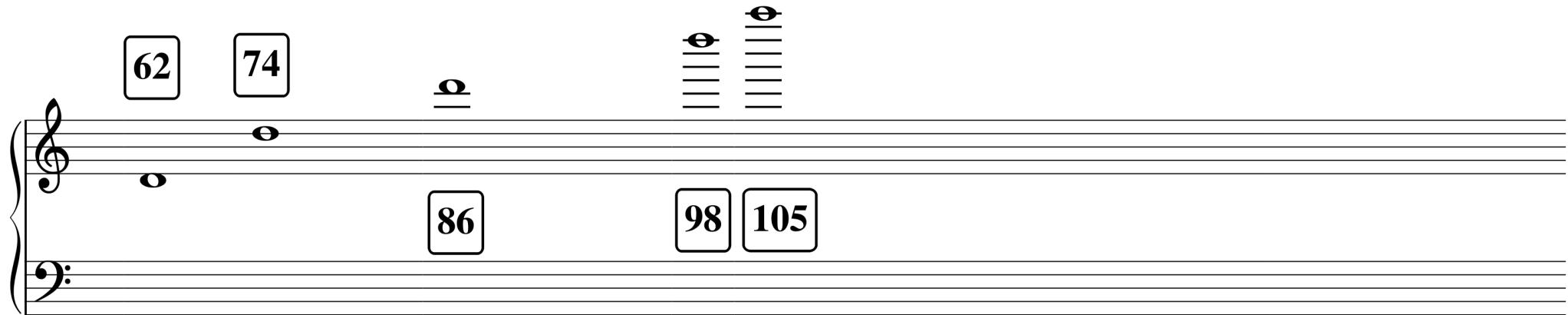
Fade up the Swarm control Volume fader. By turns or once this overtakes the activity of the previous movement, fade down the MasterVelocity control and toggle off GlobalThoughts. In reverse order (12-1) press the buttons shown above once each. These buttons shut off groups of active keys by octave. There should be a moment of silence after button 1 is pressed, and if inappropriate keys are still playing as these buttons are activated they need to be shut down manually by clicking them on and then off on the mr togs keyboard. Play the notes on the following pages by activating them one at a time on the mr togs keyboard. Durations are free. In the middle of the movement the process reverses and the toggles are now de-activated, eventually leading to silence at the end of the piece.

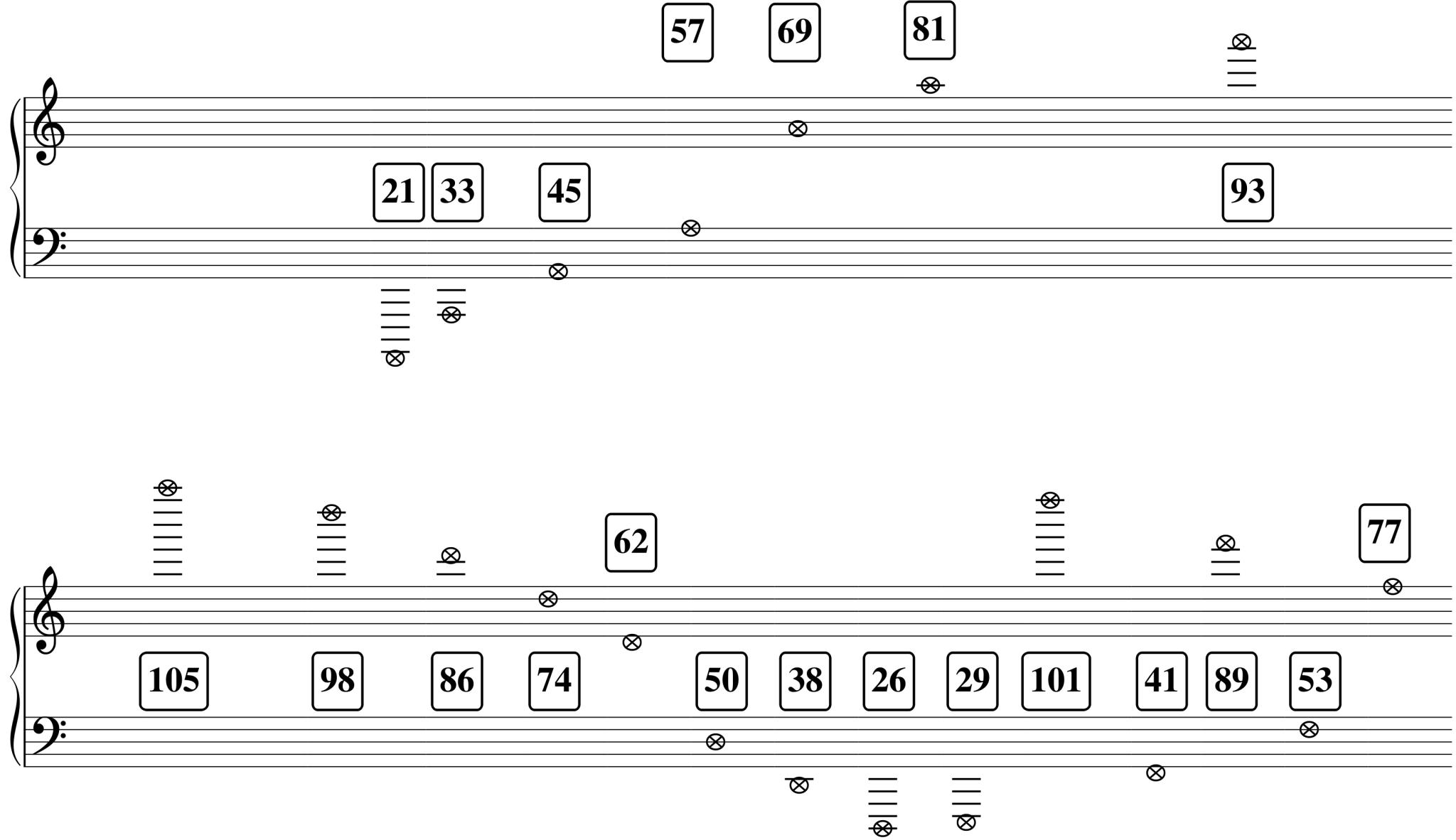


85 75 61

49 37 25 39 104 32 44 92 80 56 68 102 30

90 42 78 54 66 65 77 53 89 41 101 29 26 38 50





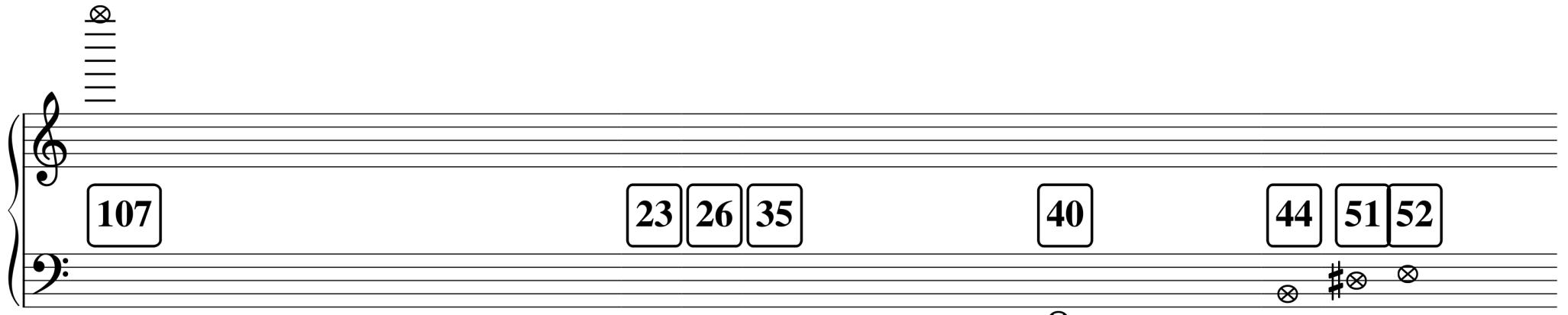
A musical score consisting of two staves. The top staff uses treble clef and the bottom staff uses bass clef. Measures are numbered in boxes above the staff. The score includes various performance markings such as sharp symbols with circles and vertical lines.

Top Staff Measures:

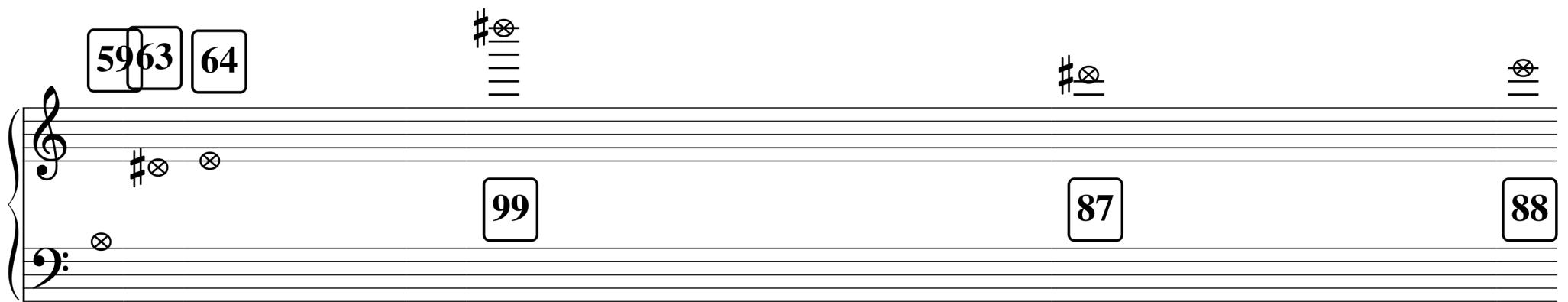
- 65
- 66
- 54
- 78
- 42
- #⊗
- 90
- 30
- 102
- 68
- 56
- 80
- 92
- 44
- 32

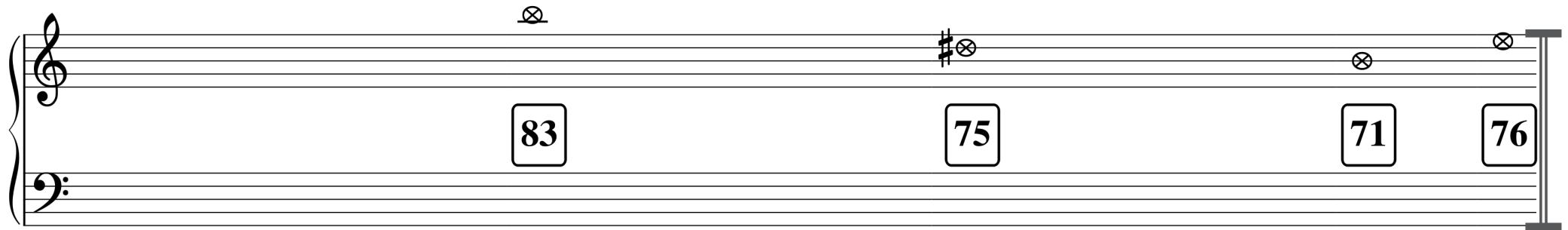
Bottom Staff Measures:

- 104
- 39
- 25
- 37
- 49
- #⊗
- 61
- 75
- #⊗
- #⊗
- #⊗
- 85
- 97
- 95
- 100



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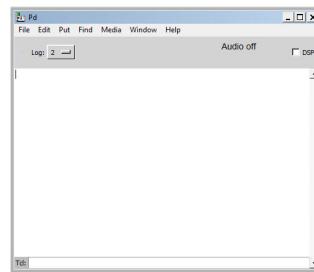


IV. Installing and Configuring Pure Data

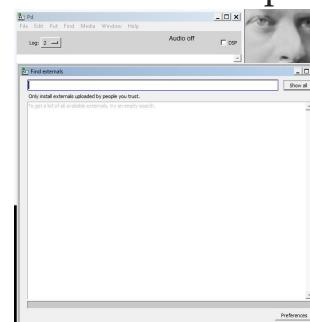
A. Installation

Pure Data is free and can be run on nearly any computer system. It can be downloaded from <https://puredata.info/downloads>. Installation instructions are found there and included in download package.

After installation open Pd. The window seen below is displayed.



This piece requires several external libraries which can be easily installed using the built-in Dekken plugin. After opening Pd, navigate to the Help menu along the upper edge of the Pd window. Click this and select "find externals" from the drop-down menu. The window pictured below (without the face) should appear.

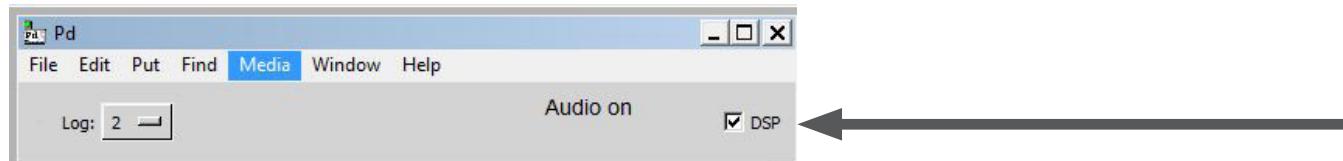


The libraries that need to be installed are **markex**, **cyclone**, **maxlib** and **boids**. One at time enter these library names into the search bar and click "search." Current versions of the libraries in the Pd repository will be listed. Select the appropriate one for your system and click on it.

A message appears prompting you to install the library, either click “Yes” to install it in the default location given or “No” to specify your own location for your libraries. Note that using locations other than the default location for libraries may result in difficulty in getting Pd to recognise them later. Pure Data objects that are from unrecognized libraries will appear with red outlines, and where Graphic User Interface controls are present they will not be displayed. Incidentally, it is for this reason that the *UnnaturalProcesses_PERFORMANCE* patch must remain inside the folder with all of its dependencies. These items are released under the same license as Pd itself, found here: <http://puredata.info/about/pdlicense/>. This license covers the software components of this piece and does not extend to recordings, broadcast rights, or score of this piece. I reserve all rights to my creative work and my own authorship of this piece.

B. Configuring Midi

After installation open Pd. The window seen above is displayed.



The first thing to do is activate DSP. This is done by clicking the box indicated by the arrow. Although Pure Data will not be producing sound in this piece, it is still necessary to have DSP on as several objects used depend on it.

Following this click the Media tab and selecting Midi Settings from the dropdown menu. Select your virtual port (Windows, Linux) or IAC Bus (Mac) to stream midi between Pure Data and the piano, or your DAW program for practicing.

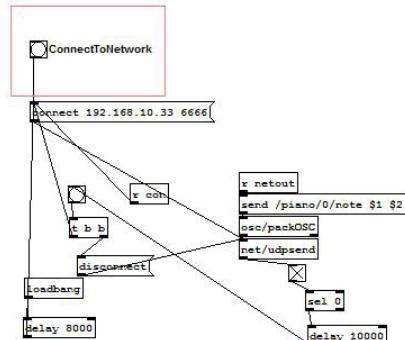
No sound output from Pd is desired for the purposes of this piece.

C. Connect to RHEA over a Network

Pure data has two cursor modes, and performance mode and an edit mode. To activate and perform the piece, it is desired to remain in performance mode throughout. However to connect to RHEA over a network is it necessary to modify the “netoutmaster” shown below.



To get into Pure Data’s edit mode either select it from the edit menu from the Pd window, or click ctrl E on windows or cmd E on mac. In performance mode the cursor appears as an arrow, and aspects of the patch can be clicked on and off. In edit mode the cursor appears as a hand and aspects of the patch can be opened and moved around. It is not recommended to modify the contents of modules other than netoutmaster in your performance copy as such hacking may prevent the program from running properly! However, a small amount of hacking is necessary to connect the patch to RHEA across a network and to do this, one simply clicks the netoutmaster, or right-clicks and selects open to access the inside of this patch, seen below.



From this window, in edit mode, it is necessary to simply modify the “connect” message shown below by clicking it and inputting the IP address of the network the piano is connected to along with an appropriate port number on the network host. Then by closing this and clicking the “ConnecttoNetwork” button on the main patch communication is achieved. If not, try again.

D. Practicing

The patch is configured to send midi across all channels, so therefore any device that receives midi should play back performer input from the patch, provided it is connected to the performers computer, that this computer is set up to send mid and the other device is set up to receive it.

For simplicity I have included a Reaper session and a piano VST (windows only, unfortunately) that can facilitate this process, however any Digital Audio Workstation (DAW) such as Nuendo, Digital Performer, or Cool Edit Pro, in addition to those mentioned earlier, should be able to play the performer's activities with the patch back with audible results. Simply select a suitable virtual piano and use this to familiarize yourself with the possibilities of the patch and the specific possibilities suggested by the score!

To get midi from Pure Data into your DAW software, more than likely a virtual port is needed. For Windows this is a third-party program, like LoopMidi, or MidiOx, excellent free software that allows for the creation of virtual ports. These ports can be named by the user and then are selected in Pd as Midi Output and in your DAW as Midi Input. On Macintosh computers of recent origin the IAC bus can serve this function. Simply enable your IAC bus in your AudioMidi Setup, name it if you wish and then select this bus as output in Pd and Input in your DAW and it should work. Happy Practicing!