

Nicholas Shaheed

Pulse

For Solo Flute, Computer, and Heart-Rate Monitor

2015

Preface and Information

About *Pulse*

The archetypical work of electronic music involving a live, acoustic instrument consists of prerecorded audio that the performer then plays to. This approach is, by necessity, static. The electronics are unchanging and, as a result, are missing the characteristics that make a live performance live. *Pulse* seeks to add an element of dynamicism to the electronics that is derived from the performer's physiological reaction to the performance at hand, through the measurement of the performer's heart rate.

The tempo and a majority of the effects in the piece are somehow shaped by the player's heart rate. Some effects (such as the tempo) simply read the present heart rate, while others are effected by the what the performer's heart rate has been. The heart rate is then the driver of the intensity, frequency, pitch, tempo, and texture of the electronics.

Between the movements of *Pulse*, there are short interludes where the performer does not play. These serve as transitions between the movements.

Tempo & Notation

Tempo



The tempo of all three movements of *Pulse* are determined by the performer's heart rate, where the BPM of the heart beat determines the BPM of the quarter note. As the performer's pulse rises and falls, so does the tempo of the music. The constantly shifting tempo in this music requires careful attention from the performer, as movements *i* and *ii* contain elements in the electronics that are tightly synced to specific measures and beats.

The heart beat is measured using a heart rate monitor (see Hardware).

Notation



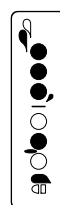
The tremolo indicates flutter tonguing.



This figure is used to indicate the increasing intensity of vibrato



Fingering diagrams are given when certain notes, effects, intonation, or polyphonics are to be played.



Hardware

The following pieces of equipment are needed:

- Stereo PA system
- A computer
 1. That can run Max/MSP 7
 2. That has at least 1 USB port
- Polar T31 Heart Rate Monitor (contact composer to get)
- Polar Heart Rate Monitor Interface (contact composer)
- An audio interface with...
 1. 2 outputs (required)
 2. Or one with 4 outputs (recommended)
- Headphones (recommended)
- A mixer (recommended if performing with two people, see Recommendations)

Using the Electronics

The electronics consist of a Max/MSP 7 patch. Contact the composer for downloading and operating instructions. When the patch is up and running, hit the "Help" button to open the help file for the electronics.

Using the Heart Rate Monitor

To attach the Polar T31 Heart Rate Monitor:

1. Fasten one end of the heart rate sensor to the elastic strap.
2. Moisten the two grooved areas on the back.
3. Clip the heart rate sensor around your chest and adjust the strap to fit snugly.
4. Check that the wet grooved areas are firmly against your skin, and that the text on the heart rate sensor is in an upright position and at the center of your chest.

Taken from polar.com, see site for additional illustrations.

Additionally, it is recommended that a heart rate monitor electrode cream be used to ensure a more consistent connection between the skin and the sensor (Buh-Bump cream for example).

Recommendations

It is recommended that a second performer control the levels of the electronics via a mixer. This will allow for more fine grained control of the dynamics in the electronics.

A click track is provided for the performer (and because of the constantly changing tempo, it is highly recommended that it be used). The click track outputs to channels 3 and 4, which the headphones should be plugged into.

Pulse

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Movement I

♩ = Heart Beat

4 5 6 7

8 9 10

11 12 13 14

15 16 17

18 19 20

21 22 23

24 25 26

27 28 29 30 31

32 33 34

p

p

p

cresc. *mf*

cresc.

p

mf

p

mf

p

f

p

35 *f* *p*

36 37 38

39 *mf*

40 41

42 *f*

43 44 45 46

47 *ff*

48 49 50 51

52 53 54 55 56

57 58 59 60 61 62

63 64 65

66 67 68

69 70 71 72 73 74

75 76 77 78 79 80

Detailed description: This musical score is for a single melodic line, likely for a piano or violin. It consists of nine staves of music, numbered 35 to 80. The key signature is one sharp (F#), and the time signature is 3/4. The score includes various musical notations such as eighth notes, sixteenth notes, and quarter notes, often beamed together. There are also rests, ties, and dynamic markings. The dynamics range from *p* (piano) to *ff* (fortissimo). There are also articulation marks like accents and slurs. The score is divided into measures by vertical bar lines, with some measures containing multiple bar lines indicating a change in time signature or a complex rhythmic structure. The overall style is classical or romantic, with a focus on melodic development and dynamic contrast.

81 82 83 84 85

86 87 88

89 90 91

92 93 94

95 96 97 98 99 100

fff

101 102 103 104 105 106 107

p

108 109 110 111 112

sfz p sfz p

113 114 115 116 117

pp p

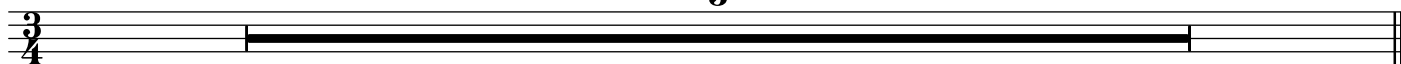
118 119 120 121 122 123

mf pp p

124 125 126 127 128 129 130

Interlude

3



Movement II

♩ = Heart Beat

1 2 3 4 5 6 7 8 9

10 11 12 13 14 15 16 17 18

19 20 21 22 23 24 25 26 27 28

29 30 31 32 33 34 35

p *f* *sf* *p* *f* *sf* *p* *mp* *mf*

36 *cresc. poco a poco* 37 38 39 40 41

36 37 38 39 40 41

42 43 44 45 46 48 49

fp *ff* *p*

42 43 44 45 46 48 49

50 51 52 53 54 55 56 57

50 51 52 53 54 55 56 57

58 59 60 61 62 63 64

58 59 60 61 62 63 64

65 *p* 66 *mp* 67 *mf* 68 69 70 *mp*

71 72 73 74 75 76

77 78 79 80 81 82 83

84 85 86 87 88 89

90 91 92 93 94 95 96 97 98

99 100 101 102 103 104 105 106 107 108 109

ff

Interlude

12

Movement III

Heart Beat

p

mp

mf

24 *tr* *f*

30 *sp*

37 *sp* *mf*

43 *molto legato* *pp*

50

56 *tr*

63 *mp* *mf*

70 *f*

79

87 *p* molto legato

95

102

110

The musical score consists of a single melodic line on a treble clef staff. The key signature has one flat (B-flat). The piece begins at measure 63 with a 4/4 time signature and a mezzo-piano (*mp*) dynamic. It transitions to 3/4 time at measure 64 and back to 4/4 at measure 65, where the dynamic changes to mezzo-forte (*mf*). At measure 70, the time signature changes to 2/4 and the dynamic becomes forte (*f*). Between measures 70 and 79, there is a vertical box containing a single note. At measure 79, the time signature changes to 3/4. At measure 87, the time signature changes to 2/4 and the dynamic becomes piano (*p*), with the instruction "molto legato". The piece continues through measures 95, 102, and 110, ending with a double bar line. The score includes numerous slurs, accents, and trills throughout.