

Richard Barrett

entoptic

2017-18

percussion and live electronics

performance score

entoptic

(2017-18) for percussion and live electronics

commissioned by Peter Neville and ELISION

duration: approximately 12 minutes

The **instrument** used for *entoptic* is based around an array of 25 found objects which is in turn based around the setup developed by Peter Neville for improvisational performance. The first version is shown in the photograph below. Its essential features are as follows:

(a) a more or less square “matrix” of 16 principal instruments with flat upper surfaces, each row using a different basic timbre (which doesn’t need to be completely homogeneous), principal pitch (if any) rising from left to right, although clear pitches should not be chosen. In the score, these rows are numbered 1-4 in order from furthest to closest to the performer. Two of the items should be Chinese hand cymbals, about 15cm in diameter. These are positioned in the photo as the third and fourth items in the third row from the top, but in a different setup they could occupy different positions. One or more of the items should be a very thin metal plate or biscuit-tin lid which can be easily warped to produce a “crinkling” sound.

(b) 9 smaller instruments in the interstices of the aforementioned matrix, of any shape so as to fill as much of the square as possible (enabling “glissandi” to be played by dragging/bouncing a beater across the square in different directions).

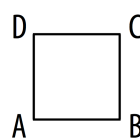
(c) an African seed pod rattle and two pebbles, placed ready for use together with the beaters: 2 plastic knitting needles, 4 hard vibraphone mallets, 2 soft vibraphone mallets, 2 superball mallets, 1 threaded steel rod about 30cm in length, 1 bow



The objects in the array are notated as follows:



The **amplification** uses four microphones, positioned over the four corners of the array, whose outputs are sent to four loudspeakers at the corners of the performing space, so that movements across the objects in the square are translated into movements across the whole space. The microphones are indicated as A, B, C and D in the score according to their positions in this diagram (from the performer’s point of view):



The output of microphone A is sent to the right front loudspeaker, that of microphone B to the left front, that of microphone C to the left rear, and that of microphone D to the right rear (from the audience’s point of view). If a four-channel sound system is not available, the four channels should be equidistant along the stereo panorama in the order C B A D from left to right (from the audience’s point of view).

Additionally, the four outputs are sent to the four inputs of the live processing patch. The **live electronics** use a Max patch constructed by Patrick Delges at the Centre Henri Pousseur in Liège. It has four inputs (for the four percussion microphones) and four outputs sent to the same quadrasonic loudspeaker system as the four microphones. The patch contains two components A and B. The first of the three main sections of the piece uses only amplification. The second uses component A and the third both A and B.

Component A is engaged by the player using a sustain pedal. It detects the most prominent frequencies in the percussion sound and resynthesizes these as sinewaves with a “percussive” exponential envelope. It therefore acts in a similar way to a piano’s sustain pedal except that the sustained sound is more clearly pitched than the original attack, with somewhat unpredictable pitch content and that the pedal only affects the input to the reverberation. When the pedal is raised nothing is sent to the reverb, but what is already there will still be sounding. The decay time (with a minimum of several seconds) of the envelope and level should be adjusted so as to have a clearly perceptible effect without compromising the audibility of what is being played. These parameters may be varied during the performance (by the sound projectionist) especially during the more improvisatory moments in the score.

Component B involves a 4-channel soundfile triggered by the sound projectionist each of whose channels is gated by an input from one of the four microphones. The overall output volume of the patch is controlled by the player using a volume pedal. The release time of the gate is adjustable and should be set to a similar value to the reverb time of component A.

Again this and the balance between acoustic and electronic sounds may be varied more or less freely during the performance. The section where component B is in use, from bar 54 to the end, is 5 minutes in duration; each system consists of a single bar 12 seconds long, and timings are provided at the beginning of each system (beginning at 0'00" at the beginning of the section). A stopwatch may be used here but it isn't intended that timings be precise, since the electronic part will "synchronise" to the playing rather than the other way around. As long as the player keeps to within a few seconds of the indicated timings the relationship between live playing and electronics will function correctly.

technical rider:

for percussionist:

table approximately 1m square

4 microphones on stands set up at the corners of the square of instruments

FOH:

FOH mixer with 4 auxiliary sends and

4 loudspeakers in a quadraphonic configuration

audio interface with 4 inputs, each fed by the output of one of the microphones, and 4 outputs

computer running the *entoptic* patch written in Max 7

sustain pedal for the player to control component A of the patch

volume pedal for the player to control the output level of component B of the patch

notations:



= scrape the surface of the object with the indicated beater



= "glissando" across the array over the indicated duration beginning and ending at the specified points, bouncing/dragging the beater over as many intervening objects as possible, following the arrow(s) in the box above the staff. Such boxes are also used for more or less improvisational movements at various points in the score. Similar boxes are also used to indicate positions and movements of hand-held objects.

] = damp all sounds covered by the bracket

P] = sustain pedal sending sounds to component A of the patch



vp = volume pedal sending sounds to component B of the patch. The volume pedal descends through four different "zones" delimited by the five lines of this staff. Between the top and second lines the pedal has no effect. Between the second and third, the microphone inputs open a gate to the soundfile (which plays continuously through the third section of the piece but is only heard when one of the four gates, one for each microphone, is open) so that it is heard with a volume proportionate to the played volume and with a very brief decay afterwards when the gate closes. Between the third and fourth lines, the delay gradually increases. Between the fourth and fifth lines the delay is effectively infinite, and the electronic sounds continue to be audible until the pedal is raised into one of the other zones. The third zone, between the third and fourth staff lines, is the only one where gradual movements induce gradual changes. Otherwise the pedal is effectively switching between four different modes. Each zone occupies an approximately equal division of the total travel distance of the pedal.

programme note

entoptic for solo percussion with live electronics is the result of an extended collaboration with Peter Neville. While performing in a succession of improvisational pieces I have written for ELISION and other ensembles (*codex I, III, IV, IX, XI, XIV, XVIII, XIX, XX*), he has been gradually evolving a percussion setup which combines maximum timbral flexibility with portability, utilising a wide selection of small instruments and other objects. This solo was conceived around Peter's setup by "systematising" it as a 4x4 grid of principal instruments placed on a table, with an additional 3x3 grid of smaller objects in the gaps between them. The setup is then amplified by microphones at its corners, which allow a "spatialisation" of the grid onto the size and shape of the performing space itself, and for instruments to be picked up and actuated next to a microphone for a "close-up" sound or moved between them for "panning". Additionally, the microphones are used to pick up percussion sounds by a computer for the live electronic part, programmed by Patrick Delges of the Centre Henri Pousseur in Liège. In the first of the three parts of the piece, no electronic sounds appear. In the second, the computer selects certain partials from the (not all clearly pitched) percussion sounds and reverberates them, triggered by a sustain pedal played by the percussionist. In the third, this processing continues but the percussive sounds now also actuate prerecorded electronic sounds and textures which expand the timbral and articulative range of the "instrument" even further.

The title refers to visual phenomena which are generated within the nervous system rather than sensed by the eyes, for example the patterns known as "form constants" which recur in descriptions of altered states of consciousness throughout many shamanistic cultures as well as experiences with hallucinogenic substances. These patterns of dots, zigzags, spirals and so on could be said to form a "map" of the visual cortex of the brain – what is being seen is in a real sense the "workings of the mind". This music uses such "form constants" as patterns of movement across the two-dimensional array of struck objects, and in the course of its three parts transforms these through electronic processing into new sound-forms, analogously to the way that the transition from waking consciousness into sleep or trance might first involve abstract patterns which the mind gradually "interprets" as the contents of dreams or (in shamanic practices) of the spirit world.

In the early 1990s, Daryl Buckley remarked to me that in working with the "grain of the instrument", as I'd been doing in the context of what I subsequently came to call "radically idiomatic instrumentalism", I was also working with the "psyche of the musician", a remark that has resonated more deeply with me as the years have gone by. *entoptic* forms part of a cycle of interlocking works under the collective title *PSYCHE*, which attempt, from various angles, to confront that interface between the inner and physical worlds (which may or may not ultimately be two sides of the same thing) that is at the heart of all musical activity. Here I've also been strongly influenced by David Lewis-Williams's book *The Mind in the Cave*, an exploration of the origins of art and creativity in altered mental states with particular reference to Palaeolithic cave paintings. For me musical activity (composition – performance – listening) is as meaningful a way of trying to understand the world as any other: what it might be thought to lack in specificity relative to science and philosophy might in the end, in some contexts, be an advantage and a way of liberating thought from language and its dualisms.

entoptic

Richard Barrett
2017-18

$\text{♩} = 100$

12 (with plastic knitting needles) - sempre l.v. except where damping is indicated

The score consists of 12 systems, each representing a 12-measure phrase. The notation includes a 12-measure staff at the top of each system, a 4-string staff with notes and dynamics, and a 4-string staff with fretting positions. Ratios are indicated above the phrases.

System 1: Ratios: 8:7, 6:4, 4:5, 7:6, 6:4, 4:3, 6:4, 5:4, 4:3, 6:5, 6:4. Dynamics: *fff*, *mf*, *pp*, *mp*, *ff*, *ppp*, *f*, *p*, *mf*, *ppp*, *f*.

System 2: Ratios: 4:3, 6:5, 13:12, 7:8, 4:3, 3:2, 3:2, 5:4, 9:8, 6:5. Dynamics: *fff*, *mp*, *mf*, *p*, *ppp*, *f*, *fff*, *pp*, *ff*, *p*, *mf*.

System 3: Ratios: 6:7, 5:4, 8:7, 6:4, 5:6. Dynamics: *f*, *pp*, *mf*, *mp*, *pp*.

System 4: Ratios: 5:4, 7:9, 7:5, 4:3, 4:5, 10:8, 7:6, 4:5. Dynamics: *ff*, *mf*, *f*, *p*, *ppp*, *mf*, *fff*, *mf*, *p*, *mf*, *mp*.

System 5: Ratios: 4:3, 13:15, 8:6, 8:9, 10:7, 4:3. Dynamics: *(mp)*, *mf*, *fff*, *ppp*, *f*, *mp*, *pp*.

System 6: Ratios: 7:6, 12:9, 4:5, 3:2, 5:6, 6:4, 3:2, 5:4. Dynamics: *mp*, *fff*, *pp*, *mp*, *f*.

7

1
1a
2
2a
3
3a
4

ff *ppp* *pp* *ff* *pp* *ppp* *pp* *ppp* *mf* *fff*

Intervals: 20:17, 8:7, 4:3, 8:7, 7:6, 6:5

8

1
1a
2
2a
3
3a
4

fff *mf* *fff* *mf* *fff* *mf* *ppp*

Intervals: 8:7, 6:4, 3:2, 5:4, 4:3, 3:2, 3:2, 4:3, 3:2, 7:5, 3:2

9

1
1a
2
2a
3
3a
4

(ppp) *fff* *p* *mf* *ff* *mp* *f* *ppp*

Intervals: 10:11, 23:15, 9:8, 7:8, 8:7, 3:2, 5:6, 9:8

10

1
1a
2
2a
3
3a
4

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

Intervals: 10:11, 6:4, 5:6, 7:8, 3:2, 4:3, 3:2

11

1
1a
2
2a
3
3a
4

mf *ppp* *mp* *pp* *f* *mp* *ff* *f*

Intervals: 8:6, 3:2, 5:6, 6:7, 3:2, 5:4, 4:5

12

1
1a
2
2a
3
3a
4

mp *pp* *fff* *f* *mf* *ppp*

Intervals: 9:7, 9:6, 5:6, 11:12, 10:8

13

1
1a
2
2a
3
3a
4

fff *mf* *p* *ppp* *p*

14

1
1a
2
2a
3
3a
4

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

15

1
1a
2
2a
3
3a
4

pp *mp* *pp* *mp* *pp* *mf* *ff*

16

1
1a
2
2a
3
3a
4

pp *fff* *pp* *mf* *f*

17

1
1a
2
2a
3
3a
4

ppp *fff* *mp* *ff* *p*

18

1
1a
2
2a
3
3a
4

f *damp!* *mf* *ppp* *mp* *f*

19

1
1a
2
2a
3
3a
4

mf *pp* *ff* *fff* *ff* *pp*

14:12 14:12 3:2 10:7 7:6 4:3 3:2

20

1
1a
2
2a
3
3a
4

(pp) *fff* *ff* *fff* *p* *fff* *p*

9:6 14:12 13:14 7:5 11:14 11:9 7:8 7:8

21

1
1a
2
2a
3
3a
4

(p) *fff* *p* *mf* *f*

13:9 8:6 6:4 7:8 9:7 12:10 4:5 4:5

22

1
1a
2
2a
3
3a
4

ppp *pp* *mp* *ff* *mf*

10:8 6:5 6:4 3:2 13:10

23

1
1a
2
2a
3
3a
4

(mf) *f* *pp* *mf* *ff* *f* *mp* *pp*

5:6 6:4 4:5 6:5 6:4 5:4 8:6 4:3 4:3

24

1
1a
2
2a
3
3a
4

(pp) *ff* *mp* *ppp* *mp*

12:10 6:7 3:2

25 5
4
8

(mp) *p* *fff* *p* *fff* *p* (*fff*)

4 $\text{♩} = 75$

26 5
8

take 4 hard vibraphone mallets (l.v. sempre)

fff *ff* *f* *ff* *fff* *ff*

29 9
16 5
8

f (*p*) *fff* *f* *ff* *mf* *ff* *mf* *ff*

32 11
16

mf *mp* *mf* *ff* *mp* *ff* *mp* *ff*

34 6
8 13
16

fff *mf* *mf* *p* *mf* *p* *mf* *p*

36 7
8 8
8

mp *p* *p* *p* *p* *p* *p* *p*

6 8 17 16

38 8

1
1a
2
2a
3
3a
4

fff *mp*

(P)

Detailed description: This system covers measures 6 to 17. It features a five-staff system (1, 1a, 2, 2a, 3, 3a, 4) with a treble clef. The music consists of eighth and sixteenth notes, some with accents. A dynamic marking of *fff* is at the start, and *mp* appears later. A '(P)' marking is below the first staff.

17 16 19 16

39 16

1
1a
2
2a
3
3a
4

ff *p* *ff* *p* *ff* *p* *ff* *p* *ff*

Detailed description: This system covers measures 17 to 19. It features a five-staff system with a treble clef. The music is highly rhythmic, with many sixteenth notes. Dynamic markings alternate between *ff* and *p* across the measures.

19 16 10 8

40 16

1
1a
2
2a
3
3a
4

mf *p* *mf* *p* *mf*

Detailed description: This system covers measures 19 to 10. It features a five-staff system with a treble clef. The music includes a long note in measure 10. Dynamic markings alternate between *mf* and *p*.

10 8 11 8

41 8

1
1a
2
2a
3
3a
4

p *pp* *p*

Detailed description: This system covers measures 10 to 11. It features a five-staff system with a treble clef. The music is sparse, with few notes. Dynamic markings are *p*, *pp*, and *p*.

11 8 12 8

42 8

1
1a
2
2a
3
3a
4

mf *pp* *mf* *pp* *mf* *pp* *mf*

Detailed description: This system covers measures 11 to 12. It features a five-staff system with a treble clef. The music consists of eighth and sixteenth notes. Dynamic markings alternate between *mf* and *pp*.

12 8 13 8

43 8

1
1a
2
2a
3
3a
4

ff *pp* *ff* *pp* *ff* *pp* *ff* *pp* *ff* *pp* *ff*

Detailed description: This system covers measures 12 to 13. It features a five-staff system with a treble clef. The music is highly rhythmic, with many sixteenth notes. Dynamic markings alternate between *ff* and *pp*.

13 14 7
8 8

fff *p*

14 15 8

p *p sempre*

15 16 8

mp *f* *mf* *mp* *f* *mf* *mp*

16 35 16

pick up Chinese hand cymbals from the array
(any extension of the duration of the rests at the beginning and end of the bar should be taken from the duration of the central part, so that the bar has its notated duration of 12.8 seconds)

replace cymbals

pp *fff*

∞

improvisation with the hand cymbal pair involving (but not necessarily limited to)

- movement between the different microphones
- friction between the two cymbals face to face and face to edge
- sliding one or both cymbals over the remaining array
- more or less rapid alternations between depressed and raised sustain pedal

35 37 16

mp *fff* *mf* *ff* *f* *fff* *mf* *f* *mp* *ff* *mp* *fff*

8

37 16 20 8

49

1 1a 2 2a 3 3a 4

pp sempre

take superball mallet (LH)

7:6 8:10 15:11 3:2 7:8 3:2 5:4 4:5 8:7

put down superball mallet and retake hard vibraphone mallets

20 8 21 8

50

1 1a 2 2a 3 3a 4

fff *pp*

14:12 10:7 11:10 3:2 4:3

21 8 45 16

51

1 1a 2 2a 3 3a 4

ff *ppp* *ff* *ppp* *ff* *ppp*

45 16 24 8

1 1a 2 2a 3 3a 4

ff *ppp* *ff* *ppp* *ff* *ppp* *ff*

45 16 24 8

52

1 1a 2 2a 3 3a 4

mf *ppp* *mf* *ppp* *mf* *ppp* *mf* *ppp* *mf*

24 8 12 8

53

1 1a 2 2a 3 3a 4

pppp *p* *ppp* *p* *ppp* *p*

("echo") (sim.)

5:4 4:3 3:2 7:8 3:2 6:5 3:2

begin playback of component B soundfile here (does not become audible until bar 54)

0'00" **12** $\text{♩} = 60$
8

1
1a
2
2a
3
3a
4

fff *f*

vp (minimum decay time)

0'12" **55**

1
1a
2
2a
3
3a
4

f *fff*

vp (gradually increasing decay time...)

0'24" **12"** $\text{♩} = 60$ accel- as fast as possible
56

1
1a
2
2a
3
3a
4

fff sempre

(decreasing decay time...) (no effect)

... randomly over the entire array for the remaining duration of the bar

0'36" **12**
57 **8** (tacet, while electronic sounds continue, until they are...)

1
1a
2
2a
3
3a
4

ff

(... suddenly cut off)

vp ("infinite" decay time)

take thin metal plate and position in centre of the array, equidistant from all four microphones

buckle the plate to make a continuous crumpling sound

0'48" **58** sim.

1
1a
2
2a
3
3a
4

f *mf* *mp* *p*

vp *p*

take threaded rod

0'48" 59

plate "bowed" with threaded rod

4.5"

1
1a
2
2a
3
3a
4

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

(P)

vp

∞
improvisation with the plate and threaded rod
with movement between the microphones

f-mp rapidly changing dynamics between these limits

0'48" 60

∞
(continue from previous bar, now with volume pedal movements)

f-pp rapidly changing dynamics between these limits

(random movements across this range)

catch final sound with pedal to sustain through the rest that begins bar 61

(off)

1
1a
2
2a
3
3a
4

vp

(off)

1'24" 61

(i.v.) replace plate in array, put down rod, take 2 plastic knitting needles

mp

1
1a
2
2a
3
3a
4

mp

4:3 5:6 10:7 4:5 5:4 4:5 4:3 10:7 5:6

1'36" 62

(i.v.)

mf

1
1a
2
2a
3
3a
4

mf *p* *p* *p* *p* *p*

12:9 5:4 6:4 4:3 6:7 10:7 6:5 5:6 4:3 5:4 4:5

1'48" 63

p

1
1a
2
2a
3
3a
4

p

9:8 7:8 9:7 7:9

2'00" 64

1
1a
2
2a
3
3a
4
vp

f (P) *ff*

2'12" 65

7.5" (♩..)

∞
improvisation with rapid horizontal movements across the array during which the knitting needles are exchanged for 4 hard vibraphone mallets

pp *fff*

(vibraphone mallets)

1
1a
2
2a
3
3a
4
vp

2'24" 66

1
1a
2
2a
3
3a
4
vp

fff p *fff* p

take pebbles (silence!)

2'36" 67

2 pebbles struck against one another, constantly changing "pitch" by altering the resonating cavity in one palm, constantly making rapid and irregular movements between microphones while keeping the tempo absolutely steady

mp *f*

1
1a
2
2a
3
3a
4
vp

2'48" 68

(sim.)

1
1a
2
2a
3
3a
4
vp

ff *p*

3'00"

69 (sim.)

1
1a
2
2a
3
3a
4
vp

pp *(fff)*

(P)

3'12"

70

objects struck ("dead-sticking") with pebbles

1
1a
2
2a
3
3a
4
vp

fff *mf* *ppp*

(P)

3'24"

71

10"

(diamond-headed notes = soft mallets)

1
1a
2
2a
3
3a
4
vp

mf *fff* *mf*

(P)

3'36"

(sim.)

72

1
1a
2
2a
3
3a
4
vp

fff *mf* *fff* *mf* *fff* *fff* *f*

(P)

3'48"

73

1
1a
2
2a
3
3a
4

4:5 5:4 7:8 9:7

4:3 4:5 5:4 5:6 3:2 3:2 7:6 8:7 4:3

p *pp*

vp

4'00"

74 (i.v.)

1
1a
2
2a
3
3a
4

put down mallets
take 2 superball mallets

pick up one of the
cymbals (or a gong
if used)

11:12 14:12

mp *mp*

(P)

vp

stroke handheld cymbal (or gong) with superball mallet - vary sound each time

5:6

mp < *mf* *mp* < *mf* *mp* < *mf*

4'12"

75

1
1a
2
2a
3
3a
4

put down mallets
& take bow

bowed cymbal (or gong) - as continuous and consistent in sound as possible

put down bow
put down cymbal (or gong) when inaudible
take 4 hard vibraphone mallets

mp *f*

(P)

vp

4'24"

76

(silence!)

1
1a
2
2a
3
3a
4

3:2 5:4 3:2 7:5 6:5 4:5

accents *mf*, otherwise *ppp* accents *ff*, otherwise *ppp*

(catching accents with volume pedal)

(catching accents with sustain pedal)

fff

vp

4'36"

77

1
1a
2
2a
3
3a
4

put down two of the mallets
& pick up African seed pod rattle

6:4

African seed pod rattle

(each time grasped sharply, *secco*)

fff > *ff*

ppp *sim...* *pp* *mf* *mp* *p* *f* *ppp*

vp

4'48"

78

1
1a
2
2a
3
3a
4

(African seed pod rattle)

(shaken)

10:8

f *mf*

(grasp)

(combination of shaking and rotating the handle)

16:12

mp *p*

(grasp)

(rotate the handle slowly, slowing down so that eventually only single unpredictable "clicks" remain)

pp *ppp*

vp

fade electronic sounds out together with percussion...