Richard Barrett

life-form

2011-12
cello and electronics

performing score
life-form
(2011-2012) for cello and electronics

Commissioned by:
Concertgebouw Brugge
Centre Henri Pousseur, Liège
November Music, ‘s-Hertogenbosch
Academie der Kunsten, samenwerkingsinstituut van de
Universiteit van Leiden en de Hogeschool der Kunsten Den Haag
for Arne Deforce

duration: approximately 95 minutes

Notations

Trills, tremoli and grace notes always as fast as possible, unless otherwise indicated. Quartertones: (c) = “air-bowing” (“tonlos”); extremely low bow pressure, such that no discernible pitch is heard (although pitch-movements such as glissandi may be perceptible as modulations of the sound).

= stop bow on string; [(-) re]start bow movement with bow already on string. (These two symbols are often found in conjunction.)

= “air-bowing” (“tonlos”): extremely low bow pressure, such that no discernible pitch is heard (although pitch-movements such as glissandi may be perceptible as modulations of the sound).

12343432123 = exchange of fingers on a single pitch or glissando, usually but not always extremely rapid

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Normal notations for section 6

Section 6 (also performable as a solo piece for amplified cello with the title aereal and a duration of 7 minutes) uses a method of notation which does not occur elsewhere in the piece. It is based on a set of sound/action materials, and diverse modifications of these, and transitions between them, which are described below in detail referred to only by their three-letter codes in the score. Each code is typically given additional symbols or descriptions outlining how the action is carried out, for example giving indications of bow or finger-pressure (above the code) and where (below it). These instructions should be taken not as full specifications but as starting points for exploring a particular kind of texture and/or process. “Graphic notation” is kept to a minimum because of its tendency to have prescriptive effect on performed movements and sounds. Instead the action-descriptions should become “internalised” and their precise “shape” the result of sonically- rather than graphically-influenced actions.

In section 4 the cello strings are “prepared” with circular paperclips (“Clipiola” or equivalent) or keyrings. Other techniques and notations are described as they occur in the score, except in section 6 (see below).

Special notations for section 6

The materials are divided into left- and right-hand actions. Despite the relative simplicity of the descriptions and instructions, all are characterised by an intense degree of internal complexity in sound (rendered clearly audible only under amplification) whose individual microdetails are however not specified in the score, being dependent on momentary feedback between unstable and/or partially involuntary actions and the sound-textures which result from them. The score functions principally as a structural “skeleton” which allows the sounds space to develop their own internal complexities and movements. While the techniques require a certain independence between (and within) the hands, the performer’s focus should be on the sonorous integration of the layers of simultaneous activity. Note that the sounds described by the codes are not intended as an exhaustive and/or generalised objective description of cello technique, but as a shorthand for the techniques/sounds particular to this composition (many of which were suggested by Arne Deforce). Where traditionally-notated rhythms do occur they should be interpreted with the greatest precision.

The repetition-structure of section 6 should also be carefully considered: bars 1-5 are “precisely” repeated, bars 7-11 and 13-17 involve the same accumulation of processes applied to different starting pitches, and bars 19-23 are repeated as bars 25-29 but with increasing amounts of “erasure”.

Left hand: Gli
irregular wide Glissandi, typically zigzagging randomly within a total range between the nut and the end of the fingerboard on the given string, using normal or “harmonic” fingerpressure or both as indicated. Irregular left-hand pizzicati might also be added within the continuous glissando.

FcH
generally rapid and irregular F-finger-changes during a glissando, which might be modified into finger-percussion by making the fingering more staccato and forceful.

HiGl
irregular High gLissandi between the fingerboard and the bridge, using a left-hand fingernail rather than the fingertip.
Right hand: bow the **Body** of the instrument at the indicated place(s) (within the bow closest to the right hand, or beneath the strings).

**Diagonal Bowing** - typically **msp** with increased bow pressure to produce a kind of "screeching" sound basically independent in pitch of whatever the left hand is doing (what the pitch actually does depend on is unclear; it seemed in the course of our preparatory work to centre around the ninth partial of the 17th string, but that may be coincidental).

**Circular bowing**, whose typically interrupted/fragmented sound should not be minimised. Generally the left hand is only used to mute the strings during circular bowing, so that any pitch(es) arise principally from the movement of the bow.

**Horizontal bowing**, in other words the "normal" kind.

**Granular crackling sounds**, produced at *talone* with maximum bow pressure and hardly any lateral bow movement but a tight irregular "figure-of-eight" movement.

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**Technical setup**

The electronic part consists of 10 soundfiles plus a Max patch (created by Patrick Delges of the Centre Henri Pousseur) with 8 presets. The 8 speakers for the electronics surround the audience, with (if allowed by the configuration of the performing space) the cellist in the centre of the space with 2 outward-facing speakers. The cellist must be able to see the timing of the soundfiles (using an iPhone or iPad with timings fed by the patch), although there are few moments when precise synchronisation is necessary. Each of the ten sections of the composition involves a different relationship between cello and electronics, and a different tuning of the cello. Soundfile 1 consists of 16 mono tracks with a 'high/low' pair assigned to each speaker (see below), and soundfiles 2-8 consist of each of 8 mono tracks. Tracks 1-8 are assigned to the 8 speakers in clockwise order. Soundfile 10 consists of 2 tracks and is played back through the 2 outward-facing cello speakers. All tracks are in 24-bit 48kHz WAV format. The cello is amplified throughout.

All the parameters described below are adjustable in real time so that they can be calibrated during rehearsal and changed if necessary during performance.

**Section 1 (5'30'')**

soundfile 1, preset 1.

The electronic part consists of 8 "high" tracks (whose sound material centres on Eb6) and 8 "low" ones (centred on Eb1), which are played through the same 8 speakers but are affected differently by the cello sounds. The balance between these layers may be adjusted in performance according to the acoustic characteristics of the space so that they are perceived as equal in loudness.

(a) When the cello plays between Eb5 (155 Hz, MIDI 51) and Eb4 (311 Hz, MIDI 63) the electronic sounds are not affected.

(b) When the cello plays lower than Eb2 (78 Hz, MIDI 39) the low tracks are interrupted, quite suddenly (with a fadeout in the region of 10ms), and restart when the cello stops playing or plays a pitch outside this range.

(c) When the cello plays between Eb2 and Eb3 the low tracks are reduced in volume, to a greater extent as the pitch goes down (and of course reaching zero at Eb2)

(d) When the cello plays between C#4 (349 Hz, MIDI 67) and C#5 (554 Hz, MIDI 73) the high tracks are reduced in volume in the same way.

(e) When the cello plays between C#5 (554 Hz, MIDI 73) and C#6 (874 Hz, MIDI 85) the high tracks are interrupted in the same way.

**Section 2 (0'30'')**

no electronics

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**Section 3 (8'30'')**

soundfile 2, preset 2.

(a) Cello pitch => centre frequency of band-reject filter applied to all tracks

(b) Cello loudness => 1/bandwidth and => degree of gain reduction, so that as the cello becomes louder, the bandwidth of the band-reject filter becomes smaller but the gain reduction larger. When the cello does not play, no filtering is applied.

(c) The filtering is muted after the last sound played by the cello, so that the filter is not activated by any sounds made during retuning.

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**Section 4 (5'00'')**

no electronics

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**Section 5 (5'30'')**

soundfiles 3, 4, 5, 6 and 7, no preset (bypass)

The short 8-channel soundfiles are played back at the indicated times with their volumes adjusted to the notated dynamic values. They are not affected by the cello.

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**Section 6 (7'00'')**

no electronics

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**Section 7 (6'00'')**

soundfile 8, preset 3.

The duration is muted until the indicated place in the score - it should not be active during any of the slow glissando texture which occupies the first 90 seconds of the soundfile.

Cello pitch => pitch-shift of playback (when the cello plays above a certain threshold volume to be calibrated during rehearsals)

When the cello plays C#5 (554 Hz, MIDI 73) there is no pitch-shifting. The cello plays always within a range of one octave above or below this pitch, and the electronic part is pitch-shifted always to half the distance from the central C#. Therefore when the cello plays an octave lower at C#4 (277 Hz, MIDI 61) the electronic part is pitch-shifted 6 semitones down, and vice versa.

Pitch-shifting is not completely abrupt when the cello pitch is detected but shifts to the new pitch over maybe 100ms. If the cello stops playing, the pitch-shift gradually returns to zero, at a rate of maybe 1 semitone per second (and if it then starts playing again this gradual movement is interrupted).

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**Section 8 (2'30'')**

no electronics

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**Section 9 (10'30'')**

soundfile 9, presets 5, 6 and 7

It must be possible to "crossfade" gradually between the three presets.

Presets: changes in cello dynamics affect the volume of the electronic sounds, so that accentuation in the cello becomes accentuation in the electronic sounds too.

Preset 7: cello dynamics are carried over completely to the electronic sounds, so that when the cello part is interrupted there is an exponential decay lasting just over 5 seconds (quasi-reverber). As preset 6 transforms into preset 7, the decay time may stay the same, but the volume level at the end of the decay gradually goes down to zero over the 5-second duration, instead of back to a constant moderately loud level.
The sculptor Andy Goldsworthy speaks in his film *Rivers and Tides* of “understanding the stone”, to the extent necessary to build a stable structure with whatever kind of material he is working with. The stability of the structure, its symmetry and beauty, is the way in which this understanding takes perceptible form and communicates itself to the viewer. The attentive viewer is led not so much to understand something about the material, about the stone. I think this idea has much in common with my conception of how music communicates itself to listeners, and in particular how I conceive questions of (self-) expression.

*Life-form* was commissioned for Arne Deforcex by Concertgebouw Brugge, November Music (’s-Hertogenbosch), Centre Henri Pousseur (Liège) and the Academie der Kunsten, samenwerkingsinstituut van de Universiteit van Leiden en de Hogeschool der Kunsten Den Haag.

Its electronic part is (pre-)composed but influenced in real time by the cellist, according to a computer program created by Patrick Delges at the Centre Henri Pousseur. The solo cello becomes not only a kind of concert soloist, but also conductor and coordinator of the “virtual orchestra” which envelopes the space spatially and sonically. This system is intended to combine two ideals: firstly, precise coordination of electronics with the instrument, though without forcing the player to follow an inflexible fixed part, and secondly an “orchestral” complexity of textures and timbres, by using precomposed sounds created using processes impossible or exceedingly complicated to replicate in real time. The cello “imagines” - or dreams - an entire orchestra within itself, and this orchestra takes on its own independent life (and death).

The overall form, from which the title derives, relates to a contemplation of the metamorphic life-cycles of many different kinds of creature, particularly insects - cycles in the course of which an organism might shed its skin several times, each time revealing a different shape which has been growing and differentiating beneath the surface, and each time emerging into a new habitat. The music isn’t intended to illustrate some particular metamorphosis but to be in itself the “life-form” - the cello undergoes a kind of metamorphosis of its own, as if transforming between a sequence of different instruments - for example by being retuned for each of the ten sections of the composition, and sometimes also within these sections, so that the harmonic and resonant character of the instrument passes through many forms (the traditional tuning is used only in section 8), and also by “preparing” the strings with metal clips in one section.

None of the electronic sounds are derived from cello sounds, and in fact almost all of them are synthetic rather than based on recorded sounds of any kind. This may seem paradoxical or contrary in view of the “life-form” idea, but again this idea is not intended to be illustrative; rather, the sound-processes you hear might be compared to the processes of metabolism and catabolism, proliferation, differentiation and decomposition which we see in living (and dead) organisms and in the interactions of entire ecosystems. The only non-synthetic sounds in fact are the cowbells heard in the fifth and last electronic episode of section 5, which were recorded in the Auvergne in the summer of 2012.

The electronic part of section 3 may be played as an independent 8-channel fixed-media composition with the title *arboreal* (duration 8’30”), section 4 may be played as an amplified cello solo with the title *aciculae* (duration 4’00”) and section 6 may be played as an amplified cello solo with the title *aerial* (duration 7’00”).
Timings, given to the nearest second, are intended as indications of structural proportions and not as points of coordination between cello and electronics!

begin from complete inaudibility - the electronic sounds have a long fader-crescendo throughout part 1, though the crescendo becomes increasingly slow (19" from zero to mp but eventually 14" from mf to ff)

preset 1 cello cuts off high and low pitched layers respectively when playing in those registers

Richard Barrett 2010-12

life-form

1

(anaphase)
soundfile 2 begins in tempo at the end of the last cello sound of section 2.
(arboreal)

0'00" - 0'09"  (begin anywhere between these two time-points and continue in tempo, paying no attention throughout section 3 to the relation of the entry-point to the electronic sounds)

0'19" - 0'26"  nat sempre

0'40" - 0'46"  (psp)

0'53" - 1'12"  (psp)

23 16  (psp)
put down bow and place preparations on all four strings, near the end of the fingerboard around the 1st position, but each one in a slightly different position so that each string has a distinctive timbre - the IVth string will probably need two paperclips in order to make sufficient difference to its sound.
(aciculae)

(All four strings prepared) - sempre legato possibile using the indicated strings

Stems up: finger-percussion LH/RH ad lib.

Stems down: pizz. sub fasto LH/RH ad lib.

Sempre (equalise perceived loudness between pizzicato and finger-percussion)
In bars 19-26:
The upper pizzicato line is played by the left hand only. Fingering the
continuous glissando with the thumb and plucking with one
or more of the other fingers, all on the 1st string.
The open-string pizzicato line and the combined finger-
percussion and pizzicato line are both played by the right
hand only.
Notes without specified pitch are struck or
plucked on the 1st string above the left hand, so that their
pitch ascends when the left hand plays a descending pitch
and vice versa. FINGER-PERCUSSION SOUNDS SHOULD BE
PLAYED AS LONG AS POSSIBLE.

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the continuous glissando with the thumb and plucking with one
or more of the other fingers, all on the 1st string.

The open-string pizzicato line and the combined finger-
percussion and pizzicato line are both played by the right
hand only.

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plucked on the 1st string above the left hand, so that their
pitch ascends when the left hand plays a descending pitch
and vice versa. FINGER-PERCUSSION SOUNDS SHOULD BE
PLAYED AS LONG AS POSSIBLE.
* each of these removals should be incorporated as coherently as possible into the gestural and dynamic profiles of bars 33-36, as another element in the sequence of highly-varied sound types.
pizz nat. sempre (make sure that glissandi are heard as clearly as possible!)

etc. sempre sim.

the electronic part of section 5 begins immediately (in tempo!)
sempre - all changes in bow position and dynamic as abrupt and differentiated as possible.
section 6 begins just before the last electronic reverberation has died away
in memoriam Hans Werner Henze

(see preface to score for an explanation of the three-letter codes)

RH

LH

Gli

(electronics: tantet raise amplification level of cello for quietest sounds

2° occasional 'col legno' at varying positions striking the underside of the 1st and 4th strings but without breaking the continuity of the breath-like bow sounds

2° occasional bowed accentuation (f) in which a pitch or glissando-segment might fleetingly be heard

principal but mix freely with bow speed and direction-changes always highly irregular

increasing range of dynamic changes...

decreasing range of dynamic changes...

[rapid but irregular] - pitches occasionally and randomly become audible

2°: occasional alternation of Fch with finger-percussion

8

2°: occasional momentary return to situation at beginning of bar 2 (BB/HB)

increased and more irregular rate of change in intonation, sometimes accelerating as far as vibrato
(shifting weight between strings)

slow gradual changes in intonation between the strings, producing beats

Cir

any

Cir

gradually place increased emphasis on Cir...

f

gradually place increased emphasis on Cir...

pp

reduce amplitude of vertical bow movements...

(p)p

reduce amplitude of vertical bow movements...

Cir

gradually place increased emphasis on Cir...

gradually place increased emphasis on Cir...

gradually place increased emphasis on Cir...

gradually place increased emphasis on Cir...

gradually place increased emphasis on Cir...

Cir
bow under strings! msp

LH

extreme vibe

LH

the electronic part of section 7 begins an instant before the last cello sound has ended
The changes in dynamic and bow-position should sound as smooth as possible, and the maximum contrast made between legato, marcato and staccato (and presence or absence of accentuation). The glissando should sound as smooth as possible, and the maximum contrast made between legato, marcato and staccato (and presence or absence of accentuation). The glissando should sound as smooth as possible, and the maximum contrast made between legato, marcato and staccato (and presence or absence of accentuation). The glissando should sound as smooth as possible, and the maximum contrast made between legato, marcato and staccato (and presence or absence of accentuation). The glissando should sound as smooth as possible, and the maximum contrast made between legato, marcato and staccato (and presence or absence of accentuation).
vary dynamic and bow position freely between the notated limits at each repetition, spreading the triple stop up or down ad libitum and varying the length of the rest irregularly between the notated value and much longer (especially after the last repetition when enough time to retune and prepare for section 8 must be left!).

The precise ending time will vary because of the pitch/speed changes applied to the electronic sounds - although the rises and falls are intended to cancel one another out, this will always be subject to unforeseeable variation.
bow-direction changes should be clearly audible (and made only where indicated by phrase marks) - while section 8 should be practiced at a slower tempo in order to realise all the fingerings, harmonics, dynamic changes and bow-position changes with precision and stability. It should only be performed at the notated tempo, so that this precision and stability will disintegrate to different degrees and in different ways according to the interactions between the simultaneous musical processes. The music should therefore sound ‘too fast’, but not as if it is being approximated or falsified.

(always more gradually to reach msp at the indicated point, then back to raf as quickly as possible without breaking the sound)

(normal tuning)

(at the end of every crescendo, return to lower dynamic as quickly as possible without breaking the sound, or changing bow direction unless indicated)

(normal tuning)
soundfile 9 begins after the briefest "breath-pause" at the end of the last cello sound of section 8
9
(abyss)

0'00''

68°

[con sord.]

[con sord.]

64°

[con sord.]

electronic
sounds

[con sord.]

[con sord.]

adj ust volume level of cello during crescendo so that it reaches a balance with the electronic sounds by the end of this bar

f ff sempre

preset 5 (cello has no effect on sounds) moving gradually towards preset 6 (reached at beginning of bar 8)

ff sempre

open strings only, glissando of 3rd string with tuning peg

[con sord.]

ff sempre

[con sord.]

97°

72°

[con sord.]

adj ust volume level of cello during crescendo so that it reaches a balance with the electronic sounds by the end of this bar

ff sempre

The measured bars are included in the 97-second overall duration of system 3, rather than being additional to it!
In the three measured bars of system 5, each sound involves a different
of stopped strings and the complementary pair of open strings.
For clarity only the fingered pitches are indicated, although the two
remaining strings always sound together with them.

Please take care to use the indicated strings which aren't always the
obvious ones!

natural glissando of IVth string with tuning peg

\( \text{sord.} \)

\( \text{cello} \)

\( \text{st} \text{ string with tuning peg} \)

\( \text{string with fine tuner} \)

\( \text{cello} \)

\( \text{cello} \)
durations (note wider range of durations in systems 6-10) except for measured bars which may be inserted at any time within the 6.1-second duration

pitch-fluctuations sul III - up to a quarter-tone either side of open 

flatt string, irregular and random in both width and speed

[Diagram of musical notation]

insert E (continuous higher dynamic accents in the electronic sounds)

moving gradually towards preset 7 [reached at beginning of bar 10]

607"

natural durations except for freely-inserted measured bars

irregular pitch-fluctuations sul IV - note that the position of E changes as the IVth string is retuned - with independent irregular fluctuations of left-hand fingerpressure between 'harmonic' and normal

[Diagram of musical notation]

7'16"
2'8

(continued)

(continued)

section 10 begins immediately
(with a rest bar)
as in section 1, timings are intended only to indicate structural proportions

PPP \text{----} f but only audible when cello plays ppp or louder

soundfile 10 is heard only through the speaker(s) used for cello amplification, NOT through the 8-channel system. Its volume should be calibrated so that when the cello plays pppp it isn’t activated at all, when the cello plays ppp it becomes audible at about the same loudness and as cello dynamic increases the soundfile gradually becomes slightly louder than the instrument.
bowing speed varies irregularly and randomly between slow and almost stationary (single "clicks"), independently of irregular and random shifts in bow position.

explore the threshold between non-activation and activation of the electronic sounds.

raise level of cello feed to computer, or lower threshold of soundfile activation, if necessary.