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 55 minutes

Notations

Trills, tremoli and gracenotes always as fast as possible, unless otherwise indicated. Quartertones: 𝄲 𝄳 𝄭 𝄐 𝄮 𝄯 𝄰 𝄱 𝄲

psp, msp = *poco* and *molto sul ponticello* respectively, the former already being noticeably different in timbre from ***nat***., the latter being as extreme as possible consistent with the fundamental pitch remaining audible. ***pst, mst*** = *poco* and *molto sul tasto* (similarly).

 = ascending degrees of bow pressure: *flautando*; "normal"; exaggerated and distorted (pitch only just discernible); completely pitchless scraping.

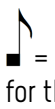
 = "air-bowing" ("tonlos"): extremely low bow pressure, such that no discernible pitch is heard (although pitch-*movements* such as glissandi may be perceptible as modulations of the sound).

 = a smooth gradual transition between two states

 = normal left-hand fingerpressure, = "harmonic" fingerpressure, = finger-percussion, = left- and (where necessary to avoid ambiguity) right-hand pizzicato respectively

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

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

clb = *col legno battuto;* ***clt*** = *col legno tratto;* ***1/2clb*** = using wood and hair of the bow simultaneously,  = strike and hold bow against string for the notated duration.

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

Section 6 (also performable as a solo piece for amplified cello with the title ***aerial*** and a duration of 7 minutes) uses a method of notation which doesn't 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 but 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.

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 **Gli**ssandi, 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**inger-**ch**anging during a glissando, which might be modified into finger-percussion by making the fingering more *staccato* and forceful.

Hgl — irregular **H**igh **gl**issandi between the fingerboard and the bridge, using a left-hand fingernail rather than the fingertip.

Right hand: Bdy bow the **Bo**dy of the instrument at the indicated place(s) (within the bout closest to the right hand, or beneath the strings).

Dia **D**iagonal **B**owing - 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 IVth string, but that may be coincidental).

Cir **Cir**cular 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.

Lef bowing whose vertical position follows very close to the **Lef**t hand as this moves through **Hgl** glissandi at the high end of the string.

Hor **Hor**izontal bowing, in other words the "normal" kind.

Gra **Gra**nular crackling sounds, produced *al tallone* with maximum bow pressure and hardly any lateral bow movement but a tight irregular "figure-of-eight" movement.

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 2-9 consist 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 betwen 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 Eb3 (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 higher than Eb5 (622 Hz, MIDI 75) the high tracks are interrupted in the same way.
(d) 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).
(e) When the cello plays between Eb4 and Eb5 the high tracks are reduced in volume in the same way.

Section 2 (0'30") - no electronics

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.

Section 4 (5'00") - no electronics

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.

Section 6 (7'00") - no electronics

Section 7 (6'00")
soundfile 8, preset 3
The preset 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!).

Section 8 (2'30") - no electronics

Section 9 (10'30")
soundfile 9, presets 5, 6 and 7
It must be possible to "crossfade" gradually between the three presets.
Preset 5: cello has no effect on the sounds.
Preset 6: 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-reverb). 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.

Section 10 (4'00")
soundfile 10, preset 8
The electronic part consists of 2 tracks which are played through the cello's local speakers, NOT through the 8-channel surround system. The material is only heard when the cello plays above a certain threshold volume. The cello part consists almost entirely of three elements: crescendi and diminuendi, which trigger the electronics, and extremely quiet sustained sounds, which do not.
Cello crescendo: lowpass filter frequency AND playback level increase.
Cello diminuendo: lowpass frequency AND playback level decrease.
The playback level should follow that of the cello, except the maximum should be slightly louder than that of the cello.
The cutoff frequency of the lowpass filter should be set around three octaves higher than the cello pitch (or multiplying the cello\s frequcny by 8), and smoothed so that it opens and closes gradually without abrupt changes. On the other hand, the playback level should be smoothed as little as possible so that when the cello stops playing the electronic sounds are abruptly interrupted.

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").

Thanks to Marie-Isabelle Collart, Arne Deforce, Patrick Delges, Stéphane Ginsburgh, Bert Palinckx, Frans de Ruiter, Kees Tazelaar, Jeroen Vanacker

Introductory note

Life-form was commissioned for Arne Deforce 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 concerto soloist, but also conductor and coordinator of the "virtual orchestra" which envelops 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 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 artist as 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
1
(anaphase)

0'00"

Timings, given to the nearest second, are intended as indications of structural proportions and not as points of coordination between cello and electronics!

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19"

tuning:

cello

soundfile 1 (5'30")

electronic sounds

(mp)

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 143" from **ff** to **fff**)

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

0'19" ♪=83

2

21/16

nat psp sub msp nat sub psp

9:8 5:6 3:2 3:2 6:7 6:7 3:2

ppp p pp mf p mp pp mp p

electronic sounds

mp

0'33"

3

17/16 (psp)

mst 1/2clb (mst) nat arco (nat) msp

3:2 4:3 3 2343 2343 12343212... 9:10

14"

(fingering & bow unsynchronised!)

mf p mp

electronic sounds

(mf)

0'47"

5

13/16

nat

msp

9:10 4:5 5:4 5:6 4:3 6:5

mp

electronic sounds

mf

6

19/16

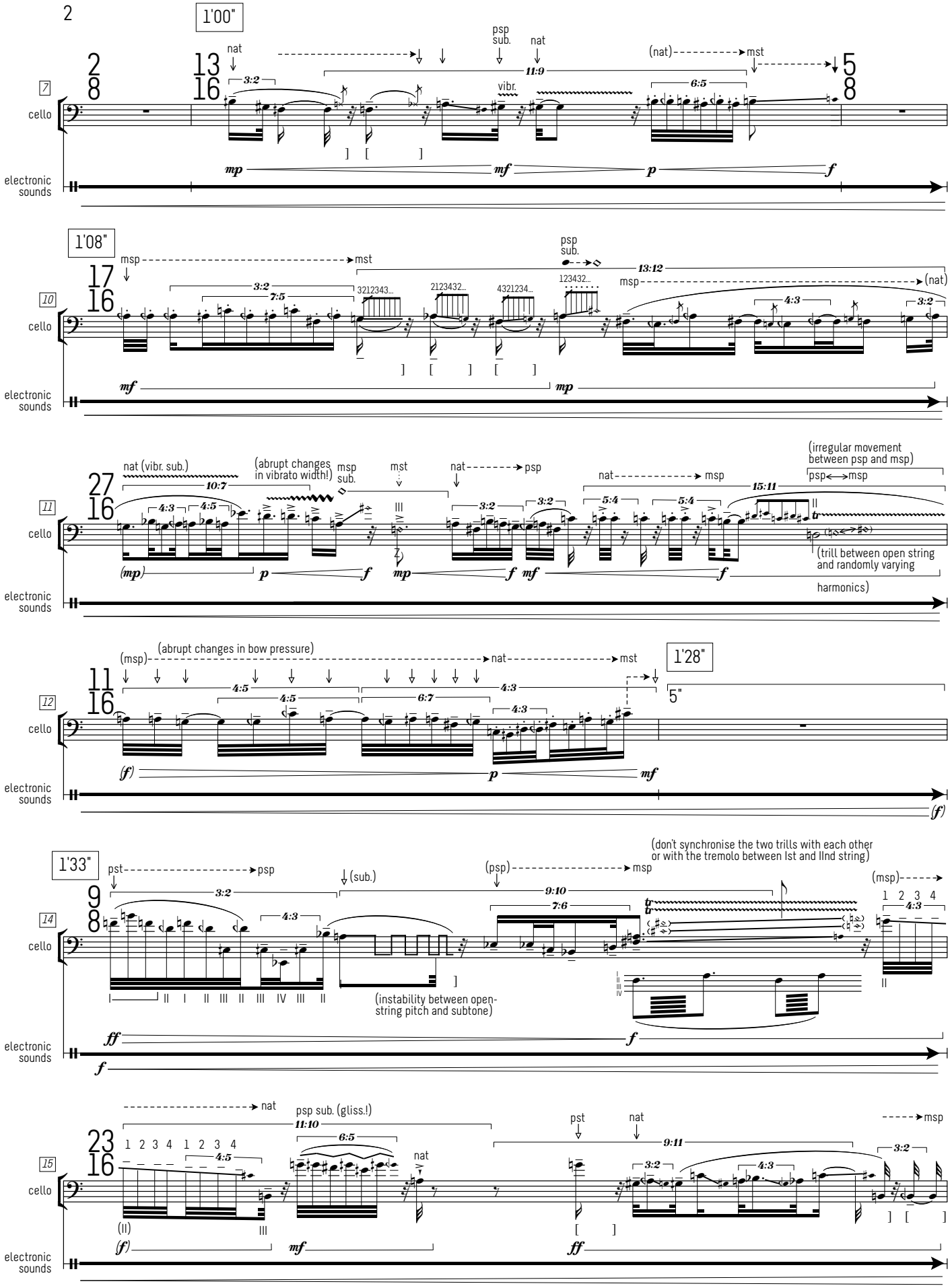
pst (irregular pitch-fluctuations up to 1/4 tone either way sul II & III)

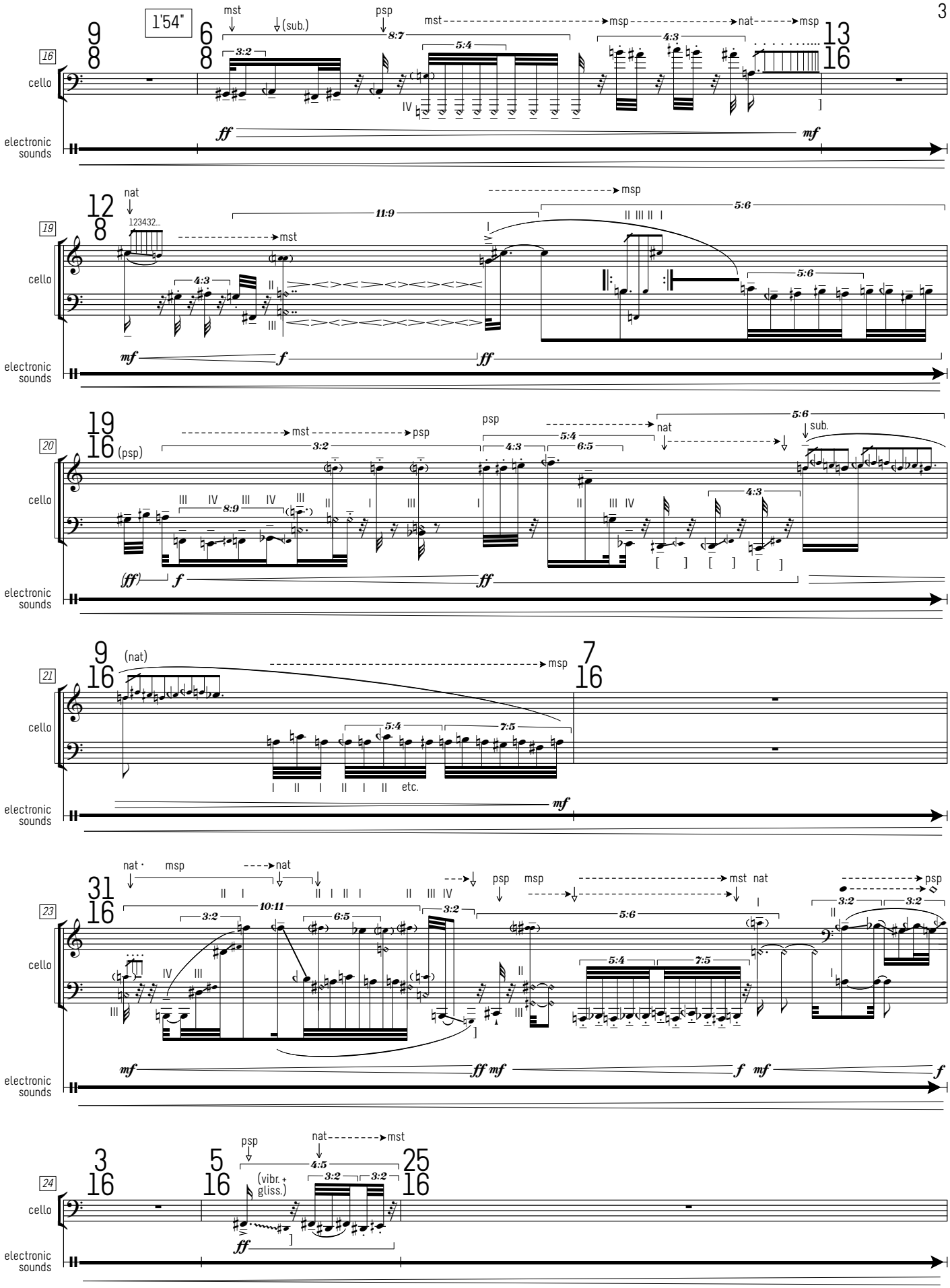
9:11 nat sub. msp nat 11:8

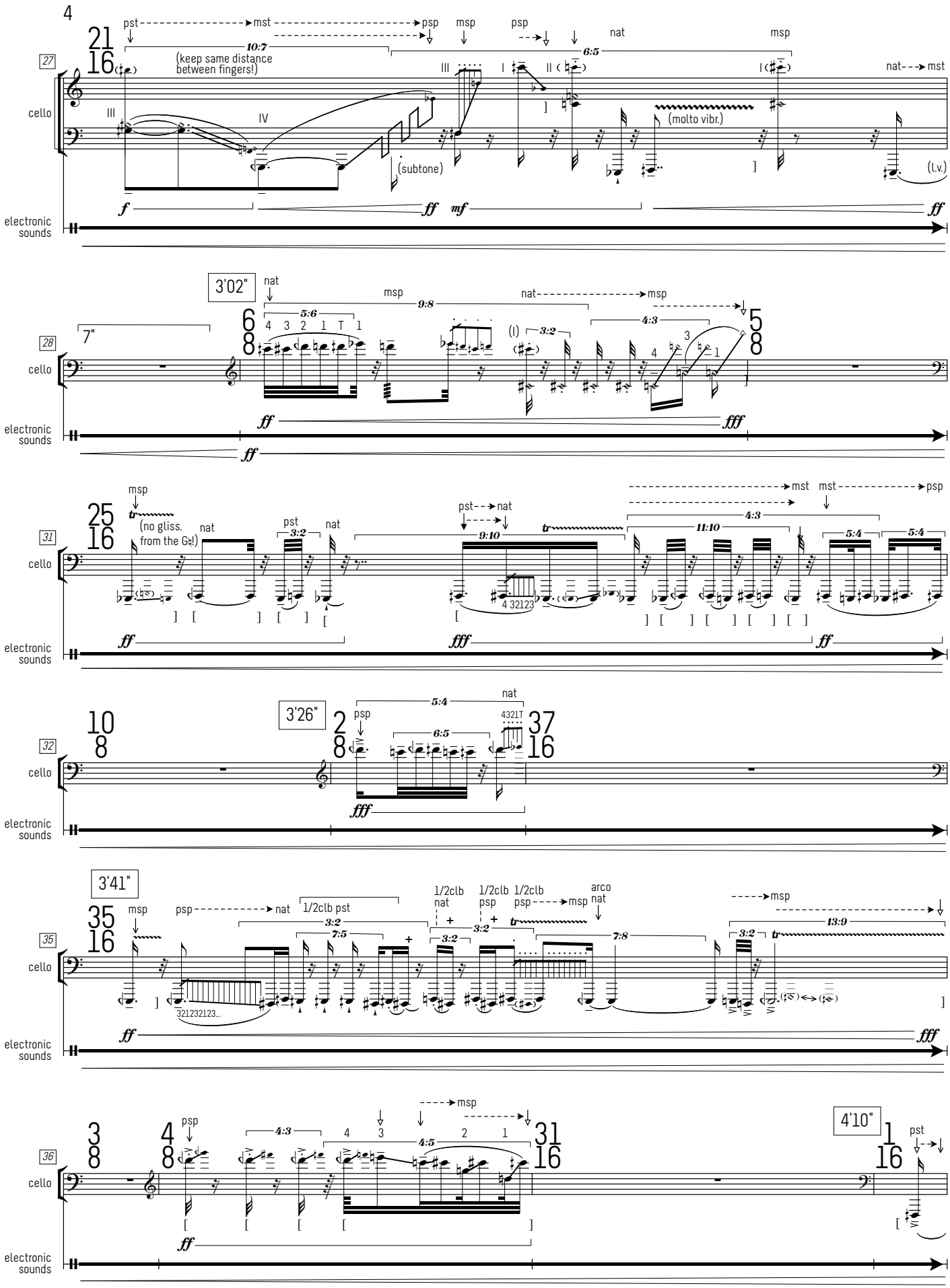
II III gettato... 4:3 3:2 4:3 6:5 4:3 4:3 II III

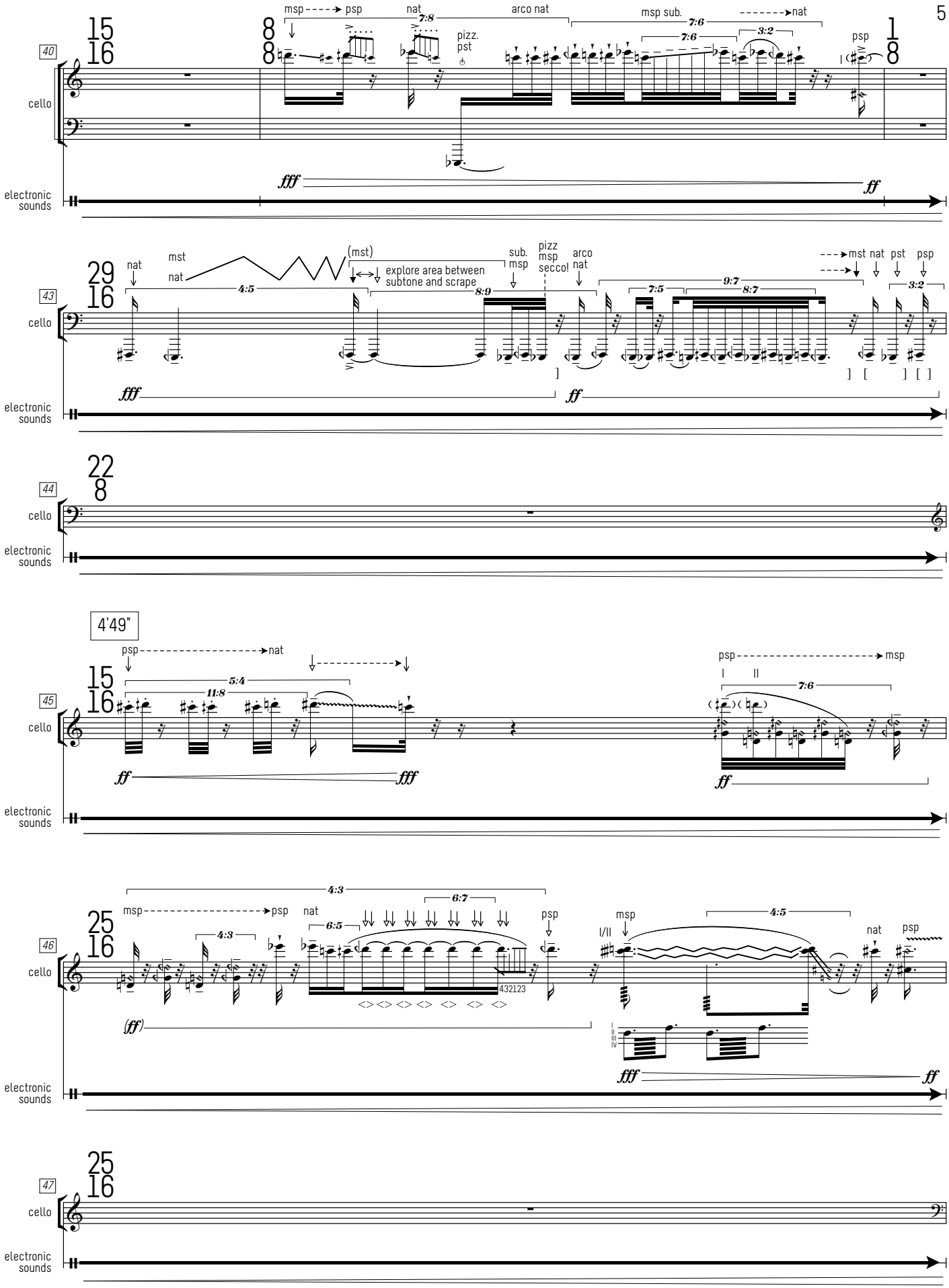
f p mf

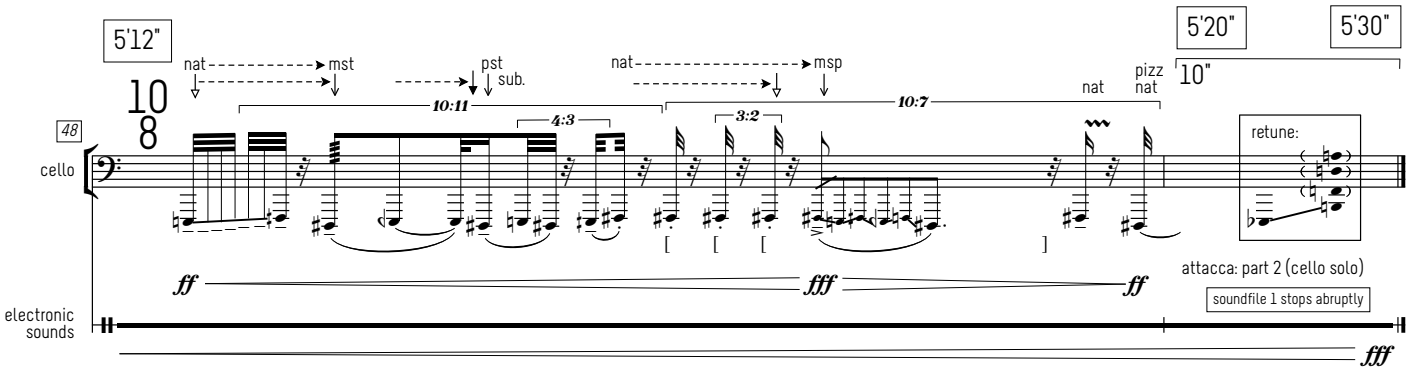
electronic sounds


1'00"
nat
psp sub.
nat
(nat)
mst
vibr.
cello
electronic sounds
1'08"
msp
mst
psp sub.
msp
(nat)
3212343...
2123432...
4321234...
123432...
cello
electronic sounds
nat (vibr. sub.)
(abrupt changes in vibrato width)
msp sub.
mst
nat
psp
nat
msp
(irregular movement between psp and msp)
psp
msp
(trill between open string and randomly varying harmonics)
cello
electronic sounds
(abrupt changes in bow pressure)
(msp)
nat
mst
1'28"
5"
cello
electronic sounds
1'33"
pst
psp
(sub.)
(psp)
msp
(don't synchronise the two trills with each other or with the tremolo between Ist and IInd string)
(msp)
(instability between open-string pitch and subtone)
cello
electronic sounds
nat
psp sub. (gliss.!)
pst
nat
msp
cello
electronic sounds

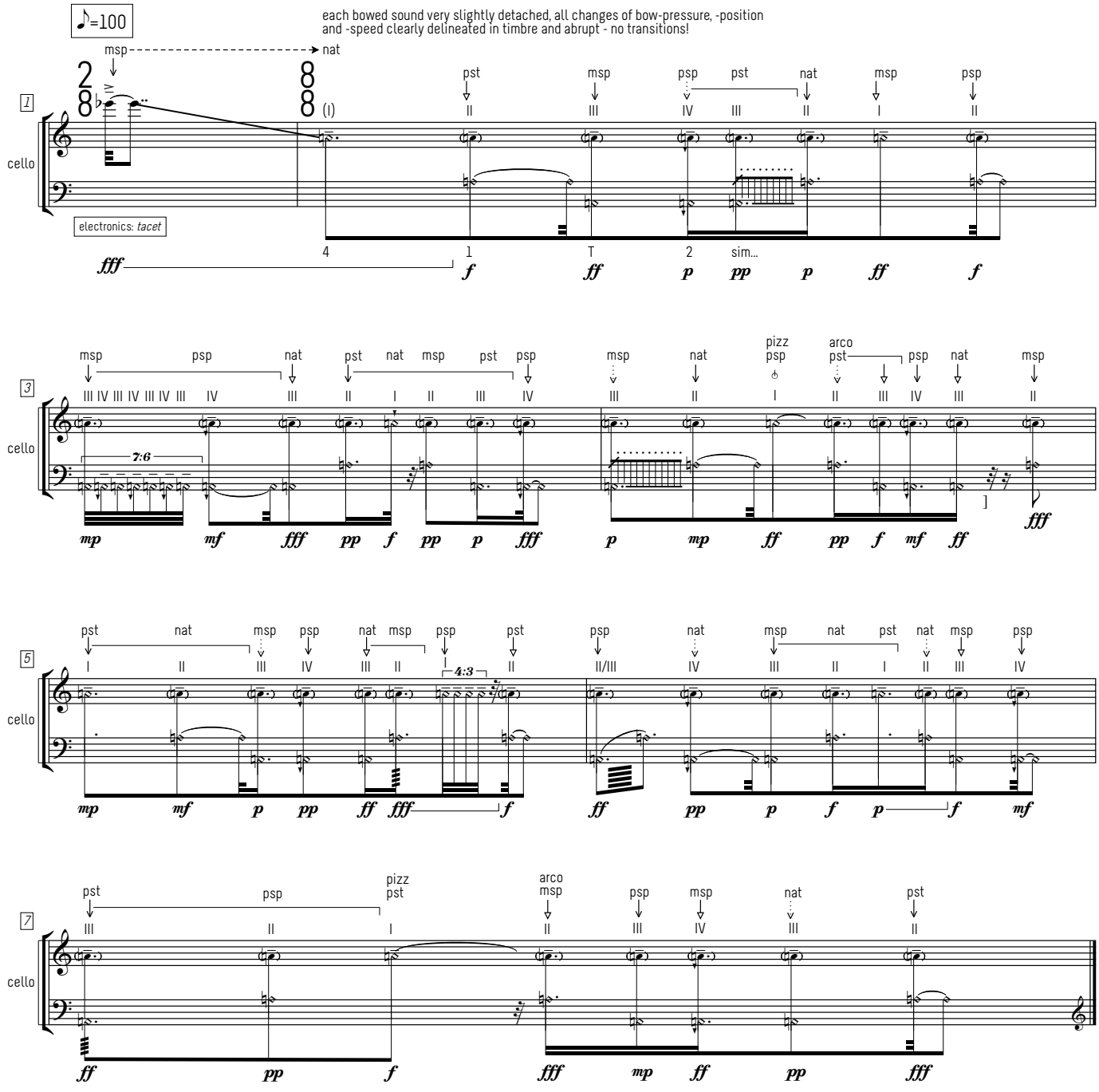

1'54"
16
cello
electronic sounds
mst
(sub.)
psp
msp
nat
19
20
21
23
24
(psp)
(nat)
(vibr. + gliss.)
etc.


4
21/16
pst
mst
psp
msp
psp
nat
msp
10:7
6:5
(keep same distance between fingers!)
III
IV
I
II
I
nat
mst
(molto vibr.)
(subtone)
(l.v.)
27
cello
electronic sounds
f
ff
mf
ff
3'02"
nat
msp
nat
msp
9:8
5:6
4 3 2 1 T 1
(I)
3:2
4:3
4 3 1
7"
6/8
5/8
28
cello
electronic sounds
ff
fff
ff
msp
(no gliss. from the G♯!)
nat
pst
3:2
nat
pst
nat
9:10
mst
mst
psp
4:3
11:10
5:4
5:4
4 32123
25/16
31
cello
electronic sounds
ff
fff
ff
3'26"
nat
5:4
psp
4321T
6:5
10/8
2/8
37/16
32
cello
electronic sounds
fff
3'41"
msp
psp
nat
1/2clb pst
1/2clb nat
1/2clb psp
1/2clb psp
msp
arco nat
msp
3:2
7:5
3:2
3:2
7:8
3:2
13:9
35/16
321232123...
35
cello
electronic sounds
ff
fff
msp
psp
4:3
4 3
4:5
2 1
3/8
4/8
31/16
4'10"
pst
1/16
36
cello
electronic sounds
ff

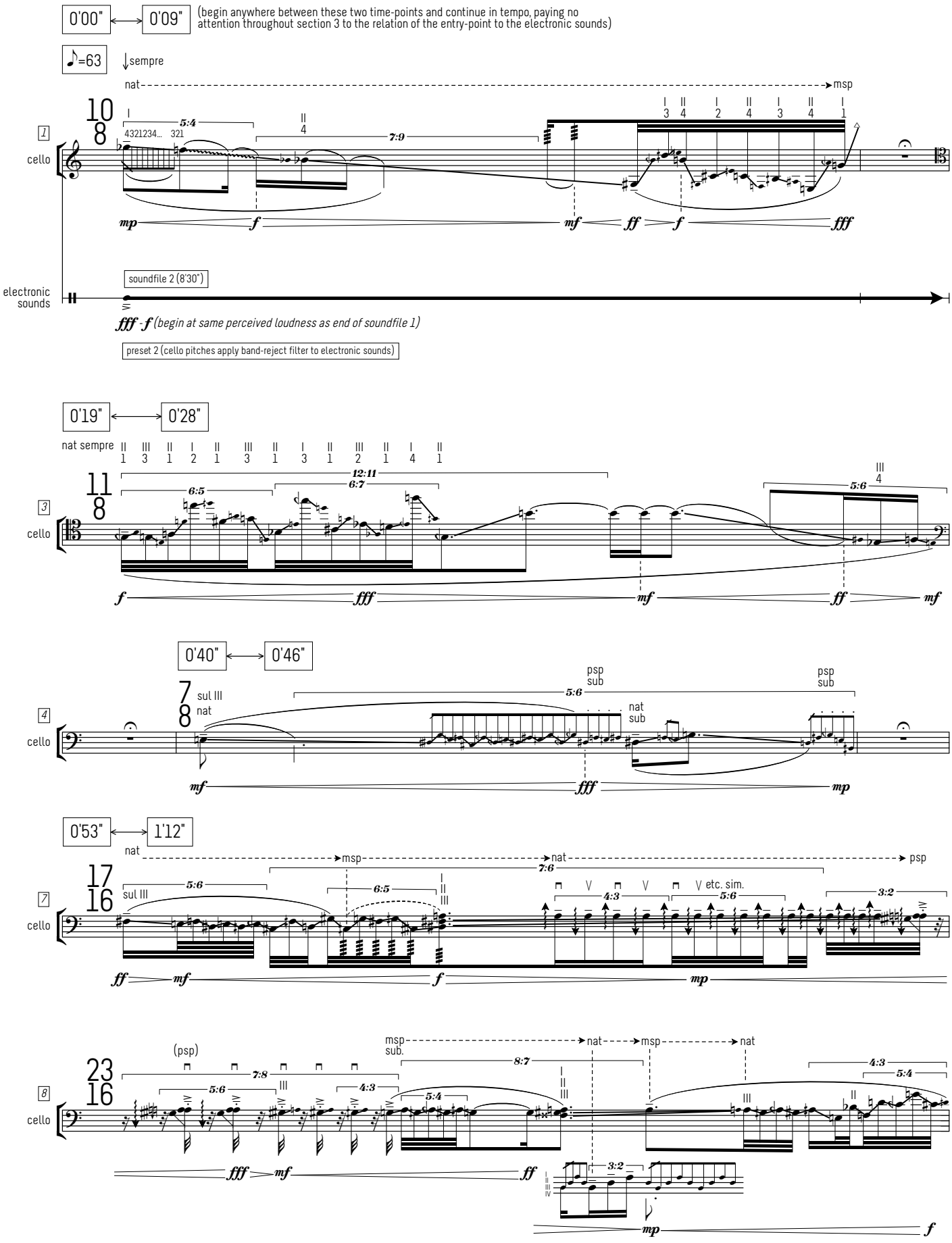

40
15/16
8/8
msp
psp
nat
7:8
pizz.
pst
arco nat
msp sub.
7:6
3:2
nat
psp
1/8
cello
electronic sounds
fff
ff
43
29/16
nat
mst
nat
(mst)
explore area between subtone and scrape
sub. msp
pizz msp secco!
arco nat
4:5
8:9
7:5
9:7
8:7
mst nat
pst
psp
3:2
44
22/8
4'49"
45
15/16
psp
nat
5:4
11:8
msp
I
II
7:6
46
25/16
4:3
6:7
6:5
432123
I/II
4:5
47
25/16

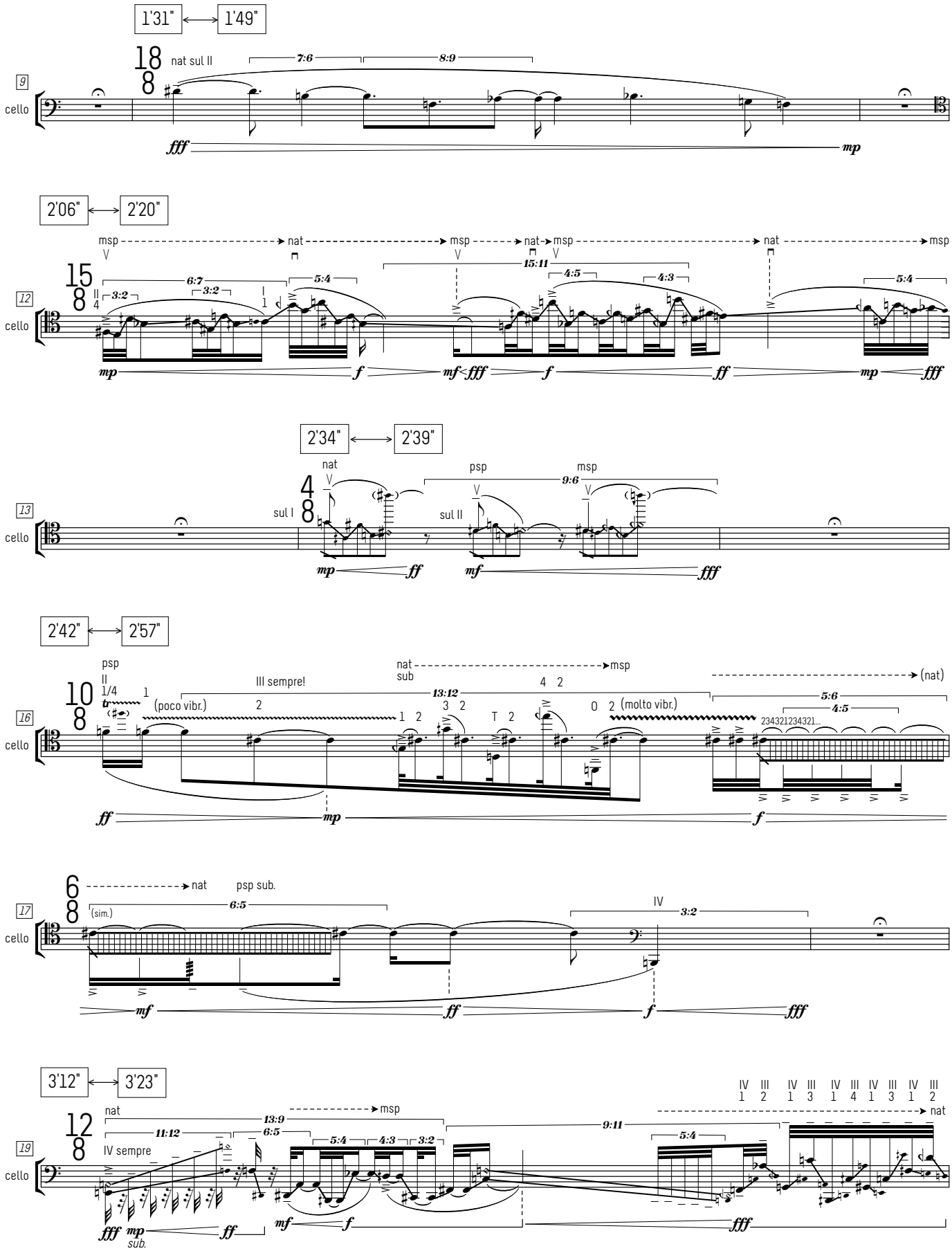

5'12"
5'20"
5'30"
10"
nat
mst
pst
sub.
nat
msp
nat
pizz
nat
10:11
4:3
3:2
10:7
48
cello
retune:
attacca: part 2 (cello solo)
soundfile 1 stops abruptly
electronic sounds

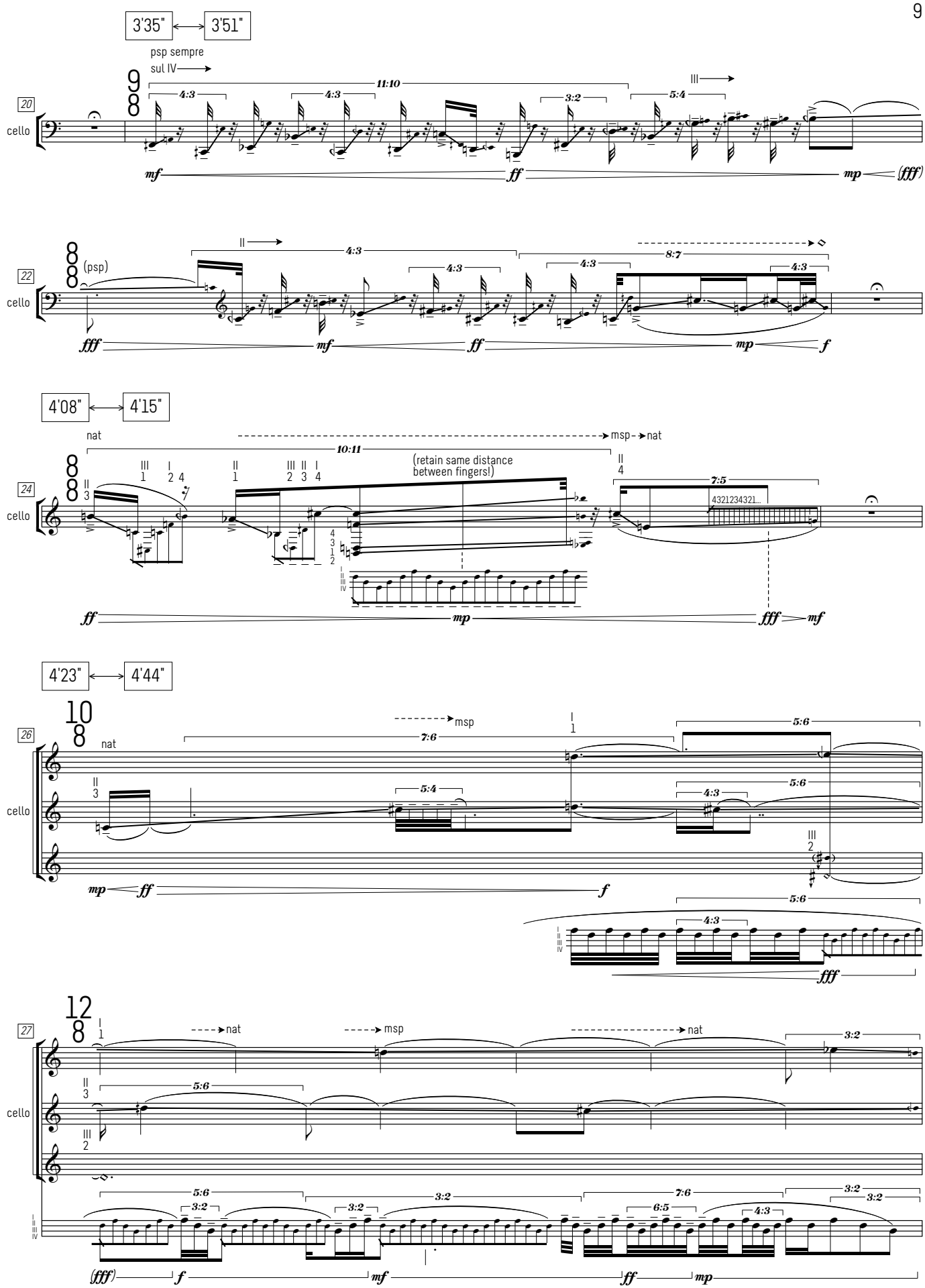
2
(axon)

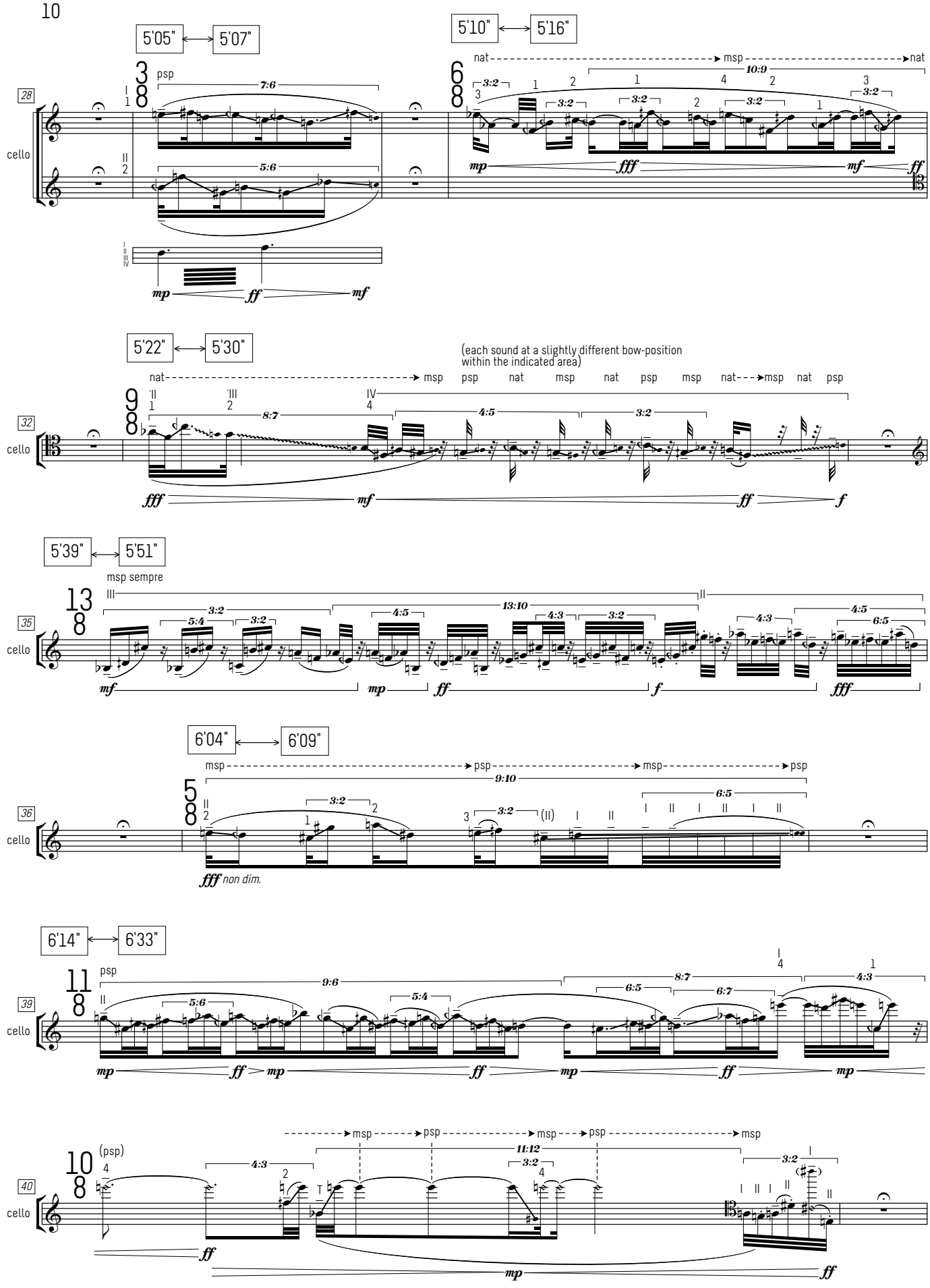

♪=100
each bowed sound very slightly detached, all changes of bow-pressure, -position and -speed clearly delineated in timbre and abrupt - no transitions!
msp
nat
1
cello
electronics: tacet
3
7:6
5
4:3
7
pizz
arco
sim...
soundfile 2 begins in tempo at the end of the last cello sound of section 2

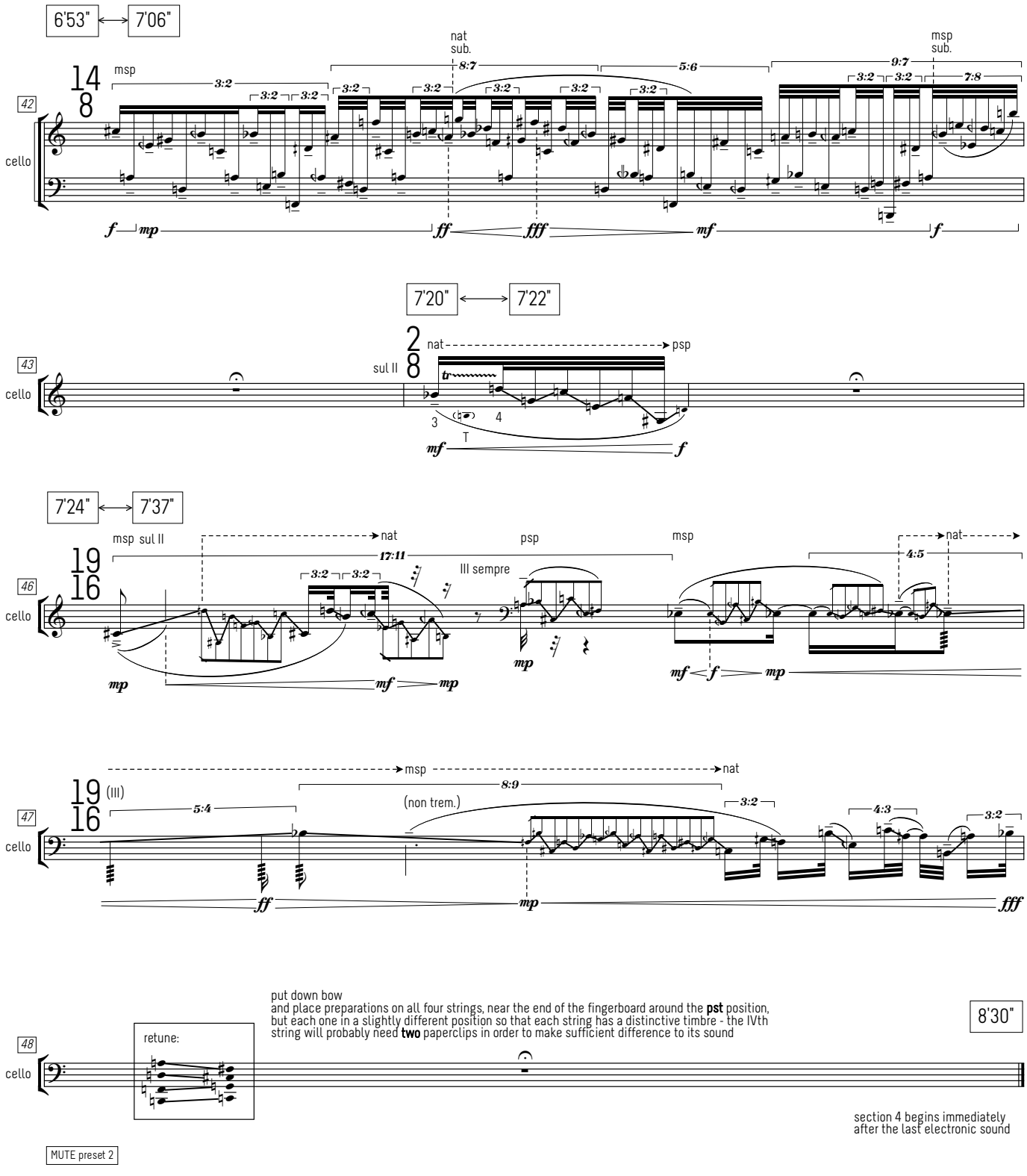
3
(arboreal)


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)
♪=63
sempre
nat
msp
cello
electronic sounds
soundfile 2 (8'30")
fff-f (begin at same perceived loudness as end of soundfile 1)
preset 2 (cello pitches apply band-reject filter to electronic sounds)
0'19" ↔ 0'28"
nat sempre
0'40" ↔ 0'46"
psp sub
nat sub
sul III
nat
0'53" ↔ 1'12"
msp
nat
psp
etc. sim.
(psp)
msp sub.

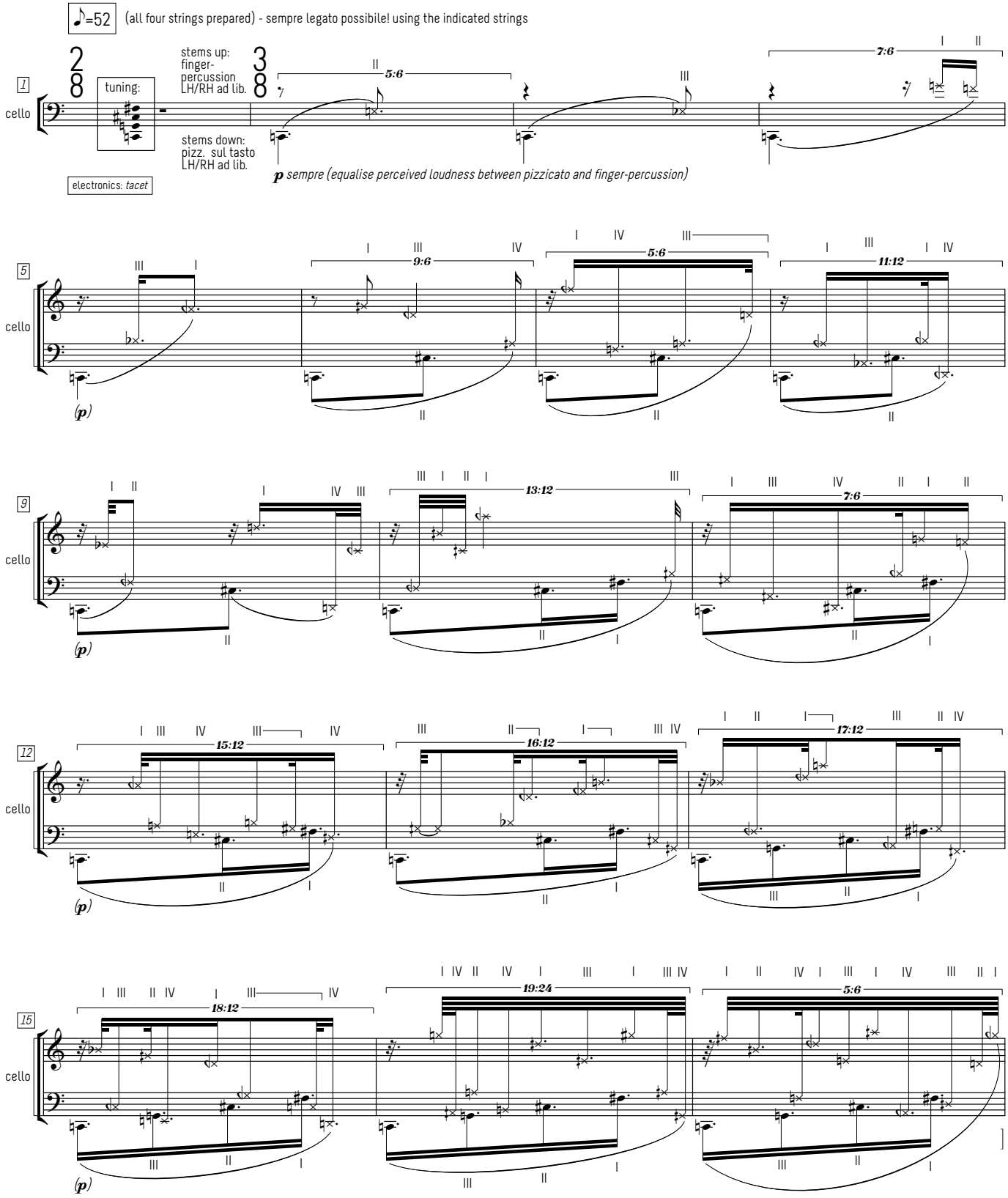

1'31"
1'49"
nat sul II
7:6
8:9
cello
fff
mp
2'06"
2'20"
msp
nat
15:11
4:5
4:3
5:4
6:7
3:2
mp
f
mf
fff
ff
2'34"
2'39"
psp
9:6
sul I
sul II
2'42"
2'57"
III sempre!
(poco vibr.)
(molto vibr.)
13:12
5:6
234321234321...
(nat)
2'57"
3'12"
3'23"
IV sempre
11:12
13:9
9:11
IV III IV III IV III IV III IV III
sub.


3'35" ↔ 3'51"
psp sempre
sul IV
20
cello
11:10
4:3
3:2
5:4
III
mf
ff
mp
(fff)
22
(psp)
II
8:7
fff
f
4'08" ↔ 4'15"
nat
msp
10:11
(retain same distance between fingers!)
24
7:5
4321234321...
4'23" ↔ 4'44"
26
7:6
5:6
27
12/8
nat
msp
3:2
(fff)

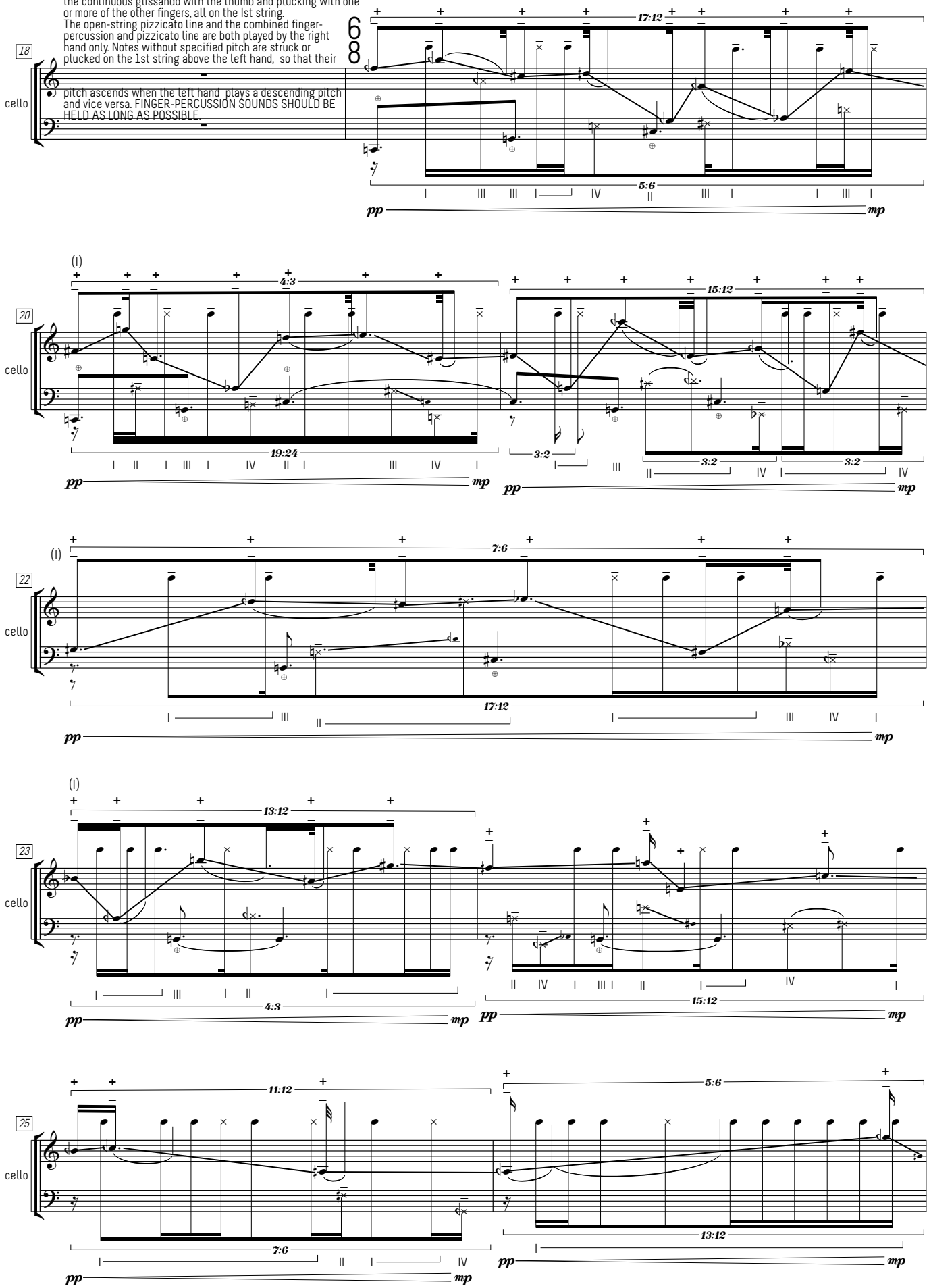

5'05" ↔ 5'07"
5'10" ↔ 5'16"
28
cello
psp
nat
msp
nat
10:9
mp
fff
mf
ff
5'22" ↔ 5'30"
(each sound at a slightly different bow-position within the indicated area)
nat
msp
psp
nat
msp
nat
psp
msp
nat
msp
nat
psp
32
cello
fff
mf
ff
f
5'39" ↔ 5'51"
msp sempre
35
cello
13:10
mf
mp
ff
f
fff
6'04" ↔ 6'09"
msp
psp
msp
psp
9:10
36
cello
fff non dim.
6'14" ↔ 6'33"
psp
39
cello
9:6
8:7
6:5
6:7
4:3
mp
ff
mp
ff
mp
ff
mp
msp
psp
msp
psp
msp
(psp)
40
cello
11:12
4:3
3:2
ff
mp
ff

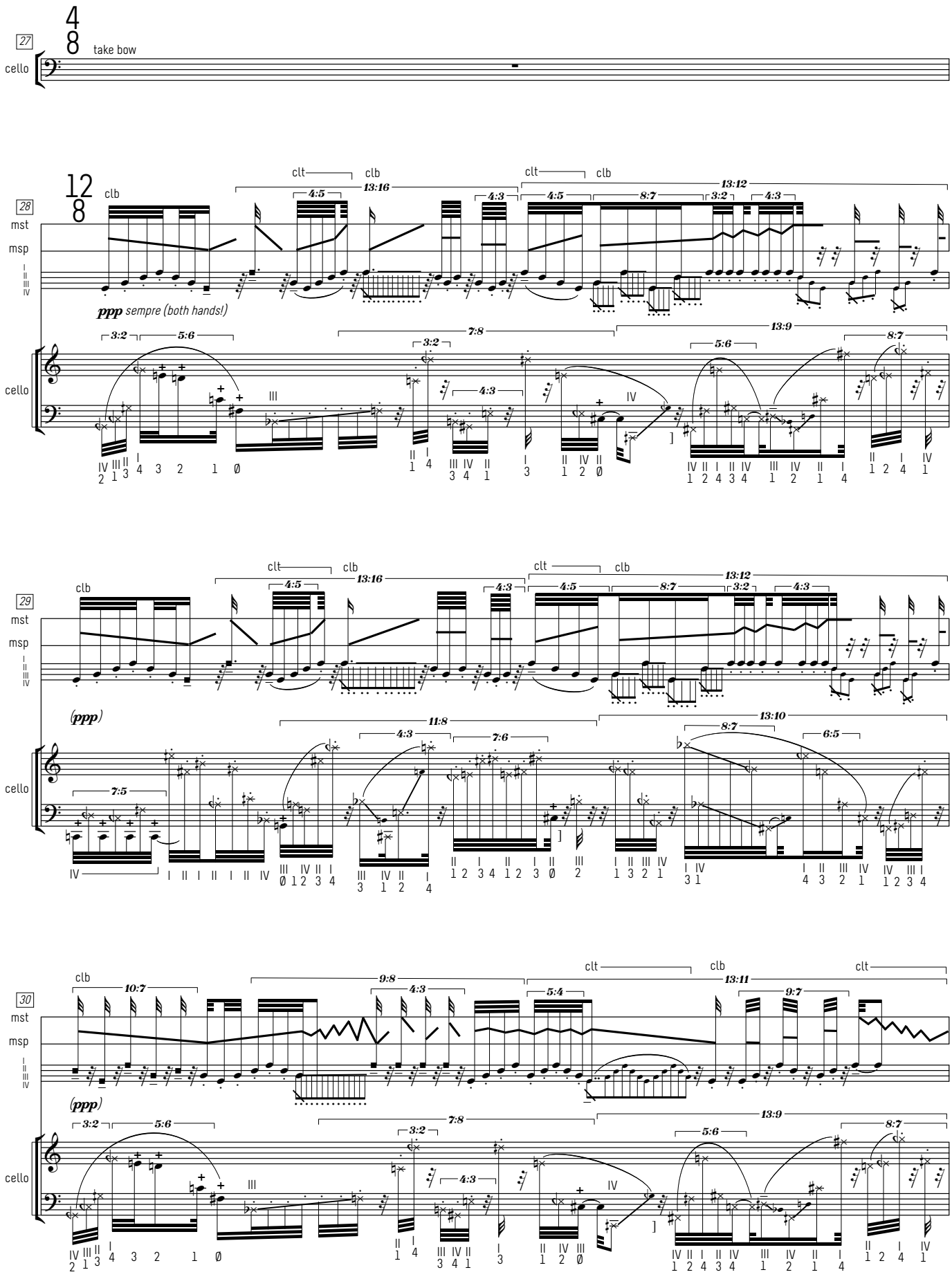

6'53" ↔ 7'06"
42
cello
14/8
msp
nat sub.
msp sub.
8:7
5:6
9:7
7:8
3:2
f mp ff fff mf f
7'20" ↔ 7'22"
43
2/8
nat
psp
sul II
mf f
7'24" ↔ 7'37"
46
19/16
msp sul II
nat
psp
msp
nat
17:11
4:5
III sempre
mp mf mp mf f mp
47
19/16 (III)
msp
nat
8:9
5:4
(non trem.)
3:2
4:3
ff mp fff
48
retune:
put down bow
and place preparations on all four strings, near the end of the fingerboard around the pst 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
8'30"
section 4 begins immediately
after the last electronic sound
MUTE preset 2

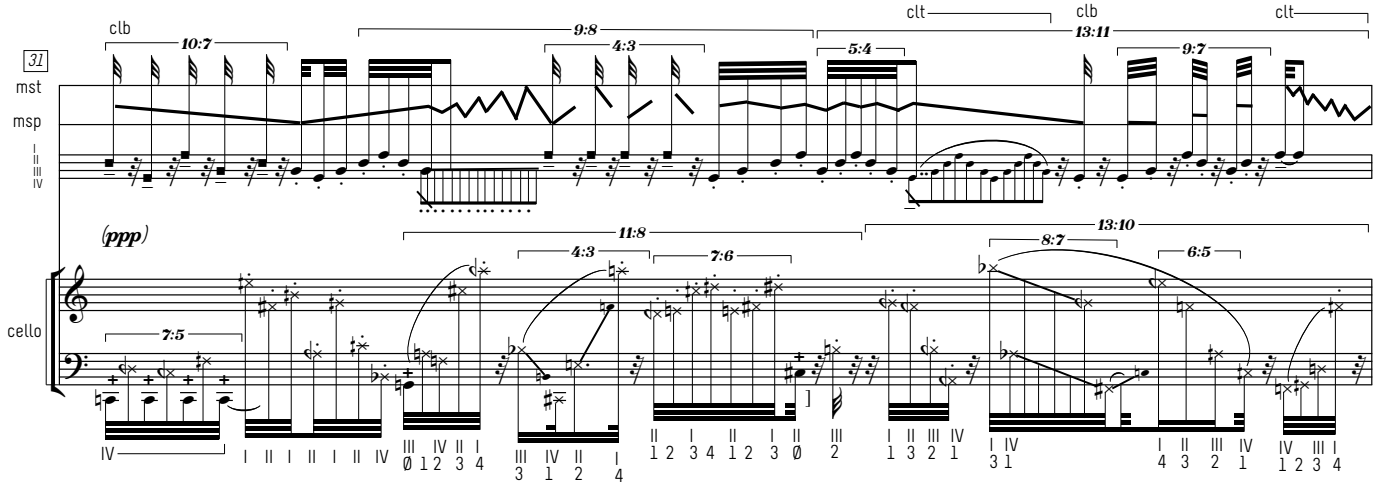
4
(aciculae)

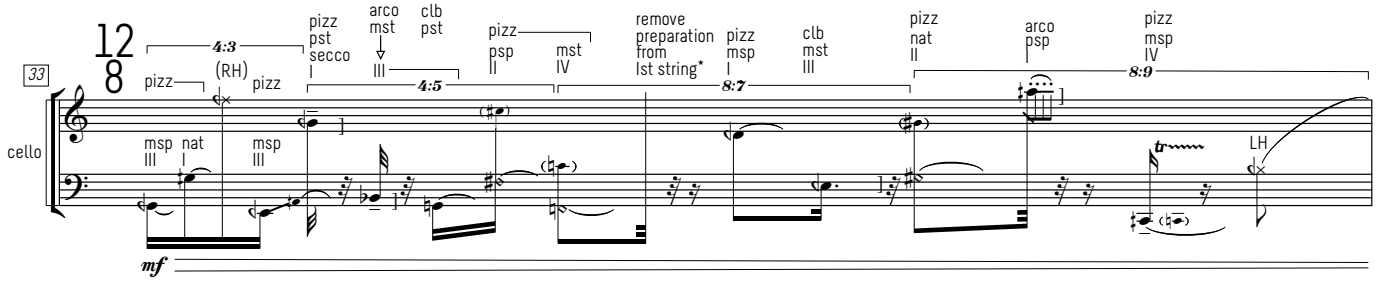

♪=52
(all four strings prepared) - sempre legato possibile! using the indicated strings
stems up: finger-percussion LH/RH ad lib.
stems down: pizz. sul tasto LH/RH ad lib.
tuning:
electronics: tacet
p sempre (equalise perceived loudness between pizzicato and finger-percussion)
cello
5:6
7:6
9:6
11:12
13:12
15:12
16:12
17:12
18:12
19:24

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 HELD AS LONG AS POSSIBLE.

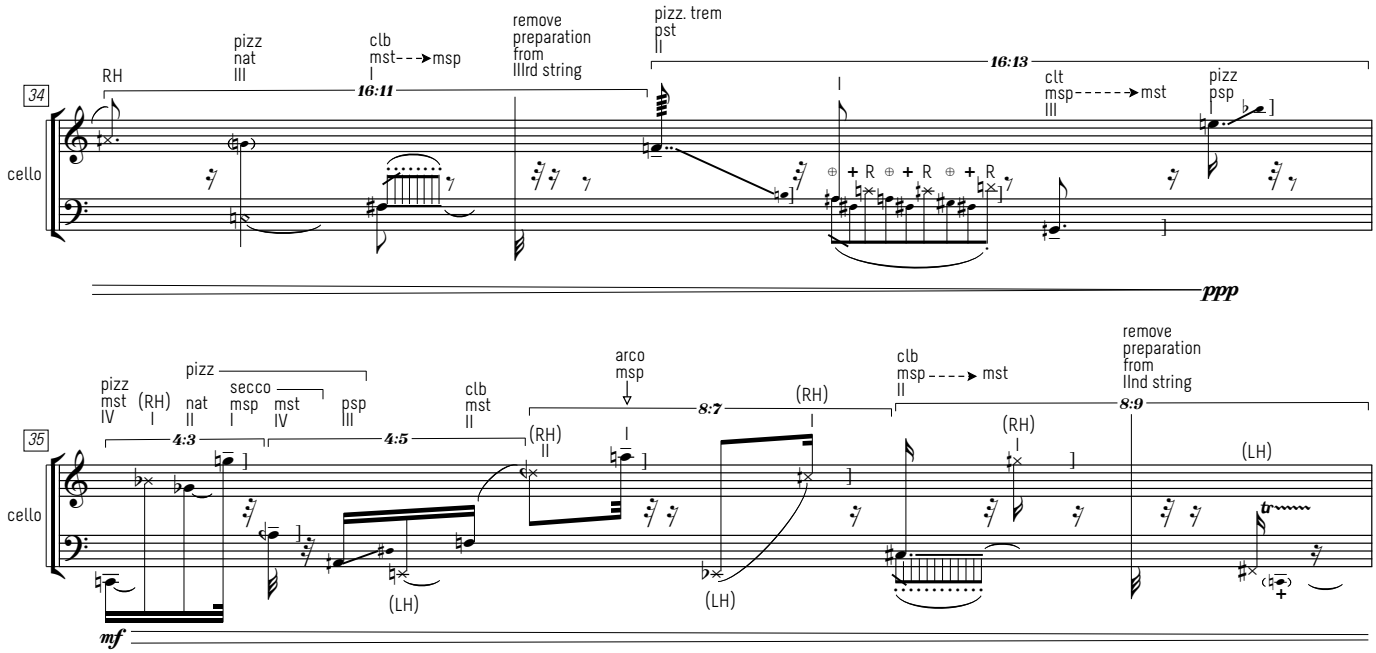


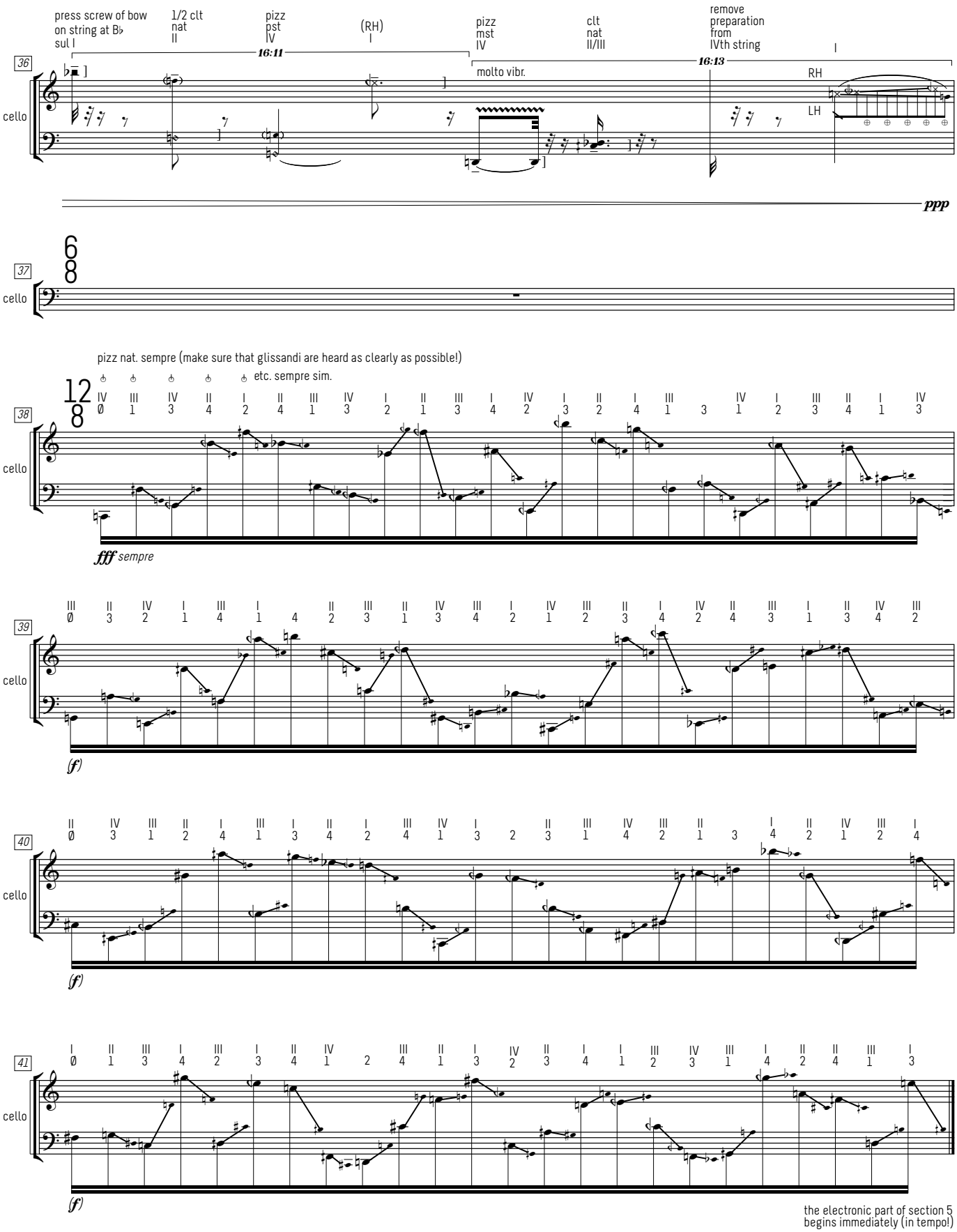

27
4/8
take bow
cello
28
12/8
clb
clt
clb
clt
clb
mst
msp
I II III IV
ppp sempre (both hands!)
cello
29
clb
clt
clb
clt
clb
mst
msp
I II III IV
(ppp)
cello
30
clb
clt
clb
clt
mst
msp
I II III IV
(ppp)
cello



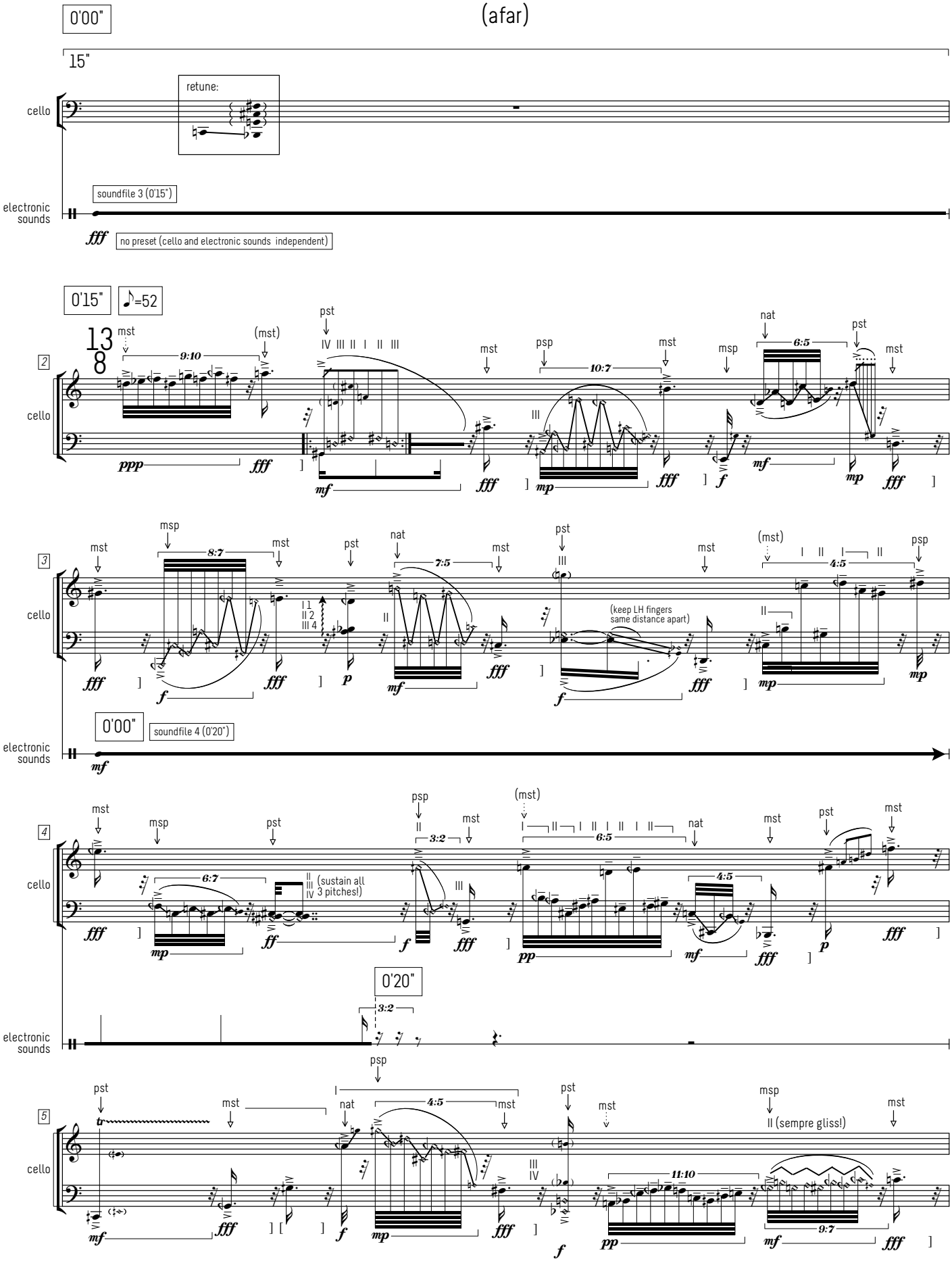


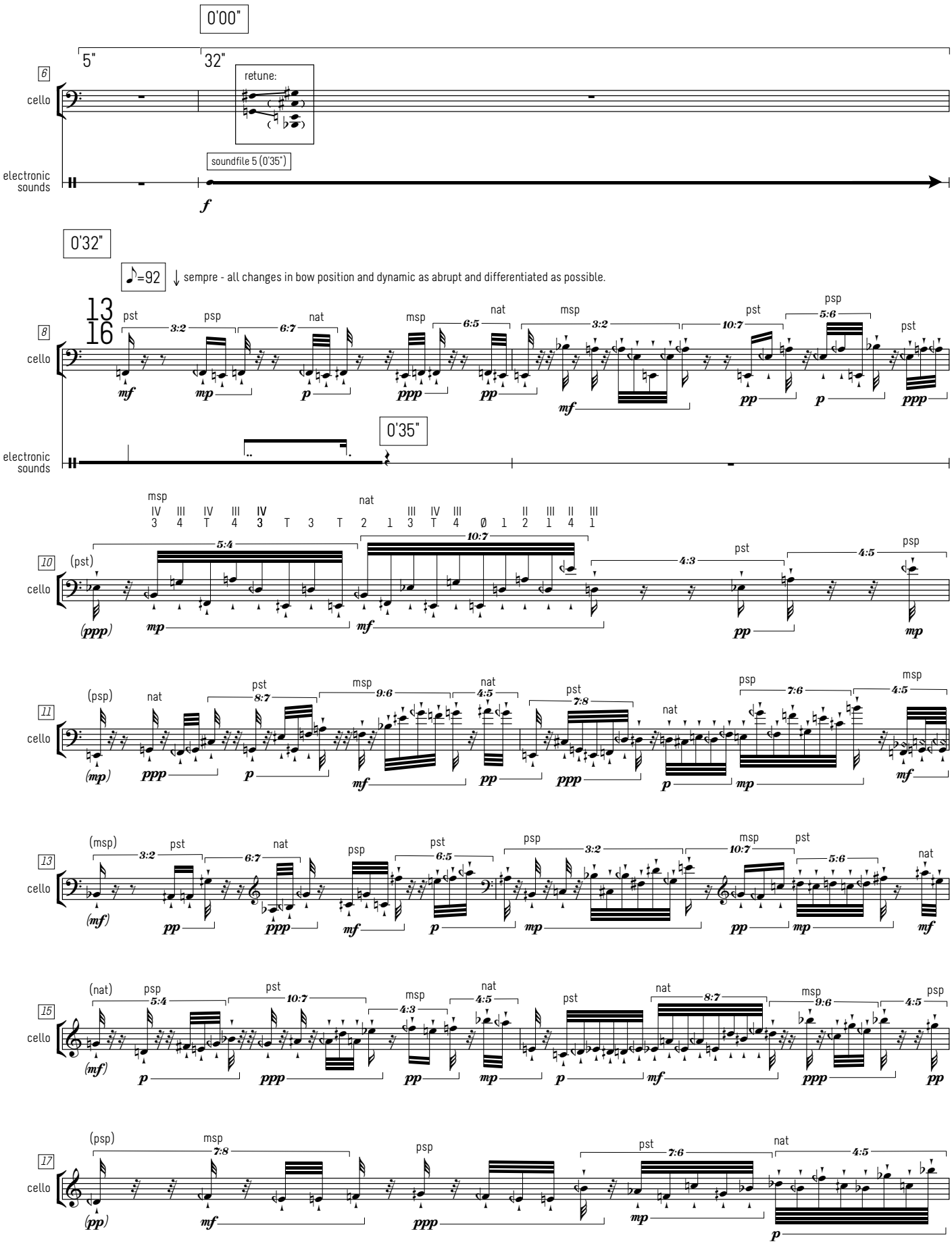
* each of these removals should be incorporated as coherently as possible into the gestural and dynamic profiles of bars 33-36, as another element in the sequence of highly-varied sound types.

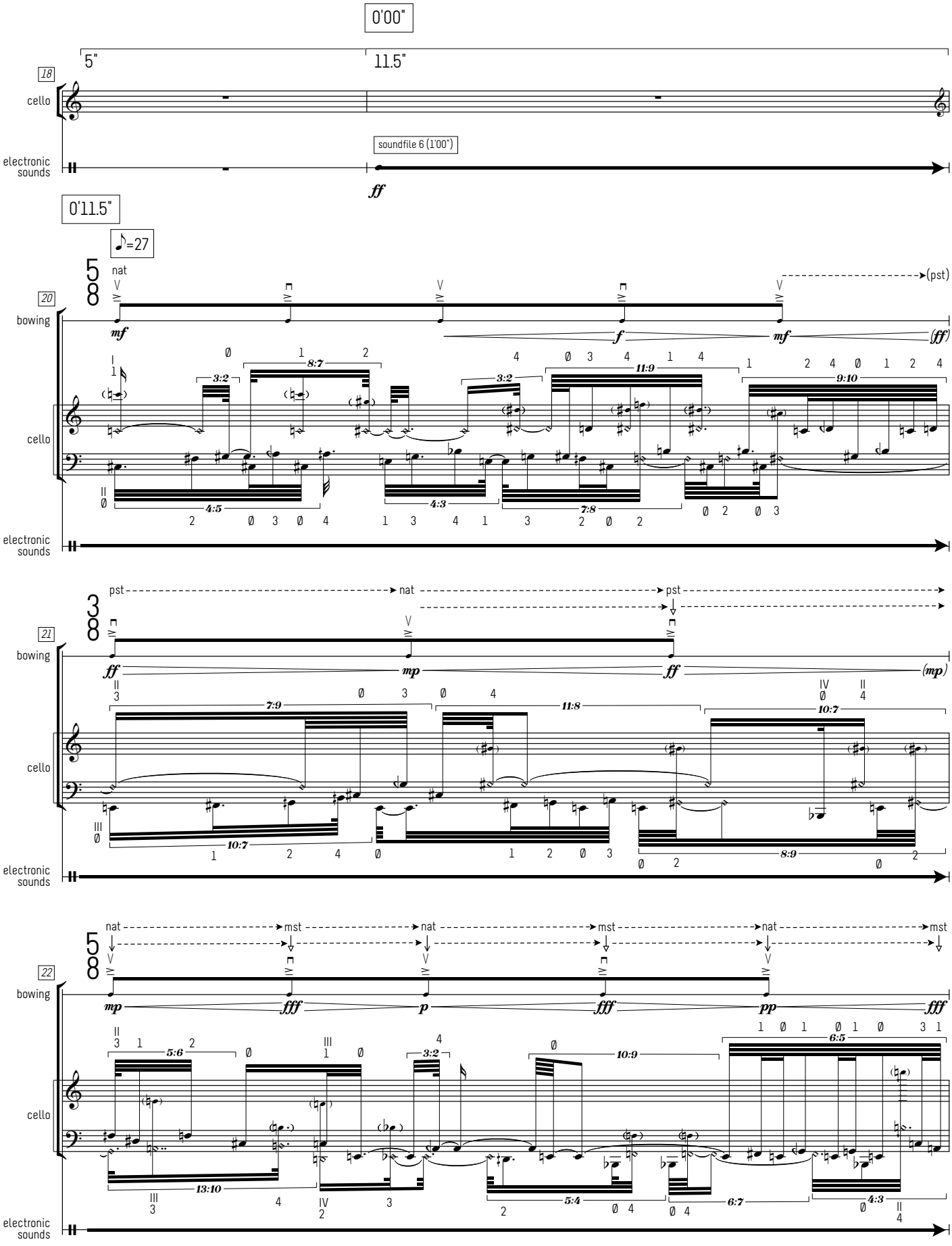


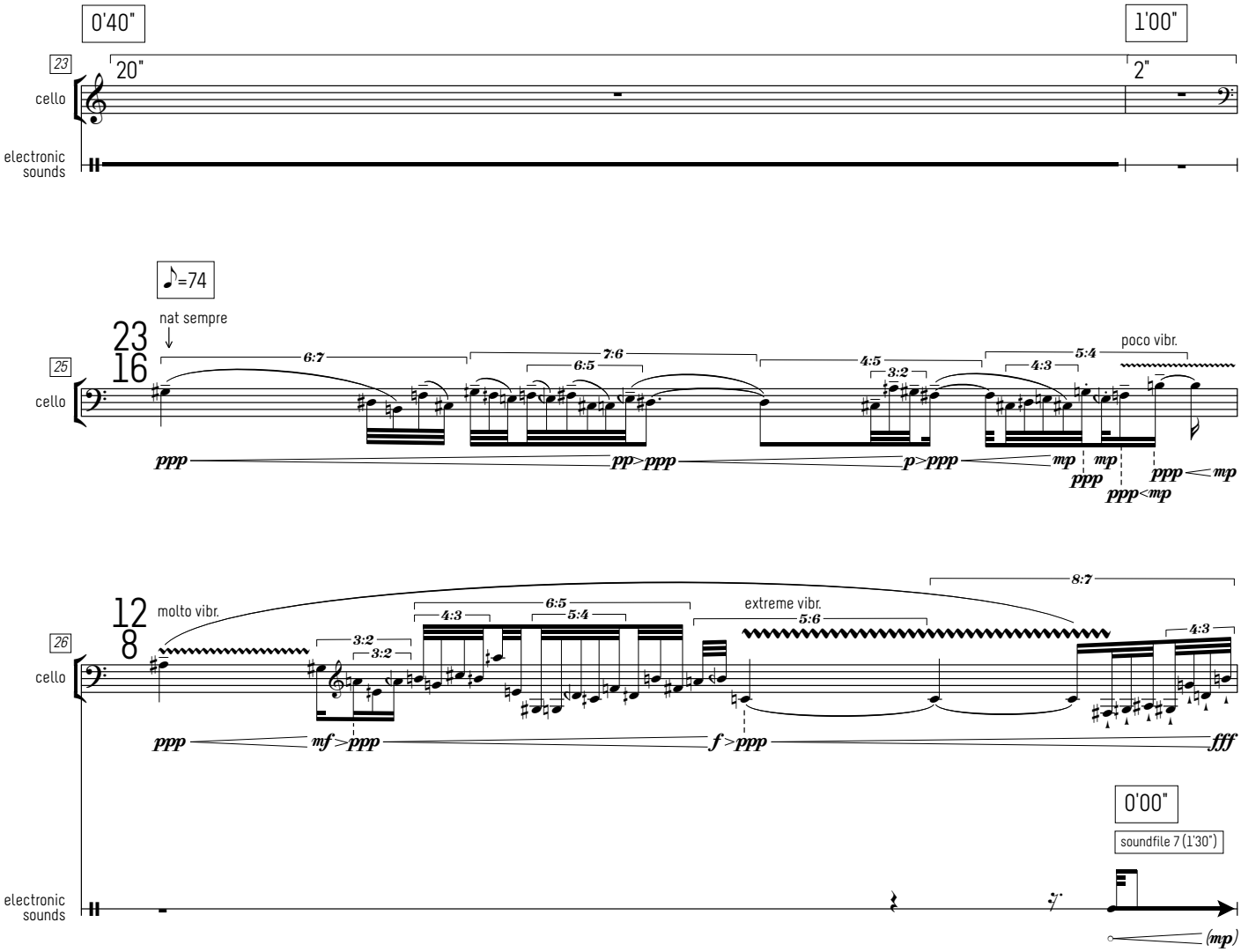

press screw of bow
on string at B♭
sul I
1/2 clt
nat
II
pizz
pst
IV
(RH)
I
pizz
mst
IV
clt
nat
II/III
remove
preparation
from
IVth string
I
16:11
16:13
molto vibr.
RH
LH
36
cello
ppp
37
6
8
cello
pizz nat. sempre (make sure that glissandi are heard as clearly as possible!)
etc. sempre sim.
12
8
38
cello
fff sempre
39
cello
(f)
40
cello
(f)
41
cello
(f)
the electronic part of section 5
begins immediately (in tempo!)

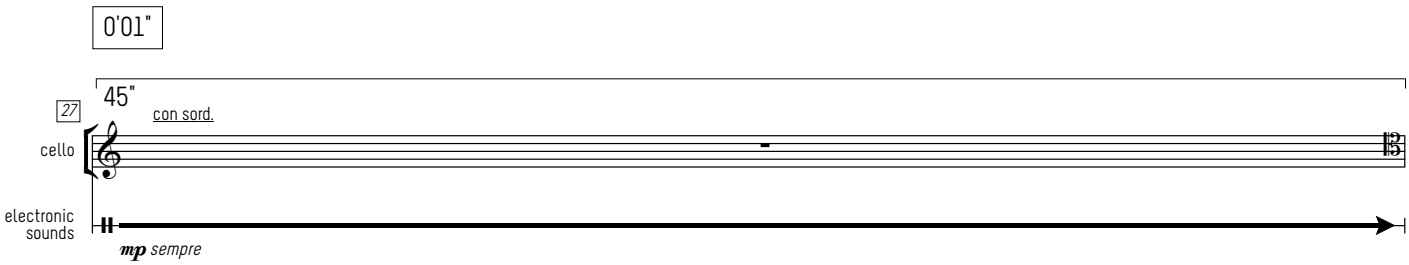
5
(afar)

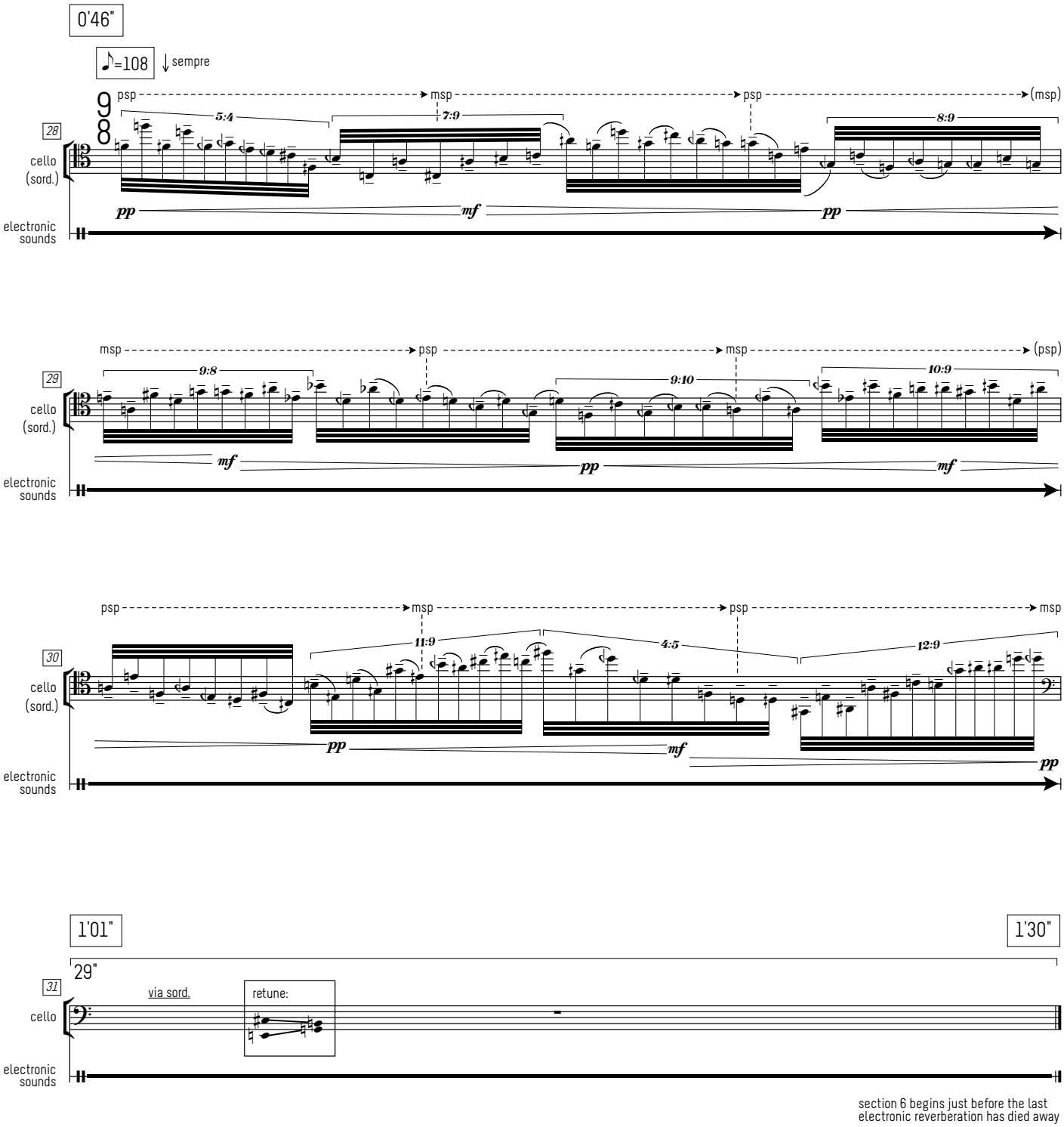

0'00"
15"
retune:
cello
soundfile 3 (0'15")
electronic sounds
no preset (cello and electronic sounds independent)
0'15"
♪=52
13/8
cello
soundfile 4 (0'20")
(keep LH fingers same distance apart)
(sustain all 3 pitches!)
0'20"
(sempre gliss!)


0'00"
5"
32"
6
cello
retune:
soundfile 5 (0'35")
electronic sounds
f
0'32"
♪=92
sempre - all changes in bow position and dynamic as abrupt and differentiated as possible.
13
16
8
0'35"
10
11
13
15
17
pst
psp
nat
msp
(pst)
(psp)
(msp)
(nat)
(ppp)
(mp)
(mf)
(pp)
ppp
pp
p
mp
mf
3:2
6:7
6:5
5:6
10:7
5:4
4:3
4:5
8:7
9:6
7:6
7:8


0'00"
5"
11.5"
18
cello
electronic sounds
soundfile 6 (1'00")
ff
0'11.5"
♪=27
20
bowing
cello
electronic sounds
nat
(pst)
mf
f
mf
(ff)
21
pst
nat
pst
ff
mp
ff
(mp)
22
nat
mst
nat
mst
nat
mst
mp
fff
p
fff
pp
fff


0'40"
1'00"
23
20"
2"
cello
electronic sounds
♪=74
nat sempre
23/16
25
6:7
7:6
6:5
4:5
3:2
5:4
4:3
poco vibr.
ppp
pp>ppp
p>ppp
mp
mp
ppp
ppp
ppp<mp
mp
12/8
26
molto vibr.
3:2
3:2
4:3
6:5
5:4
8:7
extreme vibr.
5:6
4:3
ppp
mf>ppp
f>ppp
fff
0'00"
soundfile 7 (1'30")
(mp)


0'01"
45"
27
con sord.
cello
electronic sounds
mp sempre



section 6 begins just before the last electronic reverberation has died away

6
(aerial)
in memoriam Hans Werner Henze

♪=74 (see preface to score for an explanation of the three-letter codes)

10 / 20
8 / 8

RH / LH

Bdy ↓/⇣ sempre — underneath strings — ***ppppp / pppp***

mix freely *legato* & *gettato* bowing

gradually shift bowing position...

(damp strings only)

tuning:

Bdy — around bout

Hor — sul IV msp/mst — ***pppp / ppp***

mix and overlap, tending increasingly to emphasise **Hor**

Hor — sul IV msp/mst

always highly irregular bow speed and still occasional *gettato* (and note extremely low bow-pressure!)

Gli — always wide-ranging and irregular, giving indistinct impression of movement but (because of extremely low bow-pressure and "harmonic" finger-pressure) no discernible pitches

2º: occasional *"col legno"* at varying positions striking the underside of the Ist and IVth strings but without breaking the continuity of the breath-like **Bdy** sounds

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

electronics: *tacet*
raise amplification level of cello for quietest sounds

3

15 / 24
8 / 8

RH / LH

Hor — at first introduce **Dia** sporadically, then increasingly until **Hor** (and its associated low bow pressure) is excluded

Dia — sul IV

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

Dia — sul IV

<> <> <><><> <> <> <><> <> <> <> <><> <> <> <> <><> <><><> <> <> <> <><> <><><> <><><> <>

ppp increasing range of dynamic changes... ***pp/ff*** decreasing range of dynamic changes... ***ff***

(Gli) — now introducing moments of normal finger pressure...

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

+ Fch — (rapid but irregular) - pitches occasionally and randomly become audible

2º: occasional alternation of Fch with finger-percussion

5

3 / 2 / 18 / 6
8 / 8 / 8 / 8

RH / LH

sub. Gra — sul IV — ***(ff)*** ***pp*** — Hor

↓sub. — ***pp*** ***mp***

legato bowing, shifting weight gradually between the two strings, independent of LH

irregular changes in bow speed including occasional tremolo, and in bow position between nat and msp

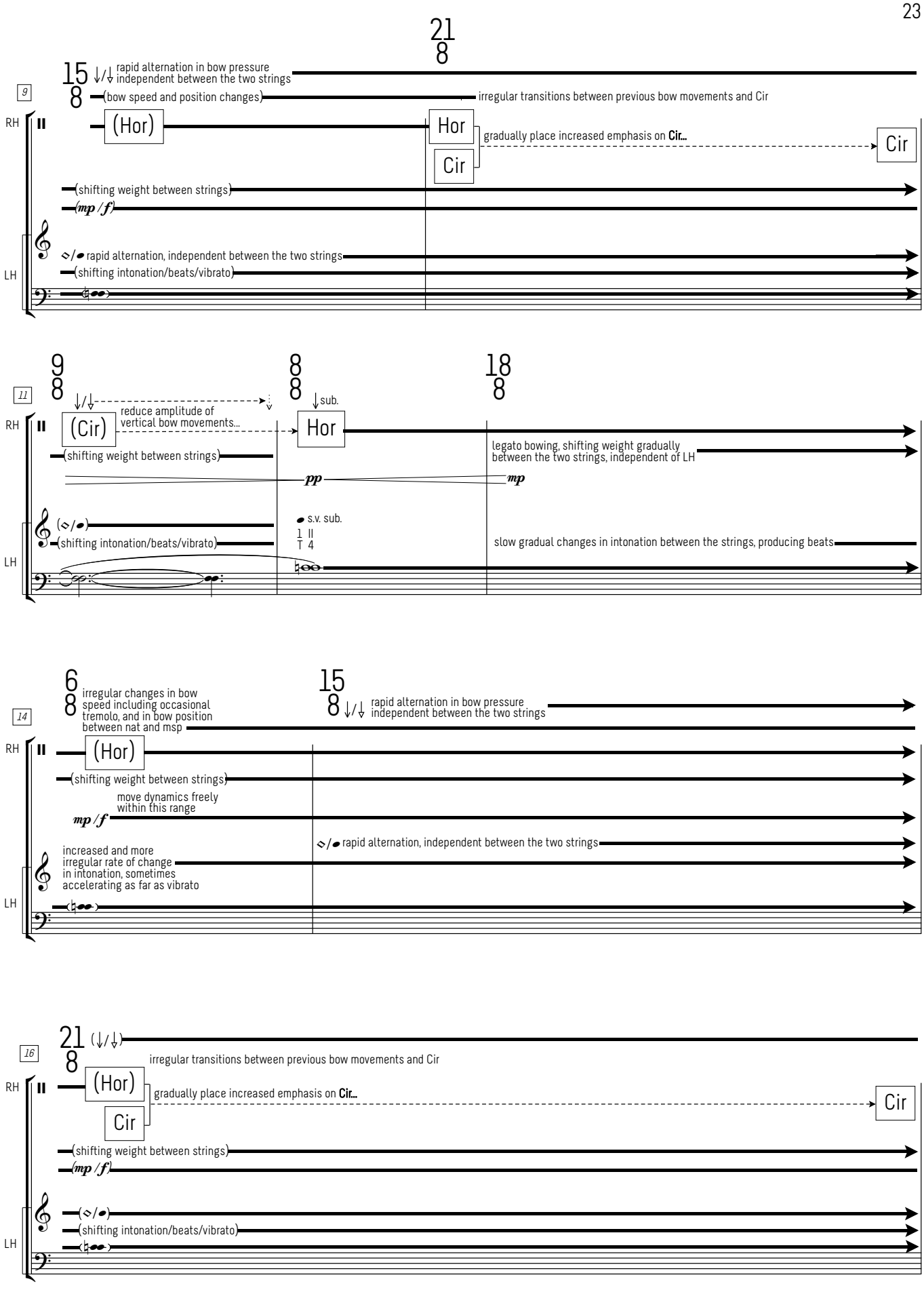
move dynamics freely within this range — ***mp / f***

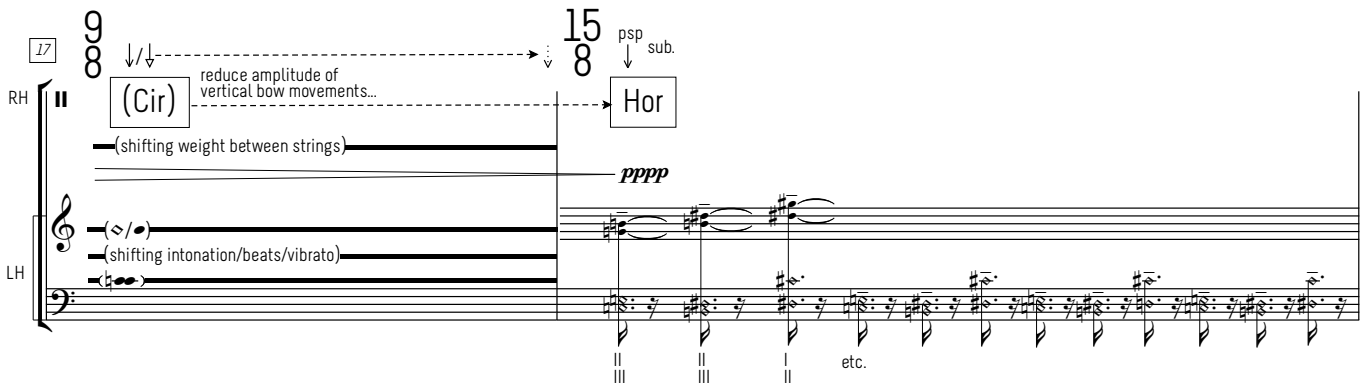
(Gli) — IV 4 — II 1 III 3

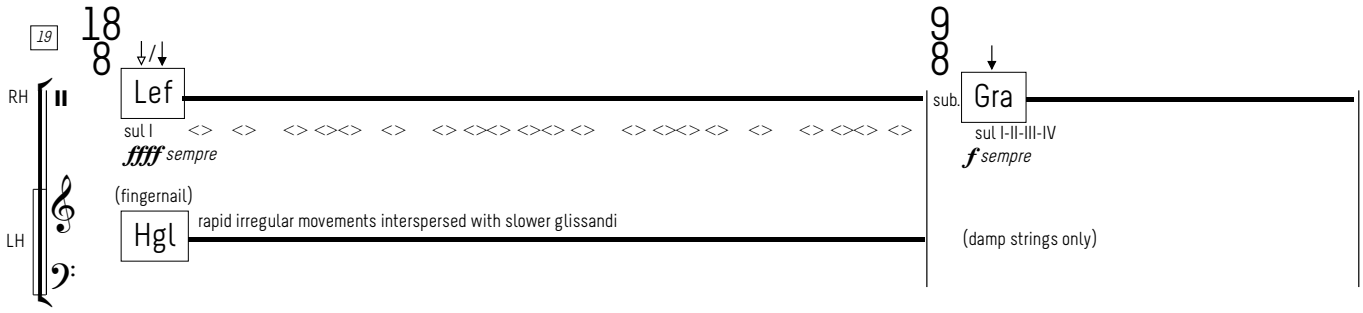
slow gradual changes in intonation between the strings, producing beats

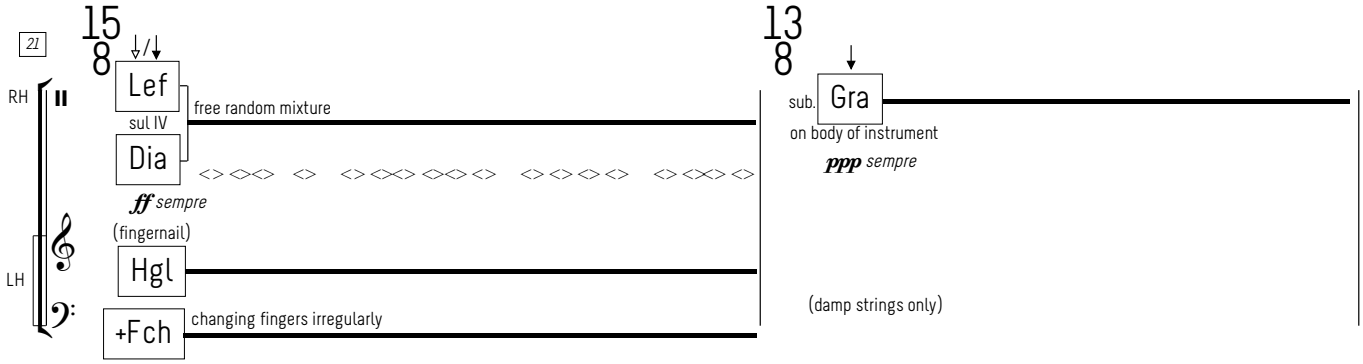
increased and more irregular rate of change in intonation, sometimes accelerating as far as vibrato

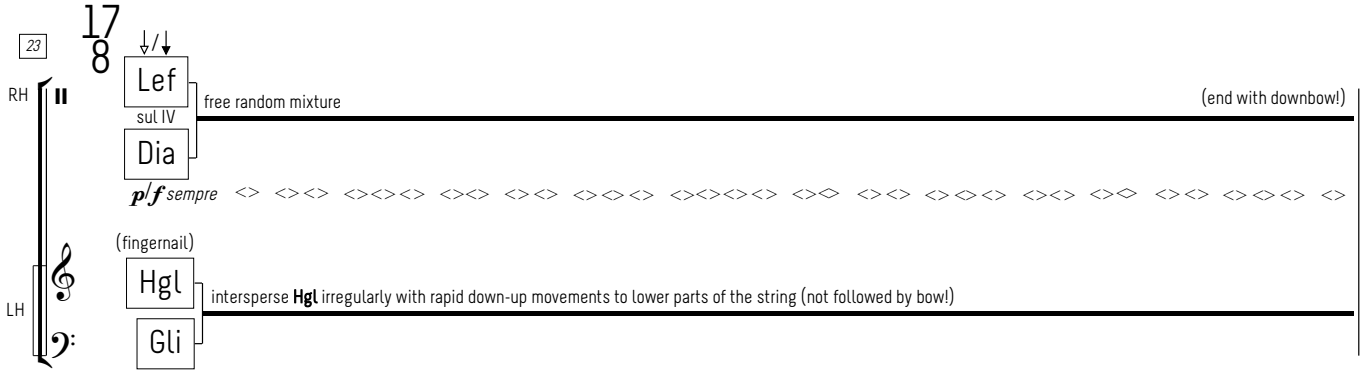
(B♭ emerges only momentarily before end of bar as endpoint of the last glissando)

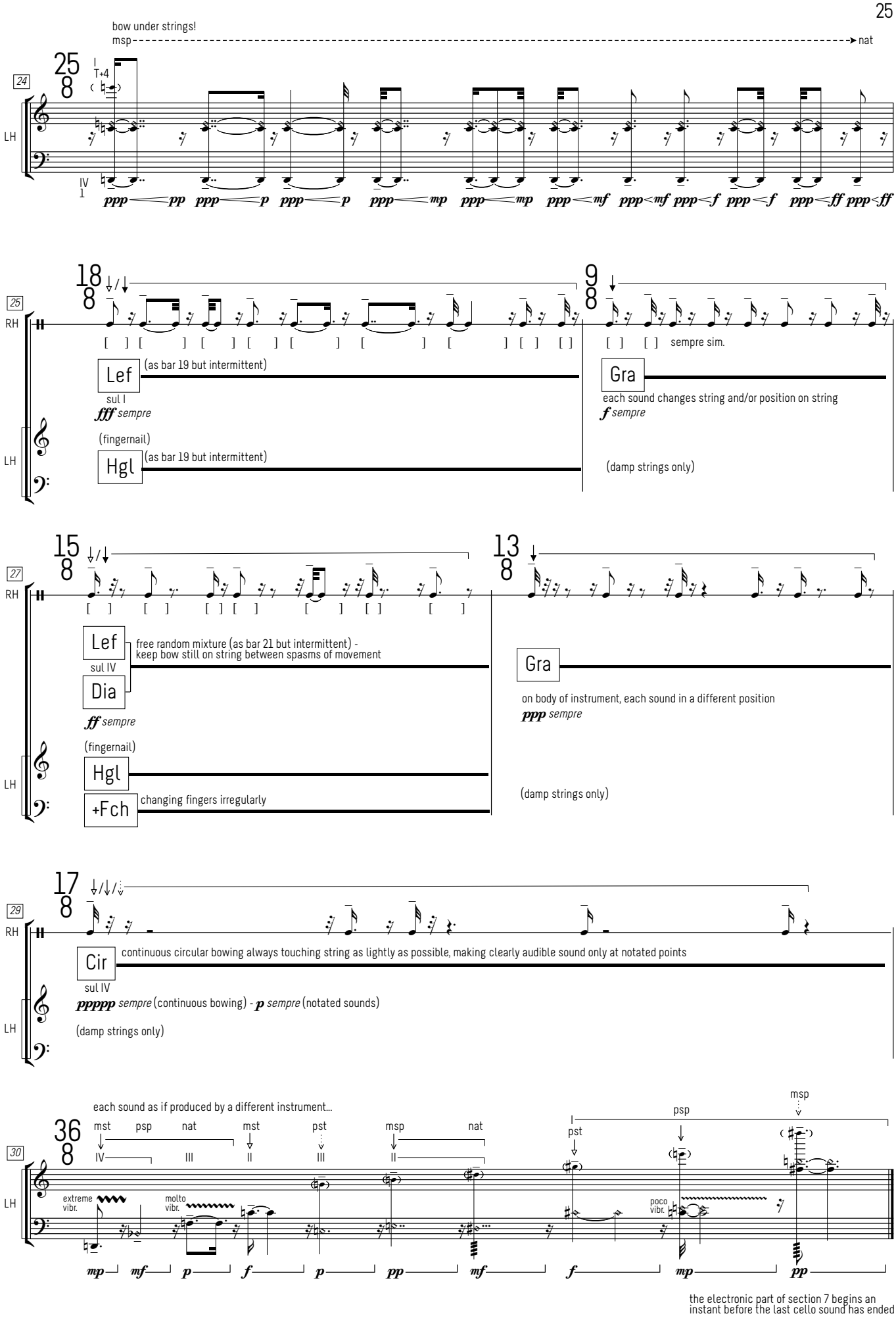

9
21/8
15/8
rapid alternation in bow pressure
independent between the two strings
(bow speed and position changes)
irregular transitions between previous bow movements and Cir
RH
(Hor)
Hor
Cir
gradually place increased emphasis on Cir...
(shifting weight between strings)
(mp / f)
rapid alternation, independent between the two strings
(shifting intonation/beats/vibrato)
LH
11
9/8
8/8
18/8
(Cir)
reduce amplitude of
vertical bow movements...
sub.
Hor
(shifting weight between strings)
legato bowing, shifting weight gradually
between the two strings, independent of LH
pp
mp
s.v. sub.
I II
T 4
(shifting intonation/beats/vibrato)
slow gradual changes in intonation between the strings, producing beats
14
6/8
irregular changes in bow
speed including occasional
tremolo, and in bow position
between nat and msp
15/8
rapid alternation in bow pressure
independent between the two strings
(Hor)
(shifting weight between strings)
move dynamics freely
within this range
mp / f
rapid alternation, independent between the two strings
increased and more
irregular rate of change
in intonation, sometimes
accelerating as far as vibrato
16
21/8
irregular transitions between previous bow movements and Cir
(Hor)
gradually place increased emphasis on Cir...
Cir
(shifting weight between strings)
(mp / f)
(shifting intonation/beats/vibrato)


17
9/8
15/8
psp
sub.
RH
LH
(Cir)
reduce amplitude of vertical bow movements...
Hor
(shifting weight between strings)
pppp
(shifting intonation/beats/vibrato)
II III
II III
I II
etc.


19
18/8
9/8
RH
LH
Lef
sul I
ffff sempre
sub.
Gra
sul I-II-III-IV
f sempre
(fingernail)
Hgl
rapid irregular movements interspersed with slower glissandi
(damp strings only)


21
15/8
13/8
RH
LH
Lef
sul IV
free random mixture
Dia
ff sempre
sub.
Gra
on body of instrument
ppp sempre
(fingernail)
Hgl
+Fch
changing fingers irregularly
(damp strings only)


23
17/8
RH
LH
Lef
sul IV
free random mixture
(end with downbow!)
Dia
p/f sempre
(fingernail)
Hgl
intersperse **Hgl** irregularly with rapid down-up movements to lower parts of the string (not followed by bow!)
Gli


bow under strings!
msp
nat
25
8
24
LH
I
T+4
IV
1
ppp pp ppp p ppp p ppp mp ppp mp ppp mf ppp mf ppp f ppp f ppp ff ppp ff
18
8
9
8
25
RH
LH
Lef
(as bar 19 but intermittent)
sul I
fff sempre
(fingernail)
Hgl
(as bar 19 but intermittent)
sempre sim.
Gra
each sound changes string and/or position on string
f sempre
(damp strings only)
15
8
13
8
27
RH
LH
Lef
free random mixture (as bar 21 but intermittent) -
keep bow still on string between spasms of movement
sul IV
Dia
ff sempre
(fingernail)
Hgl
+Fch
changing fingers irregularly
Gra
on body of instrument, each sound in a different position
ppp sempre
(damp strings only)
17
8
29
RH
LH
Cir
continuous circular bowing always touching string as lightly as possible, making clearly audible sound only at notated points
sul IV
ppppp sempre (continuous bowing) - p sempre (notated sounds)
(damp strings only)
each sound as if produced by a different instrument...
36
8
30
LH
mst psp nat mst pst msp nat
IV III II III II
psp
pst
msp
extreme vibr.
molto vibr.
poco vibr.
mp mf p f p pp mf f mp pp
the electronic part of section 7 begins an instant before the last cello sound has ended

7
(anthesis)

0'00"

40"

retune:

cello

soundfile 8 (6'00")

electronic sounds

f - *fff*

preset 4 (cello pitches shift playback pitch and speed of the electronic sounds) MUTED

0'40"

enter unobtrusively, emerging from the momentary C♯ major triad which appears in the electronic part. 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).

♪=92

sul I sempre

(trill keeping two fingers as close together as possible)

21/16

nat - msp - psp - nat

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

2

cello

p *f* *p*

psp nat

(vibr.)

9:11 4:5 5:4 4:5 3:2 3:2

3

cello

f *p* *f*

0'54"

9/8

(gett.)

psp nat (psp)

5:6 3:2 3:2 3:2 13:11 3:2 6:7

4

cello

p *f* *(p)*

12/8

psp nat (psp)

(trill as before)

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

5

cello

p *mf* *mf* *f*

rests in mid-glissando interrupt bowing but not pitch-movement, so that the glissando restarts at the point it would have reached if continuous

1'07"

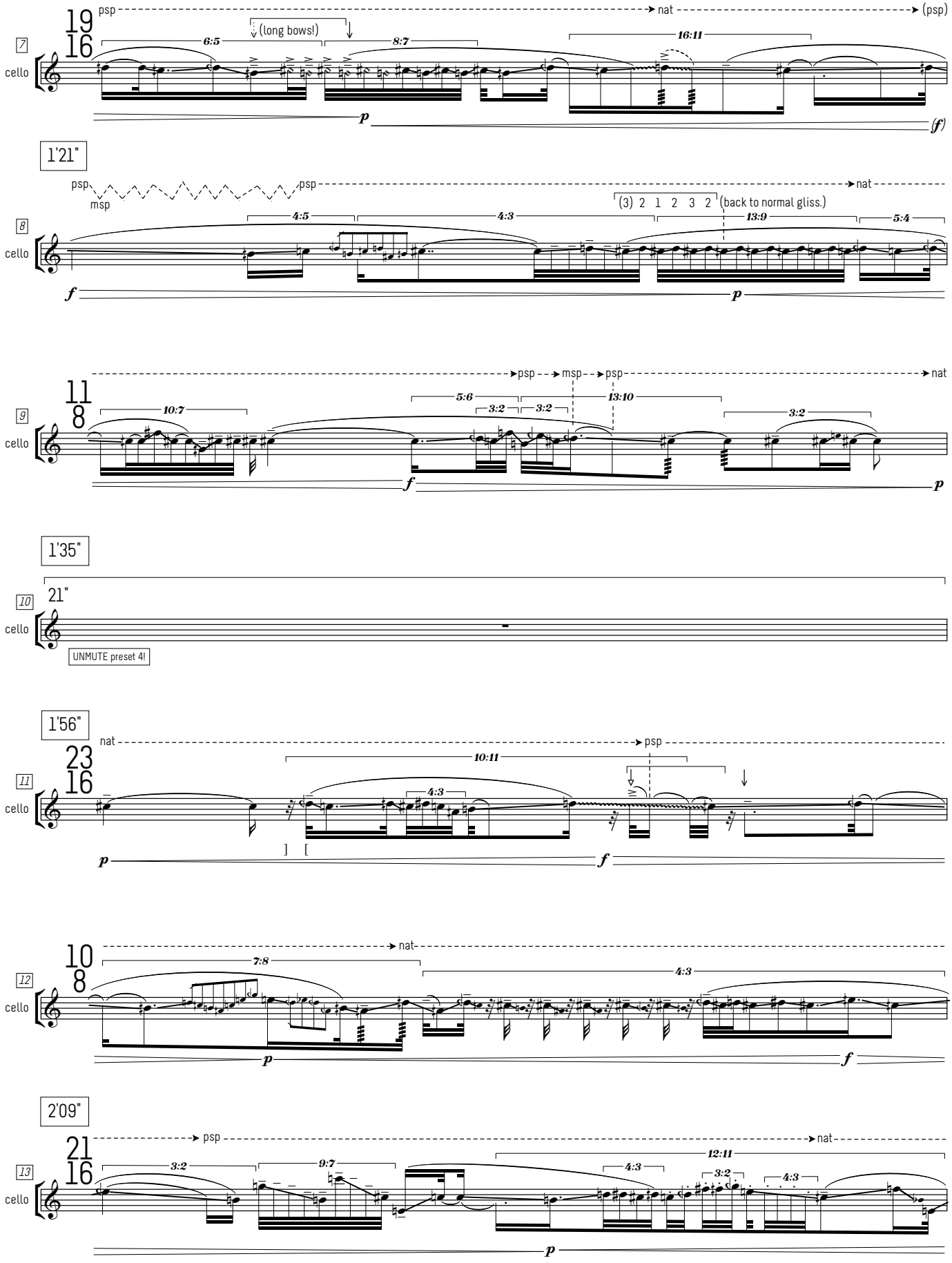
psp nat (psp)

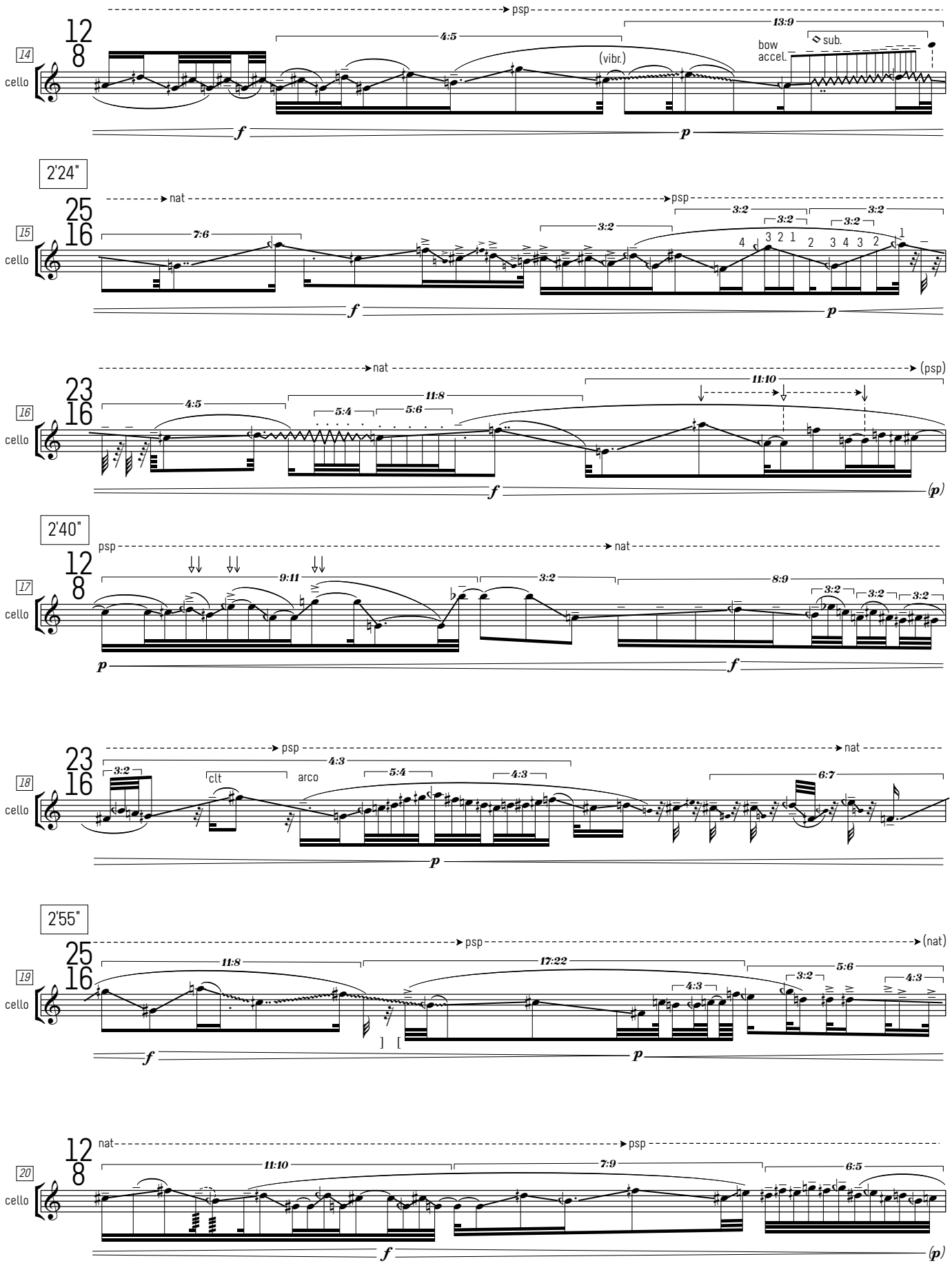
8:9 3:2 4:3 3:2 3:2

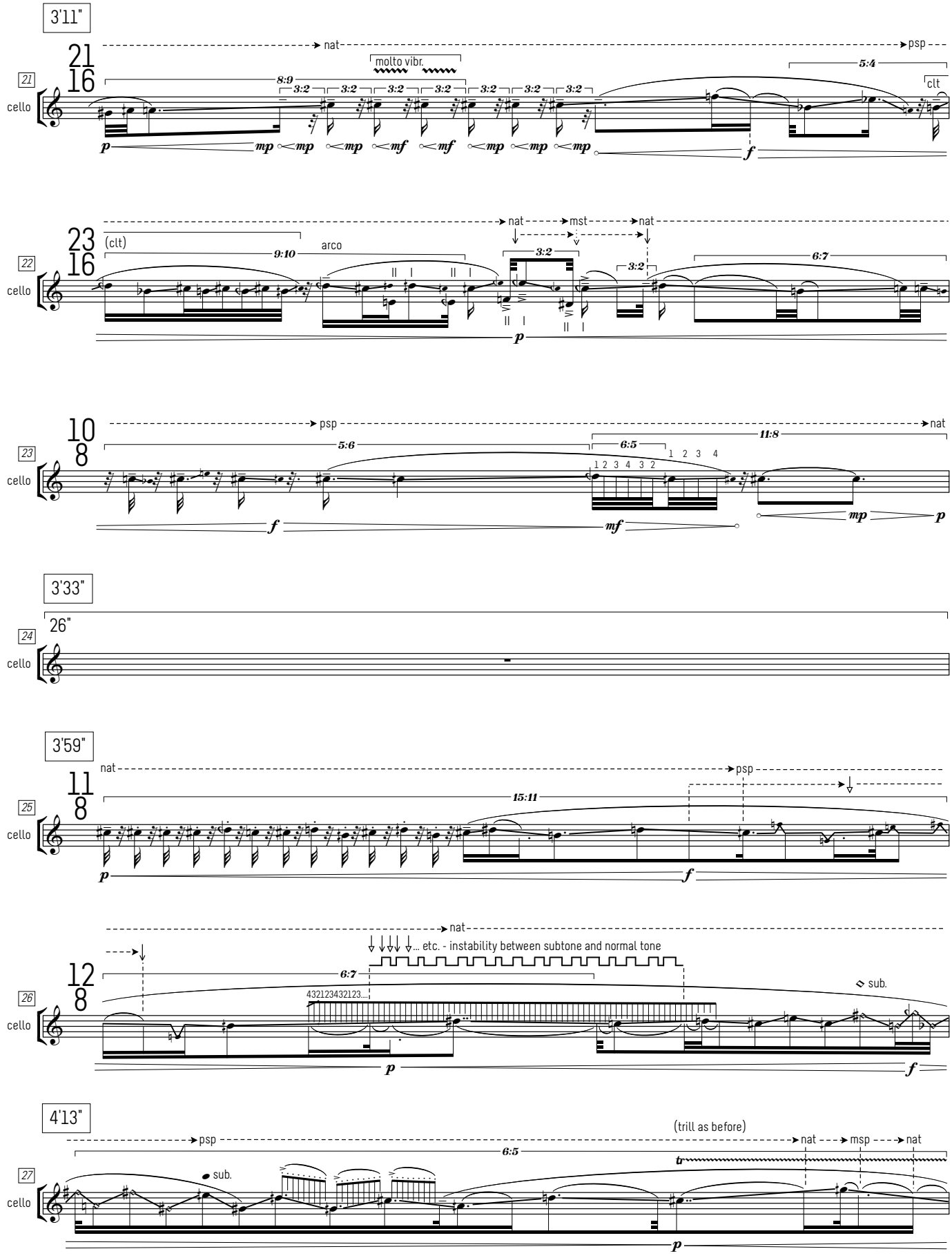
6

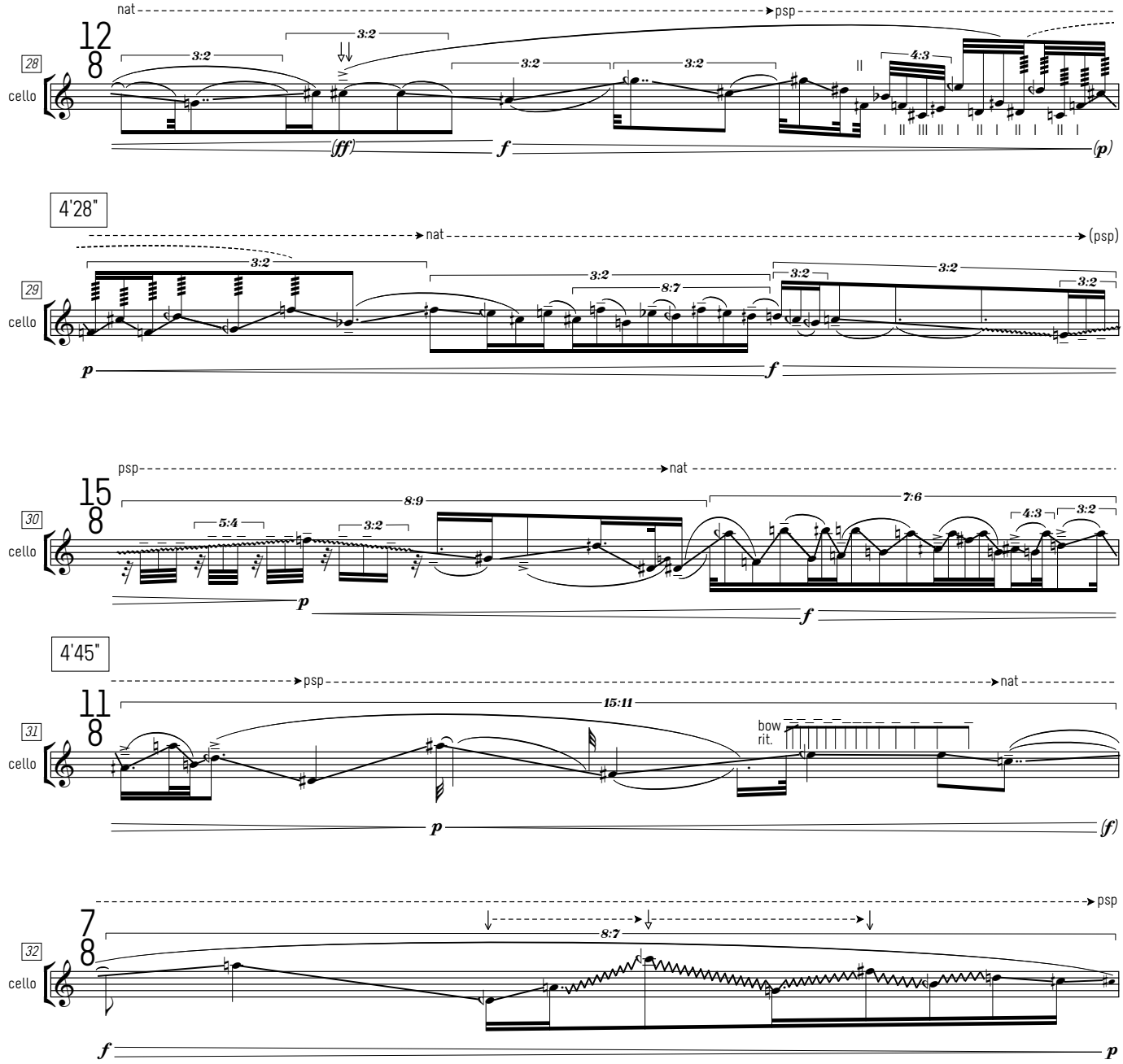
cello

p *f* *(ff)*


7
cello
19/16
psp
nat
(psp)
(long bows!)
6:5
8:7
16:11
p
(f)
1'21"
8
cello
psp
msp
psp
nat
(3) 2 1 2 3 2
(back to normal gliss.)
4:5
4:3
13:9
5:4
f
p
9
cello
11/8
psp
msp
psp
nat
10:7
5:6
3:2
3:2
13:10
3:2
f
p
1'35"
10
cello
21"
UNMUTE preset 4!
1'56"
11
cello
23/16
nat
psp
10:11
4:3
p
f
12
cello
10/8
nat
7:8
4:3
p
f
2'09"
13
cello
21/16
psp
nat
3:2
9:7
12:11
4:3
3:2
4:3
p


psp
13:9
4:5
sub.
bow
accel.
(vibr.)
14
cello
12
8
f
p
2'24"
nat
psp
3:2
7:6
15
cello
25
16
f
p
nat
(psp)
11:10
4:5
11:8
5:4
5:6
16
cello
23
16
f
(p)
2'40"
psp
nat
9:11
3:2
8:9
17
cello
12
8
p
f
psp
nat
4:3
3:2
clt
arco
5:4
6:7
18
cello
23
16
p
2'55"
psp
(nat)
11:8
17:22
5:6
19
cello
25
16
f
p
nat
psp
11:10
7:9
6:5
20
cello
12
8
f
(p)


3'11"
21
16
cello
nat
psp
molto vibr.
8:9
3:2
5:4
clt
p
mp
mf
f
23
16
(clt)
arco
9:10
nat
mst
nat
3:2
6:7
10
8
psp
nat
5:6
6:5
11:8
1 2 3 4 3 2
1 2 3 4
3'33"
26"
3'59"
11
8
15:11
12
8
... etc. - instability between subtone and normal tone
6:7
sub.
4'13"
(trill as before)
msp
6:5
tr

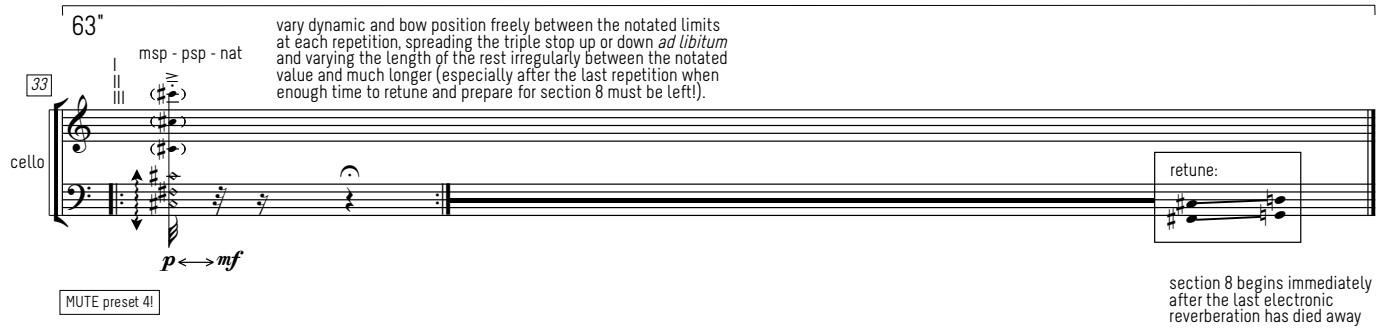


4'57"

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 unforseeable variation.

6'00"

63"



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!).

MUTE preset 4!

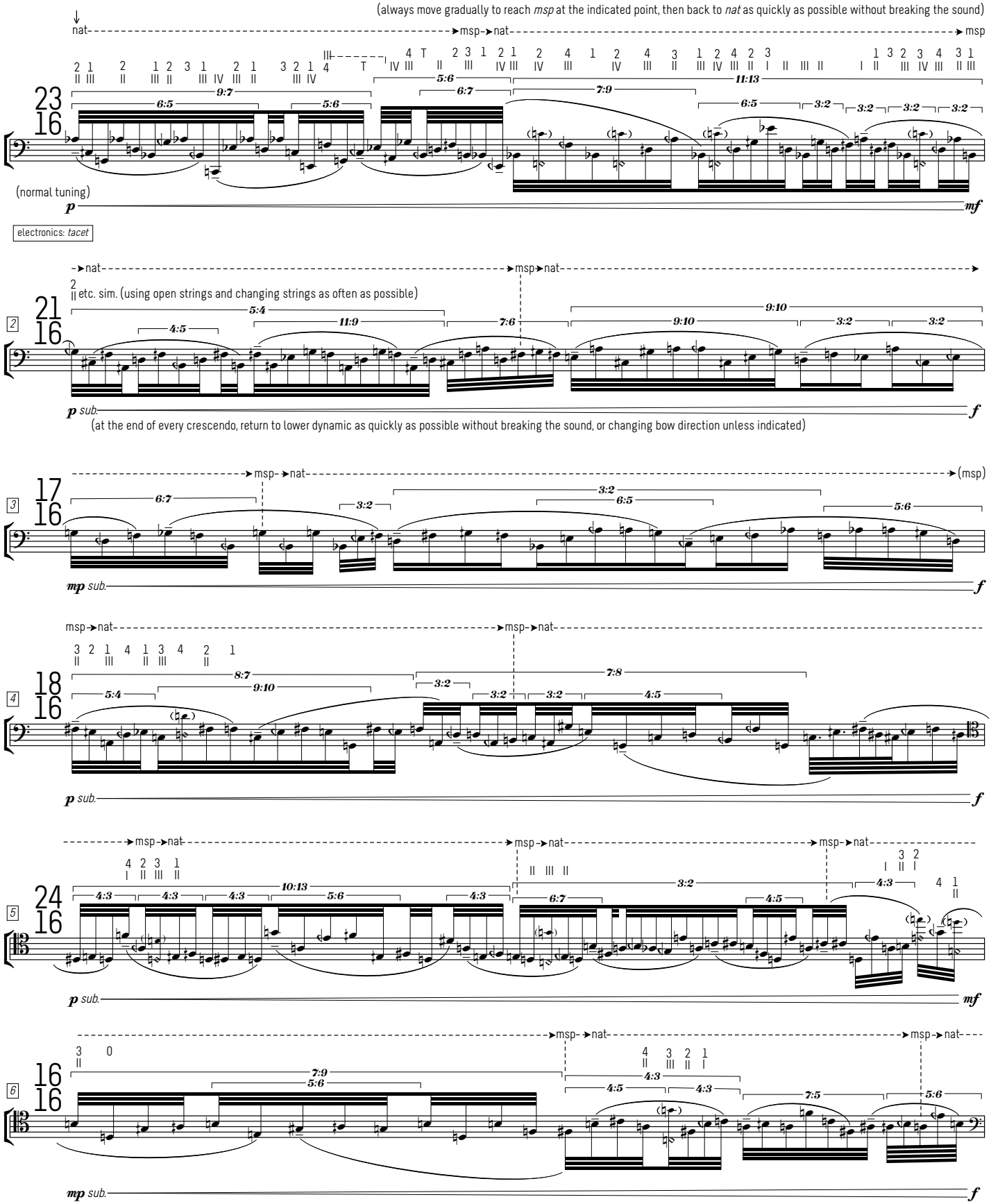
section 8 begins immediately after the last electronic reverberation has died away

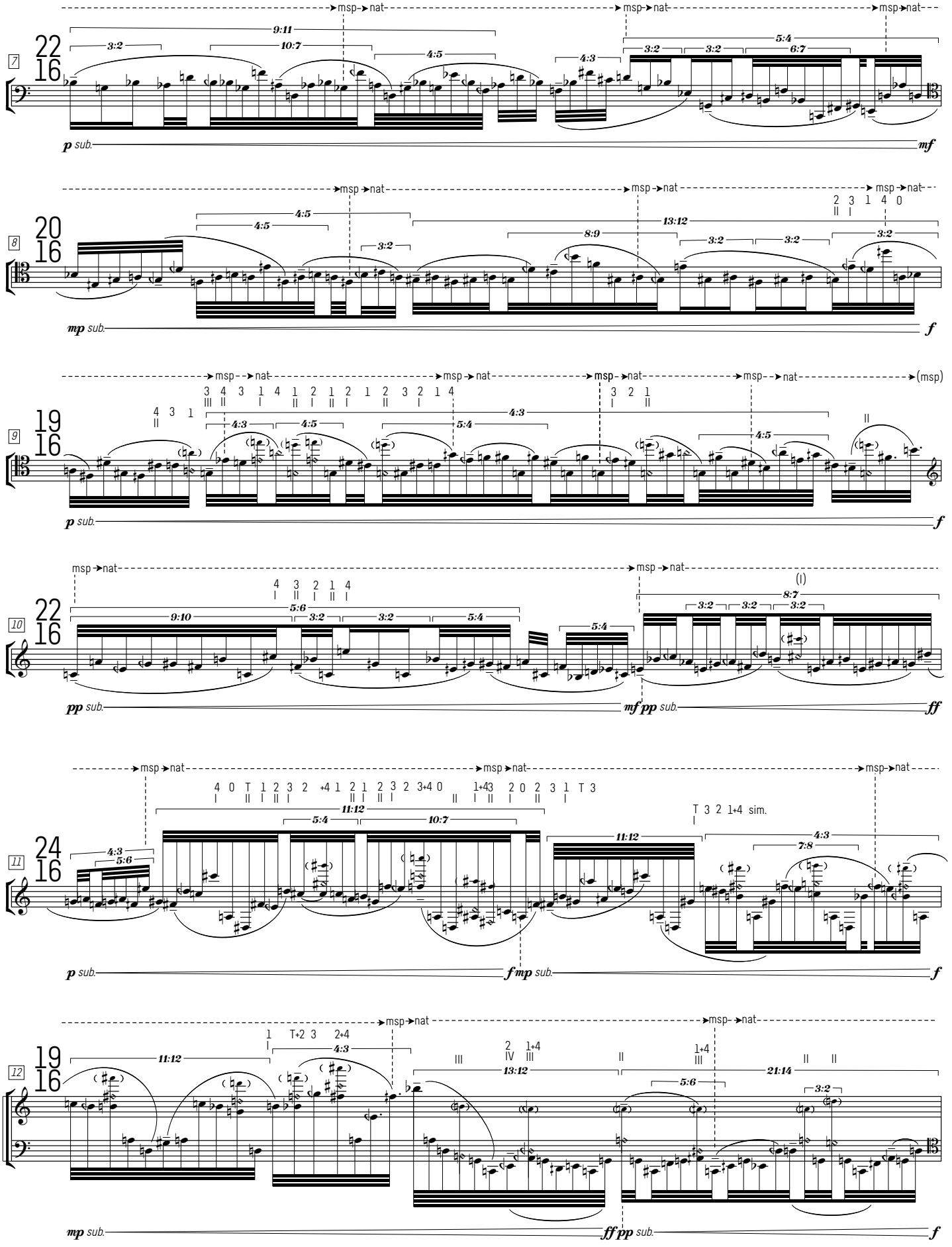
8
(apoptosis)

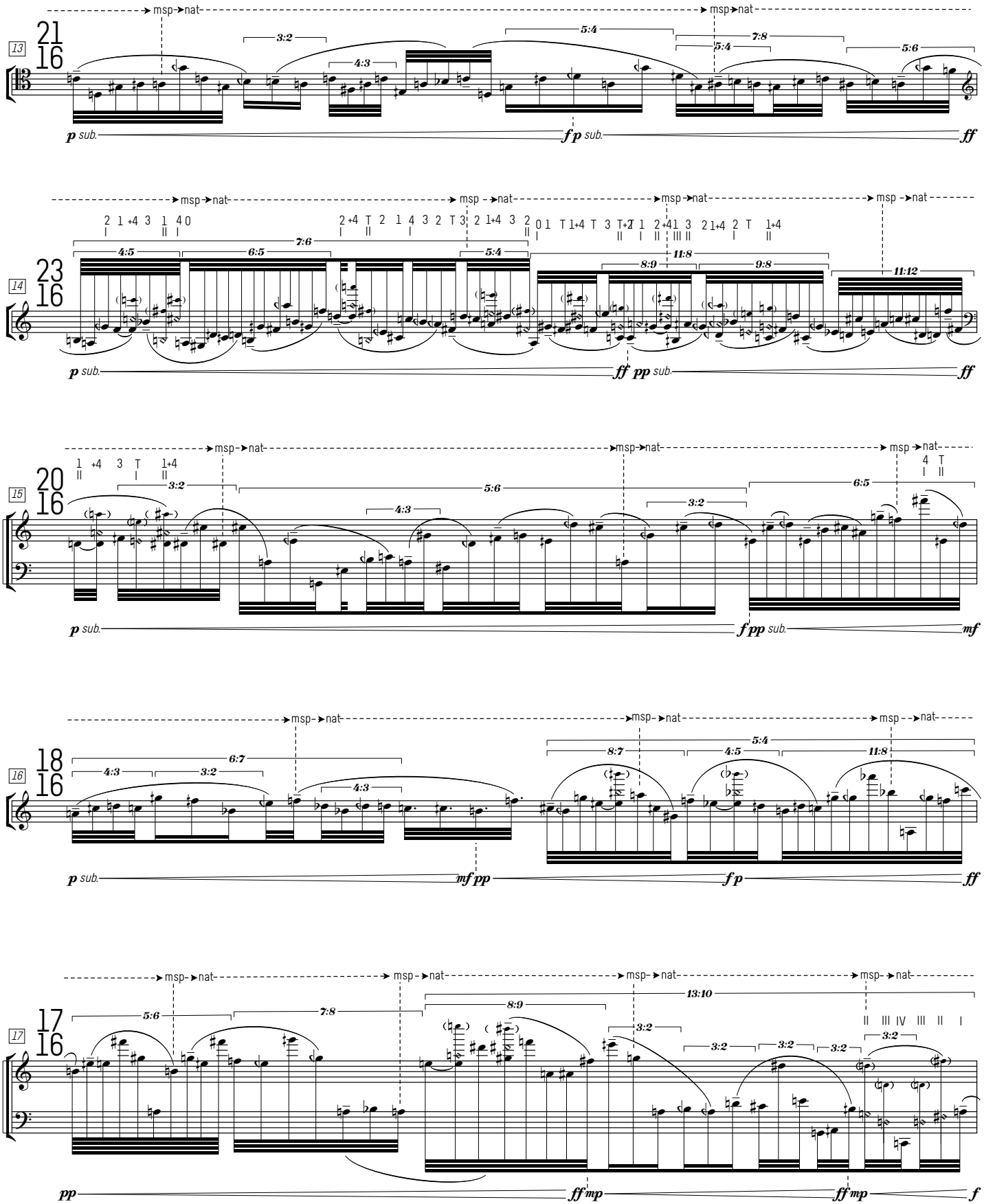
♪=108

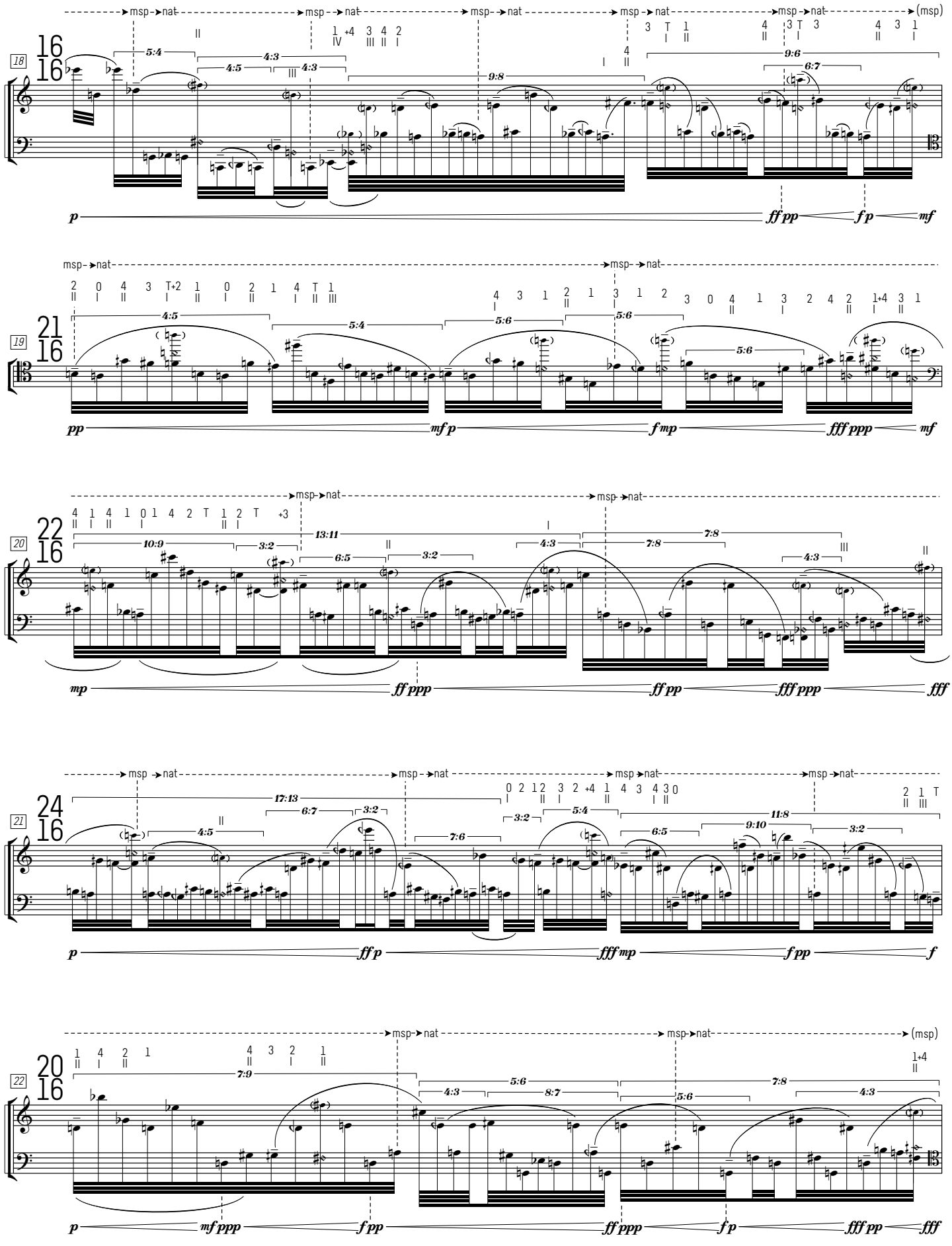
bow-direction-changes should be clearly audible (and made only where indicated by phrase marks!) - while section 8 should be practiced at a slower tempo in order to realise all the fingerings, harmonics, dynamic changes and bow-position changes with precision and stability, it should only be performed 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.

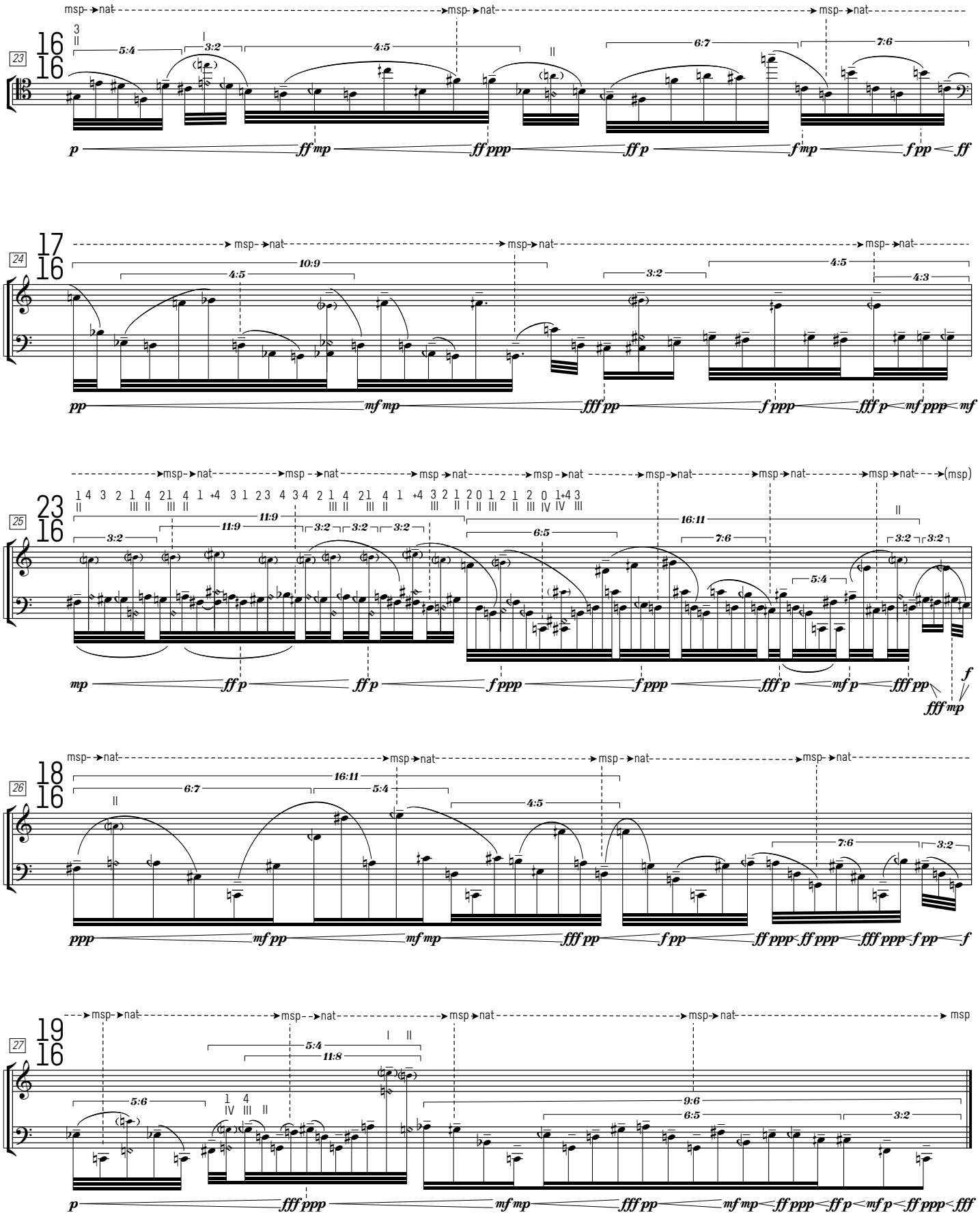
(always move gradually to reach *msp* at the indicated point, then back to *nat* as quickly as possible without breaking the sound)




7
22
16
msp→nat
msp→nat
msp→nat
9:11
3:2
10:7
4:5
4:3
5:4
3:2
3:2
6:7
p sub.
mf
8
20
16
msp→nat
msp→nat
msp→nat
2 3 1 4 0
4:5
4:5
3:2
13:12
8:9
3:2
3:2
3:2
mp sub.
f
9
19
16
msp→nat
msp→nat
msp→nat
msp→nat
(msp)
3 4 3 1 4 1 2 1 2 1 2 3 2 1 4
4 3 1
3 2 1
4:3
4:3
4:5
5:4
4:5
p sub.
f
10
22
16
msp→nat
msp→nat
4 3 2 1 4
(l)
5:6
9:10
3:2
3:2
5:4
5:4
8:7
3:2
3:2
3:2
pp sub.
mf pp sub.
ff
msp→nat
msp→nat
msp→nat
4 0 T 1 2 3 2 +4 1 2 1 2 3 2 3+4 0 1+43 2 0 2 3 1 T 3
11:12
5:4
10:7
T 3 2 1+4 sim.
11
24
16
4:3
5:6
11:12
4:3
7:8
p sub.
f mp sub.
f
msp→nat
msp→nat
1 T+2 3 2+4
11:12
4:3
2 1+4
1+4
13:12
21:14
5:6
3:2
12
19
16
mp sub.
ff pp sub.
f

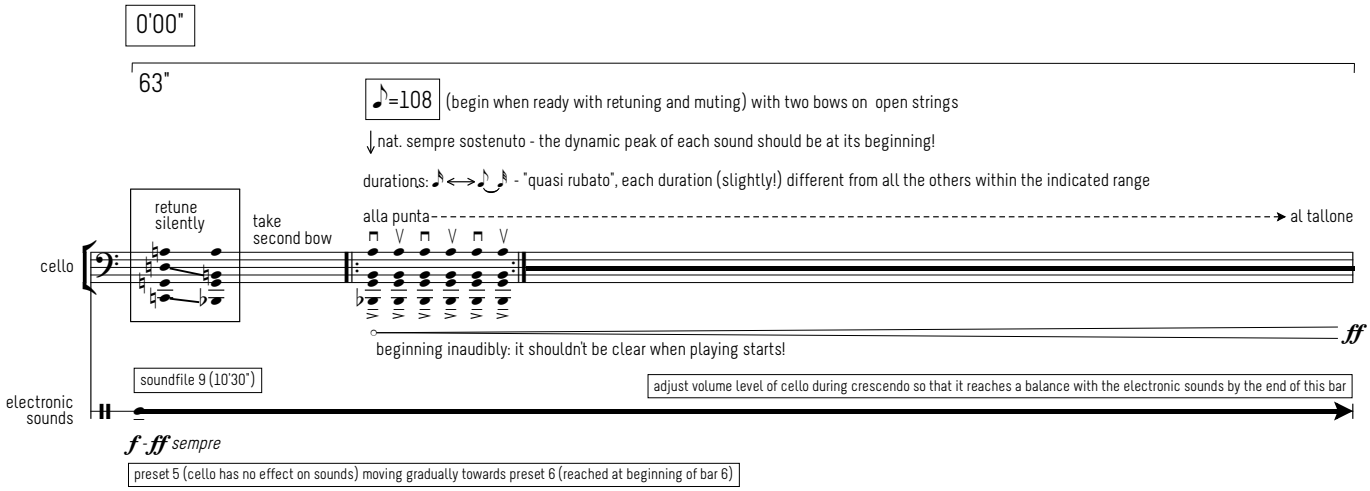

13
21
16
msp→nat
3:2
4:3
5:4
7:8
5:6
p sub.
fp sub.
ff
14
23
16
4:5
6:5
7:6
5:4
11:8
8:9
9:8
11:12
p sub.
ff pp sub.
ff
15
20
16
3:2
4:3
5:6
6:5
p sub.
f pp sub.
mf
16
18
16
6:7
4:3
3:2
8:7
5:4
4:5
11:8
p sub.
mf pp
f p
ff
17
17
16
5:6
7:8
8:9
13:10
3:2
pp
ff mp
ff mp
f

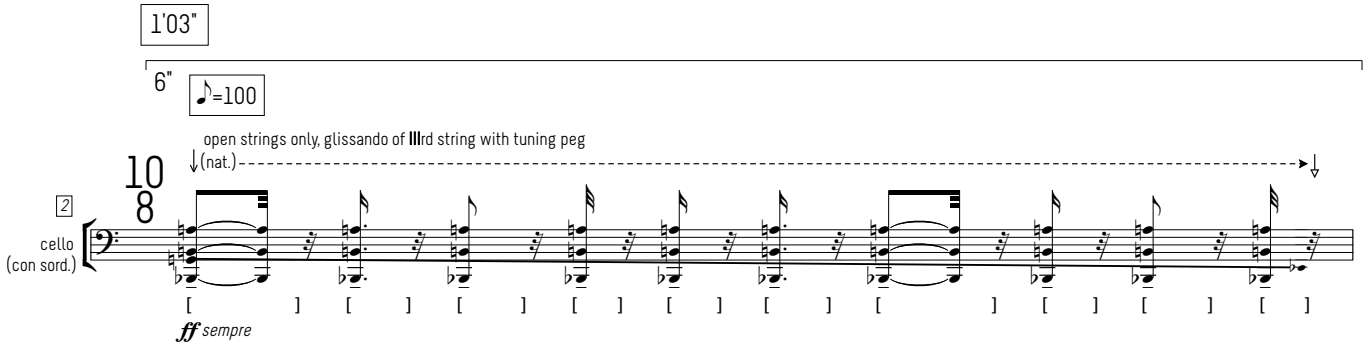

18
16
msp nat msp nat msp nat msp nat msp nat (msp)
5:4 4:3 4:5 4:3 9:8 9:6 6:7
p ff pp f p mf
19
21
16
msp nat msp nat
4:5 5:4 5:6 5:6 5:6
pp mf p f mp fff ppp mf
20
22
16
msp nat msp nat
10:9 3:2 13:11 6:5 3:2 4:3 7:8 7:8 4:3
mp ff ppp ff pp fff ppp fff
21
24
16
msp nat msp nat msp nat msp nat
17:13 6:7 3:2 4:5 7:6 3:2 5:4 6:5 9:10 11:8 3:2
p ff p fff mp f pp f
22
20
16
msp nat msp nat (msp)
7:9 4:3 5:6 8:7 5:6 7:8 4:3
p mf ppp f pp ff ppp f p fff pp fff

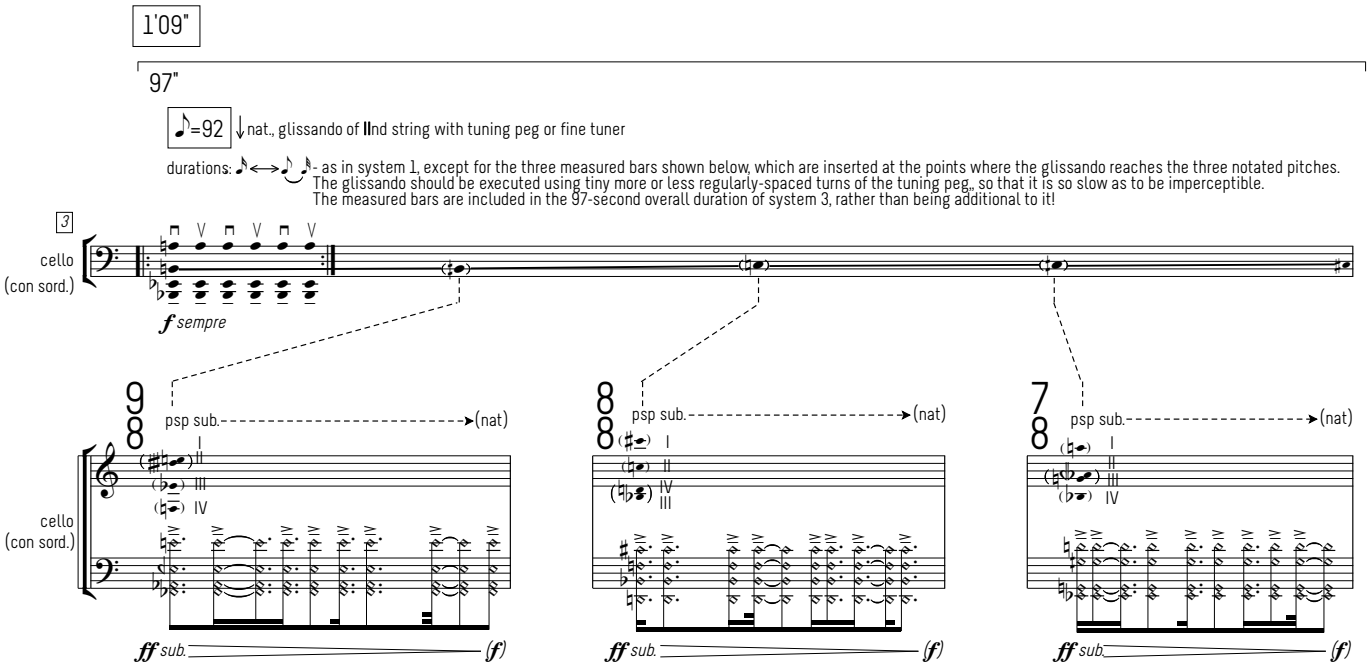


soundfile 9 begins after the briefest "breath-pause" at the end of the last cello sound of section 8

9
(abyss)


0'00"
63"
♪=108 (begin when ready with retuning and muting) with two bows on open strings
↓nat. sempre sostenuto - the dynamic peak of each sound should be at its beginning!
durations: ♪ ↔ ♪ ♪ - "quasi rubato", each duration (slightly!) different from all the others within the indicated range
retune silently
take second bow
alla punta
al tallone
cello
ff
beginning inaudibly: it shouldn't be clear when playing starts!
soundfile 9 (10'30")
adjust volume level of cello during crescendo so that it reaches a balance with the electronic sounds by the end of this bar
electronic sounds
f - ff sempre
preset 5 (cello has no effect on sounds) moving gradually towards preset 6 (reached at beginning of bar 6)


1'03"
6"
♪=100
open strings only, glissando of IIIrd string with tuning peg
↓(nat.)
10
8
2
cello
(con sord.)
ff sempre

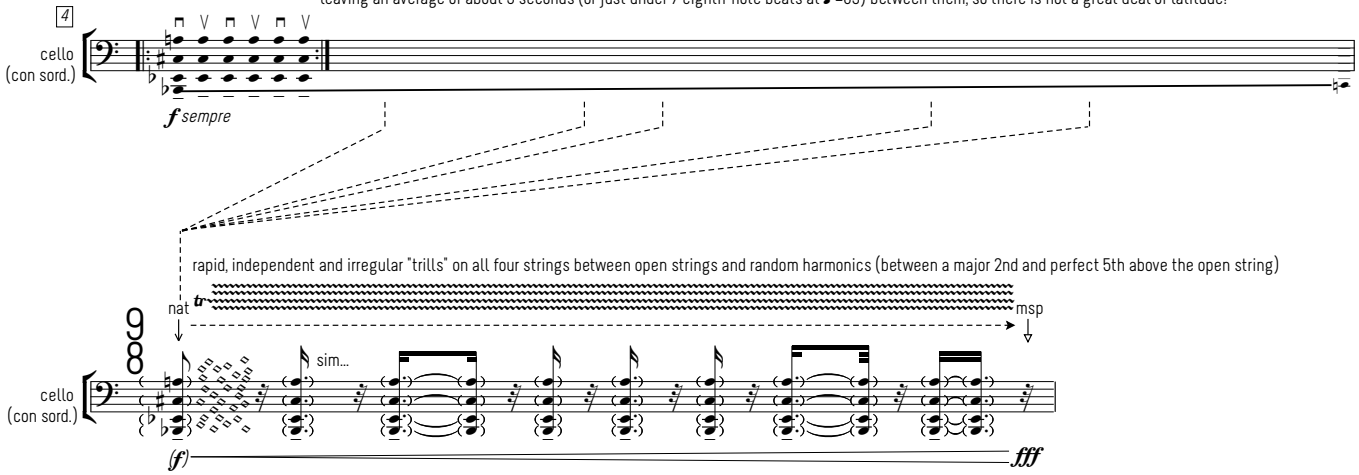

1'09"
97"
♪=92 ↓nat., glissando of IInd string with tuning peg or fine tuner
durations: ♪ ↔ ♪ ♪ - as in system 1, except for the three measured bars shown below, which are inserted at the points where the glissando reaches the three notated pitches.
The glissando should be executed using tiny more or less regularly-spaced turns of the tuning peg,, so that it is so slow as to be imperceptible.
The measured bars are included in the 97-second overall duration of system 3, rather than being additional to it!
3
cello
(con sord.)
f sempre
9
8
psp sub.
(nat)
I
II
III
IV
8
8
7
8
cello
(con sord.)
ff sub.
(f)

2'46"

57"

♪=83 ↓nat., glissando of **IVth** string with tuning peg or fine tuner

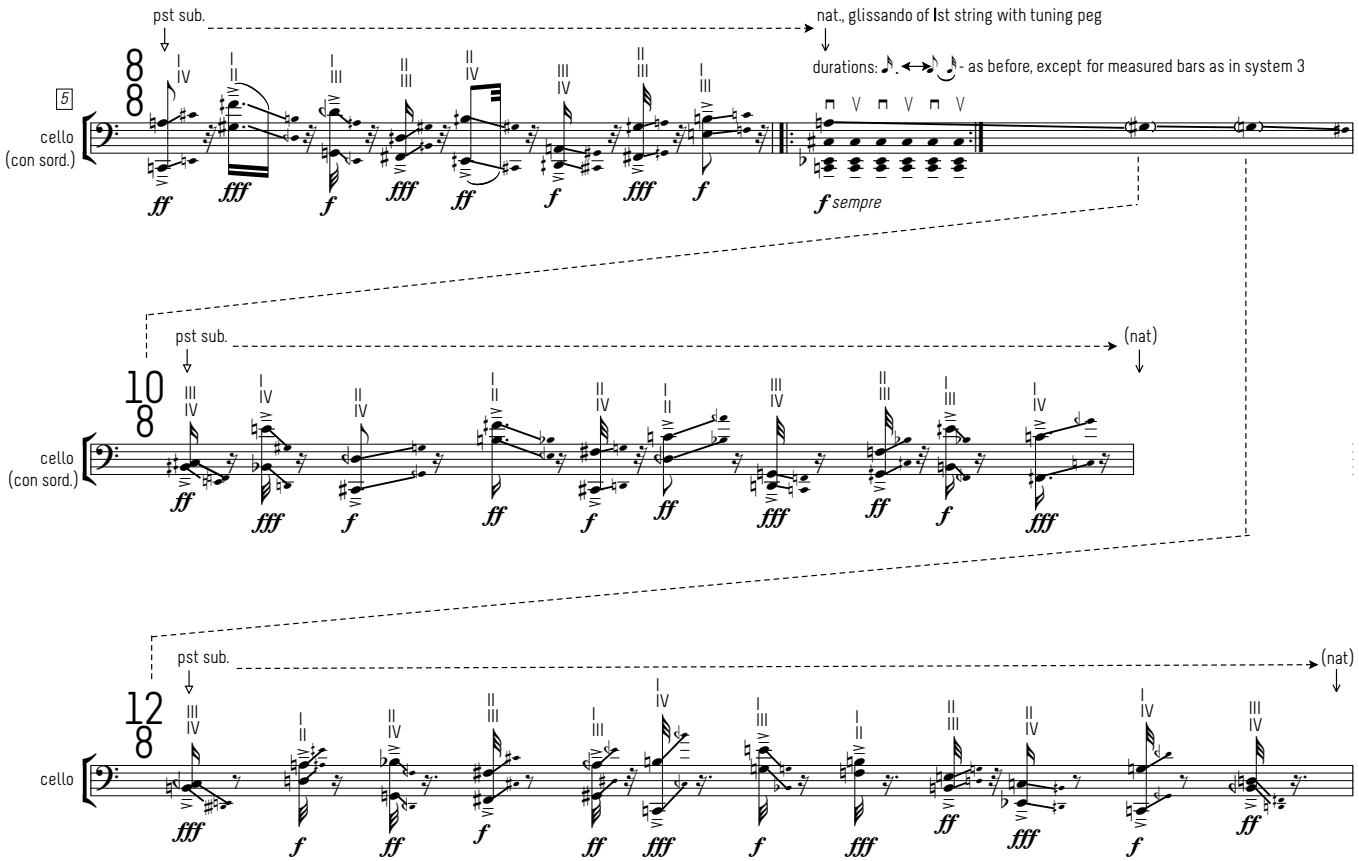
durations: ♪ ↔ ♪♪ - as before, except for being interrupted five times at spontaneously-chosen moments by the measured bar shown below, although of course the tuning of the IVth string and thus the pitch-content will be slightly different each time. Note that these five repetitions occupy a total duration of about 32.5", leaving an average of about 5 seconds (or just under 7 eighth-note beats at ♪=83) between them, so there is not a great deal of latitude!



3'43"

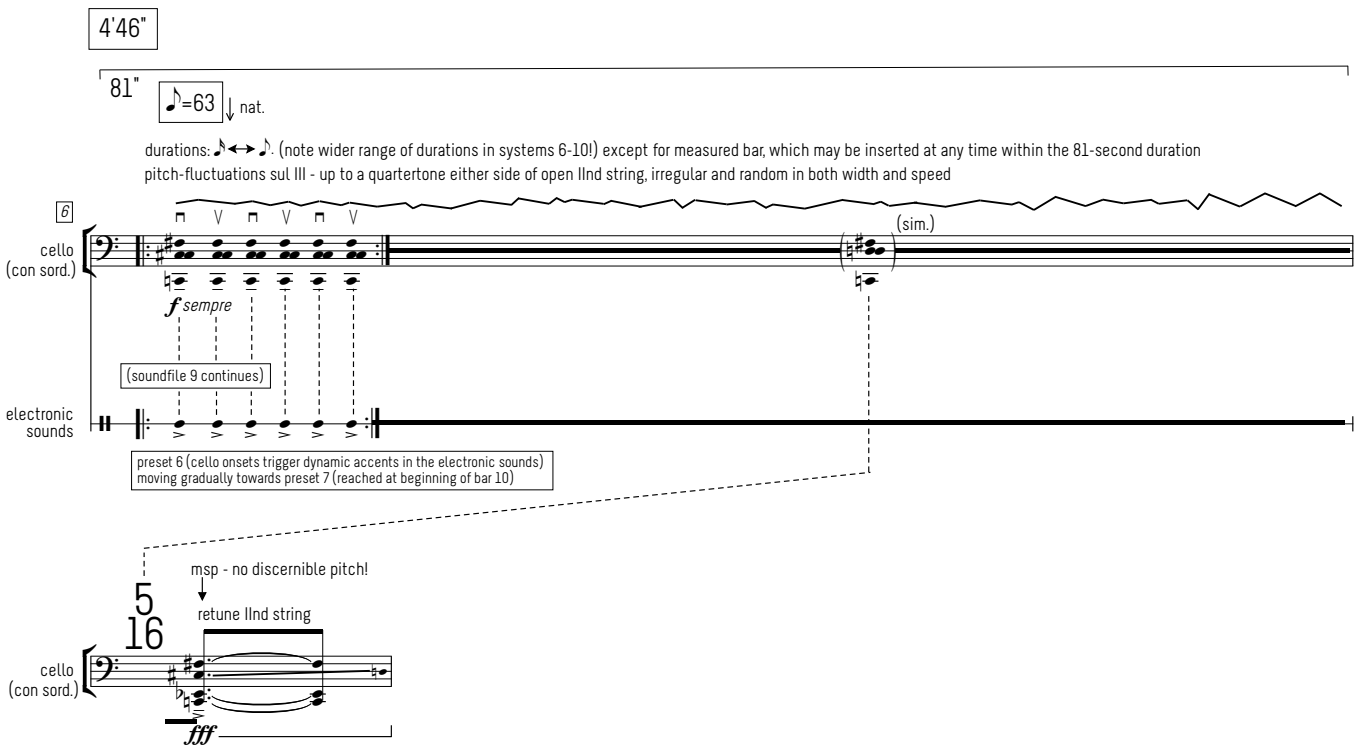
In the three measured bars of system 5, each sound involves a different of stopped strings and the complementary pair of open strings.
For clarity, only the fingered pitches are notated, although the two remainingstrings always sound together with them.

63" ♪=74 Please take care to use the indicated strings which aren't always the obvious ones!



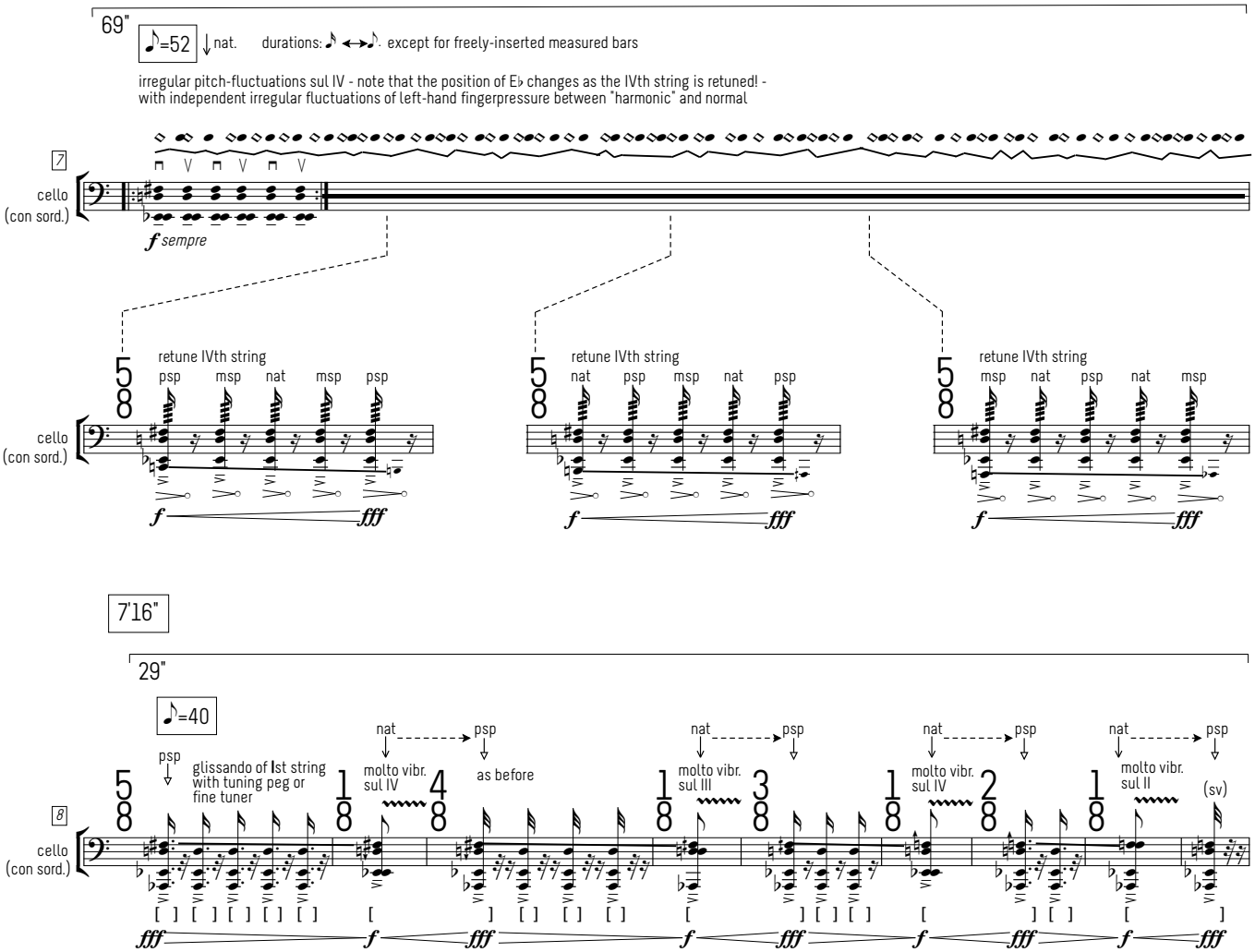
4'46"

81"



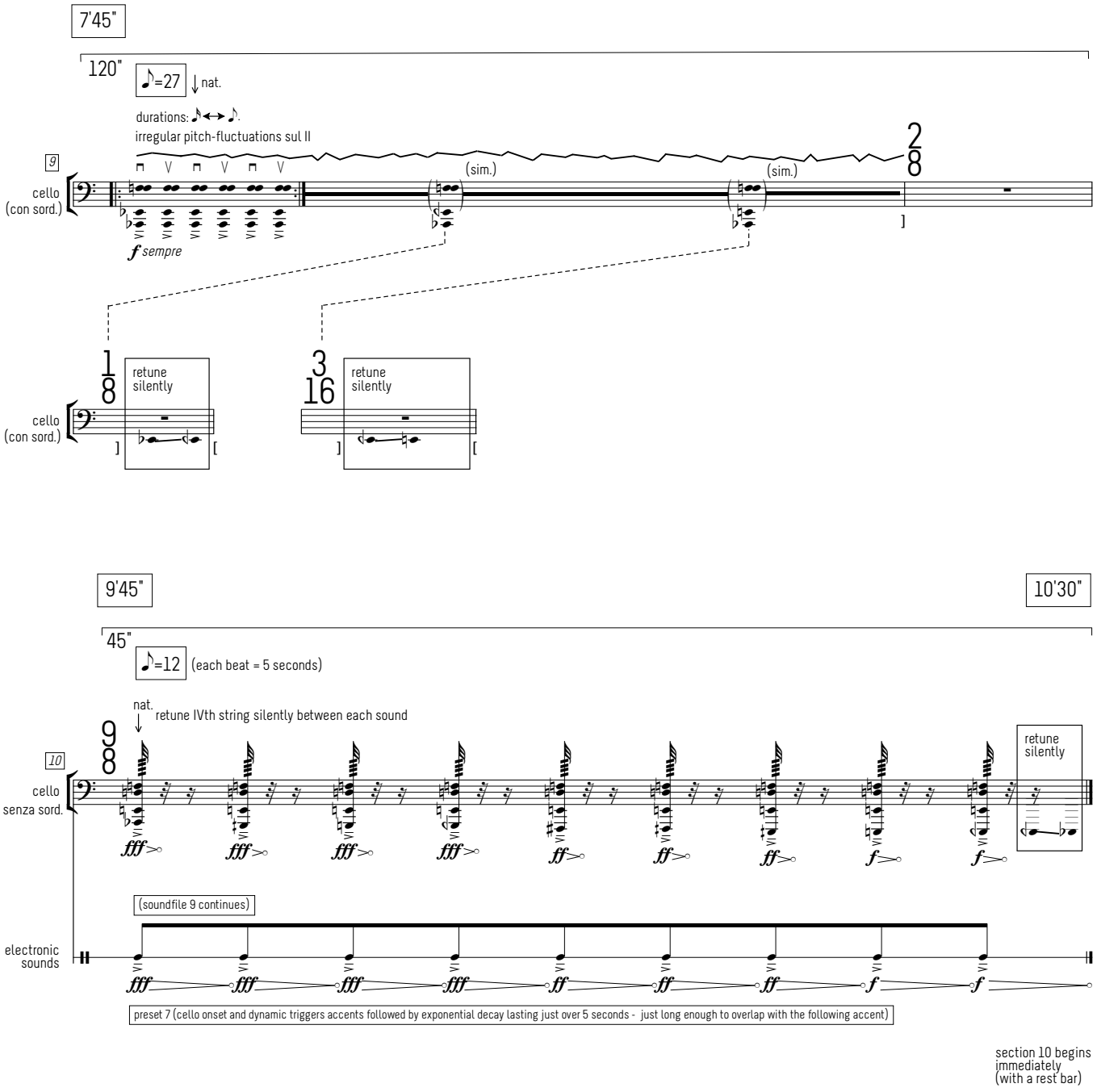
6'07""

69"



7'16"

29"


7'45"
120"
♪=27 nat.
durations: ♪ ↔ ♪.
irregular pitch-fluctuations sul II
9
cello
(con sord.)
(sim.)
(sim.)
2/8
f sempre
1/8
retune
silently
3/16
retune
silently
cello
(con sord.)
9'45"
10'30"
45"
♪=12 (each beat = 5 seconds)
nat.
retune IVth string silently between each sound
9/8
10
cello
senza sord.
retune
silently
(soundfile 9 continues)
electronic
sounds
preset 7 (cello onset and dynamic triggers accents followed by exponential decay lasting just over 5 seconds - just long enough to overlap with the following accent)
section 10 begins
immediately
(with a rest bar)

10
(anapanasati)

0'00" as in section 1, timings are intended only to indicate structural proportions

0'03"

♪=40

tuning:

begin sul III, continue ad lib.

nat mst

cello

electronic sounds

soundfile 10 (4'00")

always judge the balance between register, notated dynamic, bow position and pressure so that the electronic sounds become louder/higher and lower/softer as smoothly as possible

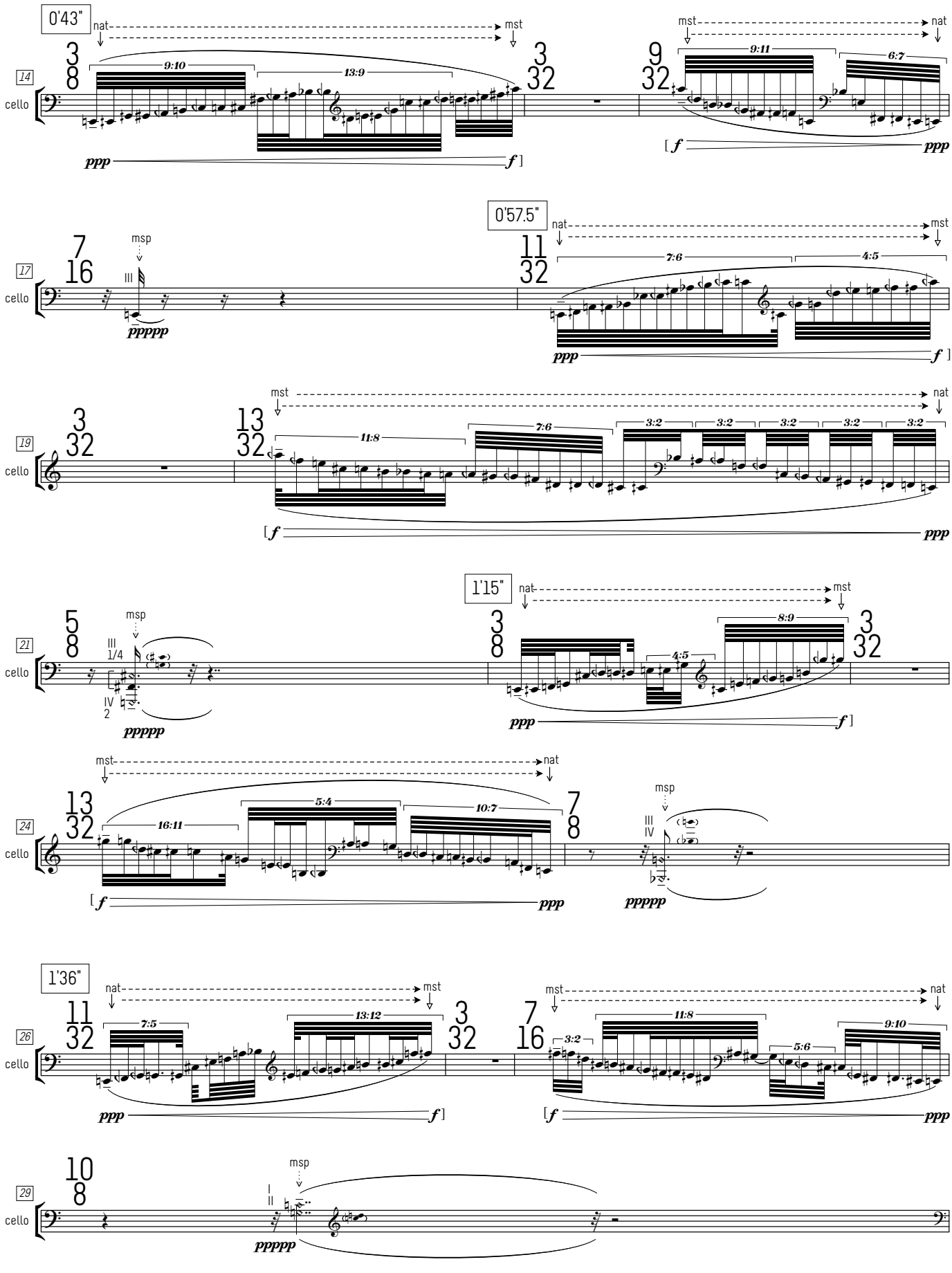
ppp ⟷ *f* *but only audible when cello plays* ***ppp*** *or louder*

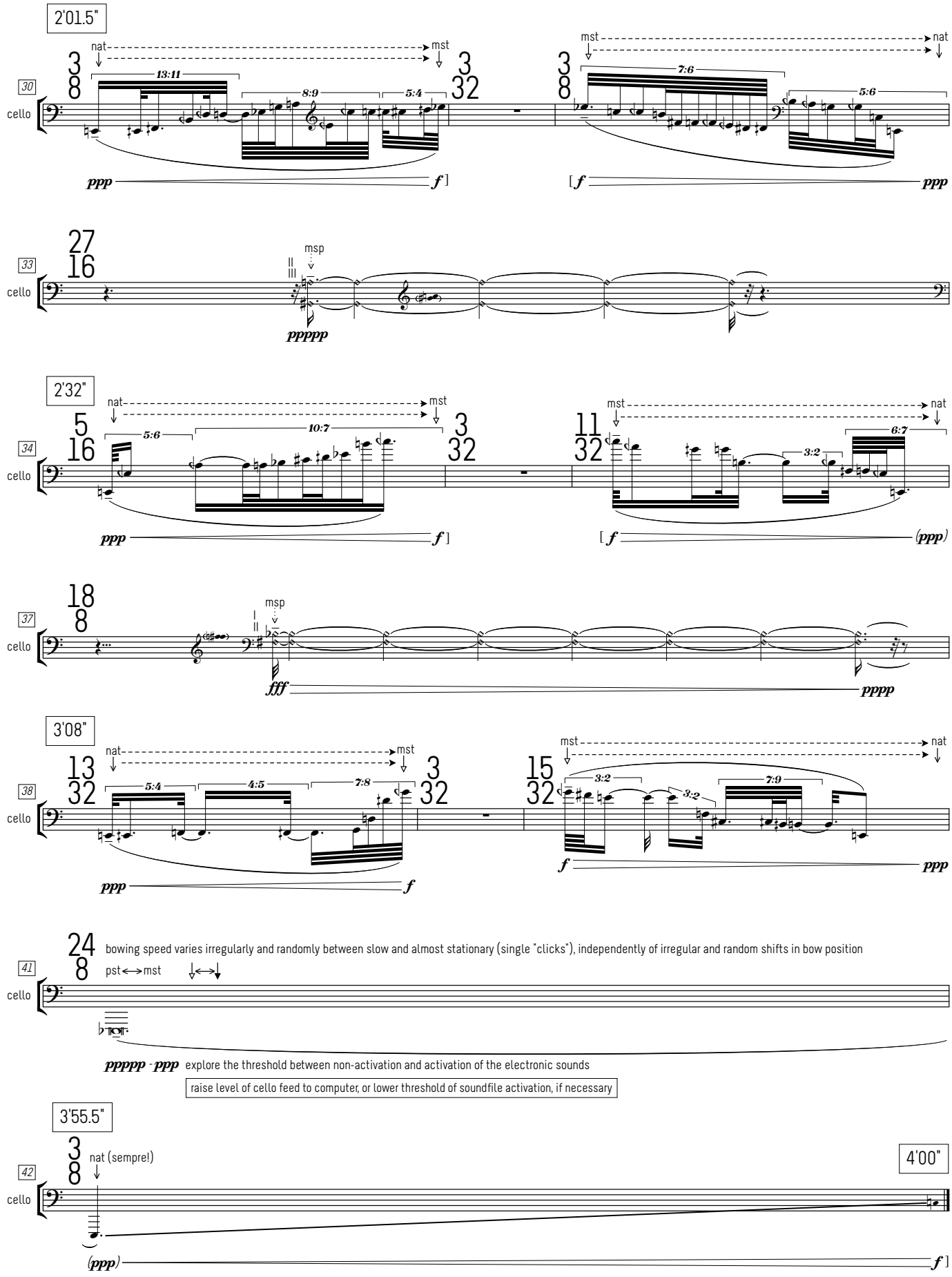
preset 8 (lowpass cutoff frequency controlled by cello pitch, loudness controlled by cello dynamics)

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 *ppppp* 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.

0'16"

0'28.5"


0'43"
nat
mst
14
cello
3/8
9:10
13:9
3/32
9/32
9:11
6:7
ppp
f
0'57.5"
7/16
msp
III
ppppp
11/32
7:6
4:5
3/32
13/32
11:8
3:2
1'15"
5/8
III 1/4
IV 2
8:9
4:5
13/32
16:11
5:4
10:7
7/8
III
IV
1'36"
11/32
7:5
13:12
3/32
7/16
3:2
11:8
5:6
9:10
10/8
I
II


2'01.5"
nat
mst
3/8
13:11
8:9
5:4
3/32
mst
nat
3/8
7:6
5:6
30
cello
ppp
f
f
ppp
27/16
msp
33
cello
ppppp
2'32"
nat
mst
5/16
5:6
10:7
3/32
mst
nat
11/32
3:2
6:7
34
cello
ppp
f
f
(ppp)
18/8
msp
37
cello
fff
pppp
3'08"
nat
mst
13/32
5:4
4:5
7:8
3/32
mst
nat
15/32
3:2
3:2
7:9
38
cello
ppp
f
f
ppp
24/8
bowing speed varies irregularly and randomly between slow and almost stationary (single "clicks"), independently of irregular and random shifts in bow position
pst↔mst
41
cello
ppppp - ppp
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
3'55.5"
3/8
nat (sempre!)
4'00"
42
cello
(ppp)
f