REVISION SAARIAHO

PETALS FOR SOLO CELLO AND OPTIONAL ELECTRONICS

Kaija Saariaho: *Petals for Cello Solo and Optional Electronics*

CD 3 track 8

Kaija Saariaho was born in Helsinki, Finland in 1952 and now lives in Paris. In the 1980s, intrigued by the role computers could play in composing, she researched at the IRCAM (Institute for Research and Coordination in Acoustics/Music) in Paris. There she developed techniques of computer-assisted composition, working on tape and with live electronics. She became known for mixing electronic sounds with classical instruments, creating a seamless connection between the two worlds. This influenced her approach to orchestral writing which has an emphasis on the slow transformation of dense masses of sound in some works, such as *Verblendungen* (1984). Her varied output has included works for ensembles, orchestra, opera houses, electronics and soloists. Her first opera *L'Amour de Loin* (*Love From Afar*) debuted in Salzburg in 2000 and was a huge success.

Saariaho has a distinct and original voice; her music is marked by its sometimes celestial atmosphere where **timbre** and colours are central. Some of her compositions can be described as **spectralist**, a style of music pioneered by Gérard Grisey (1946–1998) and Tristan Murail (b. 1947). Murail once wrote that the initial motivation of the spectralists was 'to control the finest possible degrees of change'. Spectral music is based on the computer analysis of the sound-spectrum. It focuses on the manipulation of the spectral features of sound and the potential of the **harmonic series** (or overtone series). This analytical approach led to Saariaho's use of detailed notation which uses **harmonics**, **microintervals** and a subtle continuum of sound extending from pure tone to unpitched noise.

Petals for Cello Solo and Optional Electronics (1988) takes its musical material from Saariaho's *Nymphéa* (*Waterlily*) for string quartet and electronics (1987), a piece inspired by the *Nymphéas* series of artworks by the Impressionist artist Monet. It could be described as a spectral soundscape.

Following the score

The score of *Petals* has parts for cello and electronics. R stands for **reverb** and H stands for **harmonizer**. 'Harmonization' alters the frequency of a signal thus changing the pitch, whereas reverb is an effect whereby the sound is made to reverberate slightly, something akin to an echo.

There are no bar lines but each stave is numbered. The cello part uses the bass, tenor and treble clefs and includes numerous instructions and expression marks. Some of these are new and are explained in the score. Wedge-shaped markings above the stave (for example, see staves 2–3) are an indication to apply additional bow pressure, which results in gradual transitions in and out of noise. Individual notes are transformed through timbral and pitch-based manipulations including **glissandi**, **vibrato** (see stave 3), and **harmonics** (marked by the use of diamond-shaped note heads, see stave 9).

Saariaho's research into new timbres led to the use of **extended techniques** which expand the palette of sound available. Much use is made of ***sul tasto*** and ***sul ponticello***. *Sul tasto* (S.T.) is where the string is bowed near or above the fingerboard, producing an ethereal sound. *Sul ponticello* (S.P.) is where the string is played near or above the bridge, producing high overtones. Both appear for the first time on stave 2. Normal bowing is marked by N. and cancels the previous instruction.

Notice the use of **indeterminacy**. With indeterminate music there is often much that cannot be predicted before performance. In *Petals* certain decisions have been left to the performer, including the opening instruction to play *'very* slowly: the duration of every stave in this tempo should always be *at least* 20"'. At the same time the cello sound is modified through live electronic manipulation – harmonization and reverb. This kind of indeterminacy means that every performance will be different.

The emphasis in *Petals* is on the sonic range explored rather than melody or harmony. The piece is made up of shifting soundscapes and much of the focus is on timbre. A single note is made up of the fundamental note plus quieter frequency resonances or overtones. The timbre is partly determined by the relative strength of these overtones which can be altered by different ways of playing, such as changes in bow pressure, dynamics, and bowing techniques. The overtones (or harmonics) can be produced separately on string instruments by touching the string lightly at various points and producing glassy high notes of flute-like purity.

Microintervals, raising and lowering a note by a quarter tone, are created both by the cello (as frequently happens in staves 4 and 5) and the harmonizer through **pitch shifting** (see stave 2, 50%). Although C is the primary pitch focus (see staves 14–28) and the harmony changes and evolves gradually from stave 13, there is no clear harmonic goal as would be found in **functional harmony**.

What to listen for

- Listen to the opening staves 1–7. Describe the use of dynamics and microtonality.
- Describe the role that rhythm plays in *Petals*.
- Listen to the final Lento section (beginning at stave 27). Describe the electronic effects and playing techniques used.

Wider listening

Listen to further works from the 20th and 21st centuries which create new sound worlds. In the mid 1950s Karlheinz Stockhausen integrated electronic sounds with the human voice in his classic early electronic piece *Gesang der Jünglinge*.

Prelims to *Petals*

When vibrato markings are not specified, players can use their usual vibrato.
Molto vibrato always means a rapid and narrow vibrato, unless otherwise specified.
Tremolo should always be as dense as possible.

General marks

→ change very gradually from one sound or one way of playing (etc.) to another

diminuendo al niente (diminuendo to silence)

crescendo da niente (crescendo from silence)

S.V. senza vibrato

▲ highest note possible

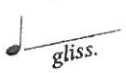
Microintervals

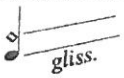
𝄲 note raised a ¼ tone (between ♮ and ♯ upwards)

𝄳 note lowered a ¼ tone (between ♮ and ♯ downwards)

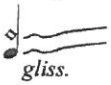
Glissandi

For glissandi there are three different notations:



or


this glissando should always be played very evenly, without vibrato and accentuations

or


glissando with much vibrato

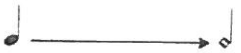
glissando with artificial harmonics, in which the upper finger is constantly moving and thus creating a rich sound with vividly varying pitches, instead of one gliding pitch

All the glissandi should be started immediately at the beginning of the note value.

S.P. *always* estremamente sul ponticello

S.T. sul tasto

N normal (used with S.P. and S.T., otherwise ord.)


move gradually from normal to harmonic sound (less and less pressure with the left hand)


add bow pressure to produce a scratching sound, in which the audible pitch is totally replaced by the noise


as above but move back from noise to tone again

decrease bow pressure to produce a soft, noisy, wind-like murmur

decrease bow pressure to produce a soft, noisy, wind-like murmur for as long as E.F. (**estremamente flautando**) continues, and then move gradually back to normal bow pressure

add bow pressure to produce a scratching sound, and decrease it gradually to produce the E.F. sound described above.

When playing long sustained tones the bow changes should always be made imperceptible.

Electronic version

For the electronic version the following are needed:

- at least one microphone for the amplification
- digital reverb with a variable reverb time
- harmonizer (Yamaha SPX90 or REV5: pitch change program, or possibly Publison, Eventide)
- at least two loudspeakers (possibly a monitor for the cellist)
- mixer (suggested set-up shown below).

The amplified sound is sent to both loudspeakers. The amount of amplification depends, naturally, on the concert space, but should not totally cover the acoustic sound of the instrument. The general level should not grow enormously when the degree of effects is added; here the straight amplified sound can be set slightly down. Nevertheless, no abrupt changes in the sound image should be made. The sound ideal is a clear and rich 'close sound'. The microphone(s) should be placed as close to the instrument as possible. The general level should be set to be rather loud, nevertheless not painfully so!

Harmonizer

The harmonizer should be set to produce microtonal pitch shifting, the transposition being about 50 cents (= ¼ tone) on both sides of the input signal. If only one channel is available, the transposition is set one ¼ tone higher. If the SPX90 is used as harmonizer, select programme 22 (pitch change B) and set the parameters as follows:

- Pitch1 +0/fine1 +45/delay1 20ms
- Pitch2 +0/fine2 -50/delay2 15ms

If some other devices are used, a slight reverb can be added to soften the effect.

Reverb

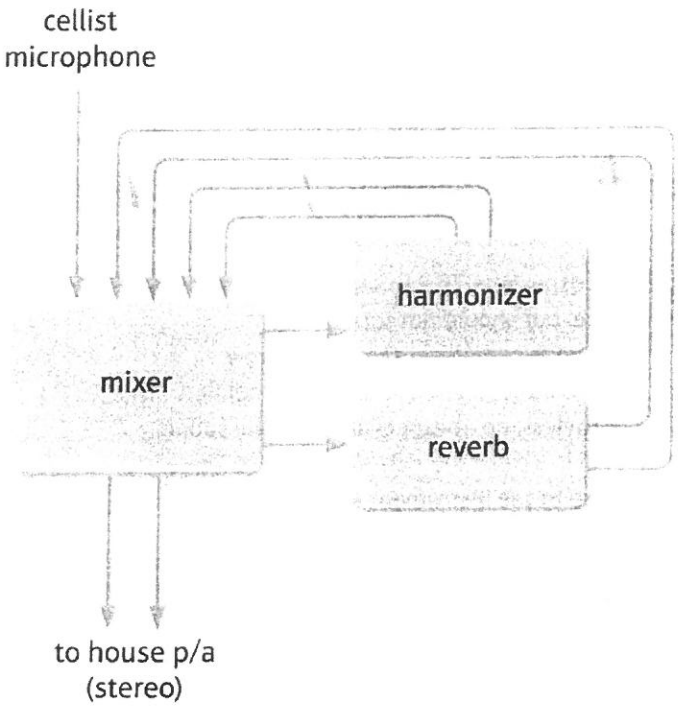
If several reverb programs are available a bright reverberation should be selected without any other effects. At the beginning the reverb time should be set to about 2.5 seconds (depending on the hall), and possible filterings and other manipulations made to obtain a clear and bright sound. If the concert space is very dry, the instrumental sound can be slightly reverberated throughout the piece. If the changing of reverberation time causes any clicks, it is better to choose a stable reverberation and accentuate the changes of reverb time by changing the amount of reverb. Generally: rather too little than too much reverb!

The notation of the electronics

The two effects are marked with R (reverb) and H (harmonizer). The changes in the degrees of the effects are marked approximately with crescendos or diminuendos from a previous level to a new level, or with dotted lines, which means that the current level is to be maintained. The percentages marked are guidelines only, and will have to be adjusted every time depending on the performance space.

Kaija Saariaho

Proposition for the set-up of the electronics



If SPX90 is used as harmonizer, select programme 22 (pitch change B) and set the parameters as follows:

- pitch1 +0/ fine1 +45/ delay1 20ms
- pitch2 +0/ fine2 –50/ delay2 15ms

Atonal music / tonality has no relevance / no harmonic relevance

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No discernable metre / bar lines

SECTION 1 → (A) = fragile, cautious passage

(A) Staves 1-3 = single notes, glissandi, trills, tremolandi + bow noise

The music is pulseless so time length given

SLOW **Lento** (*very* slowly: the duration of every stave in this tempo should always be at *least* 20"!)

S.P.

very slow bow

gliss.

Vlc.

mp

sul D

Trills, gliss: R+H make sound richer and thicker

R 40%

rev. time ca. 2.5"

Reverb

crescendo used to indicate an increase in reverb time

Monophonic texture staves 1-3

S.P. → S.T.

2

gliss.

mp *mf*

R (40%)

H 50%

Harmoniser

S.T. → S.P.

3

molto vibrato → *S.V.*

more frequent bow changes

tremolo: as dense as poss. → *rit.*

mf *ff* *f*

(B) = more energetic events with clear rhythmic + melodic character

R (40%)

H (50%)

SECTION 2 → clearly influenced by 'Nymphéas'

(S.P.) (B) Staves 4-7 = rapid demisemiquavers + quarter tone 'chromatic' figures

♩ = c.60 *energico*

clearer sense of pulse (slightly!)

N

4

10 10 10 10

ff *ff* *mf*

dectuplets

lots of articulation details - staccato dots

R (40%)

Clear monophony staves 4-7

lots of microtones

5

N S.T. S.P. N

10 10 10 10

mf *p* *mf* *mp*

slurred articulation

R (40%)

6

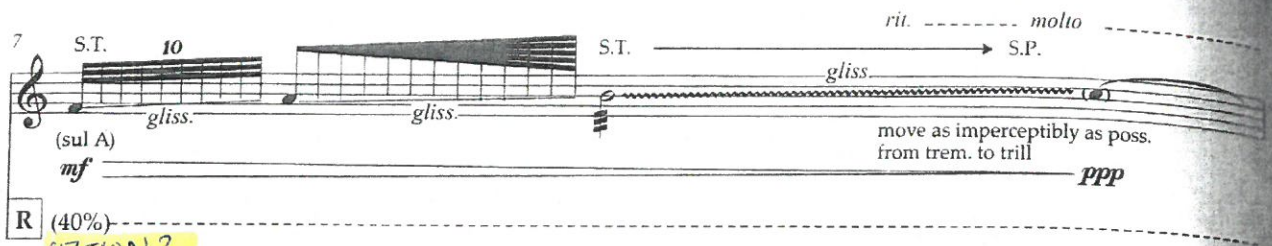
N S.T. S.P. S.T. S.P. S.T.

10 10 10 10

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

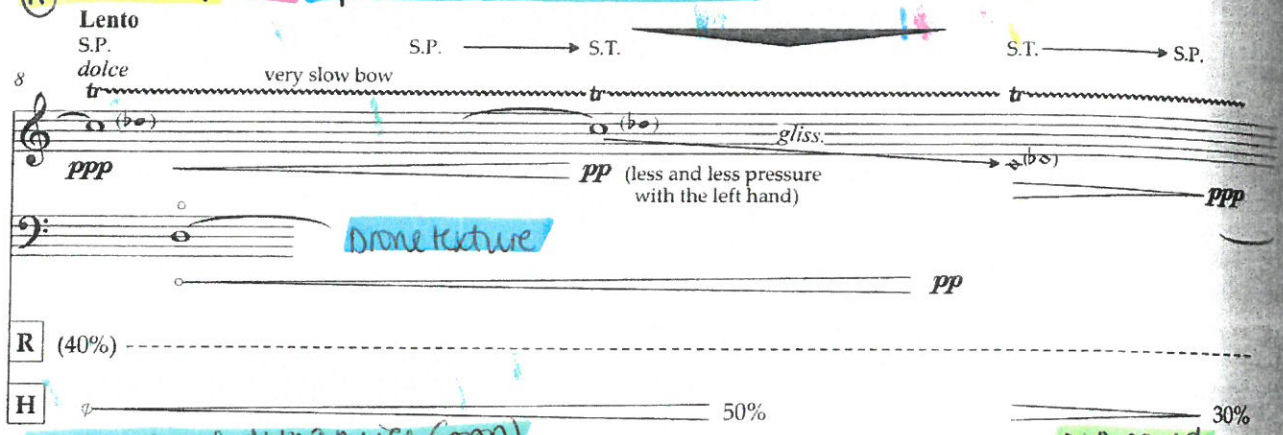
R (40%)

detailed tempo changes



SECTION 3

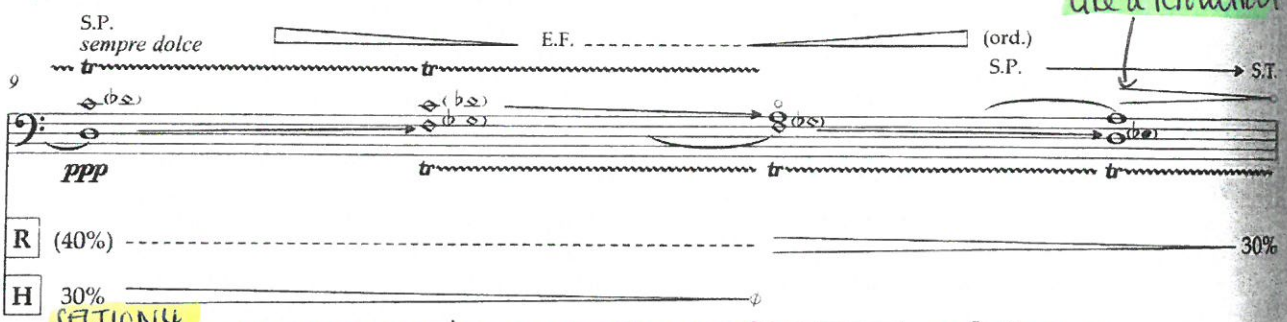
(A) Staves 8-9 = slow 2 part texture over a D pedal



Drone texture

Extremes of dynamics (ppp)

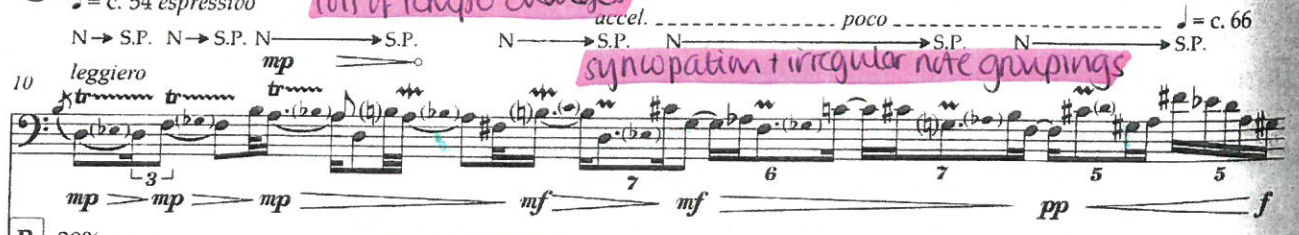
DtA sound like a recitative



SECTION 4

(B) Staves 10-13 = more conventional melodic ideas with a rhythmic focus

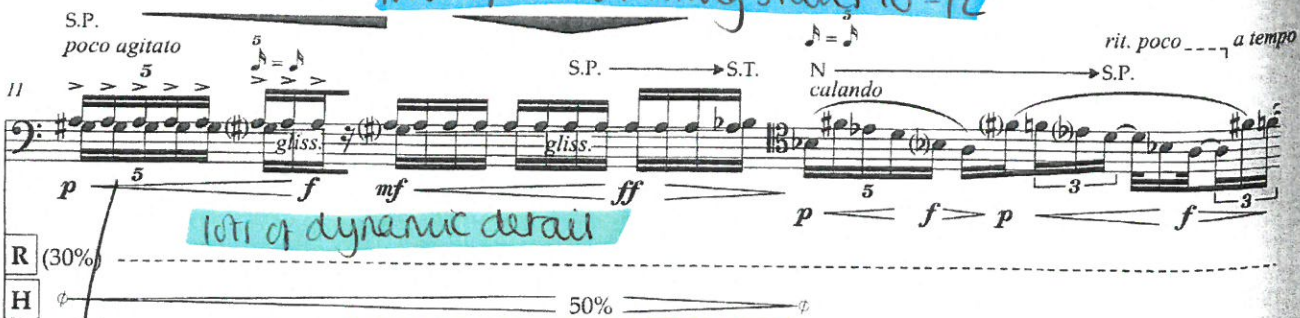
lots of tempo changes



syncopation + irregular note groupings

trill and mordent decoration

Rising melody - segmental like monophonic writing staves 10-12



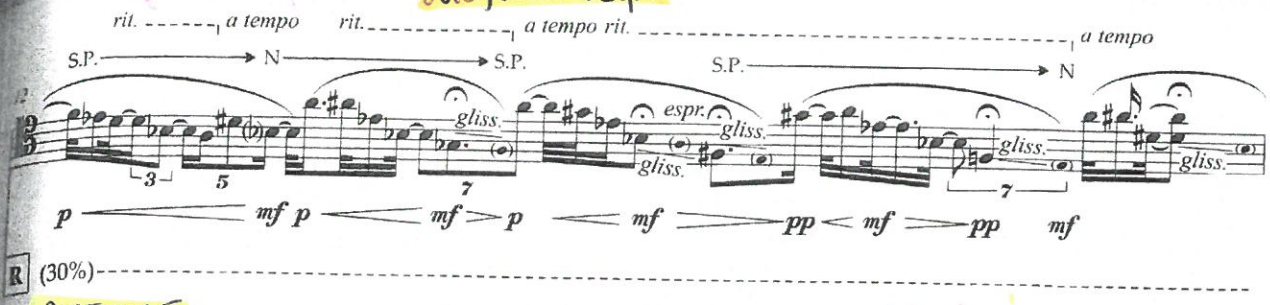
lots of dynamic detail

double stopping

falling melody based on repetitions of pitches

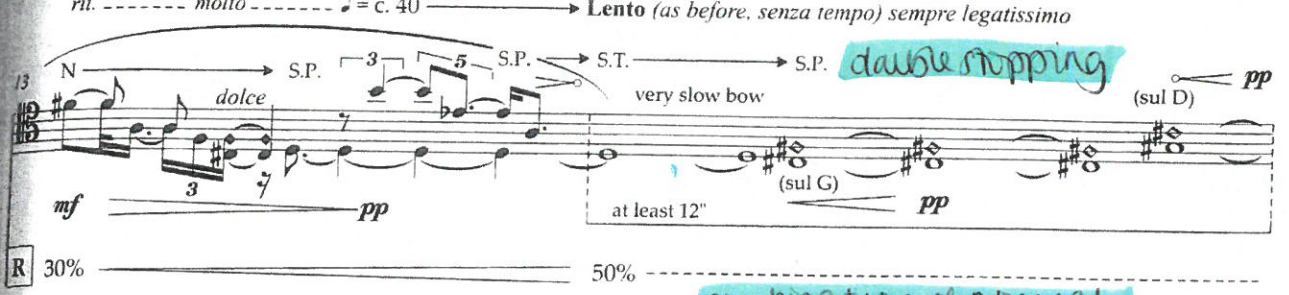
Traditional cello playing of bowed pitched sounds can be heard in staves 10-13.

disjunct leaps



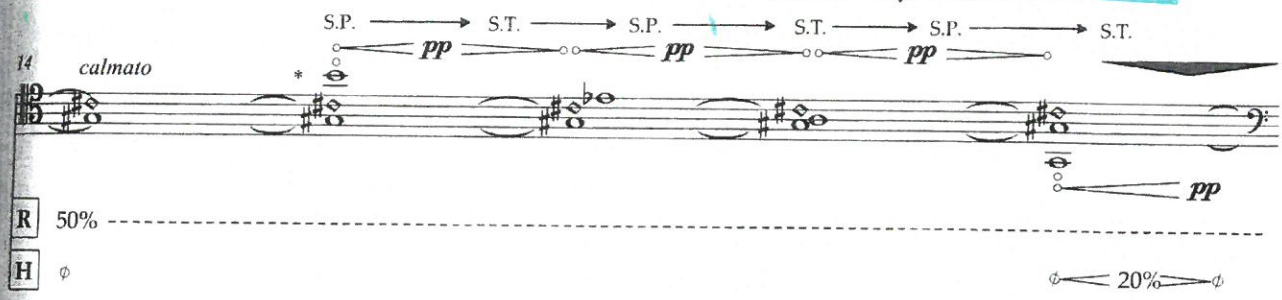
SECTION 5

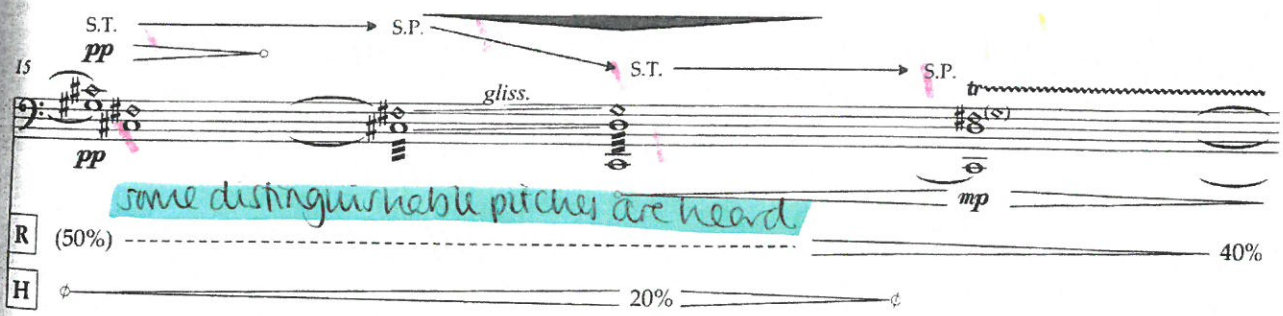
(A) Staves 13-16 = slow, 2 part texture with high artificial harmonics



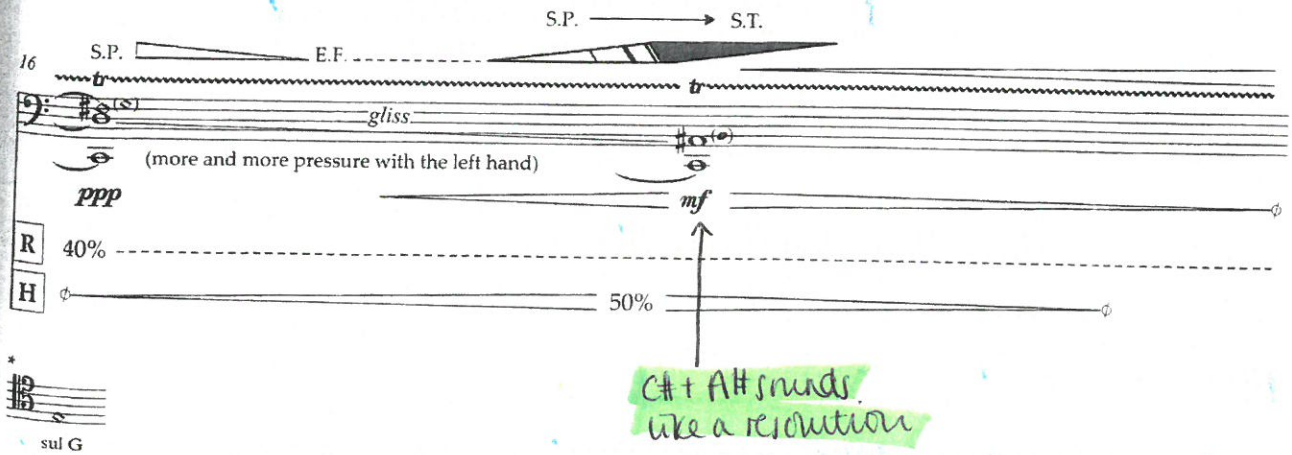
double stopping

combination of normal notes + false harmonics





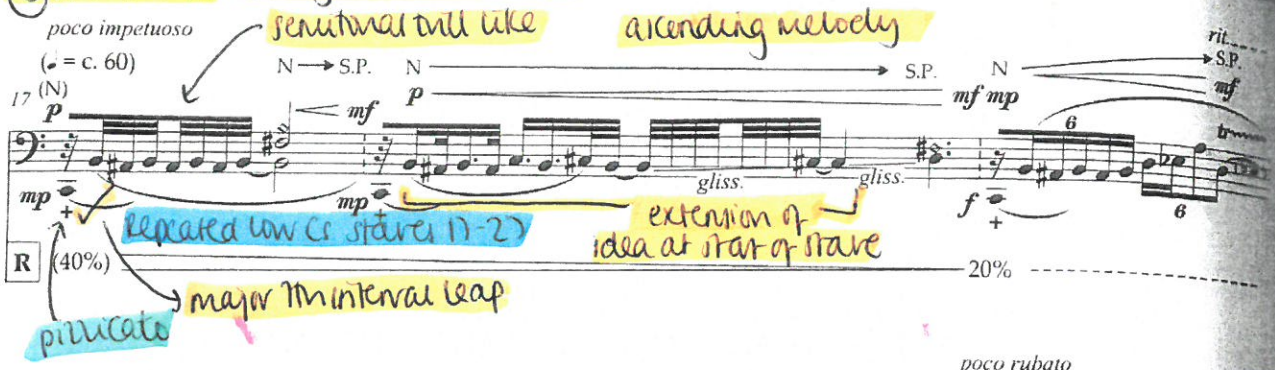
some distinguishable pitches are heard



C# + A# sounds like a resolution

SECTION 6

(B) Staves 17-27 - many variations on the idea heard at start of 17



sensitive trill like

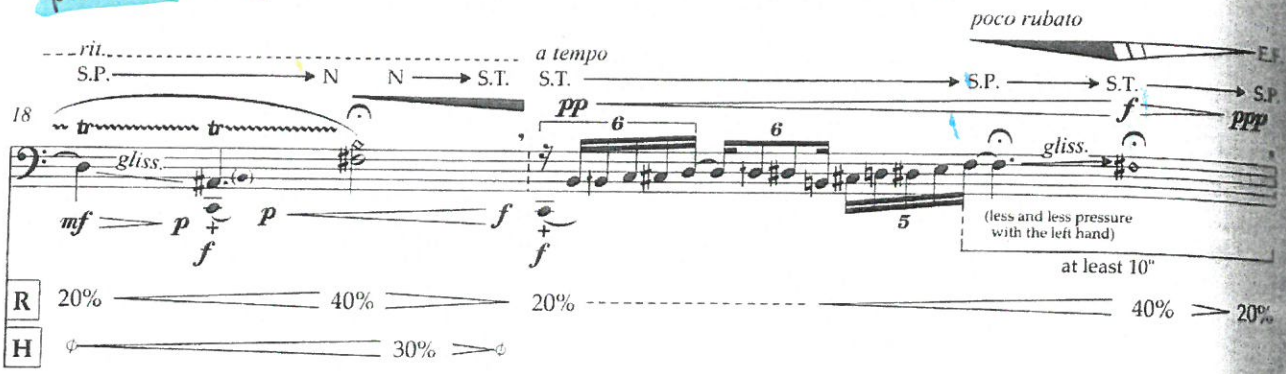
ascending melody

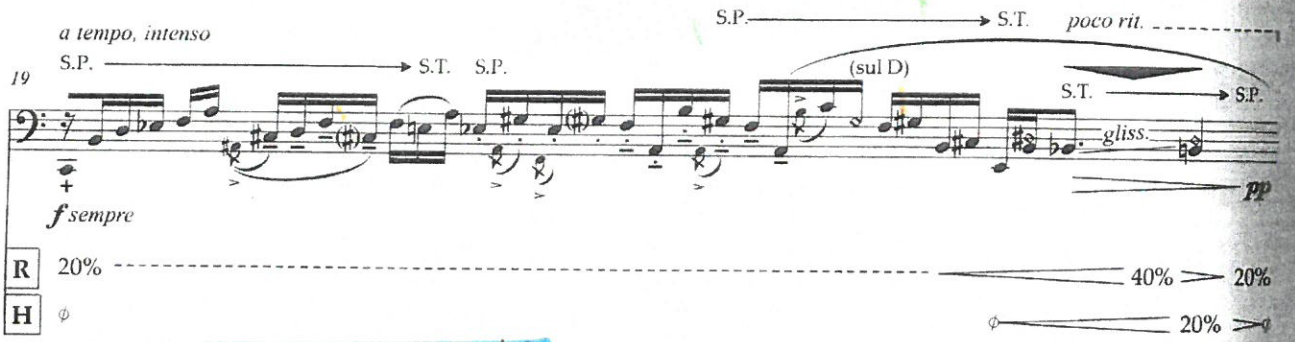
repeated low C♯ stave 17-27

extension of idea at start of stave

major 7th interval leap

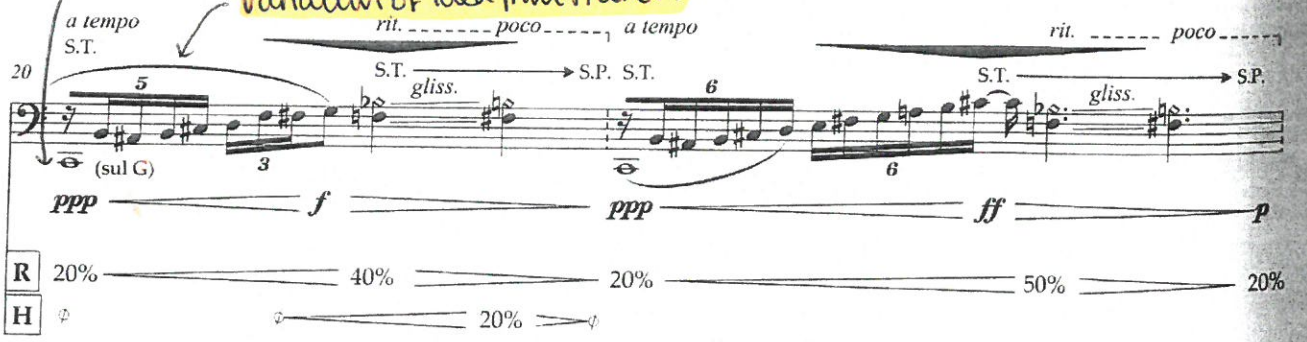
pizzicato



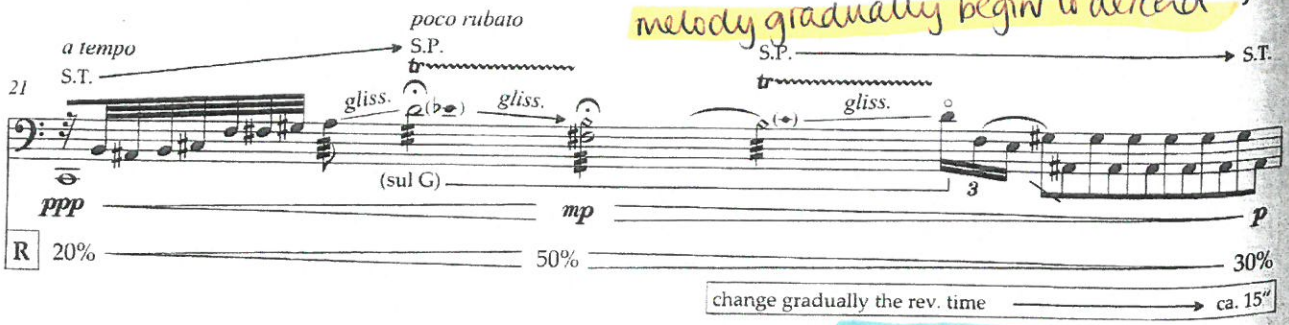


Drone like texture - now a held C

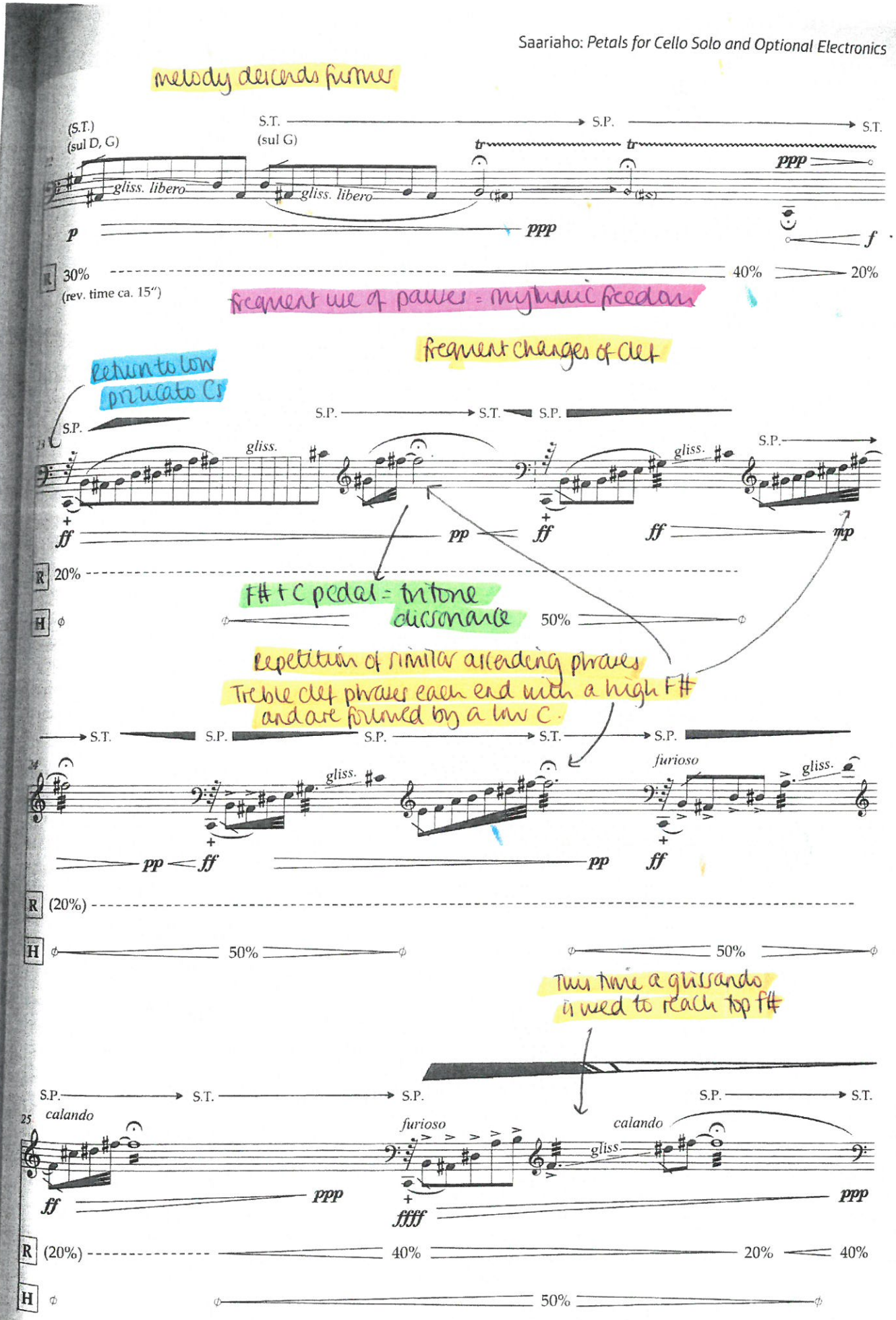
variation of idea from stave 17

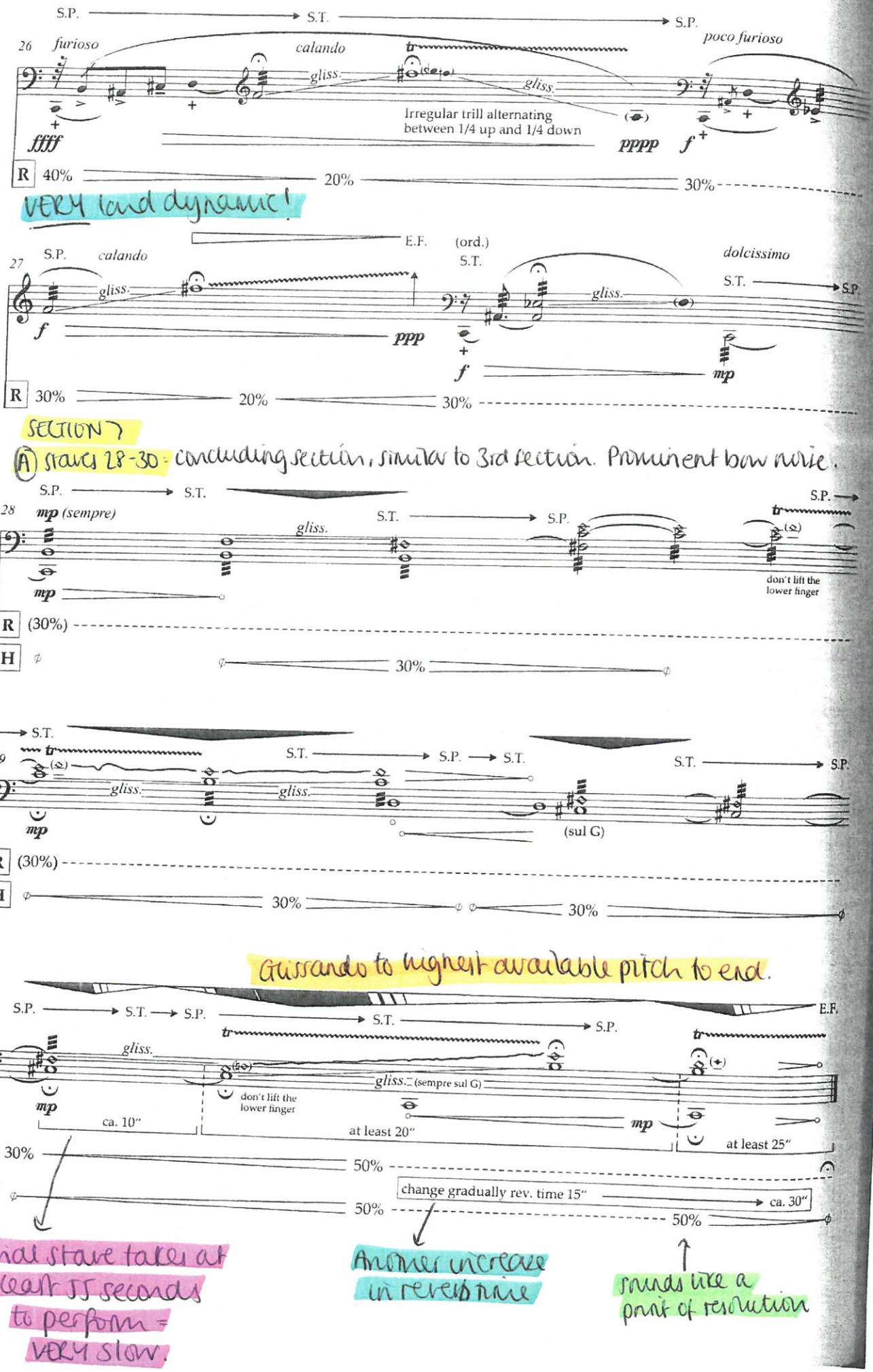


melody gradually begins to descend →



reverb time increases


melody descends further
(S.T.)
(sul D, G)
S.T.
(sul G)
S.P.
S.T.
gliss. libero
gliss. libero
tr
tr
ppp
p
ppp
f
R 30%
(rev. time ca. 15")
40%
20%
frequent use of pauses = rhythmic freedom
frequent changes of clef
return to low pizzicato Cs
S.P.
S.P.
S.T.
S.P.
gliss.
gliss.
S.P.
ff
pp
ff
ff
mp
R 20%
H
F# + C pedal = tritone dissonance
50%
repetition of similar ascending phrases
Treble clef phrases each end with a high F#
and are followed by a low C.
S.T.
S.P.
S.P.
S.T.
S.P.
gliss.
furioso
gliss.
pp
ff
pp
ff
R (20%)
H
50%
50%
This time a glissando
is used to reach top F#
S.P.
S.T.
S.P.
S.P.
S.T.
calando
furioso
calando
gliss.
ff
ppp
ffff
ppp
R (20%)
40%
20%
40%
H
50%


S.P. → S.T. → S.P.
26 furioso
calando
gliss.
gliss.
poco furioso
Irregular trill alternating between 1/4 up and 1/4 down
ffff
pppp
f
R 40% 20% 30%
VERY loud dynamic!
E.F. (ord.)
27 S.P. calando
S.T.
dolcissimo
S.T. → S.P.
gliss.
gliss.
f
ppp
f
mp
R 30% 20% 30%
SECTION 7
(A) staves 28-30 = concluding section, similar to 3rd section. Prominent bow noise.
S.P. → S.T.
28 mp (sempre)
gliss.
S.T. → S.P.
S.P.
don't lift the lower finger
R (30%)
H 30%
S.T.
29
S.T. → S.P. → S.T.
S.T. → S.P.
gliss.
gliss.
(sul G)
mp
R (30%)
H 30% 30%
Glissando to highest available pitch to end.
S.P. → S.T. → S.P.
S.T. → S.P.
E.F.
30
gliss.
gliss. (sempre sul G)
don't lift the lower finger
mp
mp
ca. 10"
at least 20"
at least 25"
R 30% 50%
H 50% change gradually rev. time 15" → ca. 30" 50%
final stave takes at least 55 seconds to perform = VERY slow.
Another increase in reverb time
sounds like a point of resolution

- Duple metre is disrupted through cross-rhythms, mainly groupings of three quavers at a time (see piano 1 opening)
- Piano 2 works against piano 1's opening rhythm with a steady crotchet pattern in the left hand and off-beat quavers in the right hand
- Notice, however, that the left hand figure in piano 2 consists of a seven crotchet ostinato, also working against the written duple time.

Structure

- Like many works of this period, Cage's structure for this piece is based on a fractal mathematical approach, also known as micro-macrocosmic design
- Here the proportions used on a small scale also operate on the movement's overall structure:
  - Dance No. 1 consists of nine 30-bar parts
  - Each part is sub-divided into nine phrases, signalled by the boxed numerals in the score
  - The phrases in all parts have the following bar-lengths: 2 5 2 – 2 6 2 – 2 7 2
  - It is highly unlikely that the listener is aware of these proportions in performance, but notice how the length of the central subdivision progressively increases by a bar a time (i.e. from 5 to 6 to 7)
- Thus, traditional large-scale dance forms are avoided, but there are some repetitions, e.g. the final 30-bar section is a repeat of the one preceding
- There are a number of other smaller-scale repetitions, including the reappearance of a number of motifs from the first two parts in the final parts, e.g. the three-quaver motif from phrase 5 returns at phrases 64 and 73.

Tonality

There can be no sense of tonality underpinning the movement's structure, given the nature of a prepared piano. In other words, there are no exact pitches creating a hierarchy of sounds revolving around a tonic.

Melody and harmony

For the same reason (indeterminate, unfixed pitch), it is impossible to speak of melodic line or harmonic content. In other words, rhythm and sonority prevail throughout.

FURTHER LISTENING

Try comparing Cage's approach to rhythm with Messiaen's use of iso-rhythms in e.g. *Quatuor pour le fin du temps.*

Petals [for Cello Solo and Optional Electronics] (Kaija Saariaho)

Context

- Kaija Saariaho is a leading Finnish composer, born in Helsinki in 1952
- She has produced a significant body of work in which electronics play an important role, e.g. the recent theatre piece *Only the Sound Remains* (2015)
- In *Petals*, the cello is combined with ongoing live electronics, as opposed to pre-recorded electronic sounds
- *Petals* was written for Anssi Karttunen, who first performed the work at a festival of contemporary music in Bremen in 1988
- The title of the work refers to the petal of the waterlily, and is an off-shoot of *Nymphéa* [*Waterlily*], dating from 1987, scored for string quartet and electronics
- According to the composer, *Petals* is concerned with the opposition of 'fragile colouristic passages' to 'more energetic events with clear rhythmic and melodic character', which in turn are subjected to a number of transformations.

Notation

- The basis of the score is conventional staff notation
- There are, however, no bars or bar numbers. Instead, each of the 30 lines in the piece is numbered, and we will refer to these lines as 'staves'
- Indications for use of reverb and harmoniser (see below) are placed under each stave
- At some points, the notation is indeterminate, i.e. aleatoric with regard to melodic and rhythmic elements
- Notation is expanded by the addition of various symbols indicating specific effects not covered by traditional notation, as follows:
  - Horizontal arrow – a gradual change from one sound or way of playing to another
  - Diminuendo hairpin closing with a small zero – reduction in volume to absolute silence
  - Crescendo hairpin starting with small zero – increase in volume, commencing from silence
  - Arrow-head pointing upwards – highest note possible
  - Filled in black crescendo sign – add bow pressure to produce a scratching sound, i.e. pitch is replaced by noise (and vice versa for diminuendo sign)

- See the introductory comments in the Anthology score for other symbols, notably those for quarter-tones and various types of glissando.

Sonority

- The work blends traditional cello timbres with extended techniques and various degrees of electronic distortion

Acoustic

- Traditional cello playing (bowed, pitched sound) can be heard in the music of staves 10–13
- Articulation includes slurs (e.g. stave 5) and staccato (e.g. stave 4)
- Extended techniques include:
  - Lengthy trills and tremolos for colouristic effect
  - Harmonics (usually artificial), often combined with ordinary notes (see stave 14) and more strikingly with another harmonic (stave 15)
  - Glissandos (with varying degrees of vibrato and/or with harmonics)
  - Micro-intervals
  - Scratchy tone (noise) produced by use of more bow pressure than usual.

Electronic

- Live electronics most importantly involve:
  - Digital reverb with variable reverb
  - Harmoniser
- Reverb time is set at 2.5 seconds, increasing to 15 seconds in stave 21 and finally 30 seconds at the close
- The introductory remarks in the Anthology state that the reverb should result in a 'clear and bright sound' and that if there is any doubt as to how much to apply, 'too little rather than too much' is preferable
- In any event, the degree of reverb varies between 20% and 50%
- The harmoniser shifts pitches by a quarter-tone and then combines this transposed sound with the original, typically during scratchy bowing sections to maximise colouristic distortion effects. (See introductory remarks for details on preferred models of harmoniser.)

Dynamics

The range is extreme: from sounds pulled out of silence, through ***pppp*** to ***ffff***. Saariaho requires a 'clear and rich, close sound', stipulating that microphones should be placed as close as possible to the instrument and that the general level be set rather loud, but 'not painfully so'.

Texture

- In the more conventionally played passages, the cello line could be described as monophonic (e.g. stave 10)
- Double stopping occurs in stave 11 and is used to create harmonics in staves 14–16
- Effective use is made of two-part writing in stave 17, where the lowest string on the instrument (open C) is left ringing while material is played on higher strings
- Colouristic block-sounds result in the scratchy bowing passages with harmoniser, but these are far removed from the homophony of traditional textures. In fact, it is probably more useful to approach the topic of texture in terms of relative densities of sound.

Tempo, metre and rhythm

- **Tempo** moves between lento sections and faster moving passages
- *Lento* passages, as at the start, should move so slowly that staves in these sections should always last at least 20 seconds. The final section of the work is extremely slow, with the last stave taking at least 55 seconds to perform
- There is no **metre** discernable in terms of time signatures and bars
- Written note-lengths in the *lento* sections employ semibreves but are to be regarded as pulseless sounds of indeterminate length
- The passage beginning at stave 10 seems to be more precisely notated regarding **rhythms**, but pulse cannot be detected because of the irregularity of groupings, ornaments, ties, glissando and fermata (pauses).

Melody

- Melodic content is typically found in the faster moving sections (lento passages tend to be colouristic rather than melodic)
- In the energico section beginning at stave 4, a scurrying line can be heard, made up of quarter tones (microtones) and glissandos
- The second such section, at stave 10, is more conventionally melodic with clearly defined intervallic content, often of an angular nature (notice the intervals of a major 7th (stave 10) and augmented 4th (stave 12)
- Some other characteristics of this section include:
  - Repeated note figuration (stave 11)
  - Short descending figures (beginning on stave 11). The starting note of each descent rises, with the high-point occuring in stave 13
  - Ornamentation

- The poco impetuoso at stave 17 is characterised by agitated figures, initially semitonal
- From stave 23, striking use of glissandos rising alternately to C♯ and F♯ are supported by 'pedal' low (open string) Cs
- The section culminates with a glissando to the highest pitch available (stave 27).

Harmony

- There is no sense of harmonic progression, though there are very brief moments when distinguishable pitches are heard, e.g. stave 15
- It could be said that one traditional harmonic device is the lengthy pedal C at staves 15–28
- Notice the prominent high F♯s which appear at stave 23, seemingly forming a tritonal dominant with the pedal C.

Tritonal dominants can be found in Herrmann's music for the film *Psycho*. Briefly they arise from the replacing of the traditional dominant with one an augmented 4th or diminished 5th above the tonic.

Tonality

- Tonality (in terms of a hierarchy of pitches) is scarcely relevant in *Petals*, partly because of the absence of functional harmonic progressions
- However, the persistent use of the pedal C from stave 15 could be regarded as a tonal anchor, even though the work is primarily colouristic.

Structure

- *Petals* is one continuous movement
- There are elements of short-term repetition of motifs. For example, the treatment of the glissando figures from stave 23

- The work depends on the alternation of what the composer describes as 'fragile colouristic passages' with 'more energetic events with clear rhythmic and melodic character':

Tempo	Staves
Lento	1–3
'energico'	4–7
Lento	8–9
'espressivo'	10–13
Lento	13–16
'poco impetuoso'	17–27
'dolcissimo' (This marking appears as 'Lento' in the original Hansen edition)	27–30

FURTHER LISTENING

It would be useful to investigate works by other Finnish composers:

- **Sibelius, Symphonies Nos 4 and 5, and the tone poem *Tapiola***
- **Rautavaara, *Cantus Arcticus* (scored for orchestra with pre-recorded birdsong)**

For a fine example of another contemporary composer's approach to cello technique, listen to Lutosławski's Cello Concerto.