36 208

Sampo Kasurinen

Sleep Cycles

Concerto for augmented accordion and strings

2025

Music Finland

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Composers note about the harmonic language

In 1714, Italian violinist Giuseppe Tartini discovered that when he played a double stop on his violin, he could hear a third, much lower tone. When the double stop was in tune, the third tone seemed to align as well. He called this tone a *tartini tone*. It is very peculiar: one can clearly hear it, but it cannot be recorded. If one records the violin double stop and uses a spectrum analyzer to look at the recording, at the place where the tartini tone is supposed to be, there is no trace of it. It is as if it exists in another dimension, unreachable by machines.

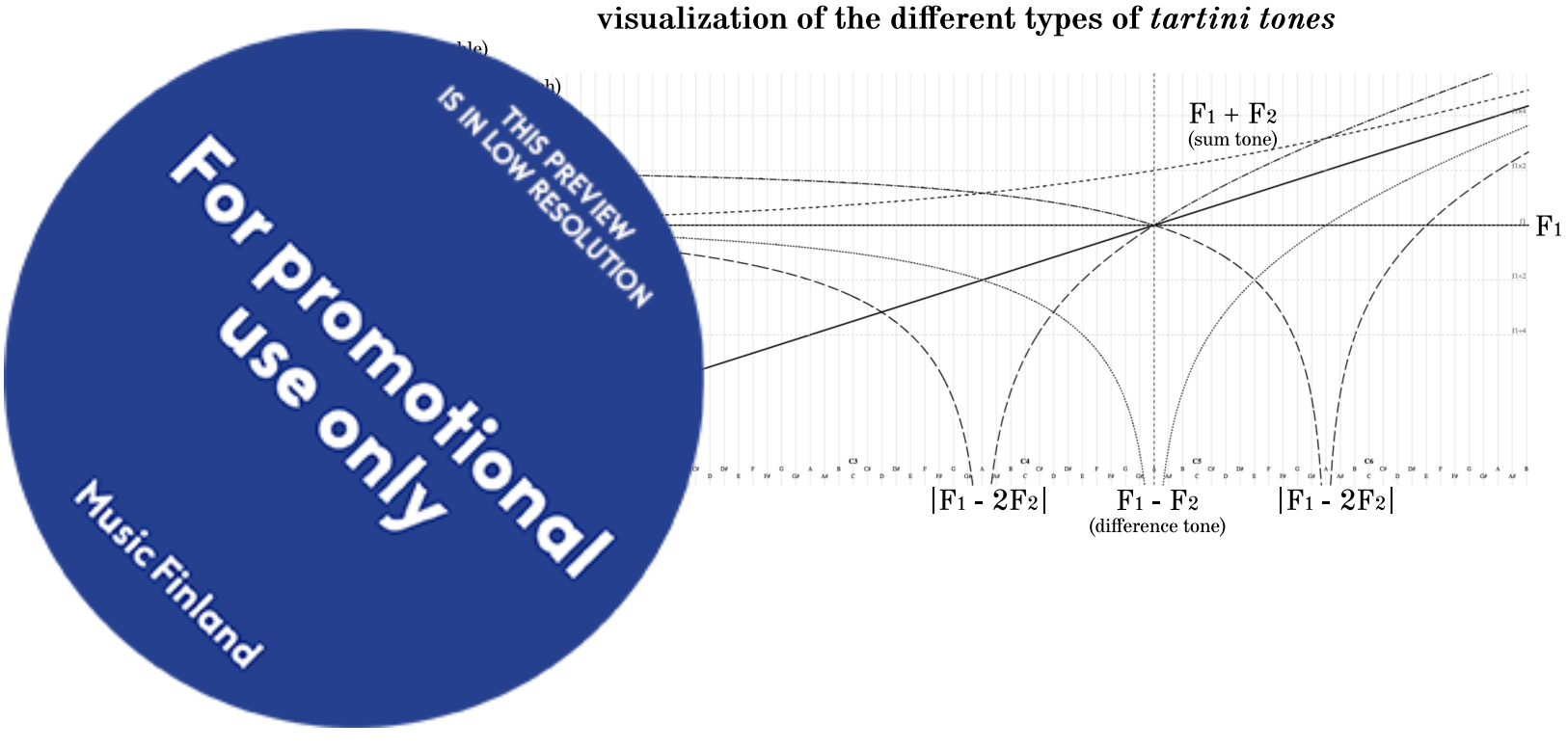
Actually not just violin, but all instruments can produce these tones, which in present day are more commonly referred as combination tones. On an accordion they are especially audible in the high register. However, an accordion cannot tune itself the same way a string player can tune a double stop. This means that the combination tones of an accordion land in very interesting places - between the twelve notes traditionally used in Western music.

Even though a combination tone cannot be recorded, its pitch can be calculated. And there are actually many types of them: some of which have cannot even be heard, but exist only in this imaginary mathematical dimension. However, they all follow the same simple principle, which Giuseppe Tartini discovered in 1714: two dissonant tones will produce a dissonant combination tone and two consonant tones a consonant combination tone. All string and wind players instinctively use this phenomenon to tune their playing: when a chord is in tune it feels resonant and pleasing. In this case the combination tones land on partials of the overtone series.

As a composer I became very interested in the combination tones of an accordion. I wrote a program that calculates them in real time from the notes played by the accordionist. Calculated tones can be then reproduced electronically - that way these imaginary pitches actually become real notes, producing very strange harmonies. Simple tonal chords and melodies turn into mysterious clusters of microtones and overtone-like scales that seem to change direction for no apparent reason. These combination tones seem to blend together with the original notes in a very natural way, resonating together beautifully. However, this resonance is very different from the traditional, justly tuned resonance.

I wanted to use also the string instruments to produce these so called tartini tones. After some thought, I decided that approximating them to the closest sixth tone would have the ideal balance between accuracy and readability. I hope that, just as traditional 12-tone notation is ultimately tuned by ear, these tartini tones will also be tuned by listening for the best resonance. These resonances can at times be very strange, but I wish that this strangeness could be embraced - and even enjoyed. Most of the time in this composition, the accordion has the same harmonies as strings, so that it can be listened to on its own as a reference.

visualization of the different types of *tartini tones*



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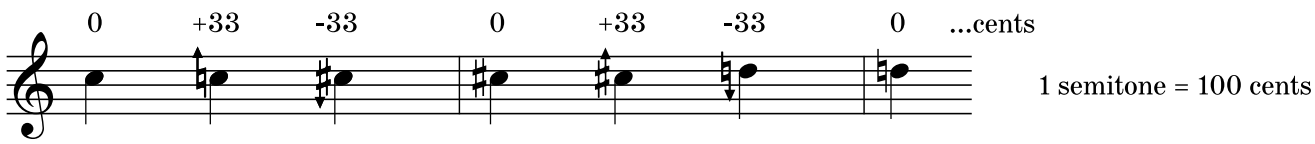
Microtonal accidentals

The notation below shows the microtonal accidentals used to notate the 1/6 tones.
Arrows indicate whether the pitch is 33 cents higher or 33 cents lower.
For example between C and C♯, there are two tones: C𝄲 and C𝄳:



It is important to remember, that these are only approximations. Any tartini tone landing between 16 and 50 cents above C, would be notated as C𝄲. Therefore the notation should be considered merely as a *starting point*, from which the intonation is further refined by ear - just like with traditional notation where the ear naturally searches for the best point of resonance. It is left for everyone to discover together if these resonances can be found for tartini tones too.

Notations

Accordion is notated at pitch, regardless of registrations

S.P. = sul ponticello

S.T. = sul tasto

N = natural

= continue earlier material

𝄪 = unpitched sound

□ = play in approximate register

= bow overpressure. Aim for complex overtones, keep bow in constant motion

OPEN = repeat section until conductor gives a cue

[illegible] = move forward when conductor gives a cue

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SLEEP CYCLES

concerto for augmented accordion and strings

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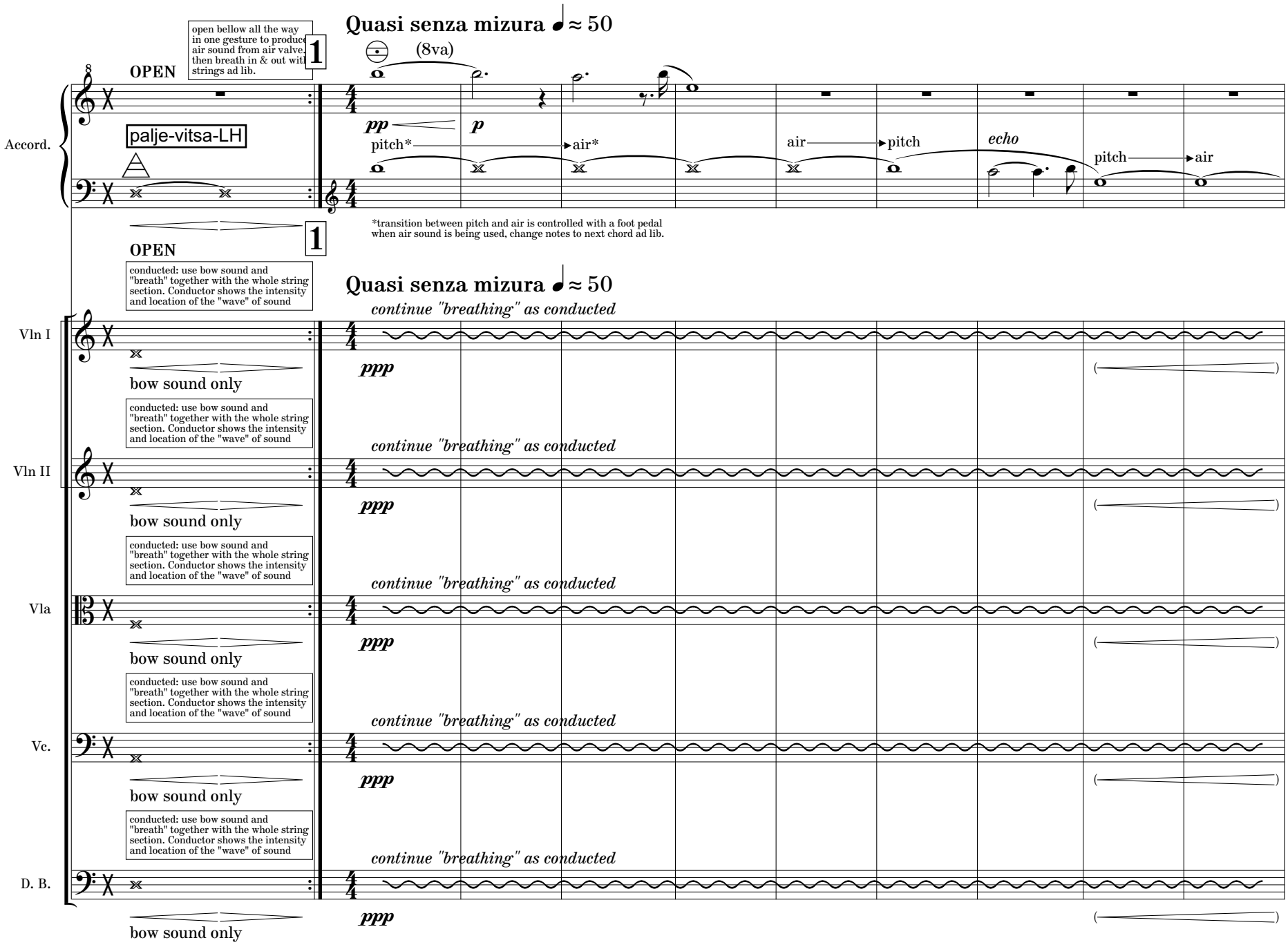

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2 **Tranquillo** ♩ ≈ 60–70

11

Accord.

ord. → musette

use musette expressively ad lib. from here on

sempre libero

2 **Tranquillo** ♩ ≈ 60–70

Vln I

Vln II

Vla

Vc.

D. B.

(mp)

sampler

3

18

Accord.

air → pitch (ca. 20%) → air

3

very airy sound

"breathing"

pp

ppp

p

div.

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25
Accord.
Vln I
Vln II
Vla
Vc.
D. B.
pp
ppp
31
Accord.
air
pitch
air
Vln I
Vln II
Vla
"breathing"
S.P.
div.
ppp
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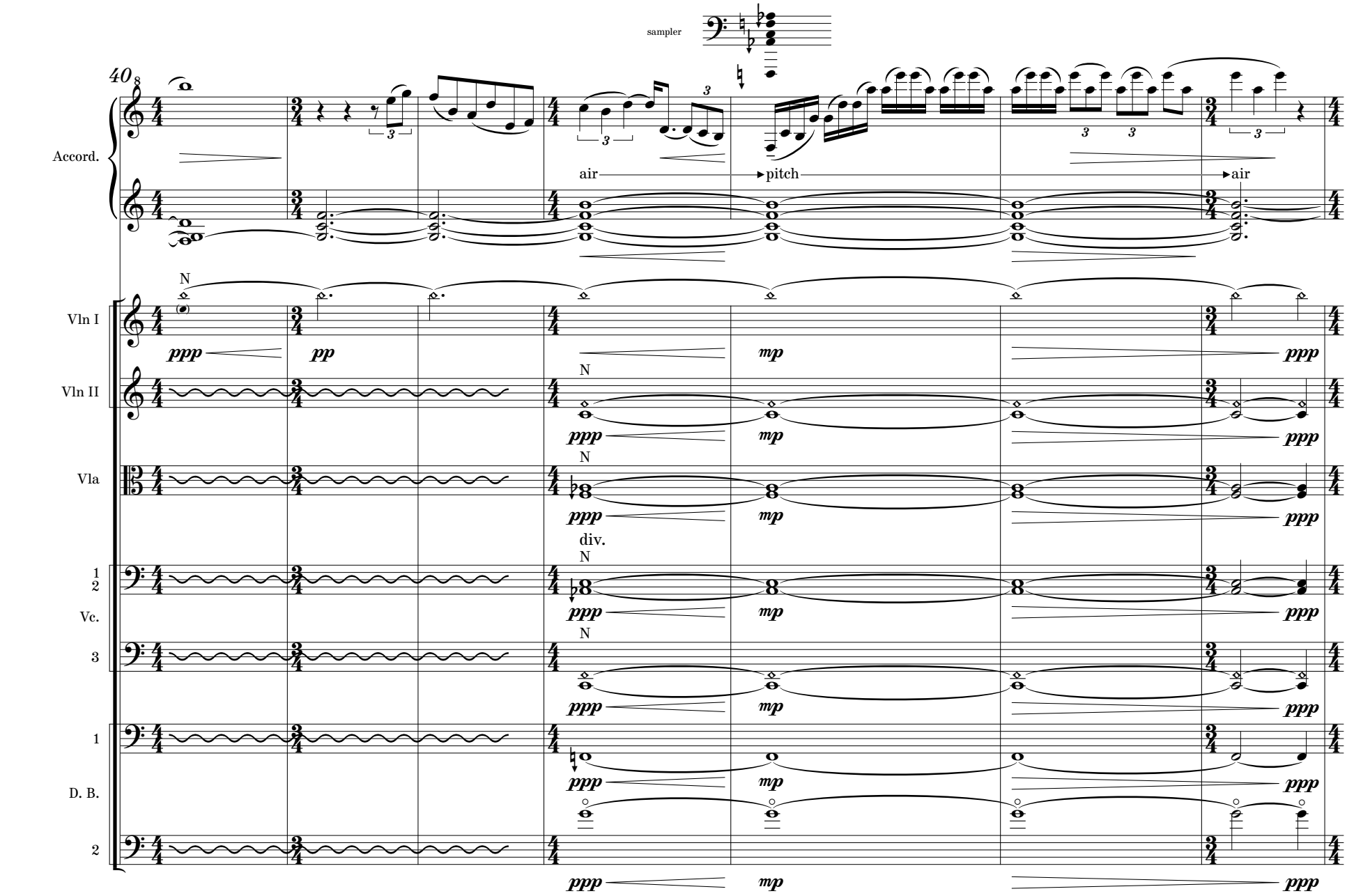

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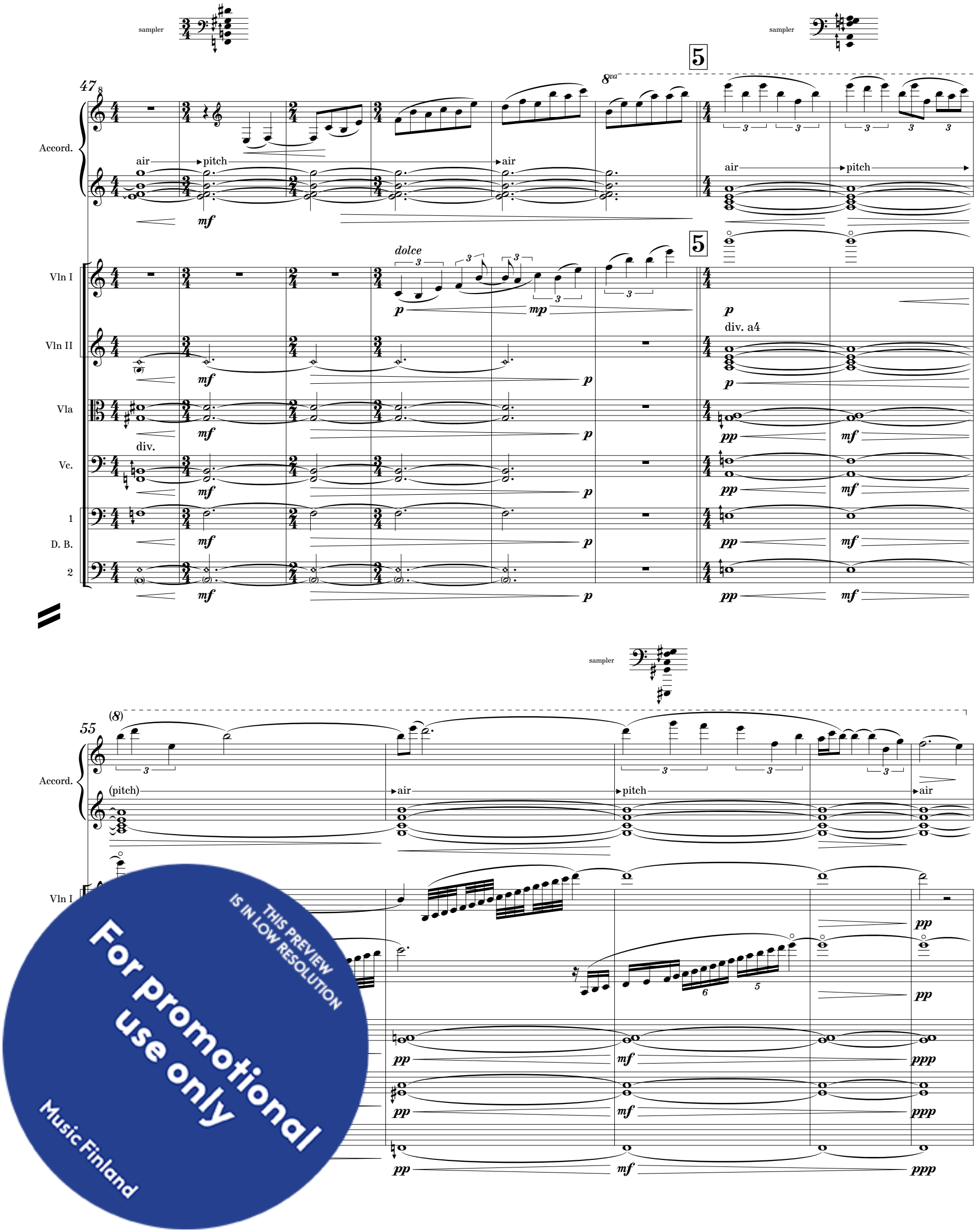

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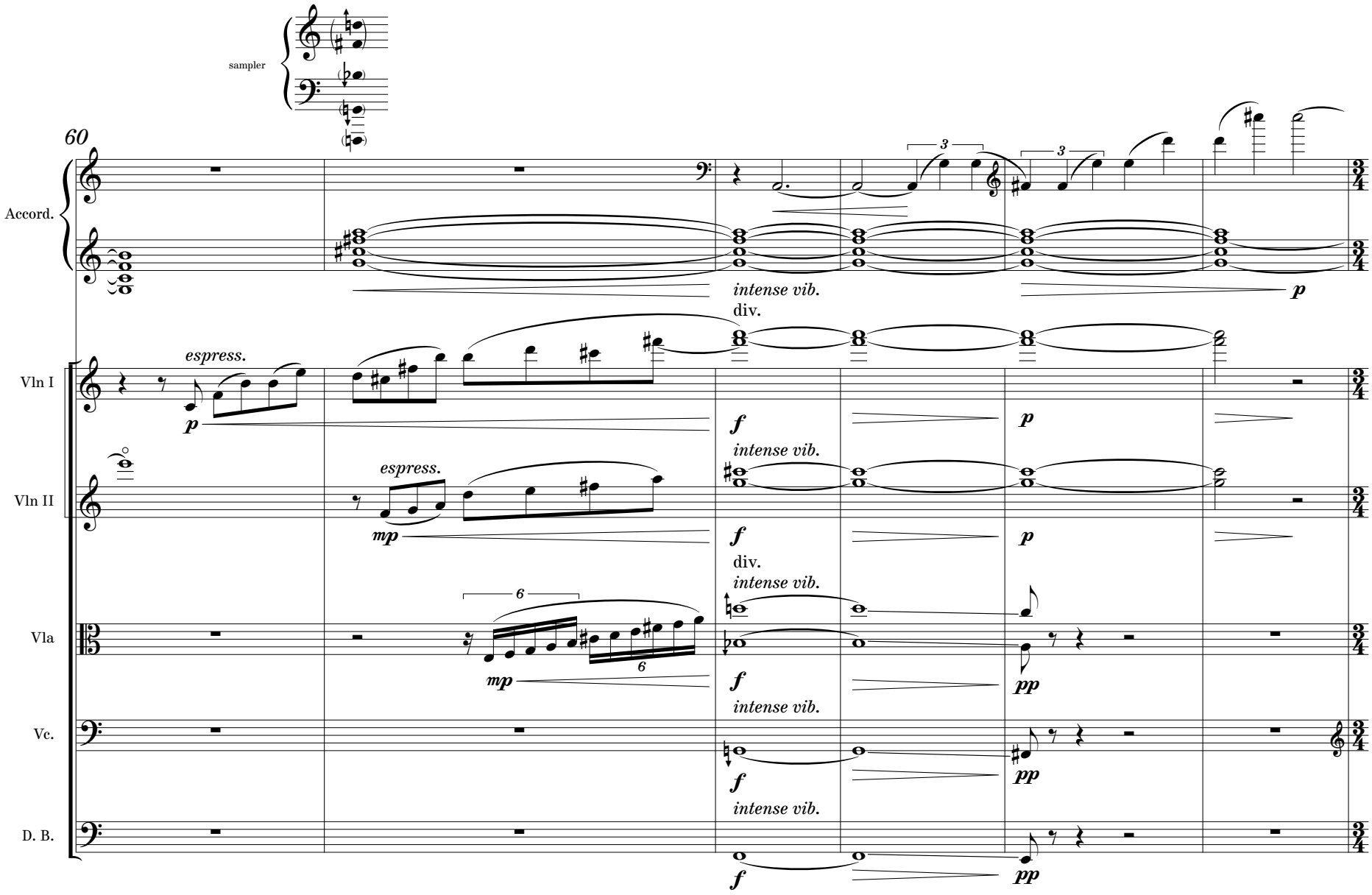

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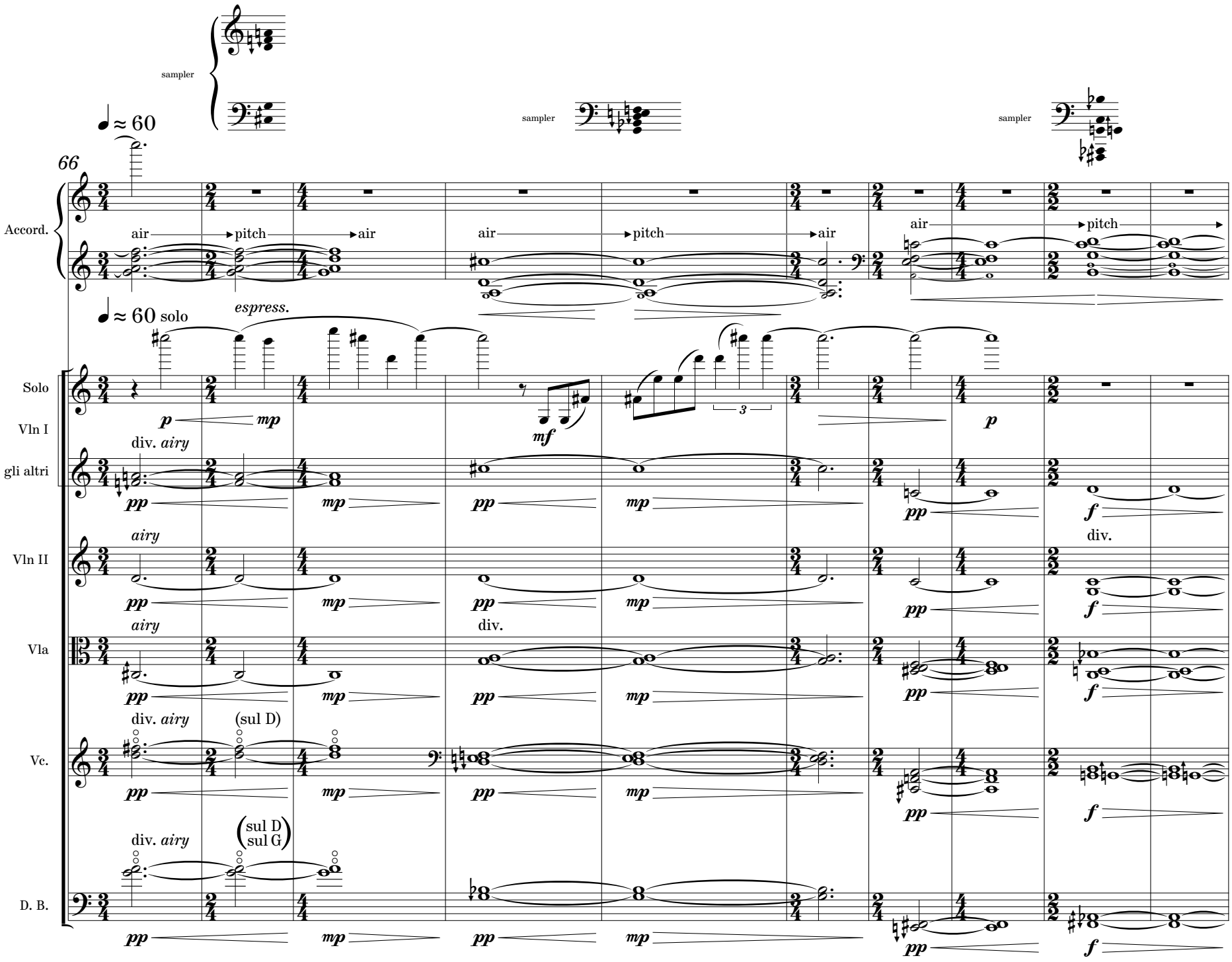

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6

76

semplice
with musette ad lib.

♩ ≈ 50

poco rit.

Accord.

p
air

mp
air

6

♩ ≈ 50

Solo
Vln I
gli altri
Vln II
Vla
Vc.
D. B.

pp

mf

bow sound only

ppp

mp

sampler

sampler

85

8va

pitch

pitch

air

4 soli

unis.

p

long even glissando

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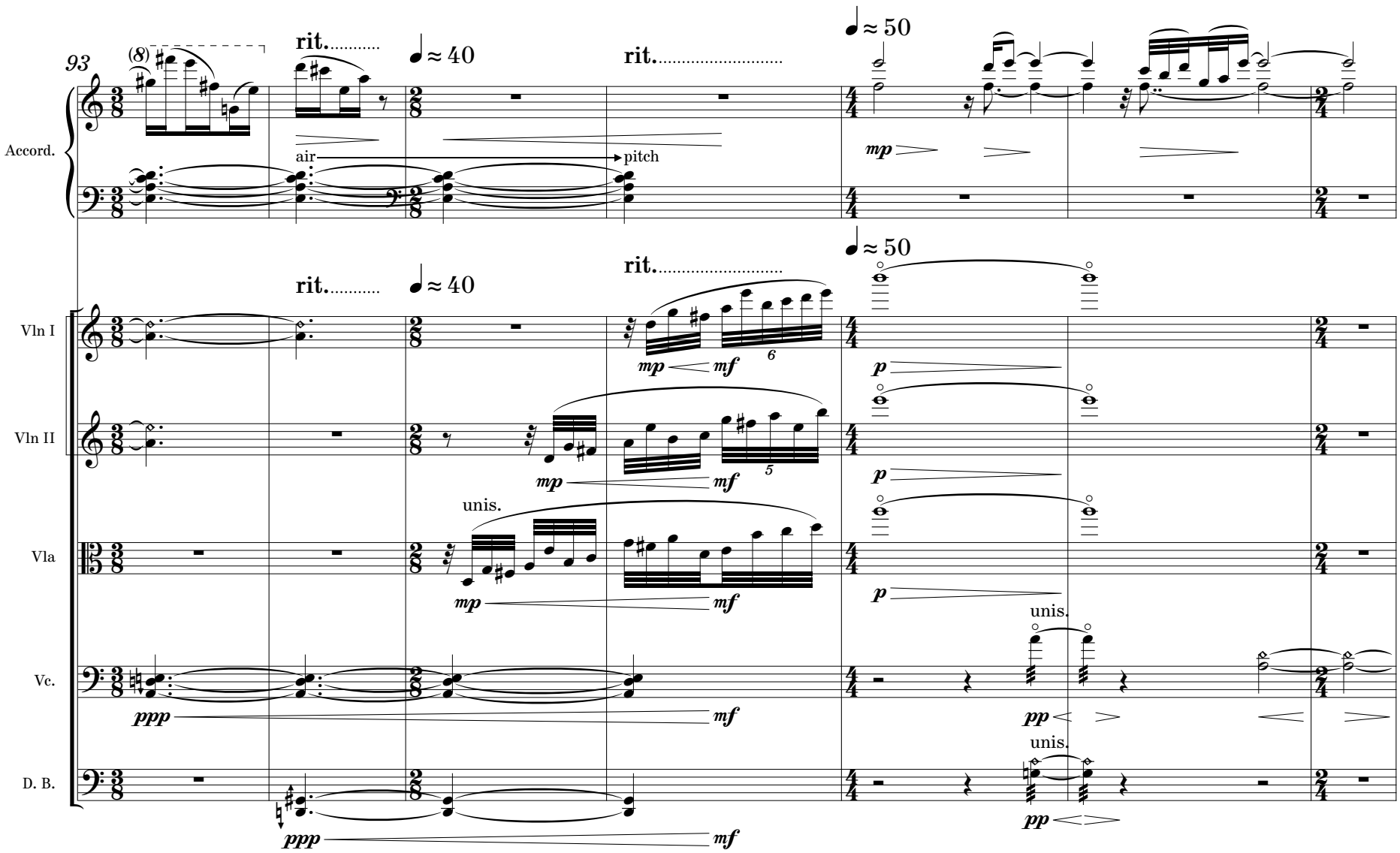

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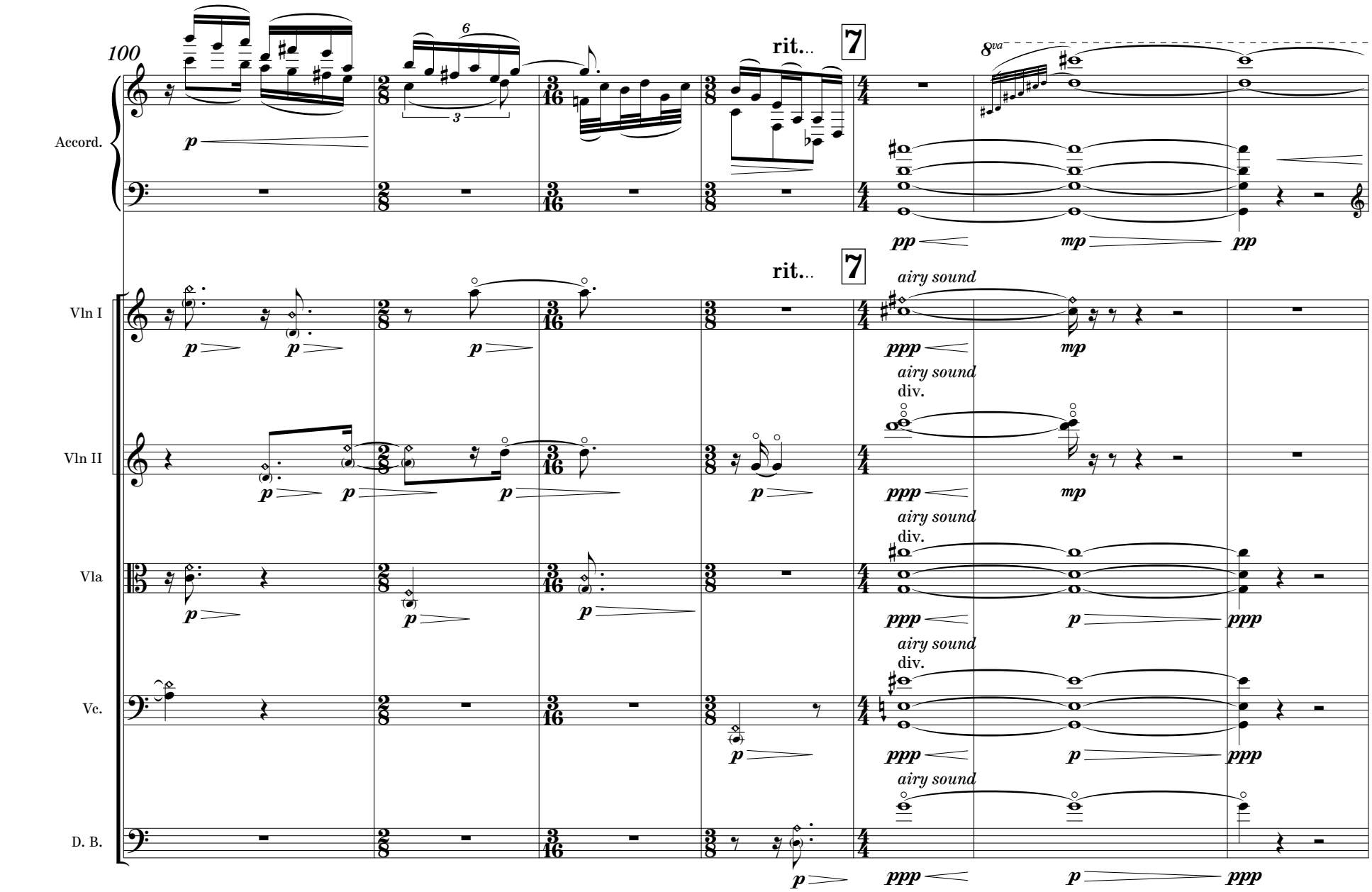

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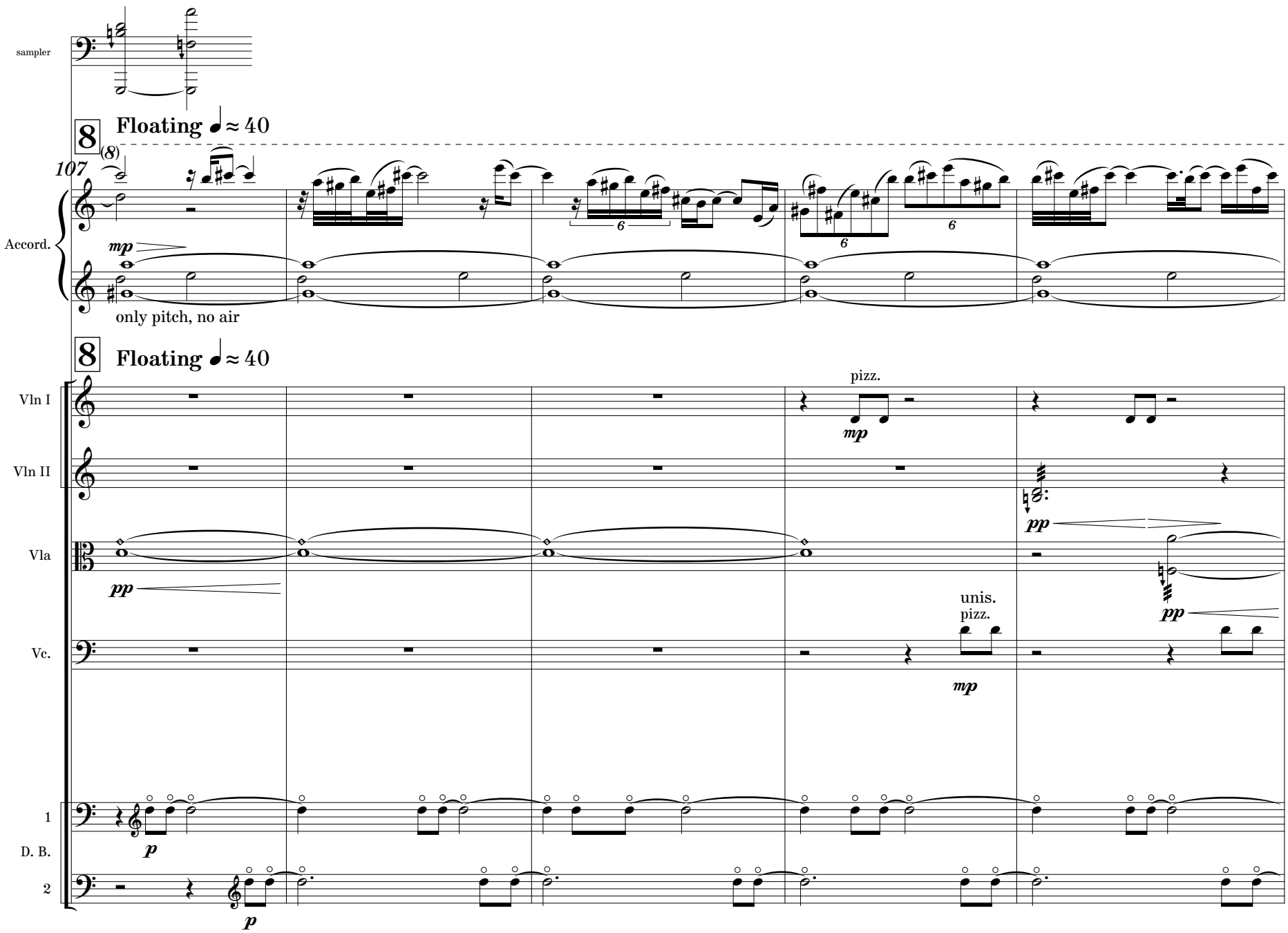

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112

(8)

cont.
ad lib.

use musette "vib" for
increasingly weird bends

sampler

9

Accord.

9

Vln I

div.
arco

pizz.

pp

Vln II

mp

Vla

1

Vc.

2
3

arco

pp

arco

pp

pizz.

1

D. B.

2

mp

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sampler

10

118

OPEN

ON CUE

Accord.

10

OPEN

ON CUE

cresc. poco a poco

Vln I

Vln II

Vla

1

Vc.

2

3

D. B.

(pizz.)

sampler

11

123

Accord.

2

3

4

5

6

11

non div.

Vln I

p

f

poco a poco

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129

7 8 9 10

Accord.

Vln I

Vln II

Vla

1 Vc.

2 3

D. B.

div.

on the string, molto pesante

133

11 12 13 14

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137

15 16 17 18

Accord.

Vln I — unis. — fp f — f — 3 — div.

Vln II

Vla — f — 3 3 3 — f — 3 3 5 — p f p

1 Vc.

2 3

D. B.

141

19 20 21

Accord.

non div. — 3 3 — 6 3

12 Fast ♩ = 150

Vln I

Vln II — arco — f — 6 — div. — 3 3 3 3

1 Vla — pizz. — f

2

1 Vc.

f

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146

sampler

13

Accord.

L.H.

13

Vln I

Vln II

Vla

Vc.

D. B.

arco

arco

pizz.

153

sampler

Accord.

Vln I

Vln II

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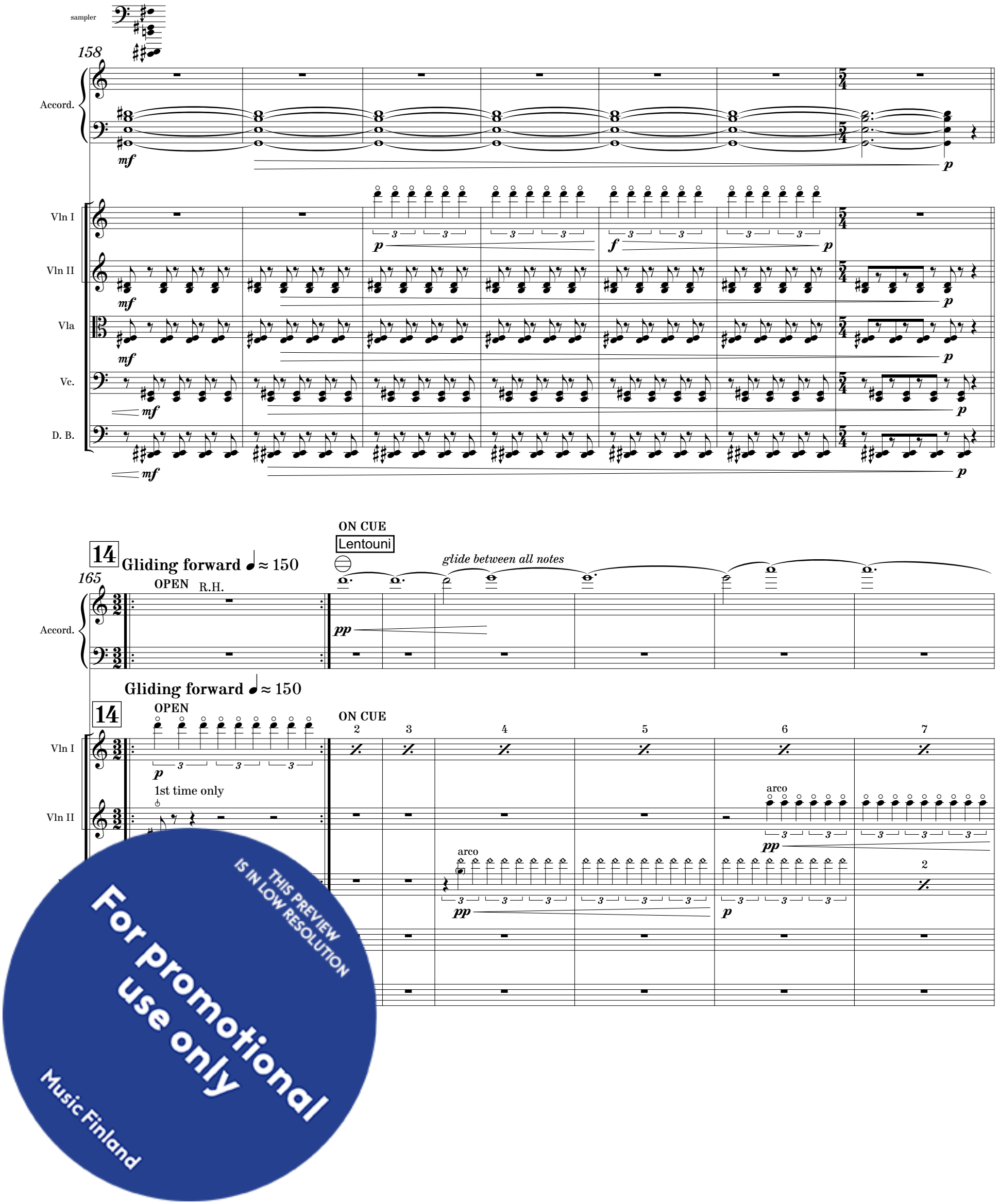

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15

172

8va

Accord.

15

Vln I

Vln II

Vla

Vc.

8 9 10 11 12 13 14 15

2 3 4 5 6 7 8

3 4 5 6 7 8

2 3 4 5 6 7

arco

p

pp

p

180

(8)

Accord.

mf

Vln I

Vln II

Vla

Vc.

D. B.

9 10 11

2 3 4

8 9 10

arco

pp

p

186

8va

Accord.

Vln I

f

p

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191

Accord.

8va

mp

mf

if this is too low, use artificial F# -fourth harmonic instead

Vln I

Vln II

Vla

if this is too low, use artificial C# fourth harmonic instead

Vc.

197

Accord.

Vln I

Vln II

Vla

Vc.

201

Accord.

ppp

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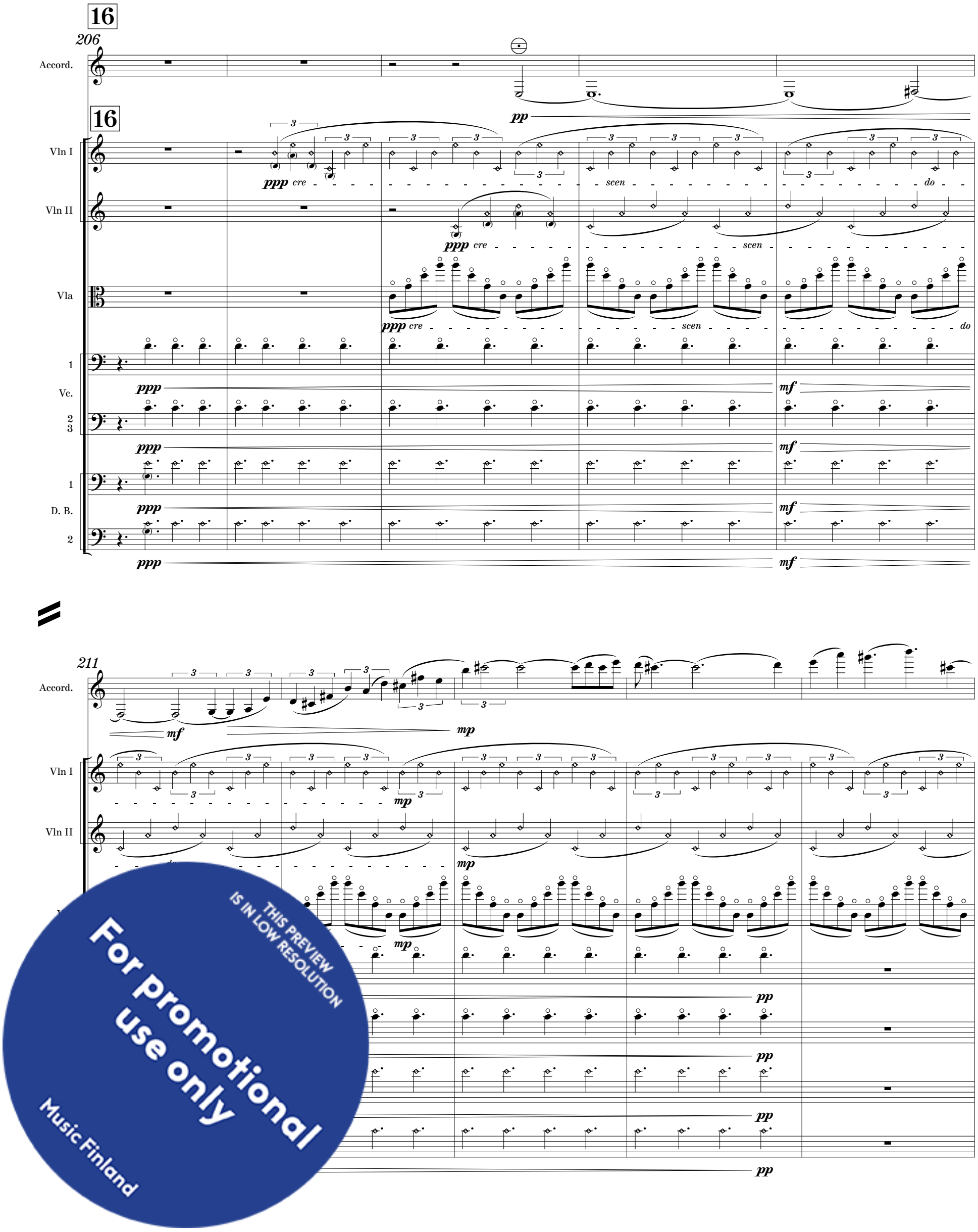
16
206
Accord.
16
Vln I
Vln II
Vla
1
Vc.
2
3
1
D. B.
2
pp
ppp cre
scen
do
ppp
mf
211
Accord.
mf
mp
Vln I
Vln II
mp
pp
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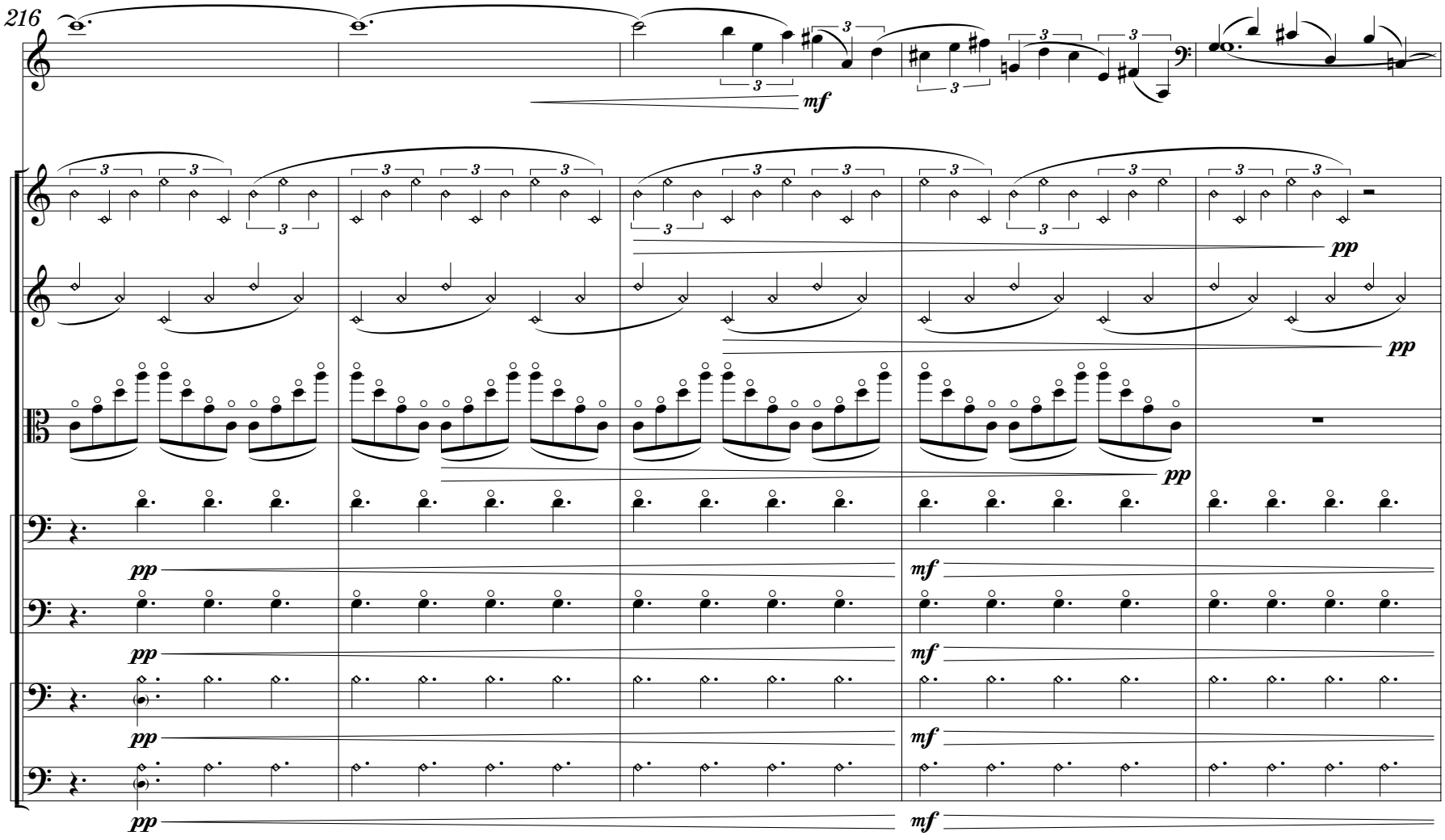

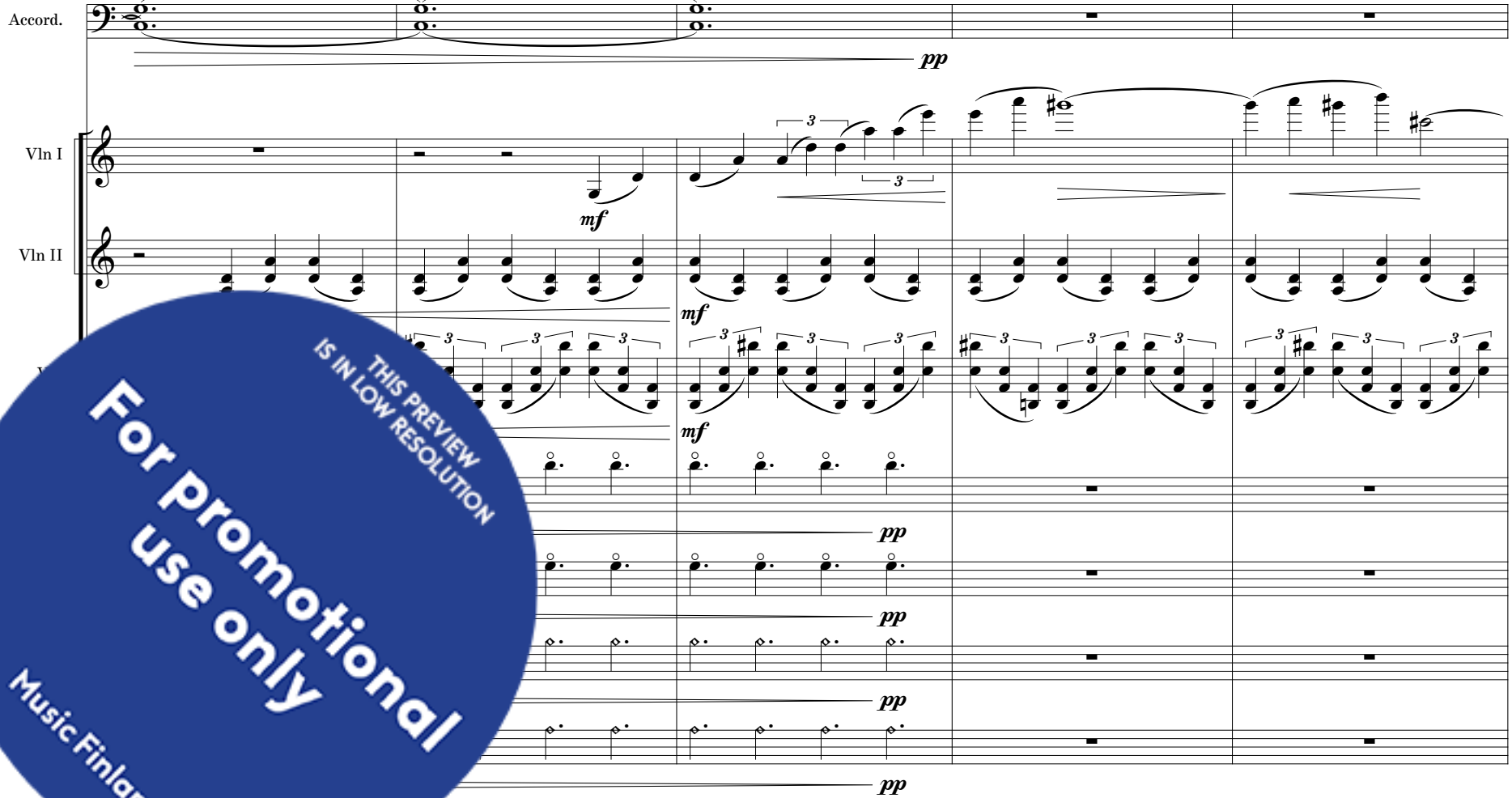

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226

Accord.

Vln I

Vln II

Vla

1

Vc. 2

3

1

D. B.

2

8va

di mi nuen do

234

(8)

sampler

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sampler

17

240

Accord.

rit.

17

Vln I

1

Vln II

2

Vla

1

Vc.

2
3

1

D. B.

2

18 a tempo

246

sampler

8va

Ped.

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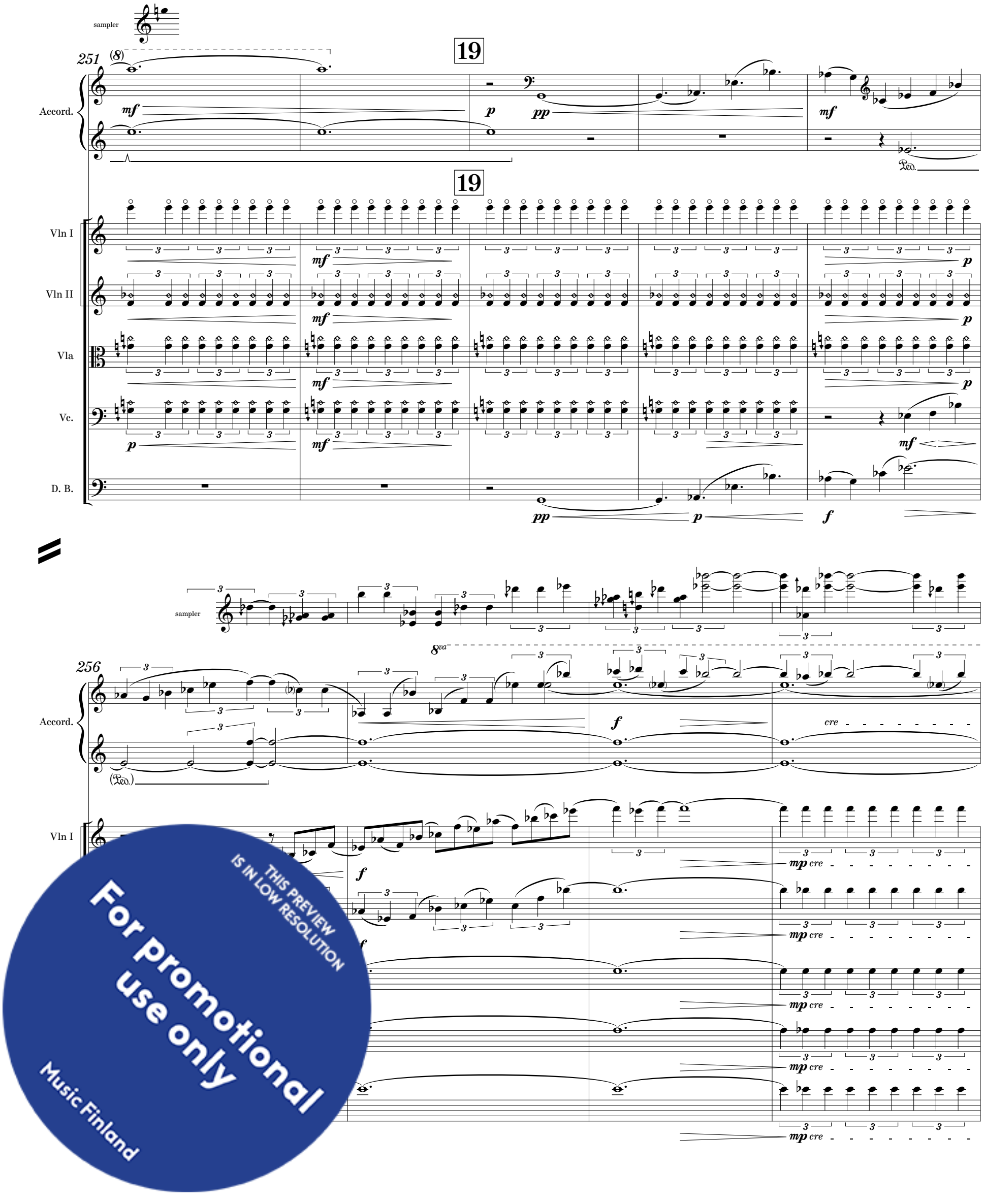

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sampler

260

(8)

Accord.

scen

do

Vln I

Vln II

Vla

Vc.

D. B.

scen

sampler

sampler

molto rit.

20

a tempo

264

ff

Ped.

molto rit.

20

a tempo

molto pesante

ff

sempre ff

molto pesante

sempre ff

div.

molto pesante

sempre ff

molto pesante

sempre ff

sul G

div.

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sampler

sampler

sampler

269

8va

Accord.

Ped.

Vln I

Vln II

Vla

Vc.

D. B.

sampler

sampler

sampler

275

(8)

21

Accord.

p sub.

21

p sub.

p sub.

div.

p sub.

div.

p sub.

p sub.

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280

Accord.

Vln I

Vln II

Vla

Vc.

D. B.

ff

p

unis.

sampler

284

8va

di - - - - mi - - - - nuen

di - - - - - - - - mi

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sampler

sampler

288

Accord.

(Ped.)

Vln I

Vln II

Vla

Vc.

D. B.

do *mf* *di* *mi* *nuen* *do* *mp*

di *mi* *nuen* *do* *mp*

di *mi* *nuen* *do* *mp*

nuen *do* *mp*

sampler

sampler

294

Accord.

p *mf* *p*

f *p*

f *p*

f *p*

f *p*

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sampler

sampler

301

22

3+3

Accord.

(Ped.)

22

3+3

Vln I

Vln II

Vla

Vc.

D. B.

308

Accord.

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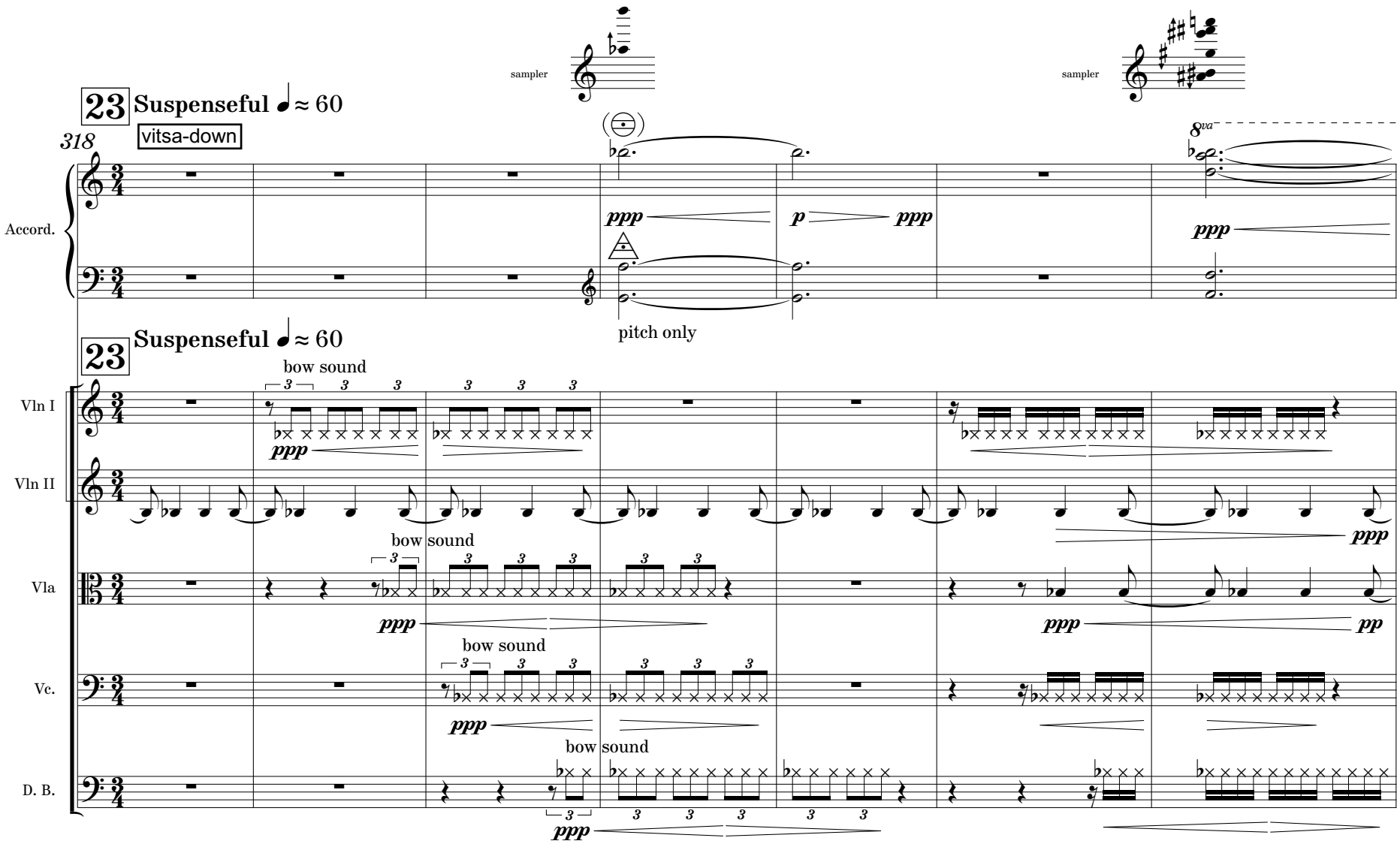

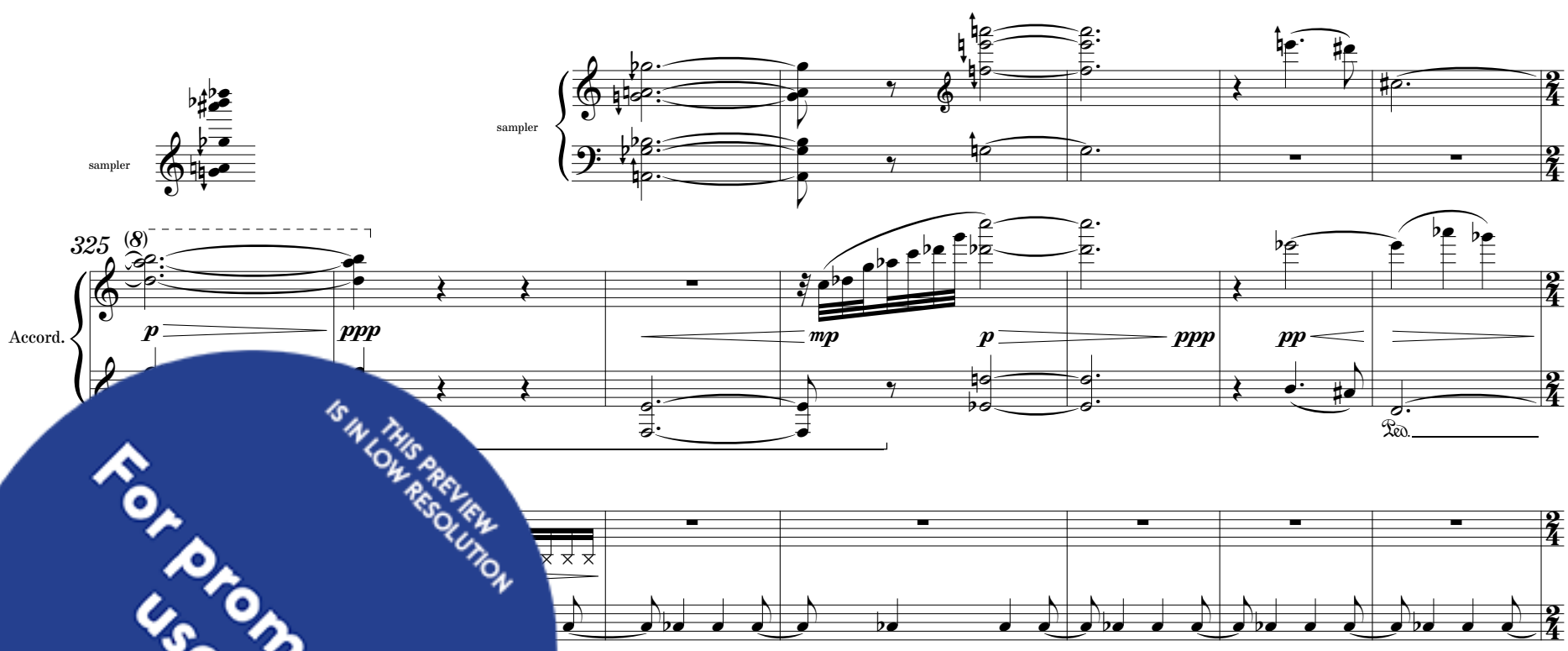

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sampler

332

Accord.

mp *p* *ppp*

(Ped.)

sampler

p

Ped.

sampler

p

Vln I

molto sul tasto
very airy

3 6 6

ppp

S.P.

pp

Vln II

molto sul tasto
very airy

3 6 6

ppp

Vla

Vc.

S.T.

ppp

sampler

338

Accord.

6

pp *pp* *pp* *pp*

9

mf

pp *mf*

(Ped.)

Ped.

Vln I

pp

pp

pp *p* *f*

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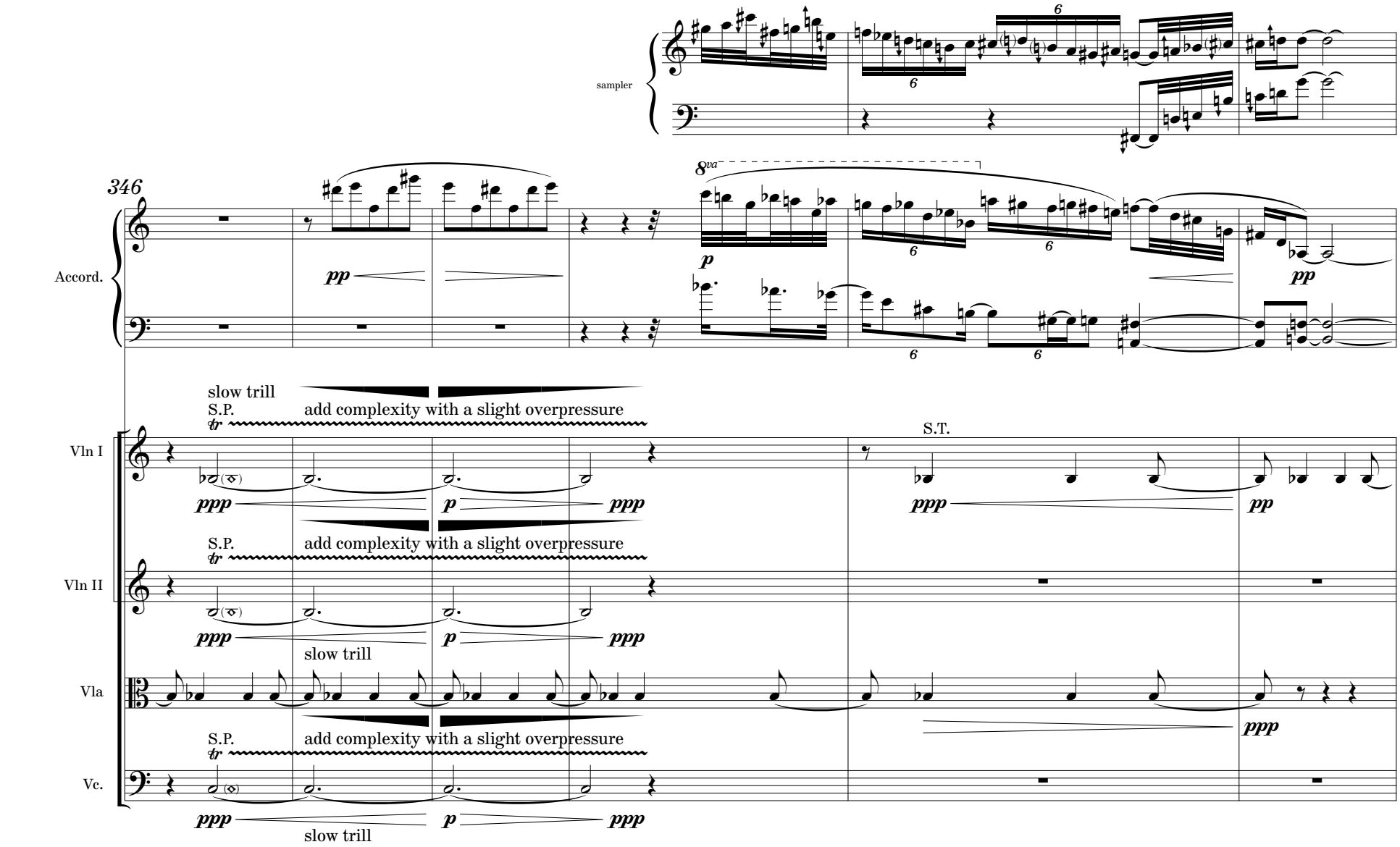

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sampler

352

8va

Accord.

pp

Vln I

Vln II

Vla

Vc.

D. B.

S.T.

S.P.

bow sound

bow sound

bow sound

bow sound

sampler

360

8va

Accord.

pp

mp

pp

pp

pp

S.T.

S.T.

S.T.

S.T.

S.T.

S.T.

S.T.

ppp

pp

ppp

pp

ppp

pp

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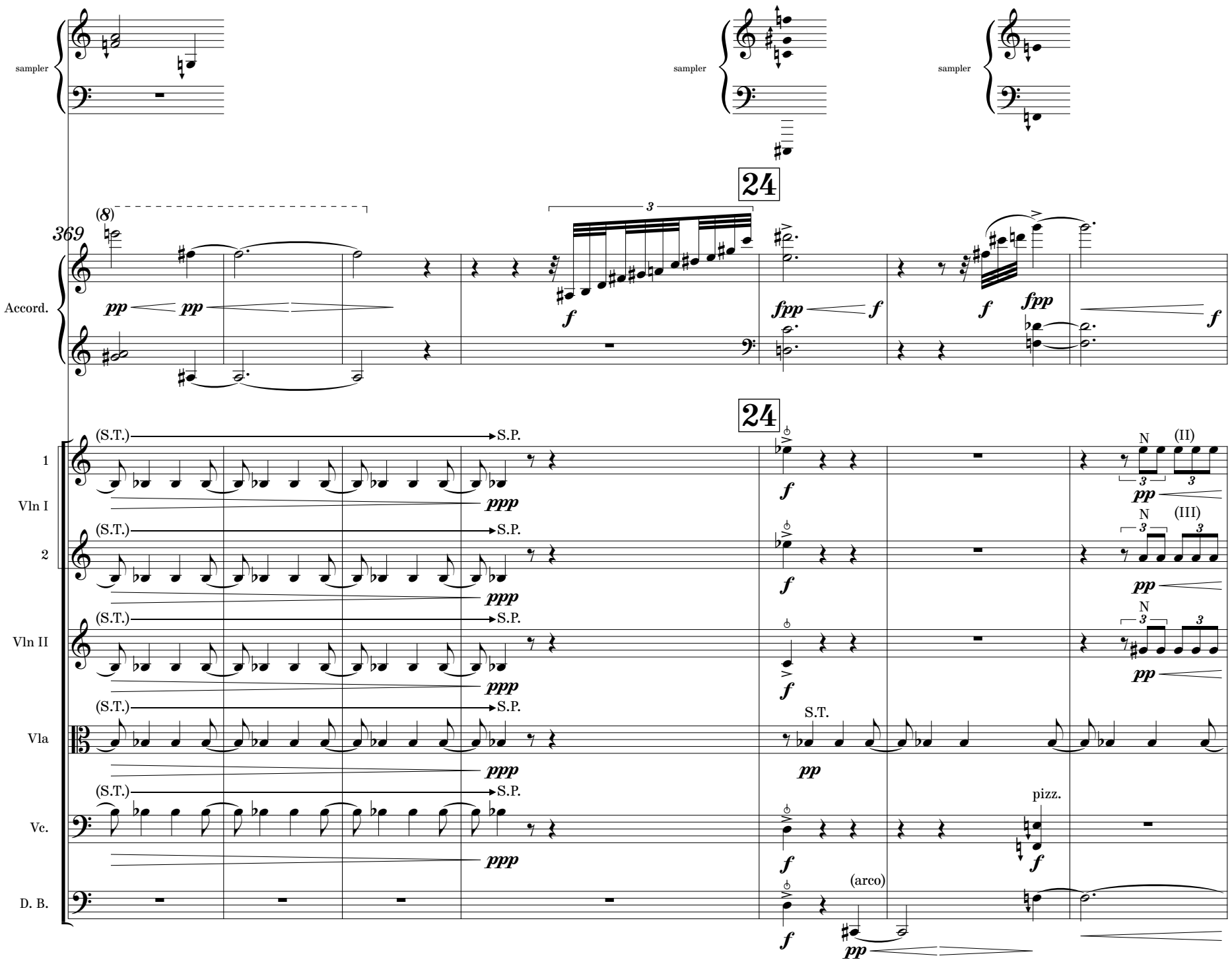

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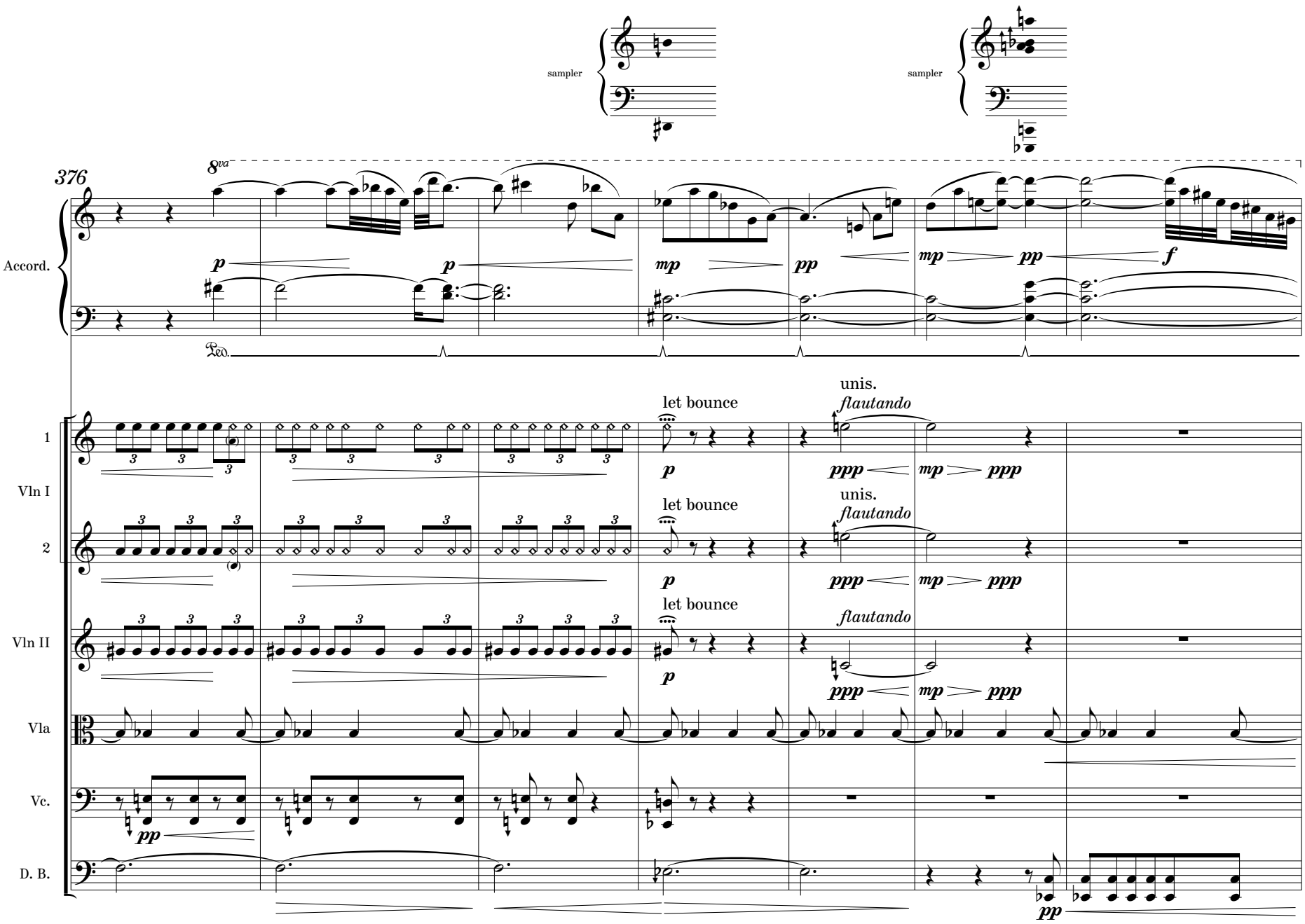

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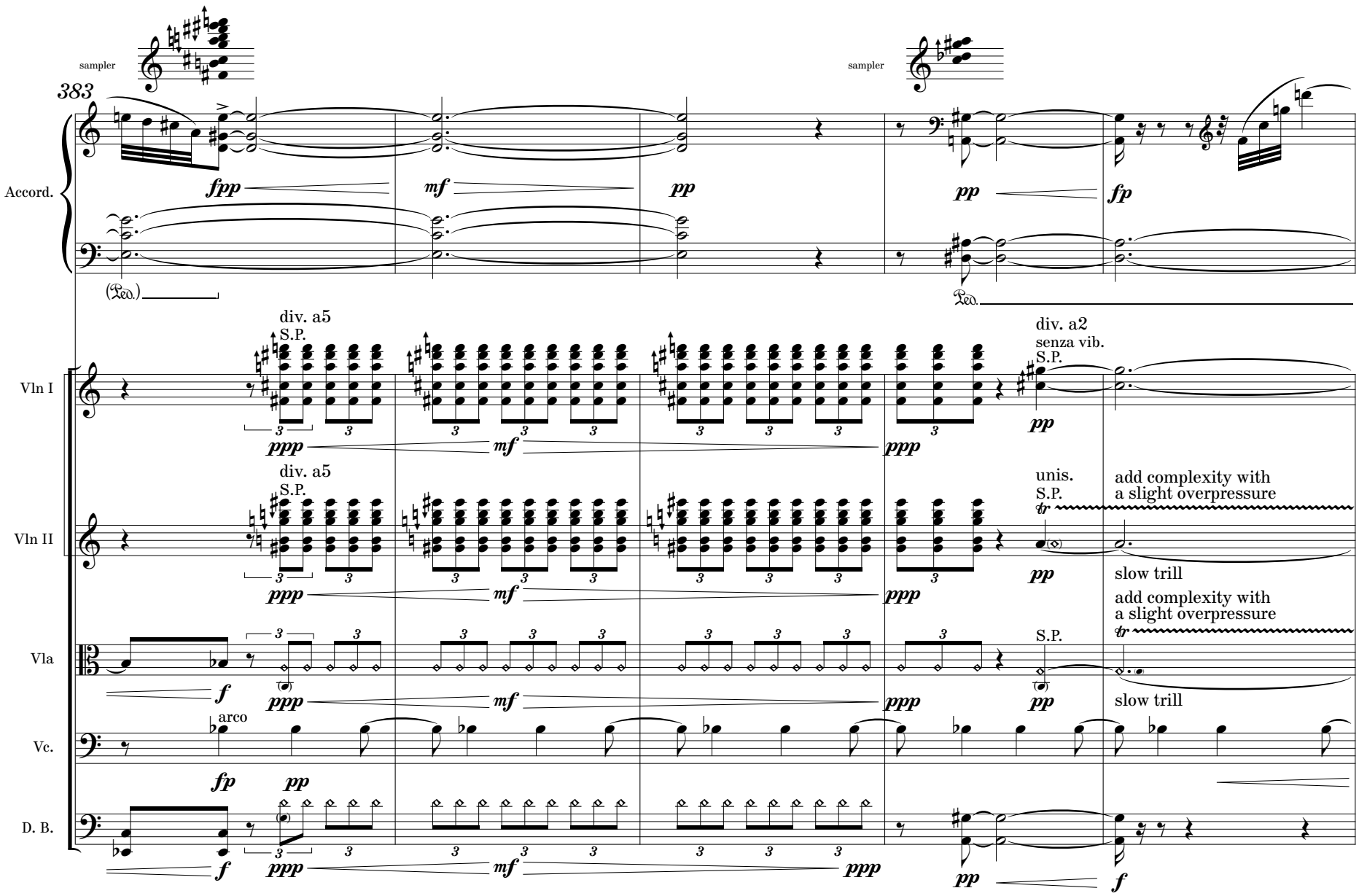

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388

sampler

sampler

sampler

Accord.

Vln I

Vln II

Vla

Vc.

D. B.

S.P. slow trill

vib. ord

S.T.

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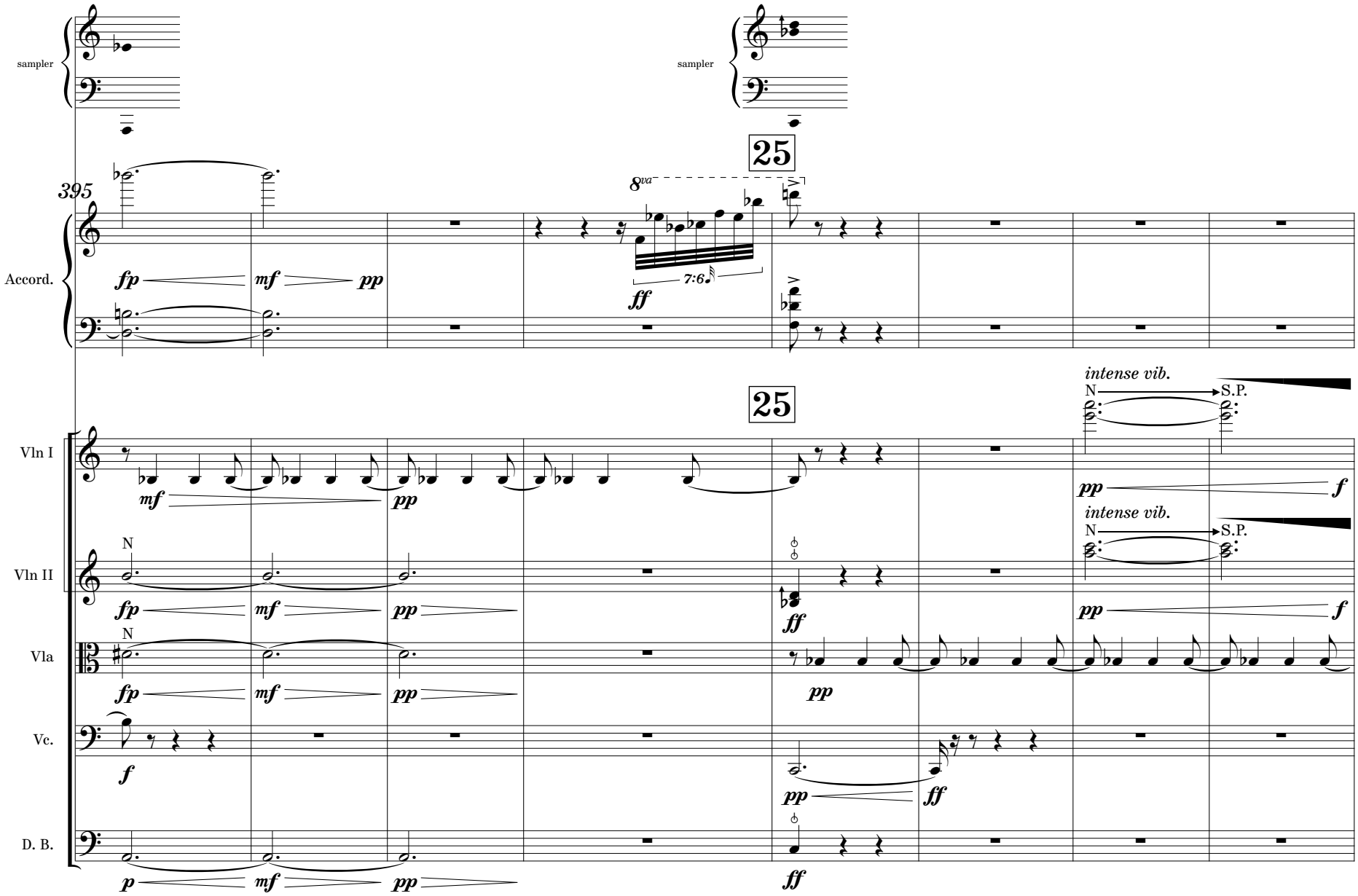

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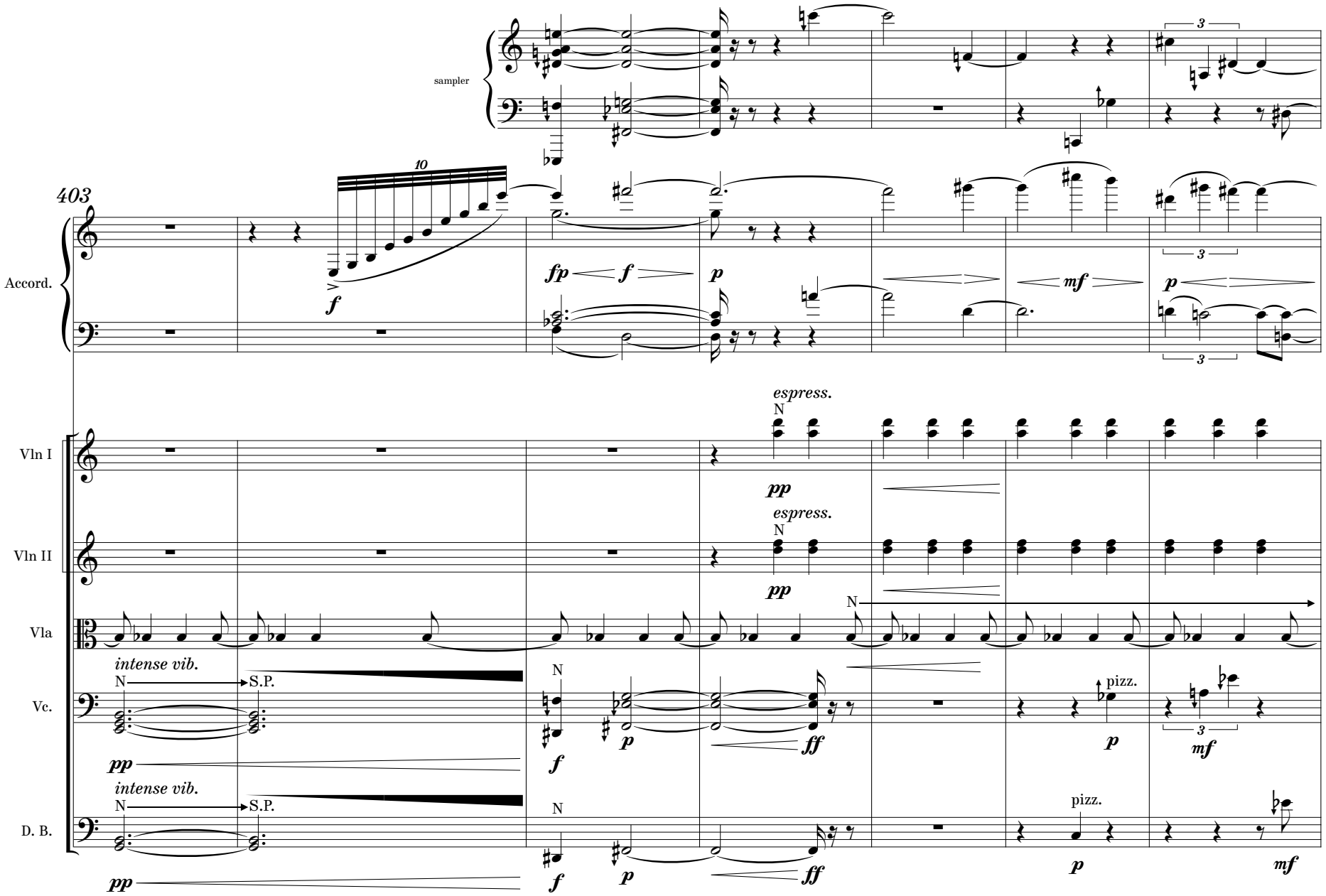

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sampler

26 ♩ = 170

410

differenceCrossH

Accord.

ff

pp

26 ♩ = 170

Vln I

Vln II

Vla

(N) S.P.

Vc.

S.P. arco

2 3 4 5 6

f mp

D. B.

ff

420

ad lib.

Accord.

f

p cre scen do

Ped.

Vln I

scen

scen

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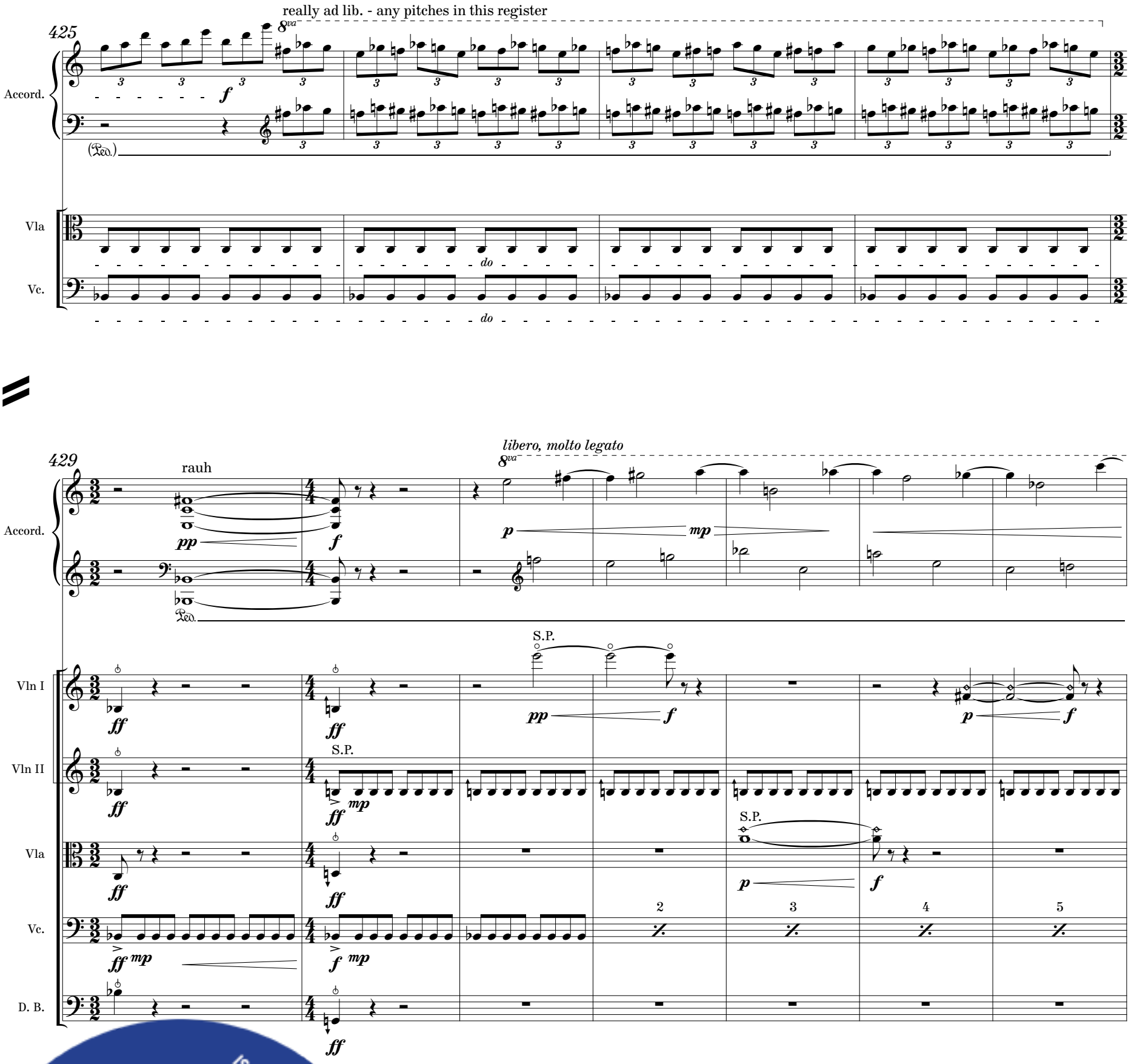

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436
(8)
Accord.
Vln I
Vln II
Vla
Vc.
D. B.
S.P.
arco
443
(S.P.)
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27

448

Accord.

p mp p f

(Ped.)

27

Vln I

Vln II

Vla

Vc.

D. B.

p mf f

mp cresc. mf f

454

Accord.

p f p

air sound

(Ped.)

OPEN

follow conductor for intesity

bow sound

Vln I

Vln II

Vla

p ff p

follow conductor for intesity

bow sound

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ON CUE

28

Accord.

ff

fp

Ped.

ON CUE

28

Vln I

Vln II

Vla

Vc.

D. B.

overpressure

ff

465

Accord.

(Ped.)

Vln I

Vln II

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469

♩ = 86

Accord.

ff

p

♩ = 86

Vln I

N

fff

p

ff

Vln II

N

fff

p

ff

Vla

N

fff

p

ff

Vc.

N

fff

p

D. B.

N

fff

p

473

OPEN

perhaps little solo?
bends?

Accord.

OPEN

Vc.

D. B.

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475

ON CUE

Difference (single hand)

Accord.

Vla

ON CUE

S.P.

tr

S.P.

tr

1
2

Vc.

3

D. B.

478

29

8va

Accord.

29

intenso

Vln I

intenso

Vln II

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482

Accord.

Vln I

Vln II

Vla

1
2
Vc.

3

D. B.

486

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489

Accord.

Vln I

Vln II

Vla

1
2
Vc.

3

D. B.

493

30 ♩. = 90

energetic sul pont.

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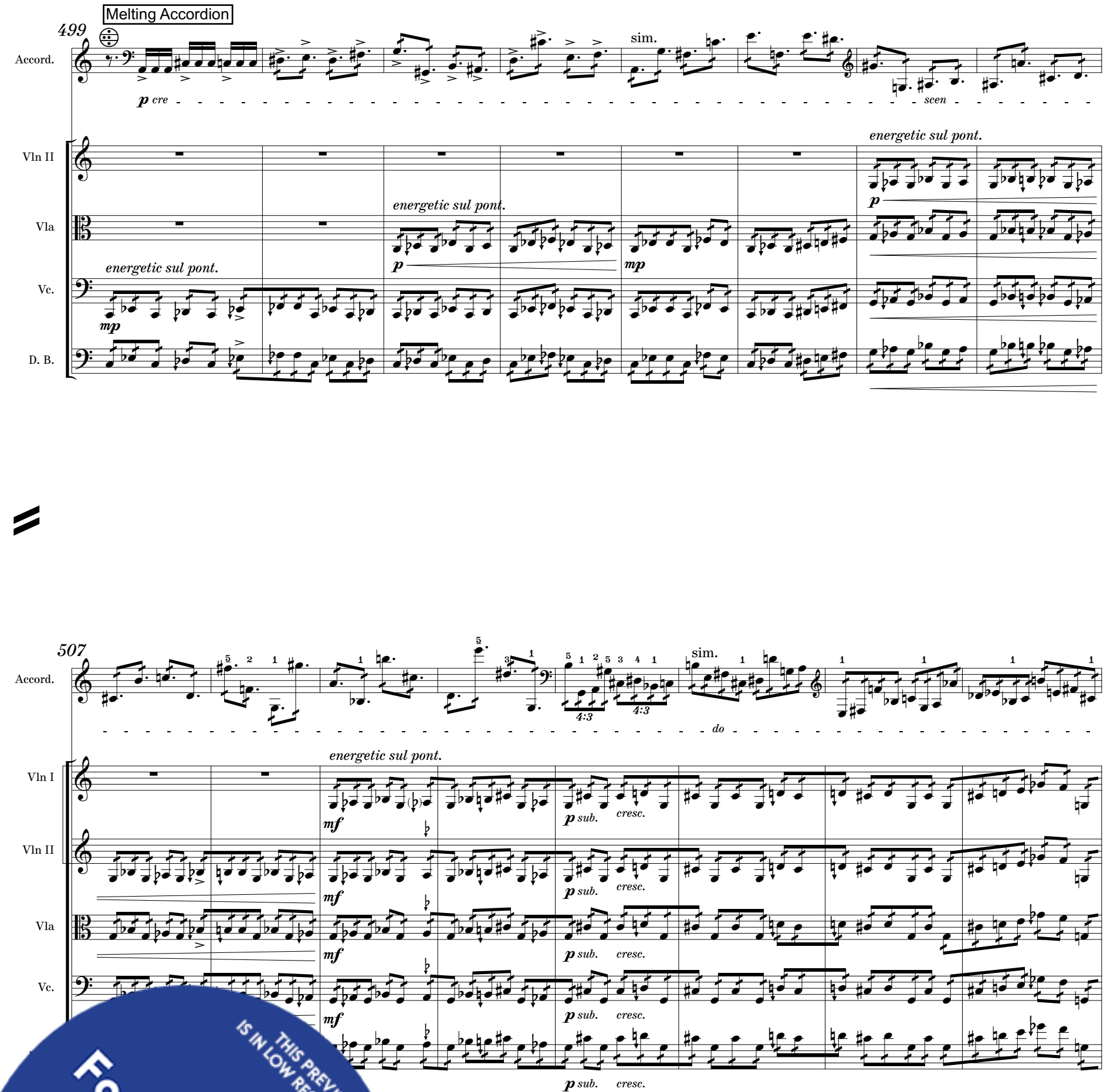

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515

Accord.

Vln I

Vln II

Vla

Vc.

D. B.

IV

520

(IV)

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525

hold acoustic chord until the bellow is fully extended

Accord.

pedal 1: 0%

pedal 2: 0%

pedal 1: 100%

Ped.

Vln I

Vln II

Vla

Vc.

D. B.

ff

530

exact timing of bend ad lib.
aim for perfect blend
bend can start over acoustic chord

optionally shake the fully opened bellow violently for visual effect

OPEN

pp

(pedal 2: 0%)

pedal 2: 100%

(Ped.)

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31

Gliding Overtones

538

ON CUE

Accord.

f

ON CUE

31

Vln I

Vln II

Vla

Vc.

D. B.

N

sempre ***ff***

542

Accord.

Vln I

Vln II

Vla

8va

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545

Accord.

Vln I

Vln II

Vla

Vc.

D. B.

(8)

548

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32

start galloping as if riding a horse

552

cont. sim.

Accord.

32

Vln I

non div.

Vln II

Vla

Vc.

D. B.

33

continue ad lib.

556

Accord.

33

energetic poco sul pont
a bit like distorted electric guitar

Vln I

energetic poco sul pont
a bit like distorted electric guitar

Vln II

energetic poco sul pont
a bit like distorted electric guitar

Vla

energetic poco sul pont
a bit like distorted electric guitar

energetic poco sul pont
a bit like distorted electric guitar

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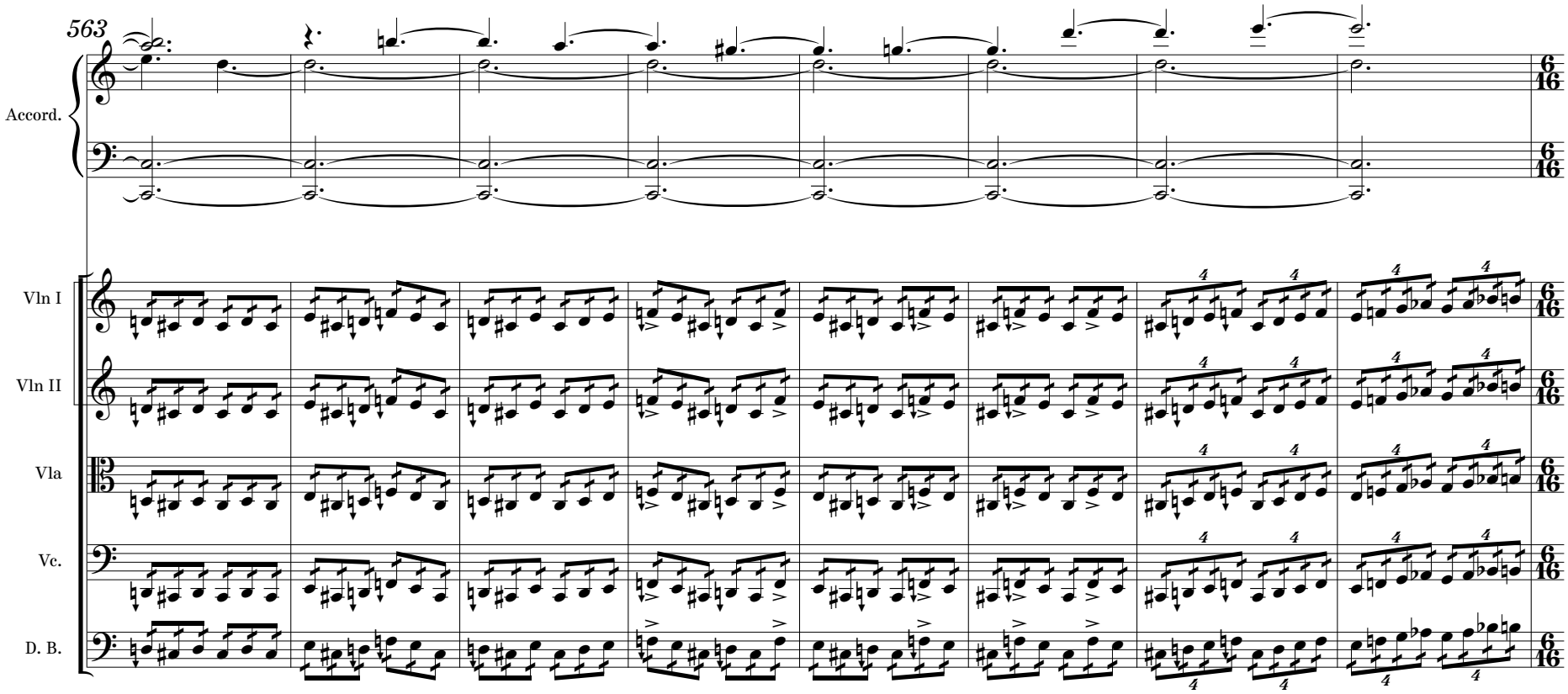

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34

571

Solo with agressive lead
over strings, wild!

Accord.

34

Vln I

Vln II

Vla

Vc.

D. B.

577

OPEN

ON CUE

Accord.

OPEN

ON CUE

Vln I

Vln II

Vla

Vc.

D. B.

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584

Accord.

Vln I

Vln II

Vla

Vc.

D. B.

592

OPEN

ON CUE

cue: strings

ff

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Music Finland

601

35

Gliding O - Palje

Accord.

Vln I

Vln II

Vla

Vc.

D. B.

p cresc.

35

S.P.

p cre

S.P.

p cre

long glissando following approximate registers

606

Accord.

Vln I

Vln II

Vla

Vc.

D. B.

S.P.

p cre

long glissando following approximate registers

scen

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610

Accord.

Vln I

Vln II

Vla

Vc.

D. B.

scen

do

614

8va

ad lib.

f

ff

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617

36 **Rubato** ♩ ≈ 60

rit.

a tempo

rit.

Accord.

ff

Ped.

Ped.

36 **Rubato** ♩ ≈ 60

Vln I

very harsh tremolo, poco sul pont.

follow conductor for intesity

ff

Vln II

very harsh tremolo, poco sul pont.

follow conductor for intesity

ff

Vla

very harsh tremolo, poco sul pont.

follow conductor for intesity

ff

Vc.

very harsh tremolo, poco sul pont.

follow conductor for intesity

ff

D. B.

very harsh tremolo
poco sul pont.

follow conductor for intesity

ff

621

molto rit.

37 **Calming down** ♩ ≈ 50

Accord.

mf

dim. poco a poco

Ped.

Calming down ♩ ≈ 50

37

molto rit.

more gentle tremolo
but with a hint of sul pont.

Vln I

mf

dim. poco a poco

Vln II

more gentle tremolo
but with a hint of sul pont.

mf

dim. poco a poco

more gentle tremolo
but with a hint of sul pont.

mf

dim. poco a poco

more gentle tremolo
but with a hint of sul pont.

mf

dim. poco a poco

more gentle tremolo
but with a hint of sul pont.

mf

dim. poco a poco

more gentle tremolo
but with a hint of sul pont.

mf

dim. poco a poco

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626

Accord.

Vln I

Vln II

Vla

Vc.

D. B.

transform gradually to wind noise
continue ad lib.

repeat and transform gradually
to "breathing" bow noise
--> add sul pont. effects ad lib.

dim.

38

632

wind noise ad lib.

39 ≈ 60

continue wind noise

breathing sound with bow, conducted
bow sound only

switch to con sord. individually

dolce
N con sord.

espress.

"breathing" sound with bow

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641

40 **Dolcississimo** ♩≈ 70

from here to end:
optionally disregard all dynamics and tempos
follow conductor instead and react to soloist

rit......

41 *meno mosso*

Accord.

continue wind noise

cue: strings

from here to end all notes are cue notes

pp

40 **Dolcississimo** ♩≈ 70

from here to end:
optionally disregard all dynamics and tempos
follow conductor instead and react to soloist

rit......

41 *meno mosso*

Vln I

dolce
con sord.

N

p

pp

Vln II

warm and big sound

pp

Vla

"breathing" sound with bow

warm and big sound

pp

Vc.

warm and big sound

pp

D. B.

warm and big sound

pp

652

Accord.

più mosso

improvise on top of strings with right hand only

poco rit.

meno mosso

p

pp

Vln I

più mosso
con sord.

warm and big sound

poco rit.

meno mosso

p

pp

Vln II

p

pp

Vla

p

pp

p

pp

p

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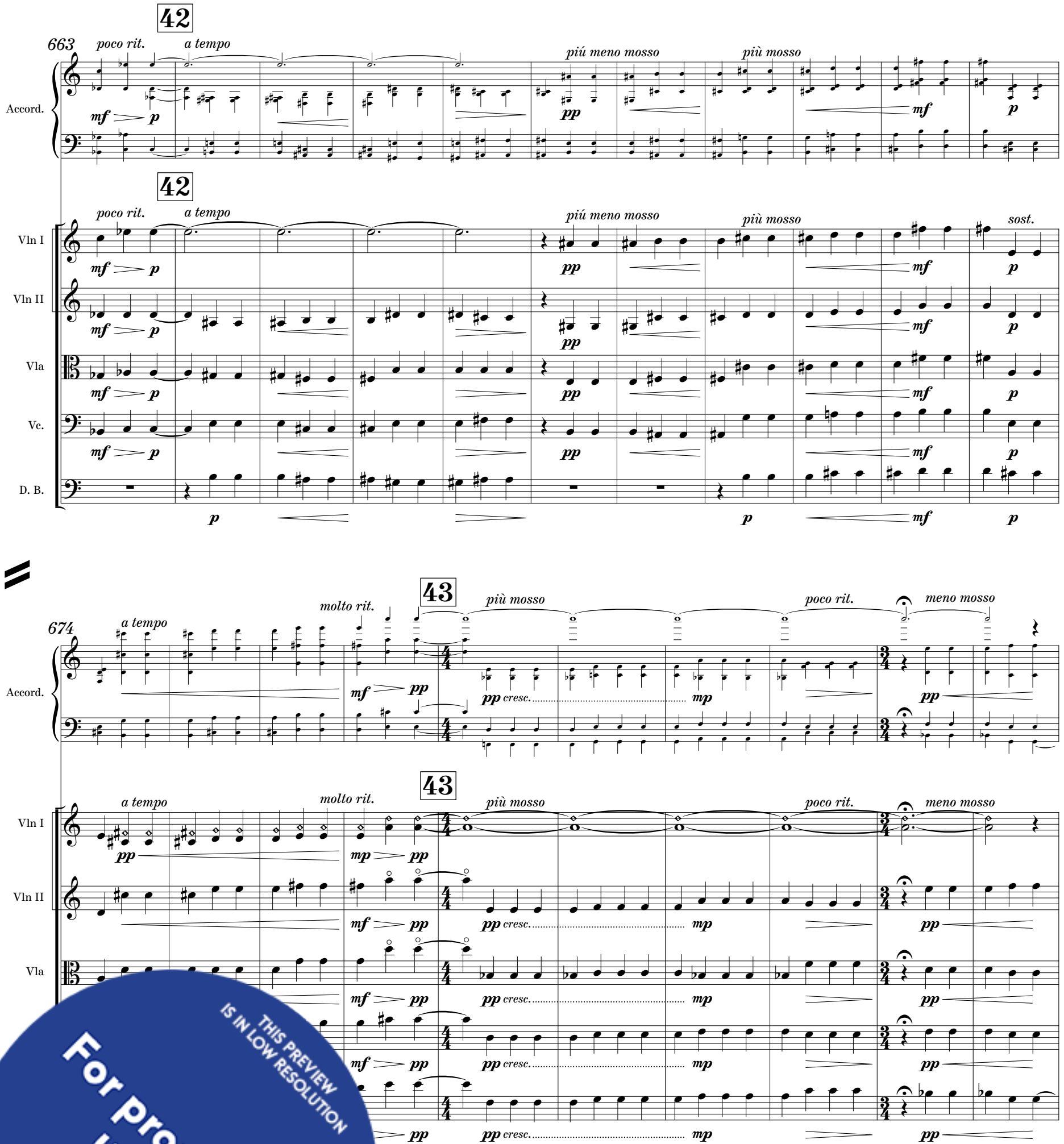

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684

44

molto rit.

a tempo

poco accel.

Accord.

Vln I

Vln II

Vla

Vc.

D. B.

p cresc. mf dim. pp mf p

8va

697

45

poco rit.

(8)

mp

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708

a tempo

Accord.

Vln I

Vln II

Vla

Vc.

D. B.

pp cre scen do f molto espress.

720

molto rit.

end slightly abruptly
...as if waking up
from a dream....

p dolce

dim. pp

rit.

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