# *We Doubled Down The Base Camps*

for violin and cello

for Mira Benjamin and Gregor Riddell

by David Pocknee

Commissioned by Mira Benjamin and Gregor Riddell for *nu:nord* 2016.
First performed on 5 August 2016 at University of Huddersfield and then on 7 August 2016 at Union Chapel, London.

**General**

This work involves two performers listening to each other.
In the first half of the piece, listening to pitch is prioritised.
In the second half of the piece, listening to rhythm is prioritised.
The first half of the piece is in 7-limit just intonation.
The second half of the piece is in equal temperament.
The first half of the work uses conventional rhythmic notation, tempi and simple metric modulations to notate a series of very slow polyrhythms between the two instruments.
When the speed of these polyrhythms become too fast for conventionally-notated metric modulation in the second half of the work, the two players start performing these polyrhythms through an alternative notation.

The change between the first and second half of the piece should be imperceptible to a listener i.e. it should sound like the work is one continuous movement, rather than being in two halves.

The work moves through a sequence of 47 chords.
Each of these chords is based on a set of 10 chords and their inversions (see fig. 3).
These base chords are in 7-limit tuning and are generated using Golumb rulers of order 4 (see fig. 2).
The transition between each chord in the sequence is done by changing one note at a time.
The points in the piece where one of these 47 chords occur are indicated in the score by an italicized letter in brackets above the staff, showing which of the ten source chords (fig. 2) it is based on. This information may help in tuning certain chords.
Most chords in the sequence have two notes in common with the previous one.

There are several simple processes at work over the course of the piece:
(loud=>soft)(low=>high)(slow=>fast)(normale=>sul tasto)(just intonation=>equal temperament)

Changes in bow placement are indicated by a number in a box above the top staff.
Imagine the distance between extreme sul tasto and normale bow positions divided into 8 equal sections, numbered 1 to 8.
1 = extreme sul tasto 8 = normale
Extreme sul tasto should be at the point just before double-stopping becomes impossible, or at the point just above where the left hand would be at its highest position at the end of the piece.

It is suggested that each new rhythmic attack should be accentuated using a change in bowing direction and a small, short increase in dynamics.

This piece has no programme note and none should be printed for performance.
This score should ideally be printed on B4 size paper.

**First half of the piece**

Equals signs (=) underneath staves indicate that the duration of this note is the same as in the previous bar. This may aid understanding some of the metric modulations.
In the first half of this piece, each new note played should not be tuned in equal temperament, but tuned in just intonation in relation to an already-sounding pitch.
When a new note occurs, it is notated in red, the note it should be tuned to is notated in blue, and the ratio between the pitches of the two notes is written above the red note.
Tuning to another pitch should always be the method of playing - digital tuners should not be used.
This way of tuning means that, over the course of the piece, the tuning of the notes will slowly fluctuate to and from equal tempered pitches.
It also means that the pitch notated in the score may not be the closest pitch to the one that sounds. e.g. a middle C in the score may sound closer to a C#, D or B, due to the way in which all of the tuning is relative and not absolute.

**Second half of the piece**

In the second half of the piece, the rhythmic notation changes to mirror the relational approach to pitch seen in the first half, whilst the pitch content moves to equal temperament.
This section of the work is in proportional rhythmic notation.

In the notation in this section, each tuplet is used to establish a new tempi, leading to tuplets nesting inside tuplets inside tuplets etc.
One player will play a pulse, the other player will perform a tuplet over this, which then becomes the new tempi. The first player then plays a tuplet over this new tempi etc.
Due to the difficulty performing these continually changing rhythms, this section of the piece is split into a series of small sections delimited by repeat marks.
These repeat marks indicate that the section within them can be repeated as many times as needed to effectively establish a new tempi such that the bar that follows can be played correctly.

dp (revised 11-09-2017)

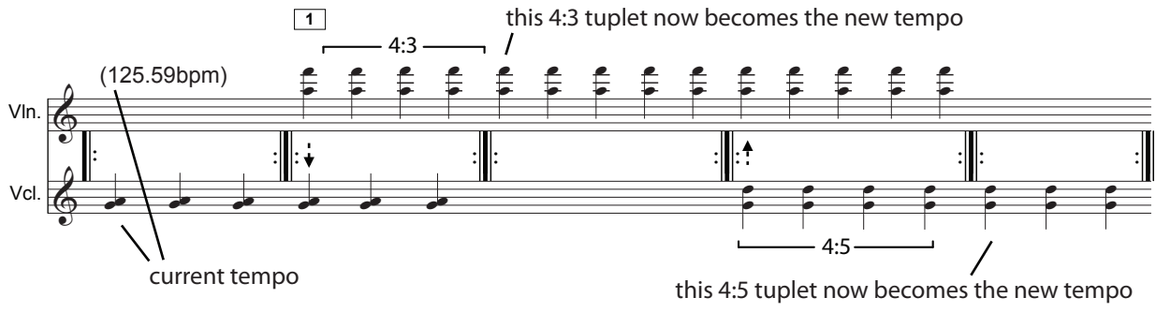


Fig 2. Ratios betweeen the frequencies of each note of the ten chords used in this work, based on Golumb rulers of order 4

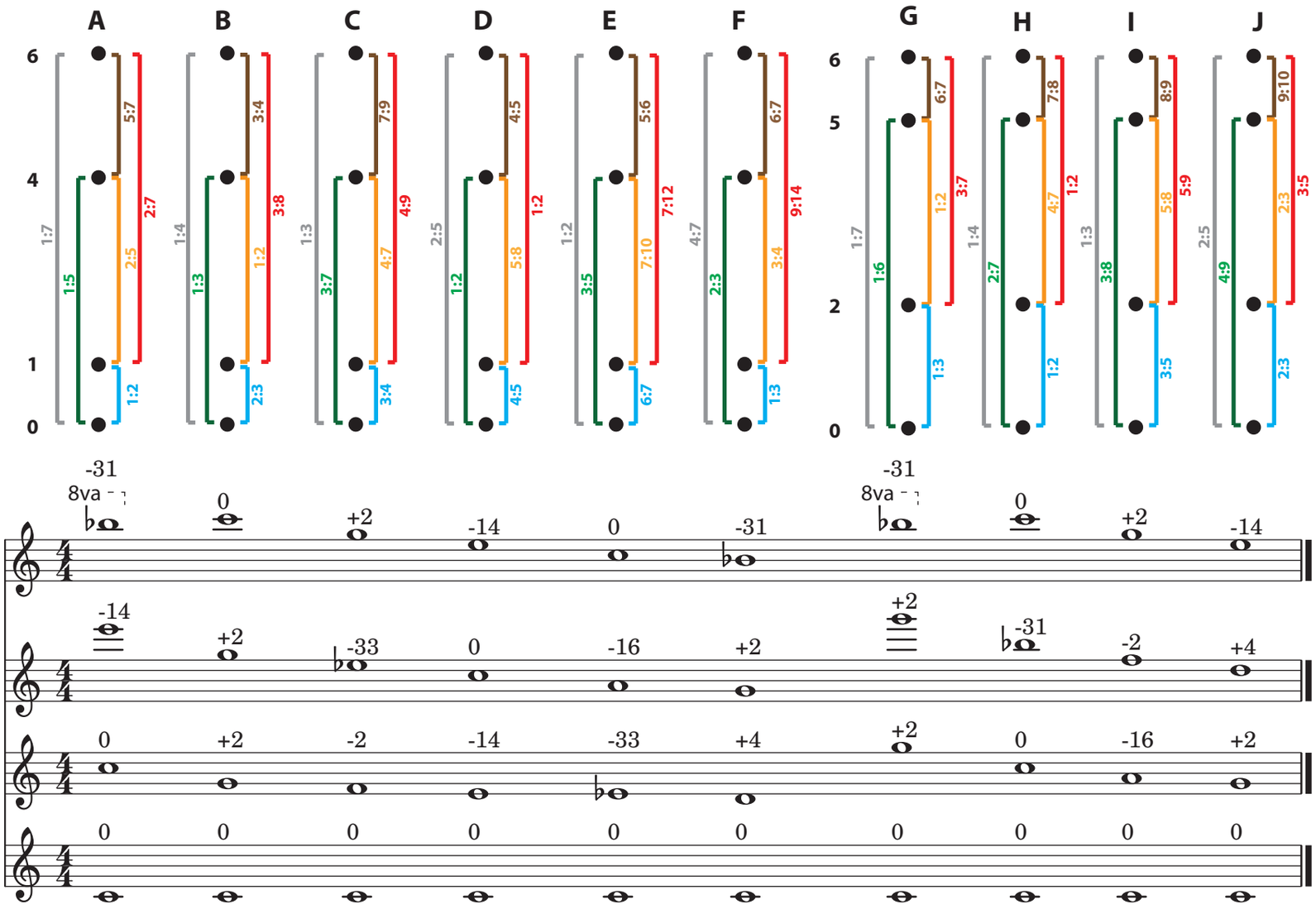



Fig 3. The 10 chords in their original inversions and transpositions.

| Interval name | Ratio | Cents | Deviation |
|---|---|---|---|
| Perfect octave | 2 / 1 | 1200 | 0 |
| ? | 27 / 14 | 1137 | +37 |
| ? | 40 / 21 | 1116 | +16 |
| Maj 7th | 15 / 8 | 1088 | -12 |
| Large min 7th | 9 / 5 | 1018 | +18 |
| Small min 7th | 16 / 9 | 996 | -4 |
| Aug 6th | 7 / 4 | 969 | -31 |
| dim 7th | 12 / 7 | 933 | +33 |
| Maj 6th | 5 / 3 | 884 | -16 |
| Neutral 6th | 80 / 49 | 849 | +49 |
| min 6th | 8 / 5 | 814 | +14 |
| Aug 5th | 14 / 9 | 765 | -35 |
| Perfect 5th | 3 / 2 | 702 | +2 |
| dim 5th | 10 / 7 | 617 | +17 |
| Tritone | 7 / 5 | 583 | -17 |
| Perfect 4th | 4 / 3 | 498 | -2 |
| dim 4th | 9 / 7 | 435 | +35 |
| Maj 3rd | 5 / 4 | 386 | -14 |
| Neutral 3rd | 49 / 40 | 351 | -49 |
| min 3rd | 6 / 5 | 316 | +16 |
| Aug 2nd | 7 / 6 | 267 | -33 |
| dim 2nd | 8 / 7 | 231 | +31 |
| Maj 2nd | 9 / 8 | 204 | +4 |
| min 2nd | 15 / 14 | 119 | +19 |
| ? | 21 / 20 | 84 | -16 |
| dim 2nd | 50 / 49 | 35 | +35 |
| Unison | 1 / 1 | 0 | 0 |

Fig 1. Reference chart of 7-limit tuning. Commonly used intervals in the piece are highlighted in light grey.

# We Doubled Down The Base Camps

*for Mira and Gregor*

David Pocknee

Violin

Violoncello

♩=75

8

mf

2:1 (+0)

8

mf

5:1 (-14)

(A)

7:1 (-31)

7

Vln.

Vcl.

3:1

3:4

6:7

13

Vln.

Vcl.

5:3 (E)

2:3

(F)

3:1

1:2

7

3:8

3:4

21

Vln.

Vcl.

6:7 (G)

8:3

1:2

25

Vln.

Vcl.

5:3 (I)

3:4

(C)

7:9

mp

29 7 3:2 (F) (G) 4:5
Vln.
4:3 1:2 7:16
Vcl.

37 (D) 3:2 6 3:4 (J) (C)
Vln. mp
1:2 2:3
Vcl.

42 (J) (F) 3:2 (J)
Vln.
3:8
3:4 1:2 6 3:10
Vcl.

50 7:12 (G) 3:2 (C) ♩=93.75 (♩♪ = ♩) 3:2
Vln. p
1:2 3:4
Vcl. =

58 (J) 2:1
Vln.
3:10 7:12
Vcl.

65

Vln.

Vcl.

♩=62.5 (♩. = ♩)

(F)

(I)

♩=50 (♩ = ♩♪)

(J)

5

5 12:7

5:12

1:3

4:5

p

70

♩=100 (♪ = ♩)

7:12 (J)

8:3

5:4 (I)

81

3:2

(C)

♩=66.67 (♩. = ♩)

(G)

7:9

3:2

1:4

2:3

87

♩=111.11 (♩ = ♩♪³)

(C)

4

♩=74.07 (♩. = ♩)

7:9

3:2

97

(G)

3:2 (F)

♩=98.77 (♪³ = ♩)

3:4

3:2 (C)

3:2

4:5

3:2

pp

106
♩=41.15
3:2
♩=65.84 (♩. = ♩)
(F)
Vln.
Vcl.
4
1:3

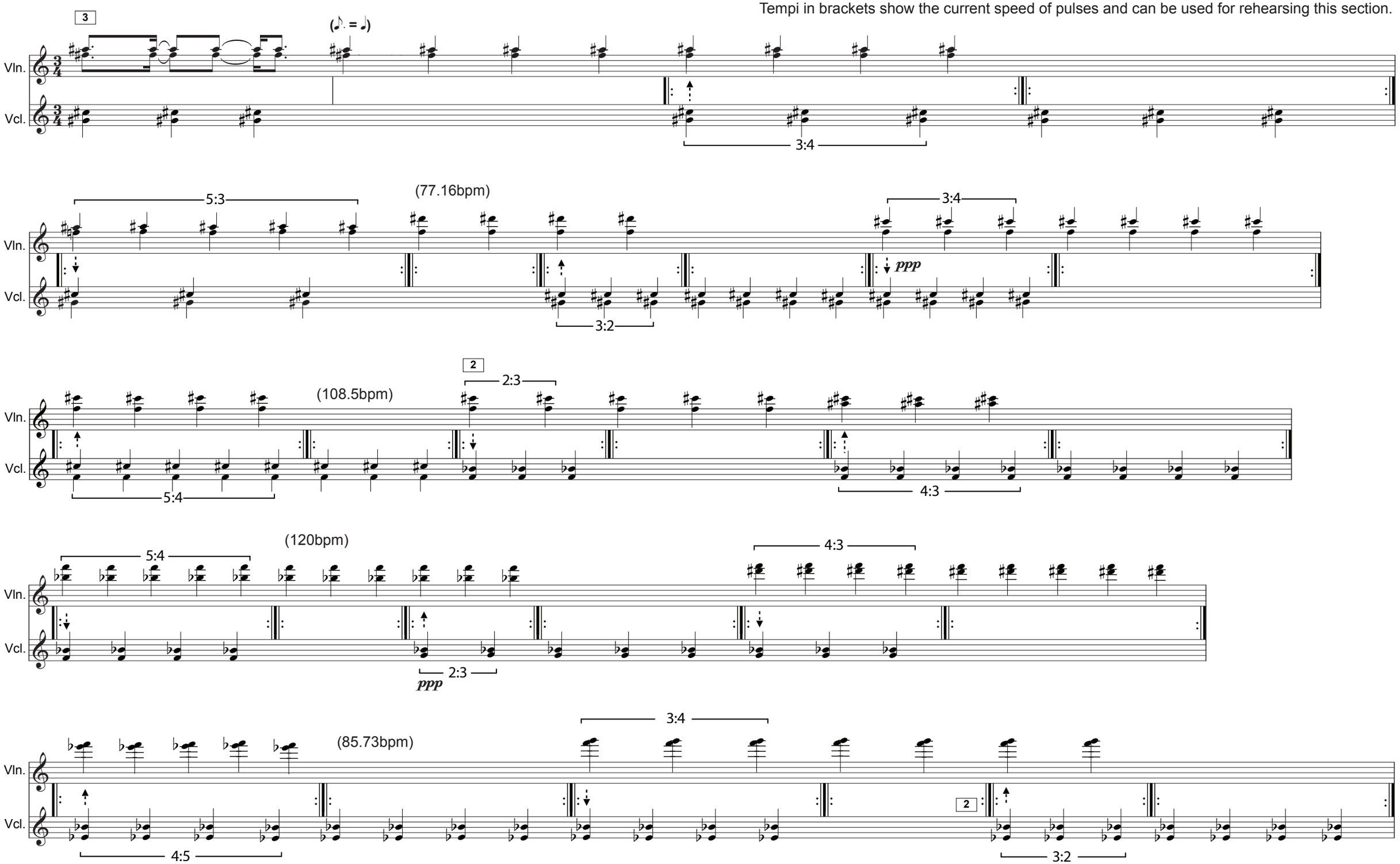
109
♩=98.77 (♪³ = ♩)
♩=74.07 (♪♪³ = ♩)
4:3
(B)
12:7
Vln.
3:4
Vcl.

113
♩=92.59 (♪♪ = ♩)
(B)
♩=41.15 (♩.♪. = ♩)
1:2
(E)
Vln.
5:8
7:12
pp
3:10
3
3:4
Vcl.

121
2:3
(E)
♩=49.38
Vln.
3:5
1:2
Vcl.

129
♩=37.03 (♪³ = ♩)
(I)
♩=61.73
Vln.
3:4
5:3
Vcl.

The following two pages are written in proportional notation and use a process of metric modulation whereby tuplets are nested within tuplets.
Sections between repeat marks should be repeated as few times as possible to allow a successful modulation.
Additionally each note changed from this point on should be in equal temperament.
Tempi in brackets show the current speed of pulses and can be used for rehearsing this section.



(120.56bpm)

5:4

3:4

2:3

Vln.

Vcl.

(90.42bpm)

5:4

2:3

1

3:2

4:3

(134bpm)

5:4

2:3

4:3

3:4

3:2

1

4:3

(125.59bpm)

2:3

4:3

4:5

3:2

3:2

5:4