

# TRACING THE CREATIVE PROCESS A CASE STUDY OF BOB BERG'S SOLO ON "ANGLES"

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# AIMS

1. Attempt to reconstruct the creative process during jazz solo improvisation using all available data from the musical surface.
2. Show-case all or most computational tools and techniques developed by the Jazzomat Project.
3. Integrate classical and computational analysis methods.
4. Provide a blueprint for further case studies. (Many case studies make a quantitative study...)

# BOB BERG

- Bob Berg (1951–2002), was an eminent postbop tenor sax player from Brooklyn, New York, of Italian-Jewish origin.
- Only few information available about his life & personality.
- Started playing sax at age 13, studied at Juilliard, professional at age 18.
- Important collaborations:
  - Horace Silver (1973-76)
  - Cedar Walton (1977-81)
  - Miles Davis (1984-1987)
  - Mike Stern
  - Chick Corea and many others...
- First record as leader: New Birth (1978)
- 12 records as leader in total

# BOB BERG

- Bob Berg was strongly influenced by John Coltrane
- Bob Berg mostly ignored Fusion and Jazz Rock in the 1970's, but became converted after working with Miles
- Berg (1996): "I feel pretty comfortable moving between different areas of music."

- Wikipedia:

*Berg's tenor saxophone sound was a synthesis of rhythm and blues players such as Junior Walker and Arnett Cobb with the lyricism, intellectual freedom and soul of Wayne Shorter, Joe Henderson and John Coltrane.*

# ANGLES

- “Angles” is an Bob Berg original from his 1993 record “Enter the Spirit” (Stretch Records STD-1105).
- Personnel: Bob Berg (ts), David Kiskoski (p), James Genus (b), Dennis Chambers (dr).
- Postbop piece, semi-tonal chord progression, angular melody
- Tempo 270 bpm
- Theme:
  - AA'B(A)
  - A: mostly stop time, B: Latin
- Solos form:
  - AAB
  - A: Latin, B: Swing

# ANGLES - THE SOLO



## Angles

Bob Berg

$\text{♩} = 270$   
 $A\flat^{maj7}$  rhythm\_si ~melody  $C-7$  ~#melody

Musical score for page 1 of 'Angles'. It features a single staff with various musical notations including notes, rests, and dynamic markings. Annotations include:  $A\flat^{maj7}$ , rhythm\_si, ~melody,  $C-7$ , ~#melody, line\_w\_a, melody,  $D\flat^7$ , line\_w\_a, lick,  $A\flat^{maj7}$ , rhythm\_si, ~line\_w\_d,  $C-7$ , lick,  $D\flat^7$ , #+lick, #+lick, #+lick, #+lick, #+lick, #+lick,  $E\flat^7$ , #lick, line\_w,  $F-7$ , ~melody,  $D\flat^7 \#11$ , line\_w\_a,  $G^7 \#9$ , ~melody, line\_w\_d,  $D^7 \#9 \#11 b13$ , line\_w\_a,  $A\flat^{maj7}$ .

2

Musical score for page 2 of 'Angles'. It features a single staff with various musical notations including notes, rests, and dynamic markings. Annotations include: ~melody,  $C-7$ , line\_w,  $D\flat^7$ , #lick,  $E\flat^7$ , line\_w\_a, line\_w\_a,  $A\flat^{maj7}$ , expressive, ~melody,  $C-7$ , ##expressive, line\_w\_d,  $D\flat^7$ , ~line\_a, oscillation,  $E\flat^7$ , #oscillation,  $F-7$ , line\_w\_a,  $D\flat^7 \#11$ , ~line\_i\_dd,  $G^7 \#9$ , line\_w, line\_w,  $D^7 \#9 \#11 b13$ , oscillation,  $A\flat^{maj7}$ ,  $D^7 \#9 \#11 b13$ , oscillation,  $A\flat^{maj7}$ ,  $C-7$ .

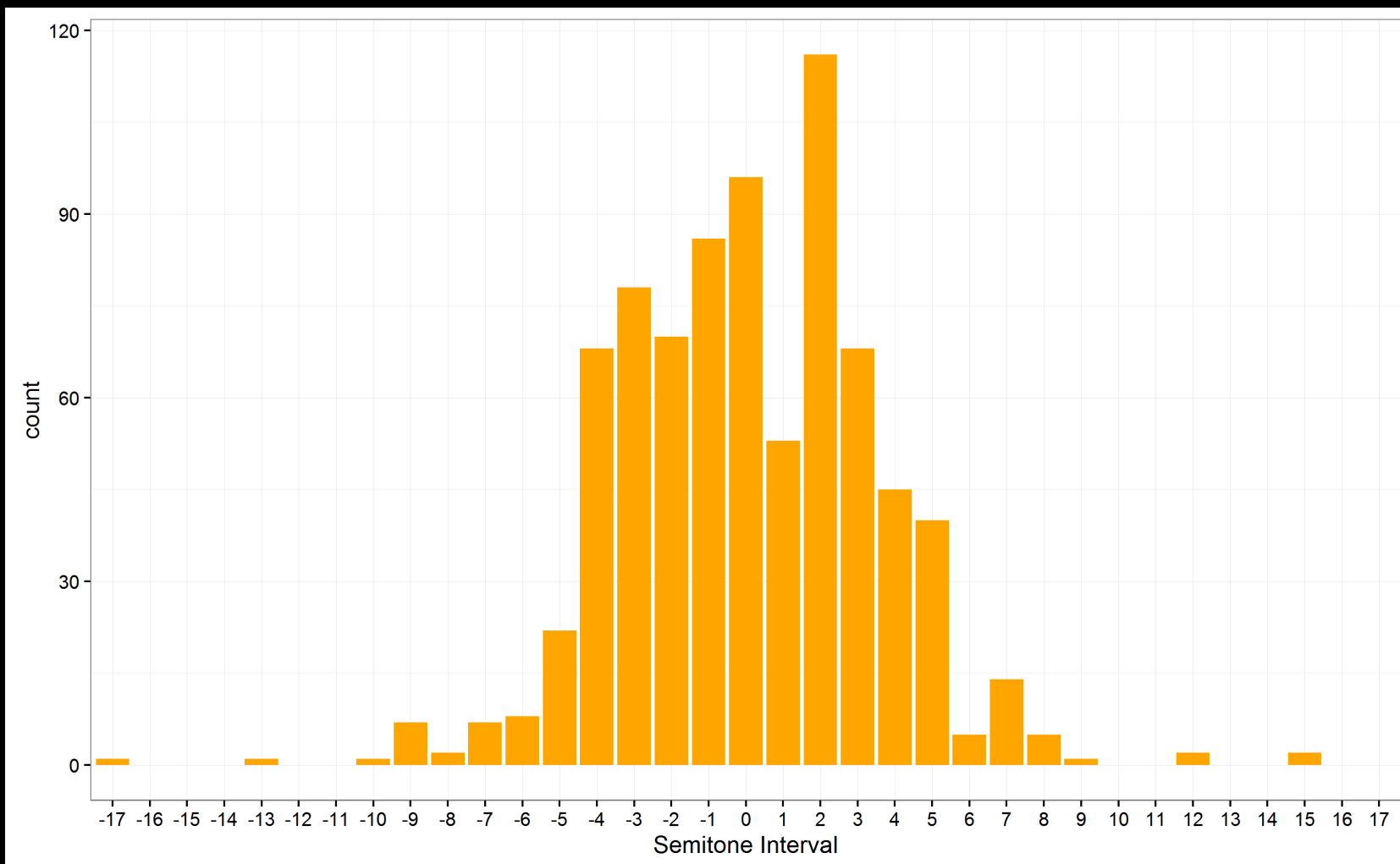
3

Musical score for page 3 of 'Angles'. It features a single staff with various musical notations including notes, rests, and dynamic markings. Annotations include: #oscillation,  $D\flat^7$ , #+oscillation,  $E\flat^7$ , line\_w\_d,  $A\flat^{maj7}$ , line\_w\_a, expressive,  $C-7$ , line\_w,  $D\flat^7$ , line\_w\_d,  $E\flat^7$ , #4line\_w\_a,  $F-7$ , ~#4expressive,  $D\flat^7 \#11$ , #expressive, ~##lick,  $G^7 \#9$ , #10line\_w,  $D^7 \#9 \#11 b13$ , #expressive,  $D^7 \#9 \#11 b13$ , #expressive,  $A\flat^{maj7}$ ,  $C-7$ .

# SOLO STATS: GLOBALS

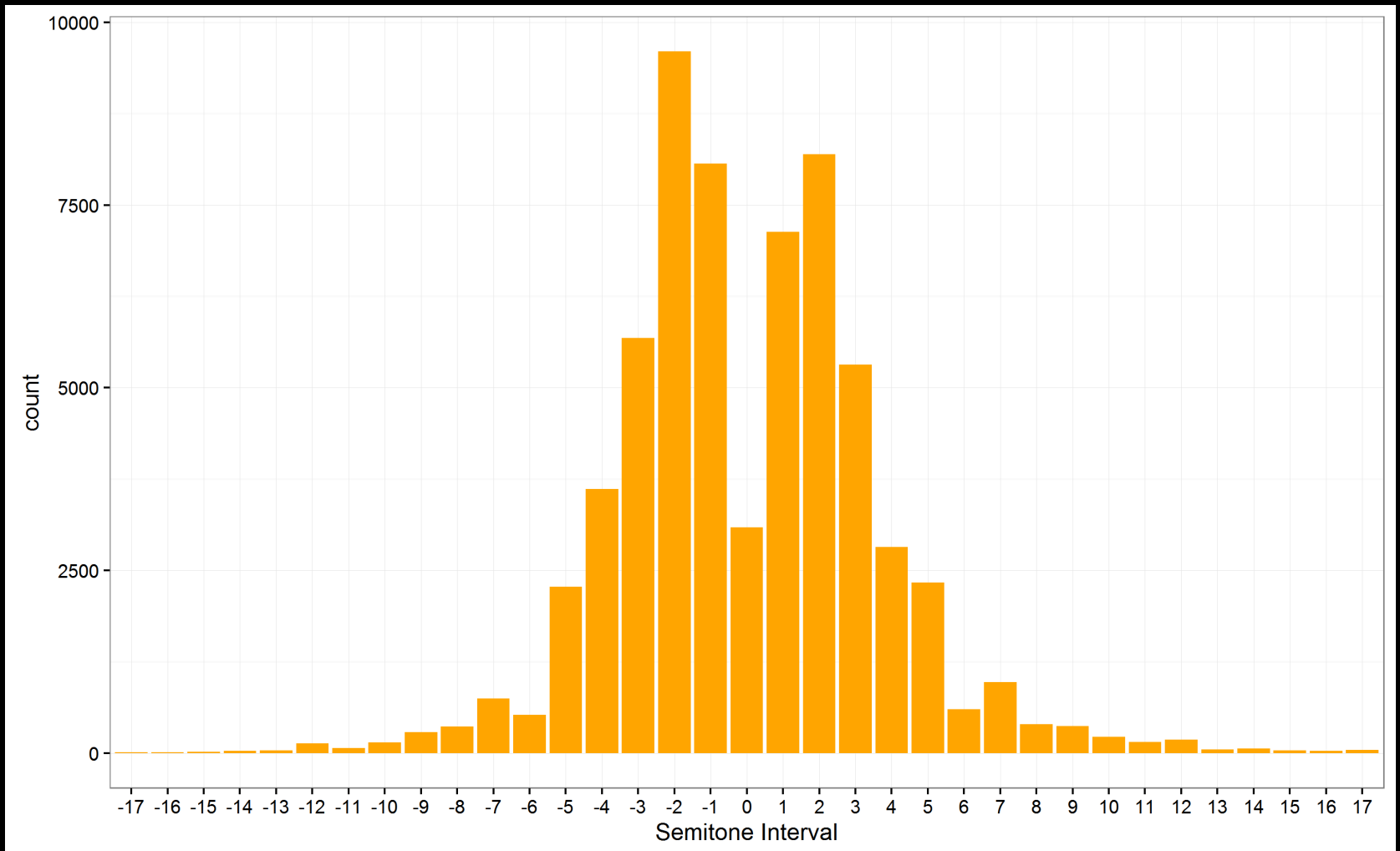
<b>Tempo</b>	270 bpm
<b>Signature</b>	4/4
<b>Key</b>	Mostly Ab-maj
<b>Form</b>	A(16) A(16) B(16), 4 bars chord changes throughout
<b>Chord Changes</b>	A: Abj7   C-7   Db7   Eb7   B: F-7   Db7#11   G7#9   D7alt
<b>Rhythm feel</b>	A: Latin, B: Swing
<b>Lengths</b>	799 tones, 144 bars, 3 choruses, 8 phrases
<b>Duration</b>	127 s
<b>Densities</b>	6.3 tones/sec, 5.6 tones/bar, 21 tones/phrase
<b>Metrical centroid</b>	3+
<b>Start of phrases</b>	42% (beat 3), 13% on 3+, 10% on 1, 10% on 2+
<b>Syncopicity</b>	9.2% (very few)
<b>Ambitus</b>	as-as'' (36 semitones / 3 octaves)

# SOLO STATS: INTERVALS

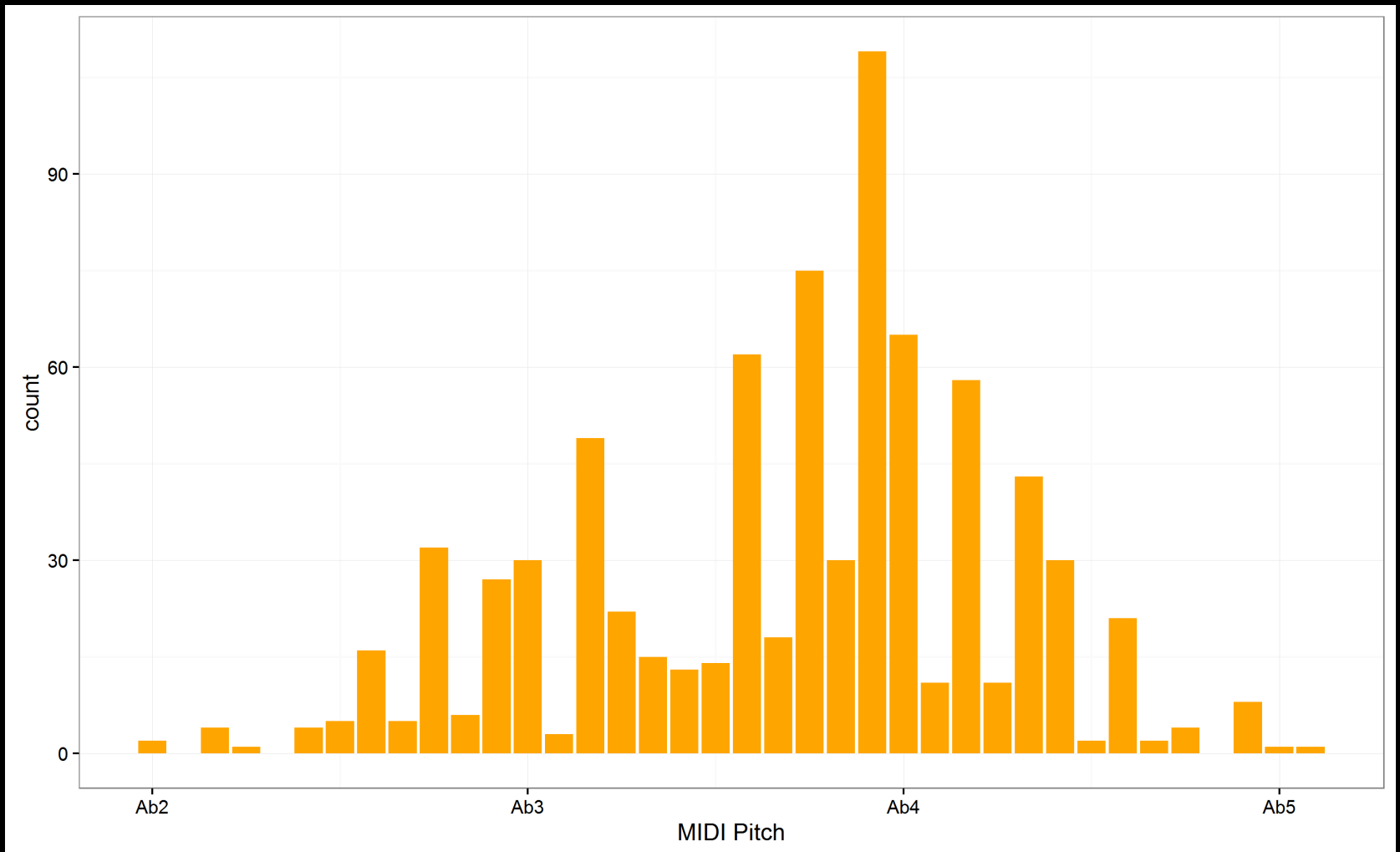




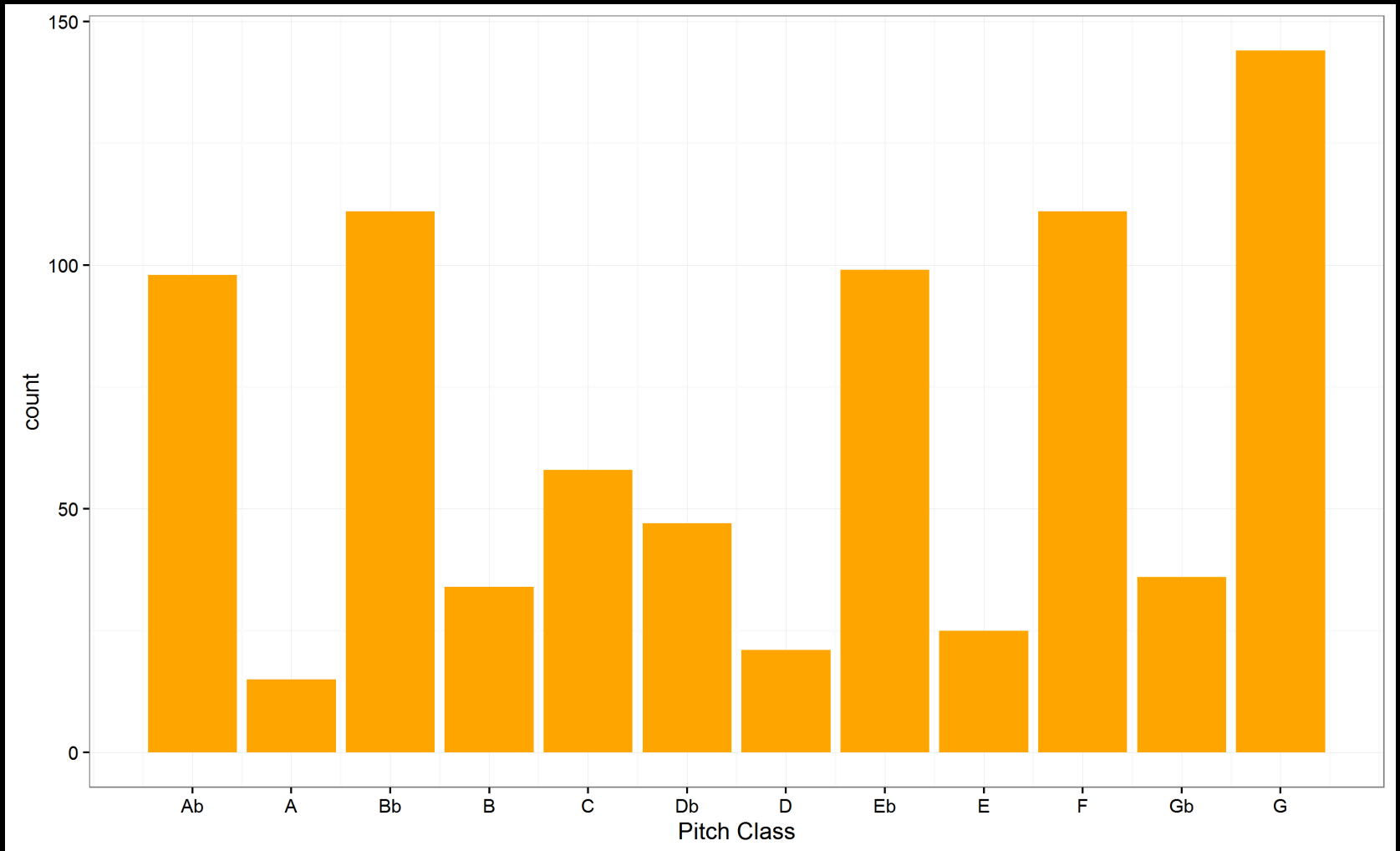
# COMPARISON: INTERVAL TENORS



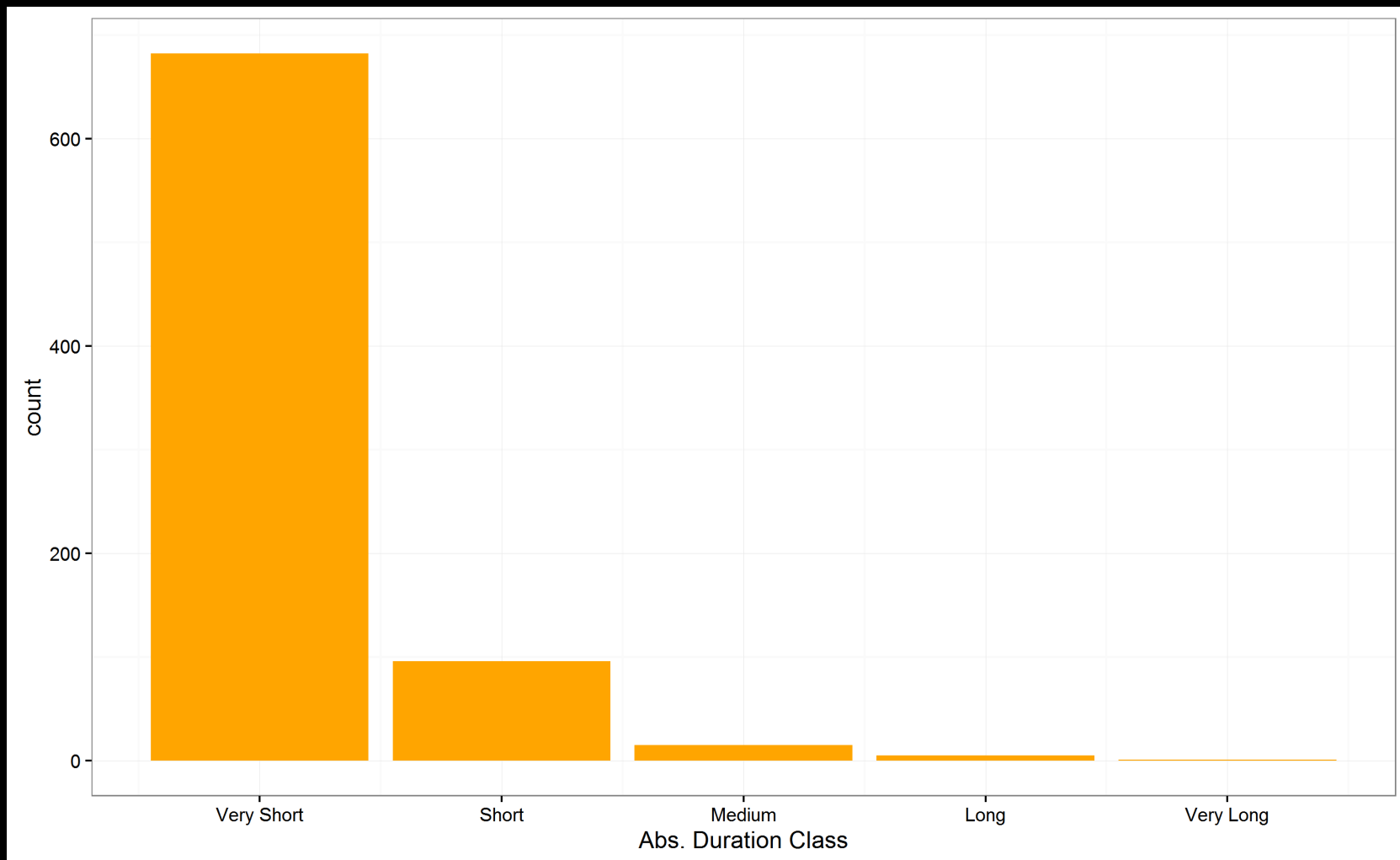
# SOLO STATS: PITCHES



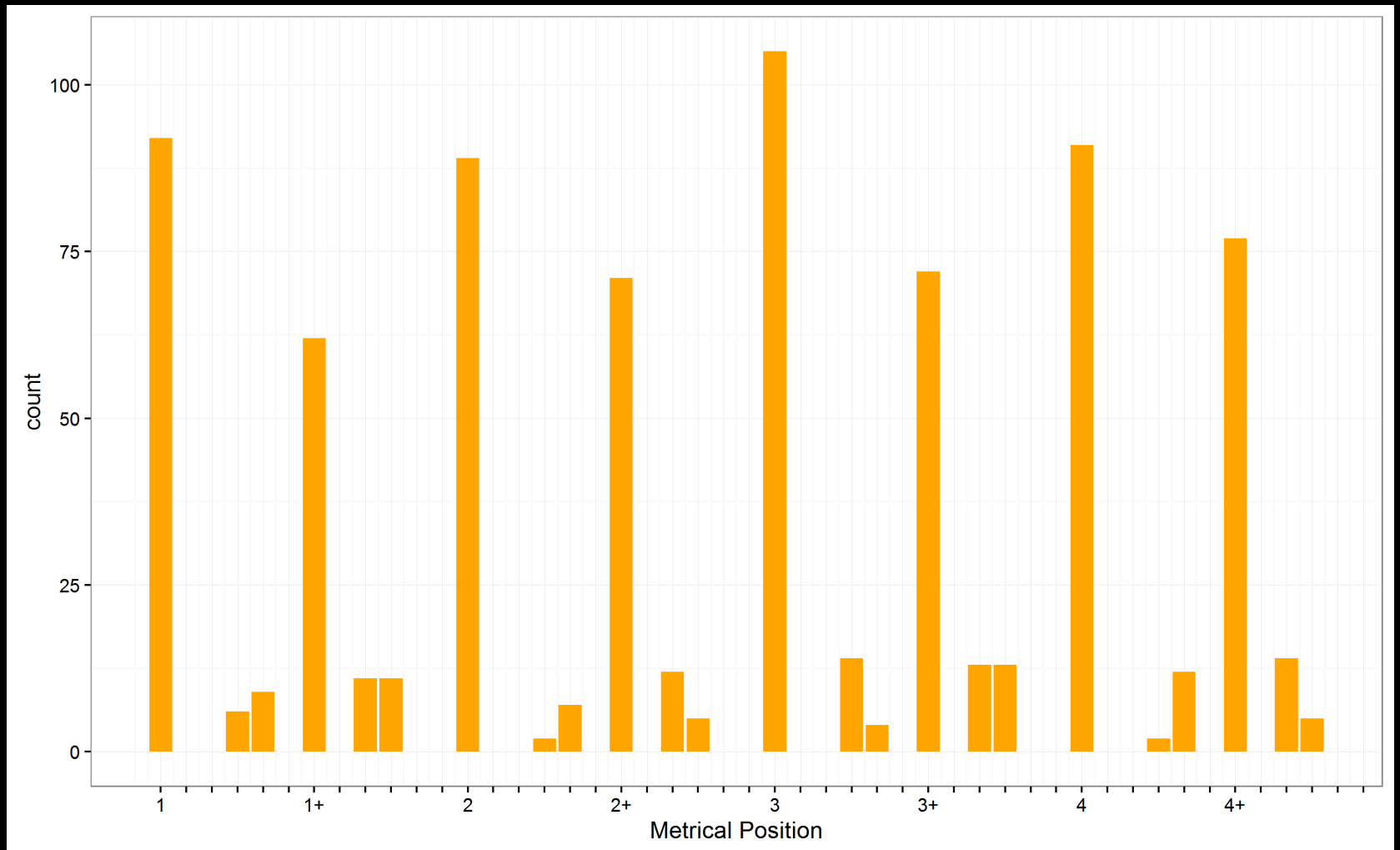
# SOLO STATS: PITCH CLASS



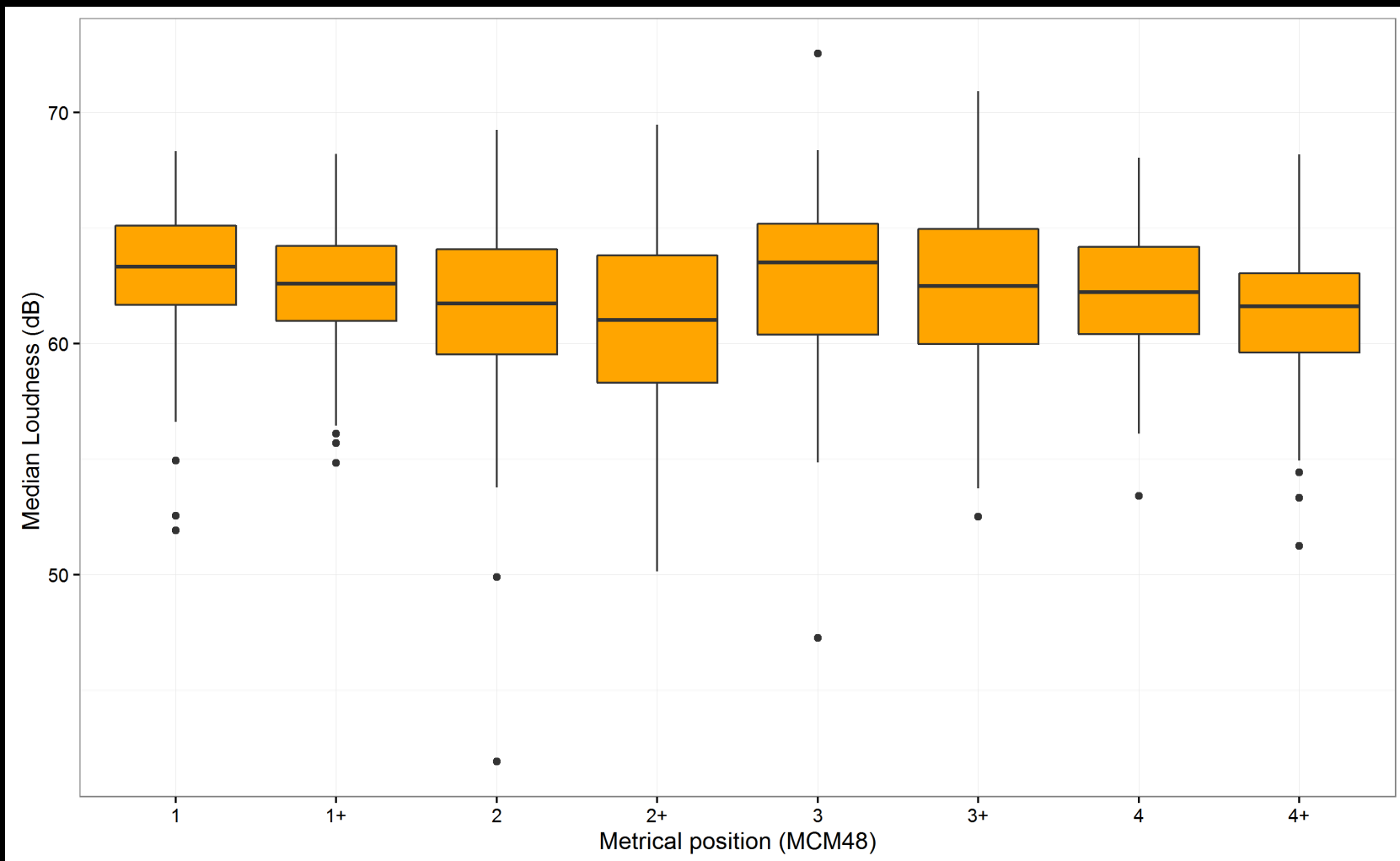
# SOLO STATS: ABS. DURATION CLASS



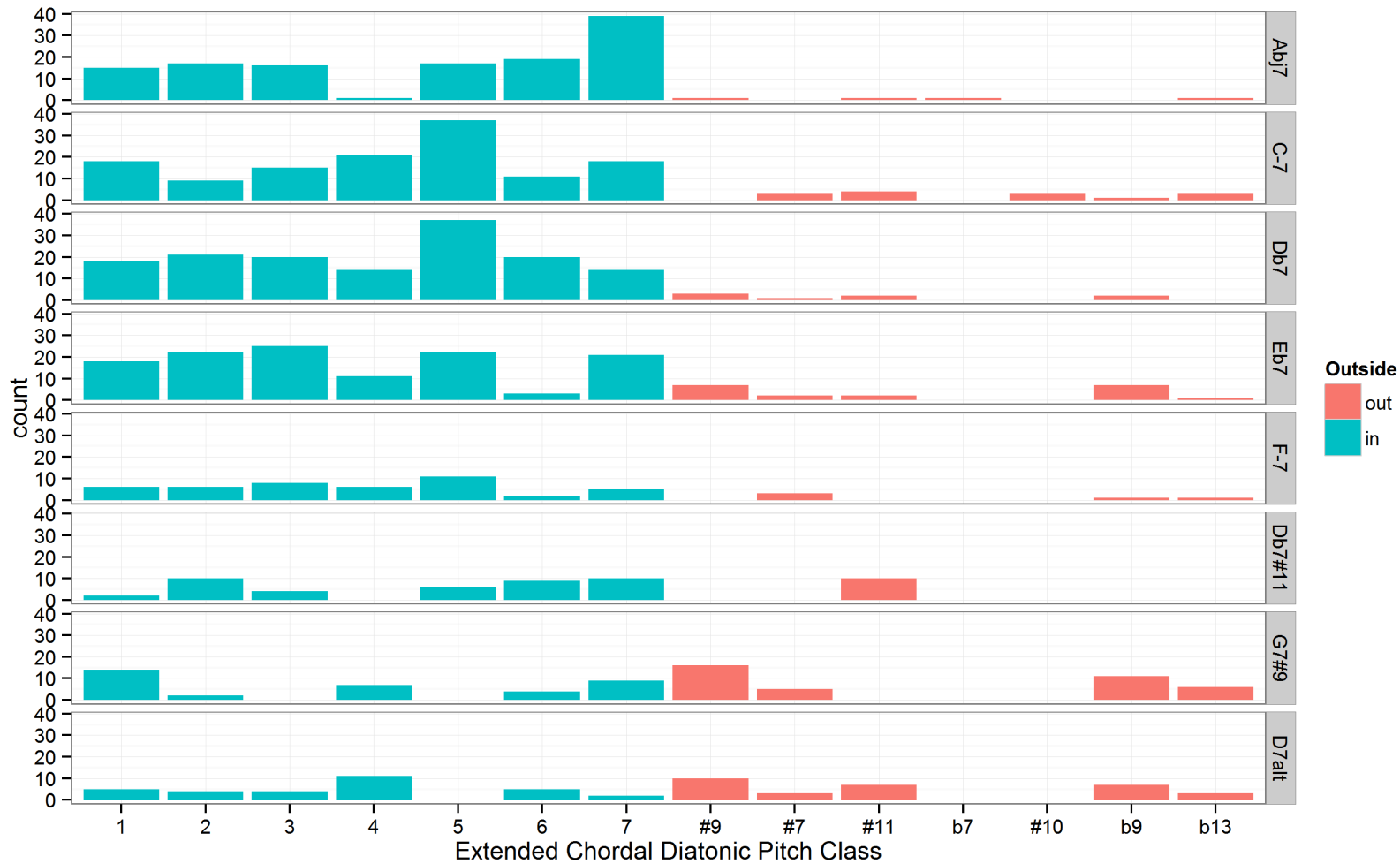
# SOLO STATS: METRICAL POSITIONS



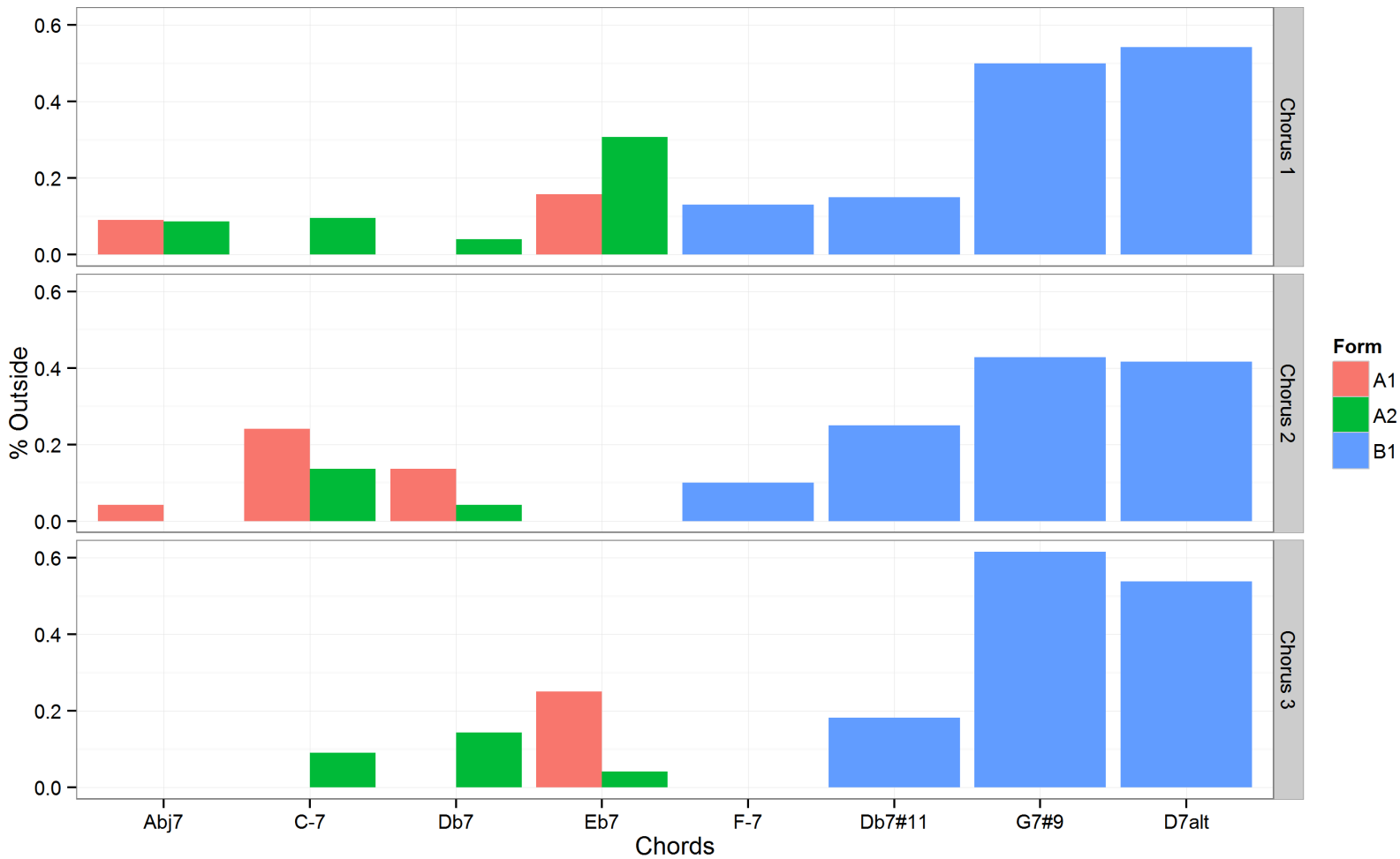
# SOLO STATS: LOUDNESS BY MCM



# SOLO STATS: TONAL CHOICES



# SOLO STATS: TONAL CHOICES





# TONAL CHOICES

- Preferences for “upper structures”.
- E.g., C- over Abj7, “G-7” over C-, F-7b5 over Db7
- Plays outside (mostly Ab-ion) on G7#9 and D7alt at the end of B-part.
- General more outside playing in B-parts.
- Mixes pentatonic, diatonic and highly chromatic passages in lines.

# RE-TELLING THE STORY

- Let's have a run-through the solo again, this time with detailed comments.
- Basic unit of analysis will be the midlevel units.

# MIDLEVEL ANALYSIS (MLA)

- Qualitative annotation with “playing ideas” (Frieler et al., 2016)
- 9 main categories of midlevel units (MLU)
  - **line, licks, melody, rhythm, expressive, theme, quote, void, fragment**
  - +16 sub- and 38 sub-subcategories
- Allows annotation of motivic relationship.
- Every phrase starts a MLU, but phrases can contain more than one MLU (“glueing”).

# RE-TELLING THE STORY

Pos.	MLU	Scale	Comment
m.2-3	rhythm-single/irregular	G4	
m.4-5	~melody	C-aeol	
m.5-7	~#melody	C-aeol	G-7 arp
9-10	line-wavy-ascending	Db-mixo	F-7b5 arps up in zig-zag fashion.
11-13	melody	Eb-mixo	Melody reached after long ascending line. "Piggy tail".
14-15	~lick	Eb-mixo	Strong cadential effect.

# RE-TELLING THE STORY

Pos.	MLU	Scale	Comment
16-17	lick	Eb-mixo	Jumps octave up.
18-19	~rhythm-single/irregular	F4	Short thinking pause.
19-23	~line-wavy-descending	Eb-mixo→C-aeol	Mostly diatonic.

# RE-TELLING THE STORY

Pos.	MLU	Scale	Comment
24-25	lick	Db-mixo	Sequence of licks as broken version of the F-7b5 arps in m.9-10
25	#+lick	Db-mixo	Three-beat pattern, metric shift.
26	#+lick	Db-mixo	Last tone of lick is first tone of next.
26-27	#+lick	Db-mixo	
27-28	#+lick	Db-mixo	
28	#+lick	Db-mixo	Last tone missing.
29	#lick	Db-mixo	Answers last lick, dramatical pause.

# RE-TELLING THE STORY

Pos.	MLU	Scale	Comment
30-34	line-wavy-horizontal	Eb-mixo	Largely chromatic line (“apparatus”). Interesting change to B-part with swing feel middle of line, accompanied by a register change.
35-36	~melody	C-aeol	Line→Melody piggy tail. Stark contrast.
38-40	line-wavy-ascending	Db-mixo#1	Reminds of the Db7 arps before
41-42	~melody	Ab-ion	Line→Melody piggy tail.

# RE-TELLING THE STORY

Pos.	MLU	Scale	Comment
43-46	line-wavy-descending	Eb-mixo	Outside.
47-50	line-wavy-ascending	Eb-WT (?) →Ab-ion	Change to second chorus mid-line.
51-52	~melody	C-minpent	Next „piggy tail“.
53-59	line-wavy-horizontal	Chromatic - > Gb- maj/pent	Longest line
60	#lick	Db-Mixo	More a fragment, echoes small piggy tail of last line. Cf. m. 29



# RE-TELLING THE STORY

Pos.	MLU	Scale	Comment
61-62	line-wavy-horizontal	Eb-mixo	Unusual short arp-line.
63-65	line-wavy-ascending	Eb-mixo	Zig-zagging up.
65-67	expressive	Ab-maj	First <b>expressive</b>
68-69	~melody	C-min	Piggy tailing <b>melody</b> to <b>expressive</b>
69-70	##expressive	C-dor	Sequencing the penultimate <b>expressive</b>
71-73	line-wavy-descending	C-dor/G-aeol	Two octave fall.
73-74	~line-ascending	Db-mixo	Just a scale up to the tonic. Seriously? At least unusual. Intro to the osci.

# RE-TELLING THE STORY

Pos.	MLU	Scale	Comment
75-78	rhythm-multi/regular	Gb-pent	First oscillation. Heating up things a bit.
79-82	#rhythm-multi/regular	Eb-mixo→Ab-ion	Sequencing up first, but then down. Ends with a short piggy tail way up in the sky
83-86	line-wavy-ascending	Ab-ion→Db-mixo#1	Zig-zagging up.
86-88	~line-interwoven-stairs down	Db-mixo#11	Piggy tail after ascending line, between staircase and melody

# RE-TELLING THE STORY

Pos.	MLU	Scale	Comment
89-94	line-wavy-horizontal	Ab-ion	Outside. Mixture of diatonic arps, & scales and chromatic falls.
95-100	rhythm-multi/regular	Ab-ion	Three-beat diatonic mordents get's shortened to 2 beats, highest rhythmic energy.
101-104	#rhythm-multi/regular	C-dor	Changes only Ab→A, spicing things up
105-108	#rhythm-multi/regular	G-majpent	Moving a half-tone up. Possibly the peak of the solo. Bands fires up.

# RE-TELLING THE STORY

Pos.	MLU	Scale	Comment
109-112	line-wavy-descending	Eb-mixo/Chromatic	After a clear mark by the band, we're going back to lines, using the apparatus from m.30.
113-116	line-wavy-ascending	Ab-majpent	Far ranging line from Ab2 → Ab5
116-117	~expressive	C-mintriad	Again a piggy tail after a long ascending line, again on C-min triad.

# RE-TELLING THE STORY

Pos.	MLU	Scale	Comment
118-121	line-wavy-horizontal	C-blues	A bit cheesy minor blues line.
122-124	line-wavy-descending	Db-mixo	Continues preceding line after a short stop on C/Db7. Mistake?

# RE-TELLING THE STORY

Pos.	MLU	Scale	Comment
126-129	line-wavy-ascending	Eb-mixo	Up-swinging diatonic line with large intervals.
129-132	~expressive	F-aeol	Longest top tone in the solo. Again <b>line</b> → <b>expressive</b> piggy tail, with another piggy tail.
134-135	expressive	Db-mixo#11	Another top tone on #11, a WT higher. Upward sequence of <b>expressive</b> ideas.
135-137	~##lick	Db-mixo#11	<b>Piggy tail</b> to the expressive. Extended version of the piggy tail before.

# RE-TELLING THE STORY

Pos.	MLU	Scale	Comment
138-142	#10line-wavy-horizontal	F-minpent →D-alt	Reminiscence of the last oscillation, but re-mixed into a wavy line.
142-144	~expressive	D-alt	Again expressive piggy tail to a line. Segues into theme after this. Finis.

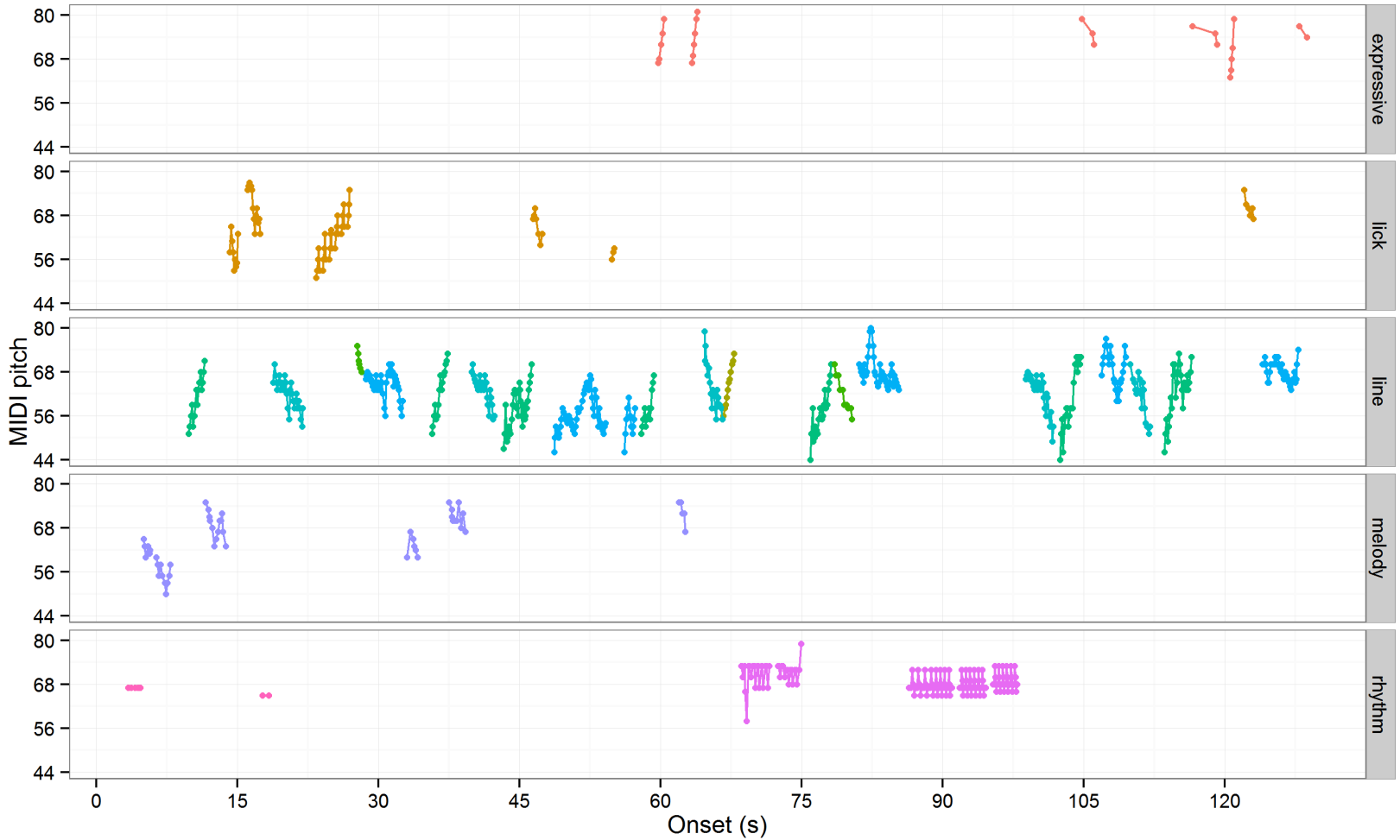
# MIDLEVEL ANALYSIS

- 51 units, 15 glued, 13 derived (mostly immediate).
- Mean duration 2.0 sec/2.75 bars
- Often across form boundaries.
- Also few group of ideas
- Lines can be classified roughly into arpeggios (6/21), diatonic (4/21), chromatic (3/21), and mixed (8/21).

	expressive	lick	line	melody	rhythm	Sum
Count	6	11	21	6	7	51
Tones	24	67	485	50	173	799
Duration (s)	12	9	56	10	19	106

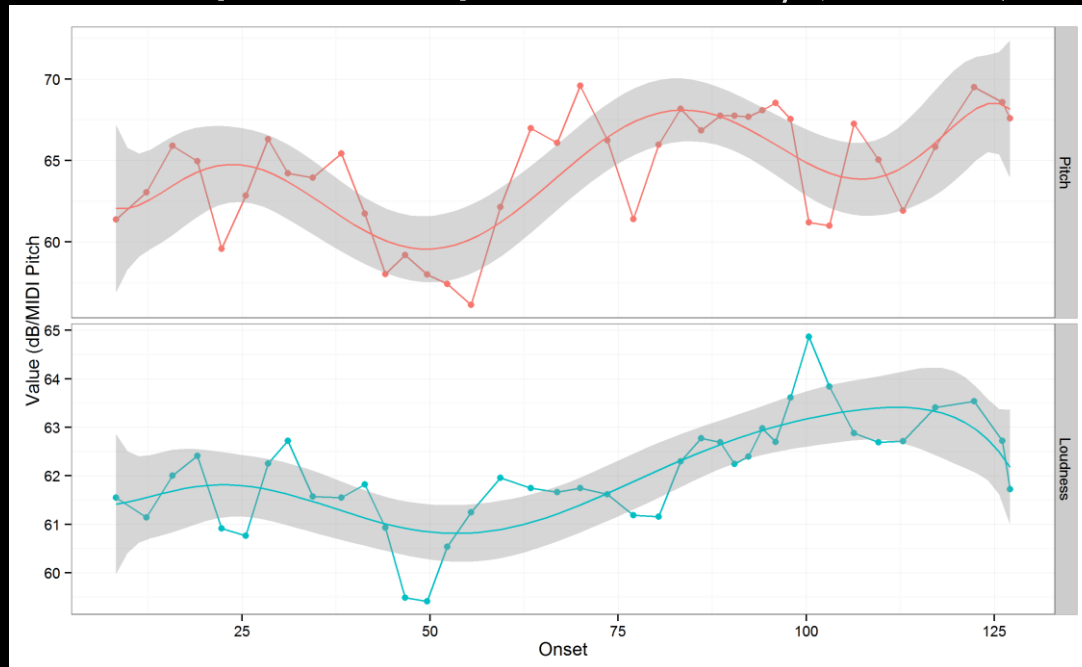


# MIDLEVEL ANALYSIS



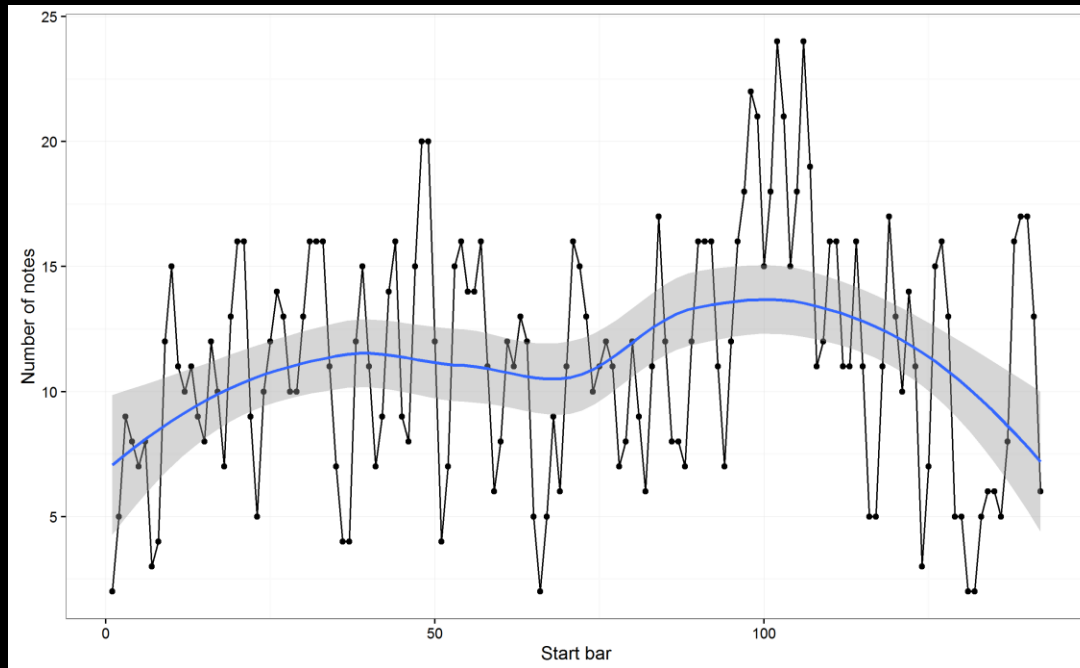
# DRAMATURGY

- Wave-like dramaturgy over three choruses.
- Overall increasing tendency with respect to pitch height and loudness.
- Wave like tendency with respect to notes/(2 bars)



# DRAMATURGY

- Wave-like dramaturgy over three choruses.
- Overall increasing tendency with respect to pitch height and loudness.
- Wave like tendency with respect to notes/(2 bars)



# LINE CONSTRUCTION

- Lines can be classified roughly into arpeggios (6/21), diatonic (4/21), chromatic (3/21), and mixed (8/21).
- Basis building blocks seem to be 4-note/half-bar units

M. 30-33

The image shows two staves of musical notation in 4/4 time, starting with a treble clef and a key signature of three flats (B-flat, E-flat, A-flat). The first staff begins with a speaker icon and a measure of rest. The subsequent measures are grouped into five boxes with labels:
 

- Measure 30: Yellow box, label "→N Chrom" (right arrow, N, Chromatic)
- Measure 31: Blue box, label "↓Chrom" (down arrow, Chromatic)
- Measure 32: Green box, label "→N Penta" (right arrow, N, Pentatonic)
- Measure 33: Purple box, label "↑N Chrom" (up arrow, N, Chromatic)
- Measure 34: Red box, label "↓ 4-Arp" (down arrow, 4-note Arpeggio)

 The second staff starts at measure 35 and is grouped into four boxes:
 

- Measure 35: Yellow box, label "↑ Dia" (up arrow, Diatonic)
- Measure 36: Yellow box, label "↓N Dia" (down arrow, N, Diatonic)
- Measure 37: Blue box, label "↓ Chrom" (down arrow, Chromatic)
- Measure 38: Yellow box, label "↓ Penta" (down arrow, Pentatonic)

- < Arrow: overall direction><zig-zagity><tonality>
- Tonalties: Penta(tonic), Dia(tonic), Chromatic, Arp(eggio)

# PATTERNS

M. 19-22



Musical notation for measures 19-22 in 4/4 time, key of B-flat major. The notation is divided into eight measures, each with a colored background and a label below it. A red box highlights measures 20 and 21.

- Measure 19: →N Penta (Yellow)
- Measure 20: →N Dia (Green)
- Measure 21: ↑N Chrom (Purple)
- Measure 22: ↓ 4-Arp (Red)
- Measure 23: ↓N Dia (Yellow)
- Measure 24: →N Penta (Green)
- Measure 25: ↓ Penta (Yellow)

M. 30-33



Musical notation for measures 30-33 in 4/4 time, key of B-flat major. The notation is divided into two systems. The first system has five measures, and the second system has four measures. A blue box highlights measures 30-31, and a red box highlights measures 32-33.

- Measure 30: →N Chrom (Yellow)
- Measure 31: ↓Chrom (Purple)
- Measure 32: →N Penta (Green)
- Measure 33: ↑N Chrom (Purple)
- Measure 34: ↓ 4-Arp (Red)
- Measure 35: ↑ Dia (Yellow)
- Measure 36: ↓N Dia (Yellow)
- Measure 37: ↓ Chrom (Purple)
- Measure 38: ↓ Penta (Yellow)

M. 43-45



Musical notation for measures 43-45 in 4/4 time, key of B-flat major. The notation is divided into five measures, each with a colored background and a label below it. A blue box highlights measures 43-44, and a red box highlights measures 44-45.

- Measure 43: ↓Chrom (Purple)
- Measure 44: →N Penta (Green)
- Measure 45: ↑N Chrom (Purple)
- Measure 46: ↓ 4-Arp (Red)
- Measure 47: ↓ 4-Arp (Red)

# PATTERNS: CROSS TALK

Angles: M. 43-45

A musical staff in 4/4 time, key of B-flat major. The notation shows a melodic line starting with a quarter rest, followed by a series of eighth notes. A blue box highlights the sequence from the second measure to the fifth measure. The notes in this sequence are: Bb, Bb, Ab, Gb, Ab, Bb, Bb, Ab, Gb, Ab, Bb, Bb, Ab, Gb, Ab, Bb. A speaker icon is located to the right of the staff.

Blues for Bela: M. 43-45

A musical staff in 4/4 time, key of B-flat major. The notation shows a melodic line starting with a quarter rest, followed by a series of eighth notes. A blue box highlights the sequence from the second measure to the fifth measure. The notes in this sequence are: Bb, Bb, Ab, Gb, Ab, Bb, Bb, Ab, Gb, Ab, Bb, Bb, Ab, Gb, Ab, Bb. A speaker icon is located to the right of the staff.

# CREATIVE DEVICES

- Well-crafted dramaturgy, double-arched shaped, overall increasing energy.
- Motivic relationships and sequences create musical logic and coherence.
- Abundance of lines with absences of licks
  - Mostly built from four-tone patterns
  - pentatonic/diatonic, arpeggios, chromaticism
  - Frequent “apparent motion” in a small pitch range
  - Certain long patterns clearly pre-rehearsed, but also present in parts, in recombination and with variations.

# CREATIVE DEVICES

- Frequent “oscillations” with upward sequences, over the Latin B-part.
- „Piggy tails“ (mostly melodoc, simple diatonic figures) after ascending lines.
- Playing „after the chord“.
- Blurring of form boundaries.
- Slightly extended tonality, still rooted in the overall key with outlining of chords.
- Certain but not overwhelming many interactions with the band.



# OUTLOOK

- Work in progress...
- More detailed pattern analysis still waiting.
- Classification of four-tone patterns.
- Finding good ways of pattern content representation.
- Sound, tone formation and articulation to be included.
- More case studies.