

Towards the analysis of linear aspects in tonal jazz harmony

Michael Kahr, University of Music and Performing Arts in
Graz, Austria

Towards the analysis of linear aspects in tonal jazz harmony

1. Brief contextual discussion
2. Method for the analysis of voice-leading events
3. Report of ongoing exploration of MeloSpy software

Examples for definition of voice leading in literature

“... das Fortschreiten der einzelnen Stimmen von einem Akkord zum nächsten”

(Frank Sikora, Neue Jazzharmonielehre, 71)

“Unter Stimmführung versteht man die Richtung, die ein bestimmter Ton einschlagen will”

(Mark Levine, Das Jazztheoriebuch, 20)

“Voice leading refers to the creation of smooth motion between inner voices by maintaining adjacent tones when moving from one chord to another”

(Robert Rawlins/Nor Edine Bahha, Jazzology, 70)

Diatonic guide tone line

The image shows a musical score for a diatonic guide tone line in 4/4 time. The chords are: Cmaj7, Fmaj7, Bm7(b9), Em7, Am7, Dm7, G7, and Cmaj7. The notation includes treble and bass staves. The treble staff shows the guide tones (3rd and 7th) for each chord, connected by ties. Arrows indicate diatonic whole steps between the 3rds of adjacent chords, and green lines indicate diatonic half steps between the 7ths of adjacent chords. The bass staff shows the bass notes for each chord.

Tie: sustained voice

Arrow: diatonic whole step

green line: diatonic half step

Chromatic guide tone line

The image shows a musical score for a chromatic guide tone line. The score is written in 4/4 time and consists of two staves: a treble staff and a bass staff. The chords are labeled above the treble staff: Cmaj7, Gb7, Fmaj7, Bb7, Em7, A7, Dm7, Db7, and Cmaj7. The treble staff contains a melodic line with various annotations: a tie between the first and second measures, a red line connecting the 3rd and 4th notes, a black arrow pointing from the 4th note to the 5th, a red line connecting the 5th and 6th notes, a black arrow pointing from the 6th note to the 7th, a green line connecting the 7th and 8th notes, and a black arrow pointing from the 8th note to the 9th. The bass staff contains a simple bass line with notes corresponding to the chords.

Tie: sustained voice

Arrow: diatonic whole step

green line: diatonic half step

red line: chromatic half step involving non-diatonic material

Literature

Frank Sikora, neue Jazzharmonielehre

Mark Levine, Das Jazztheorie Buch

Robert Rawlins and Nor Edine Bahha, Jazzology

Rayburn Wright, Inside the Score

Ken Pullig and Dick Lowell, Arranging for Large Jazz Ensemble

Bill Dobbins, Jazz Composing and Arranging: A linear Approach

“... a clear and economical conception of arranging and composing in a jazz idiom”, by giving “each instrument in the ensemble a line, which is as melodic as possible ... to obtain a richer, more colorful sound”.

“First, when each musician in the ensemble has a part which makes musical sense and is fun to play, everyone will be able to play the music with more enthusiasm and conviction. Second, when individual lines move in a clear and convincing manner, the fabric of the music is stronger and richer.”

(Bill Dobbins, *Jazz Arranging and Composing: A linear Approach*, 8)

Clare Fischer (1928 - 2012)

Michael Kahr, *Aspects of Context and Harmony in the Music of Clare Fischer*, PhD dissertation at University of Sydney, 2010

1. International Clare Fischer Symposium at University of Music and Performing Arts Graz, 2010

Linear progression in Clare Fischer's „The Early Years“, bars 95-96

The image shows a handwritten musical score for two staves, treble and bass clef, spanning two bars (95 and 96). The score is annotated with chord symbols and lines indicating voice leading. The first bar (95) starts with an $E^b \text{ sus}^9$ chord. The second bar (96) contains two chords: $E^b 7$ and $A^b M(ma7)$. A curved line connects the top voice of the first chord to the top voice of the second chord, indicating a sustained voice. Straight lines connect the other voices between the two chords, indicating chromatic connections. The bass line shows a chromatic descent from E^b to A^b across the two chords.

Tie: sustained voice

straight line: chromatic connection

Du, Du Liegst mir im Herzen (trad.)

Interpretation by Clare Fischer

(recorded 1975, transcribed by Bill Dobbins)

The image shows a musical score for the piece "Du, Du Liegst mir im Herzen". The score is written for piano and consists of two staves: a treble clef staff and a bass clef staff. The time signature is 3/4. The key signature is one flat (B-flat major or D minor). The score is divided into eight measures. The first two measures are in 3/4 time. The third measure begins a 4:3 time signature change, which continues through the eighth measure. Above the treble staff, a bracket labeled "4:3" spans the third, fourth, fifth, and sixth measures. Below the bass staff, two brackets labeled "4:3" are positioned under the third and fourth measures, and the fifth and sixth measures, respectively. The music features a mix of chords and single notes, with some chords marked with a "7" indicating a seventh chord. The overall style is characteristic of mid-20th-century jazz piano music.

Danny Boy (trad.) version 1
Interpretation by Bill Evans
(recorded 1962, transcribed by Michael Kahr)



Bill Evans, *Bill Evans: The Complete Riverside Recordings* (Riverside RCD 018-2, 1987).

Danny Boy (trad.) version 2
Interpretation by Bill Evans
(recorded 1962, transcribed by Michael Kahr)



Empathy, (Verve V/V6 8497, 1962)

Definition of „voice“

1. Instrumental or vocal voice
2. Conceptual voice
3. Instrumental/vocal voice across various conceptual voices
4. Structural voice

Voice leading

„Law of the shortest distance“

metaphorical application of physical forces „gravity, magnetism and inertia“ (Steve Larson)

voice leading features (Robert K. Hinz dissertation)

1. Splitting: motion to two separate pitch classes from a unison
2. Merging: motion from two separate pitch classes to a unison
3. A suspension and its subsequent resolution
4. An anticipation and its subsequent resolution
5. A suspension sounding simultaneously with its resolution
6. An anticipation sounding simultaneously with the tone that the anticipation serves as a resolution for
7. A register transfer of a voice
8. A register transfer of a resolution (either subsequently to or simultaneously with a tone that is being resolved)
9. Double inflections: simultaneous movements or resolutions to two different expressions of a scale degree or chord tone. For example, major or minor third that sounds simultaneously as a resolution (one of these tones may move to a different register to change the quality of the dissonance) would be a double inflection
10. Tension notes: a tone (or tones) that, in a manner similar to a pedal tone, is sustained throughout a chord progression
11. Lines that appear to move into or originate from a prominent non-octave overtone, such as a perfect twelfth
12. Parallelism, and other related voice leading phenomena

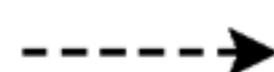
Comparison voice leading graph - transcription

Diagram illustrating voice leading between two musical staves (treble and bass clef) across eight measures. The notes in the treble clef are numbered (1) through (8). Solid lines represent voice leading paths between notes in adjacent measures. Dashed lines represent other voice leading paths. The diagram shows a complex web of connections between the two staves.

G13 C7+9-13(addMaj7) F7+11 Bb+Maj7 Eb7+11 Ab13 Db7+9-13 D7+9-13 G+4+5 G6

Musical transcription of the chord progression in 3/4 time. The top staff shows the right hand with chords and some melodic fragments. The bottom staff shows the left hand with bass notes. The chords are G13, C7+9-13(addMaj7), F7+11, Bb+Maj7, Eb7+11, Ab13, Db7+9-13, D7+9-13, G+4+5, and G6. There are 4:3 interval markings above and below the F7+11 chord.

Legend of voice leading beams and ties

-  = *sustained voice*
-  = *chromatic voice-leading*
-  = *chromatic voice-leading, registrally transferred*
-  = *diatonic voice-leading*
-  = *diatonic voice-leading, registrally transferred*
-  = *non-chromatic, non-diatonic voice-leading*
-  = *non-chromatic, non-diatonic voice-leading, registrally transferred*
-  = *leap*

Comparison voice leading graph - transcription

G13 C7+9-13(addMaj7) F7+11 Bb+Maj7 Eb7+11 Ab13 Db7+9-13 D7+9-13 G+4+5 G6

Multiple versions of structural voices

A musical score in 4/4 time, consisting of two staves (treble and bass clef). The score is annotated with four numbered structural voice labels: (1), (2), (3), and (4).
- Label (1) is a red circle around a note in the first measure of the treble staff.
- Label (2) is a red circle around a note in the second measure of the treble staff and a green circle around a note in the second measure of the bass staff.
- Label (3) is a red circle around a note in the third measure of the treble staff and a green circle around a note in the third measure of the bass staff.
- Label (4) is a red circle around a note in the fourth measure of the treble staff and a red circle around a note in the fourth measure of the bass staff.
Solid lines connect the notes in (1) to (2) and (2) to (3) in both staves. A dashed line connects the note in (3) to the note in (4) in both staves. A large slur covers the notes in measures 2 and 3 in both staves.

Comparative analysis of voice-leading events

Number of voice-leading events	Fischer	Evans 1	Evans 2
TOTAL	276 = 100%	322 = 100%	350 = 100%
Chromatic	111 = 40.2%	58 = 18.0%	52 = 14.9%
Suspension	83 = 30.1%	130 = 40.4%	126 = 36%
Diatonic	70 = 25.4%	130 = 40.4%	168 = 48%
Non-chromatic, non diatonic (including one or more alterations)	12 = 4.3%	3 = 0.9%	3 = 0.9%

Comparison of voicings and chord progressions

Total number of	Fischer	Evans 1	Evans 2
Voicings	57 = 100%	67 = 100%	68 = 100%
Entirely diatonic voicings	15 = 26.3%	38 = 56.7%	44 = 64.7%
Voicings based on diatonic chord roots	42 = 73.7%	64 = 95.5%	63 = 92.7%
Voicings based on non-diatonic chord roots	15 = 26.3%	3 = 4.5%	5 = 7.4%
Uncommon vertical structures	4 = 7%	-	-
V7	25 = 43.9%	20 = 29.9%	19 = 27.9%
Vsus7	1 = 1.8%	10 = 14.9%	13 = 19.1%
Chord progressions	56 = 100%	66 = 100%	67 = 100%
Vsus7 – V7	-	9 = 13.6%	7 = 10.5%
subV7 – V7	5 = 8.9%	2 = 3.0%	2 = 3.0%

Chromatic linear dominant chord

Handwritten musical notation illustrating a chromatic linear dominant chord progression. The score is written on two staves (treble and bass clef) and consists of three measures. The first measure is labeled "95" and contains the chord $E^b \text{ sus}^9$. The second measure contains the chord $E^b ?$. The third measure contains the chord $A^b \text{ M} (\text{ma}7)$. The notation shows the movement of individual notes between the chords, with curved lines indicating the chromatic linear motion of the dominant chord.

All possible combinations
of triadic chromatic resolutions towards
an F major triad given that no voice is sustained

Db Bb Gb	Gb	C A F	?	B Bb Gb
Db Ab Gb	Gb	C A F	(Abm	B Ab Gb
Db Ab E	Dbm	C A F	E	B G# E
Db Bb E	Bbo	C A F	?	B Bb E

All possible combinations
of triadic chromatic resolutions towards
an F minor triad given that no voice is sustained

Db A Gb	Gbm	C Ab F	?	B A Gb
Db G Gb	?	C Ab F	?	B G Gb
Db G E	Dbo	C Ab F	Em	B G E
Db A E	A	C Ab F	Bsus	B A E

All possible combinations of chromatic resolutions towards the Fmaj7 four-part chord.

The bold marks indicate chromatically resolving chords, given that no voice is sustained

D# B G# E	Emaj	E C A F	G#m	D# B G# Gb
F B G# E	Eadd9	E C A F	G#m	F B G# Gb
D# Db G# E	Dbm	E C A F	G#sus	D# Db G# Gb
F Db G# E	Db	E C A F	Db	F Db G# Gb
D# B Bb E	?	E C A F	Bmaj	D# B Bb Gb
F B Bb E	?	E C A F	Gbmaj	F B Bb Gb
D# Db Bb E	Bbo	E C A F	D#m	D# Db Bb Gb
F Db Bb E	Eo	E C A F	Gbmaj	F Db Bb Gb

All possible combinations of chromatic resolutions towards the Fmmaj7 four-part chord.

The bold marks indicate chromatically resolving chords, given that no voice is sustained

D# B G E	Em	E C Ab F	G+maj	D# B G Gb
F B G E	Em	E C Ab F	G ⁷ addmaj7	F B G Gb
D# Db G E	D# Dbo	E C Ab F	D#	D# Db G Gb
F Db G E	Dbo	E C Ab F	?	F Db G Gb
D# B A E	Esus B ⁷ add11	E C Ab F	B⁷	D# B A Gb
F B A E	Bsus Esus	E C Ab F	Gbm	F B A Gb
D# Db A E	? (all notes from Db diminished scale)	E C Ab F	Gbm	D# Db A Gb
F Db A E	F+	E C Ab F	Gbm	F Db A Gb

All chord constituents of
G#m7, G#sus7, Bmaj7 and D#m7
resolve chromatically towards Fmaj7.

All chord constituents of
G+maj7, D#7+9, B7 and Gbm6
resolve chromatically towards Fmmaj7

All possible combinations of chromatic resolutions
towards the Fm7 four-part chord,
given that no voice is sustained.

D B G E	Em	Eb C Ab F	Gmaj	D B G Gb
E B G E	Em (no four-part chord)	Eb C Ab F	G ⁶ maj7	E B G Gb
D Db G E	Em Dbo	Eb C Ab F	?	D Db G Gb
E Db G E	Dbo (no four-part chord)	Eb C Ab F	Dbo	E Db G Gb
D B A E	Esus	Eb C Ab F	Bm	D B A Gb
E B A E	Esus (no four-part chord)	Eb C Ab F	Bsus	E B A Gb
D Db A E	Esus	Eb C Ab F	Gbm	D Db A Gb
E Db A E	A (no four-part chord)	Eb C Ab F	Gbm	E Db A Gb

All possible combinations of chromatic resolutions
towards the F7 four-part chord,
given that no voice is sustained

D B G# E	E ⁷	Eb C A F	G# ^o	D B G# Gb
E B G# E	E (no four-part chord)	Eb C A F	E ⁶	E B G# Gb
D Db G# E	Dbm	Eb C A F	Dmaj	D Db G# Gb
E Db G# E	Dbm (no four-part chord)	Eb C A F	Dbm	E Db G# Gb
D B Bb E	Bm	Eb C A F	Bm	D B Bb Gb
E B Bb E	? (no four-part chord)	Eb C A F	Bsus	E B Bb Gb
D Db Bb E	Bbo	Eb C A F	D+maj	D Db Bb Gb
E Db Bb E	Bbo (no four-part chord)	Eb C A F	Gb	E Db Bb Gb

Conclusions

Melospy software in the analysis of voice leading in jazz harmony:

-

not easy to use (improvement by implemented GUI)

interoperation of results takes experience/knowledge about specific analytical terms, partly derived from computer science
time consuming

+

ability to minimize errors in statistical counts

provides “hard” mathematical evidence

ability to analyze large amounts of data in comparative studies

of particular use in exploration of voice leading in instrumental
voices of big band arrangements as well as of conceptional voices

Thank You