Improving Improvisational Skills Using Impro-Visor (Improvisation Advisor)

TI:ME 2012 Presentation

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Please Ask Questions

- Questions are fine during the presentation.

- During this talk, I will demonstrate certain aspects live on Impro-Visor. Not everything is represented in these slides.

A second Impro-Visor talk

- A second, more hands-on, Impro-Visor talk is offered Thursday afternoon at 1:30 in Clements (ST2 track).

- "Bring your own laptop" aspect is optional.

Motivation

- Having taught jazz improvisation as a "side line" for a few years, I desired a notation tool that would:
  - Help students produce **clean homework** of written-out solos.
  - Provide **assistance** of some kind to the students.
  - Act as a **repository or notebook** for improvisational ideas.

- **Impro-Visor** is the result.

Free Software

- Impro-Visor is free, open-source, software, funded as an academic research project by NSF, The Mellon Foundation, and The Baker Foundation.

- It runs on Windows, Mac, and Linux.
- Version 4.12 had over 19,000 downloads.
- 6800+ users in user group, 45 countries.
- Developers are mostly college students.

Contributors to Software & Design

- Prof. Robert Keller
- Prof. Belinda Thom
- Stephen Jones
- Aaron Wolin
- David Morrison
- Martin Hunt
- Sayuri Soejima
- Stephen Lee
- Emma Carlson
- Xanda Schofield
- August Toman-Yih
- Steven Gomez
- Jim Herold
- Brandy McMenamy
- John Goodman
- Jon Gillick
- Kevin Tang
- Chad Waters
- Nicolas Froment
- Ryan Wieghard
- Zack Merritt
- Amos Byon

Conventional Wisdom

for learning to improvise

- Choose a solo from some jazz master.
- Transcribe the solo from audio and memorize it.
- Repeat, until you “know how to improvise”.

Problems with Conventional Wisdom

- Difficult enough to be a show-stopper.
- The learner does not *own* the result.
- Learner could end up sounding like

  (you are trying to be) a clone of the famous master.

Alternative Approach

for learning to improvise

- Pick a tune you like, or be assigned one.
- **Construct your own solo** over the chord progression of the tune. (Note: You own it.)
- Play your solo. Improvise as needed to make it sound good.
- Repeat, with different tunes.

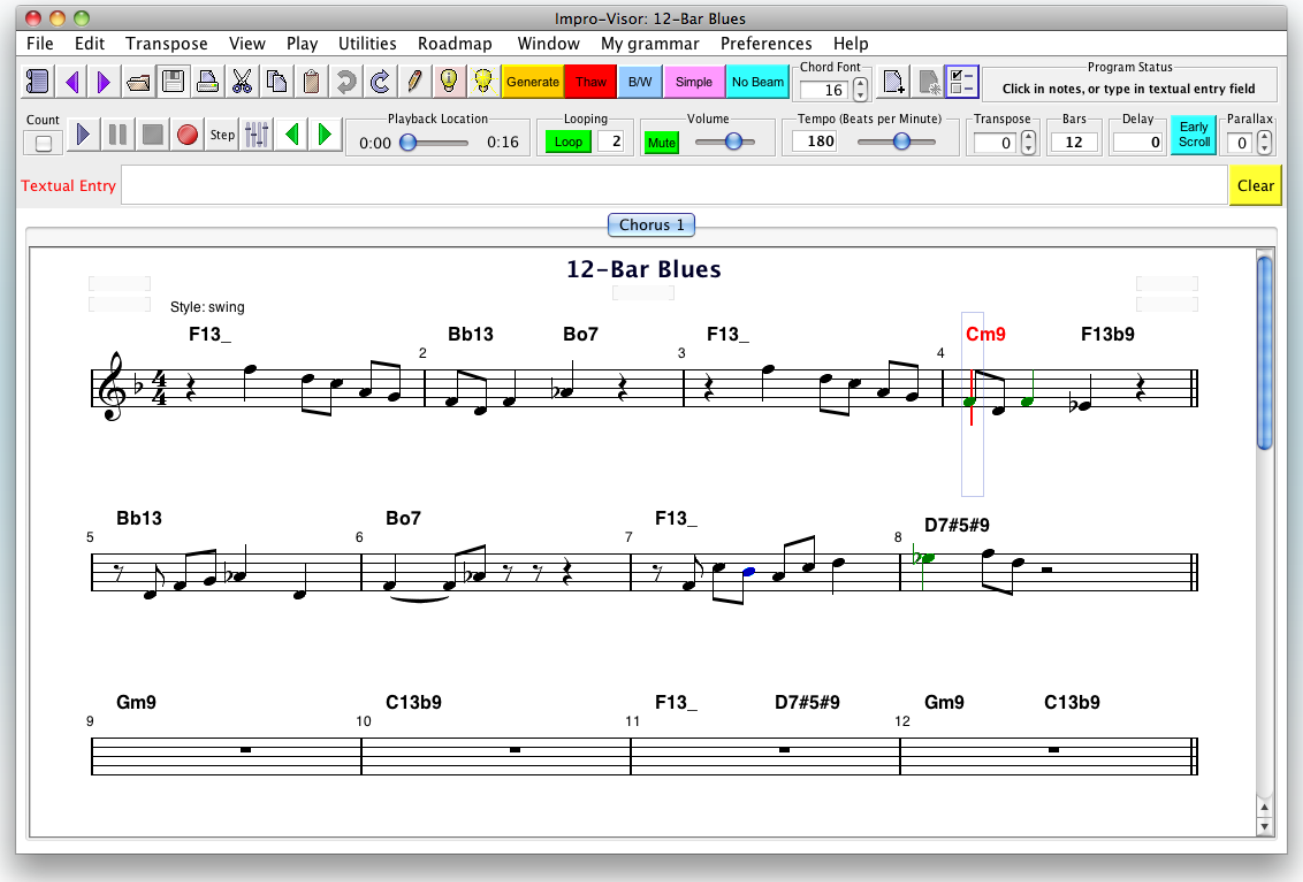
Impro-Visor

- Impro-Visor = "Improvisation Advisor"
- Designed with the Alternative Approach in mind.
- Can also be used with the Conventional Approach.

- Provides customized automated accompaniment and other features.

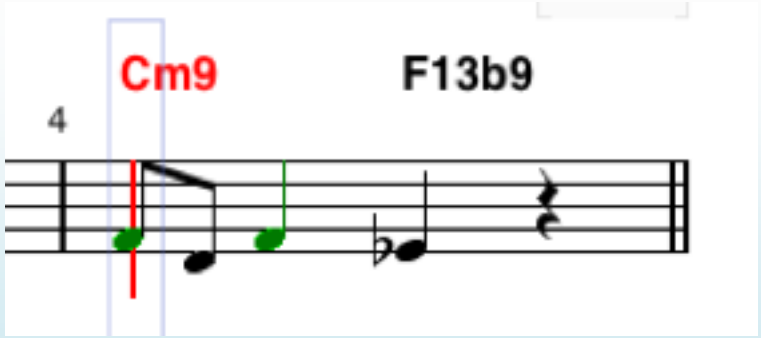
Getting Advice on Preliminaries

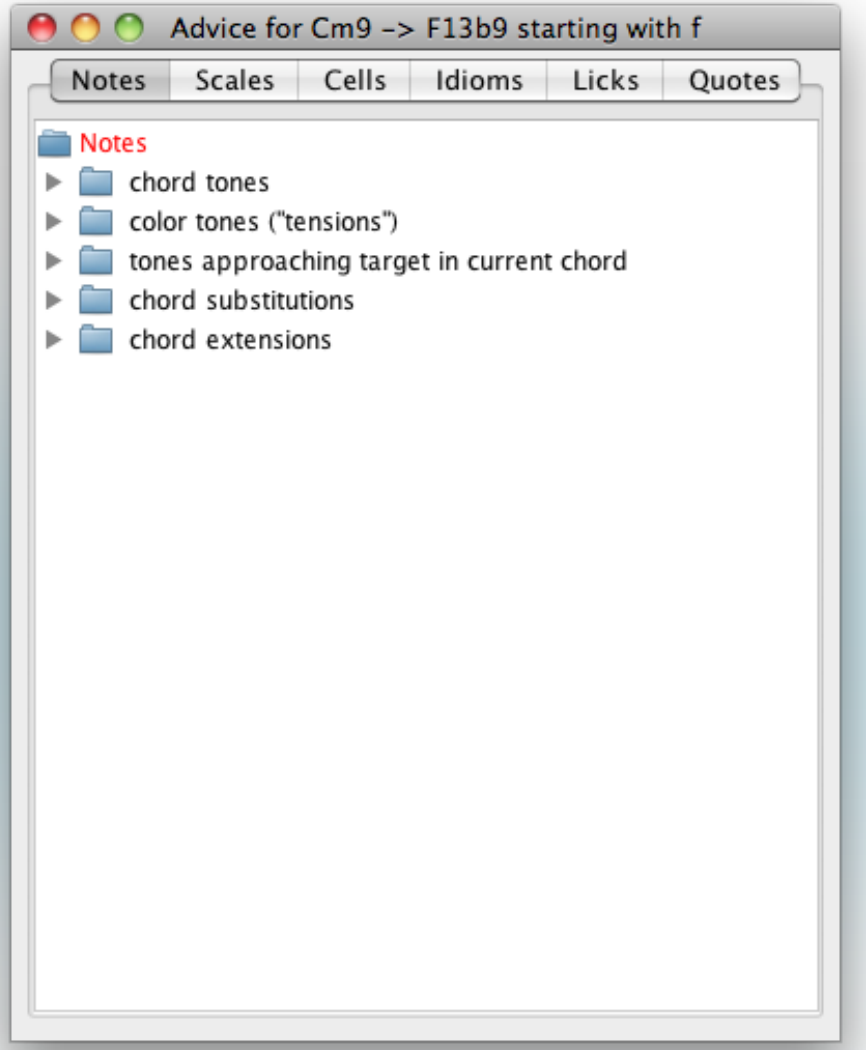
If the student doesn't know the notes in a chord or scale, **advice** can be consulted.



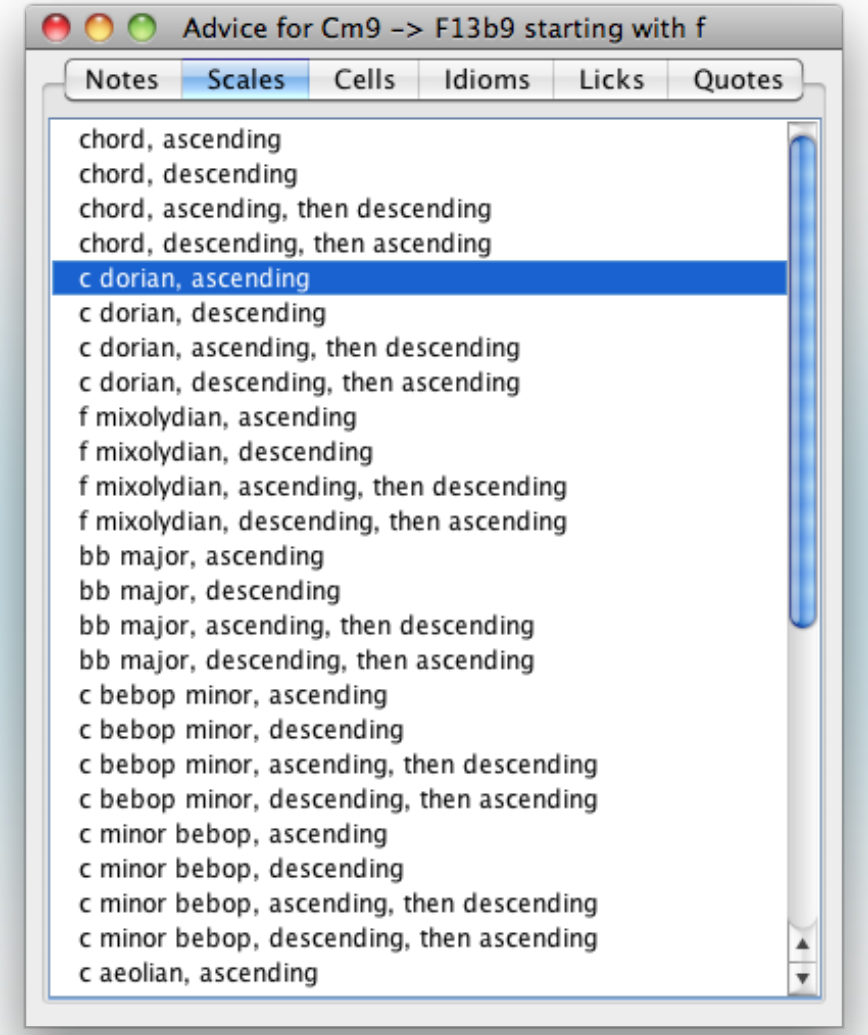
Advice Menu

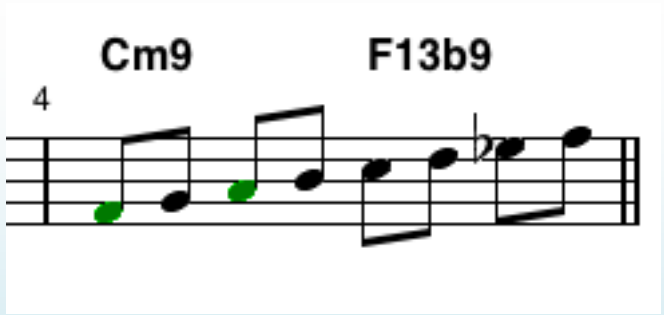
On leadsheet





Scale Advice Example





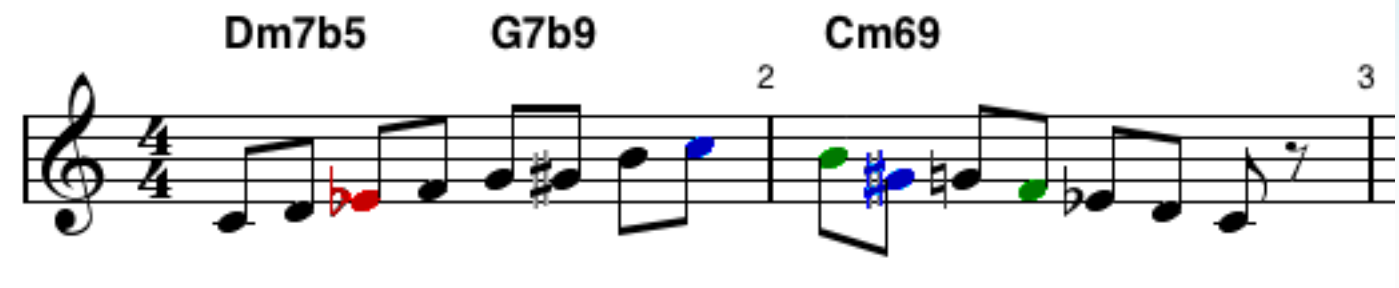
Note Coloration

Optional **color coding** for visual feedback:

- **black**: chord tone
- **green**: “color” tone (aka “tension”)
- **blue**: chromatic approach tone to one of the above
- **red**: none of the above (error or “outside”?)

Coloration can be toggled on or off.

Example suggested by Mark Levine, *The Jazz Theory Book*:



Composing Solos

- Writing one's own solo is the original intended use of Impro-Visor.

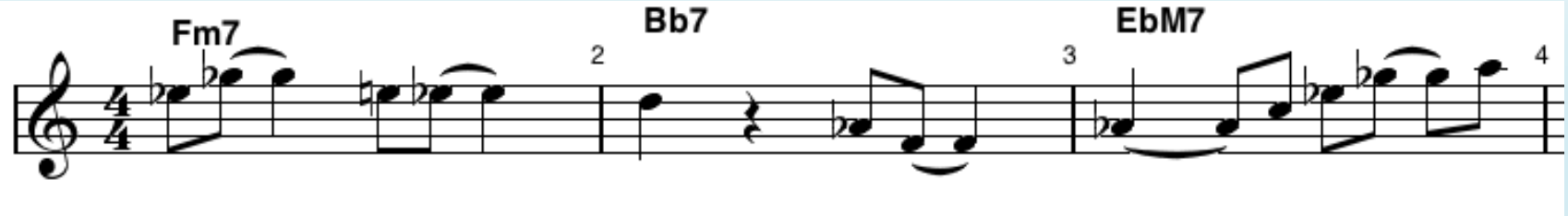
- We are not the first to suggest this. See for example, David Baker's article: "When An Improvisor Thinks Like a Composer", Jazz Player Magazine, 1997.

- For the tune under study, compose a solo of one or two choruses, or maybe just a fragment.

- Ideally, be able to play the solo. Don't make it too complex.

Students' Use of Coloration

Students (should) use coloration to spot mistakes in their own solo compositions.



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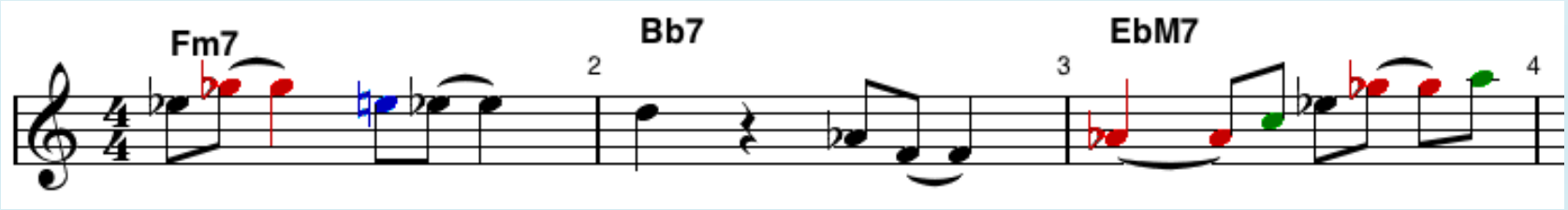


Impro-Visor Provides Help

- **Coloration**, as discussed
- **Harmonic** point-and-click entry:

  Notes **gravitate** to chord and color tones.
- Harmonic **rectification** to clean up melodies.
- **Aural** feedback (note + chord)
- **Advice** (suggestions for scales, licks, etc.)

Example Class Assignment

- Assign the class the task of writing a solo for the tune of the week.
- They **email** their submissions (which are text files) to the instructor.
- The instructor creates a **composite** of the submissions.
- Each submission is one **chorus** of the composite.

Reviewing Class Assignment

- In class, the **composite** is played for the students.
- They **watch** it on an LCD display while listening.
- They **critique** each others work.
- The instructor also provides critique.
- Examples:
  - http://www.cs.hmc.edu/~keller/jazz/improvisor/classroom/MomentsNoticeSolos.htm
  - http://www.cs.hmc.edu/~keller/jazz/improvisor/classroom

Does this really work?

- My subjective experience, compared to not doing it, says **definitely yes**.

- Not really possible to do a **controlled** experiment; every player is different + different players each semester.

Why It *Should* Work

The compositional approach increases **intellectual engagement** with the material and principles of melody construction, over and above:

- Pure transcription, which does not force thinking about construction.
- Pure rote practice, which can be more visceral than intellectual.

Context Clarification

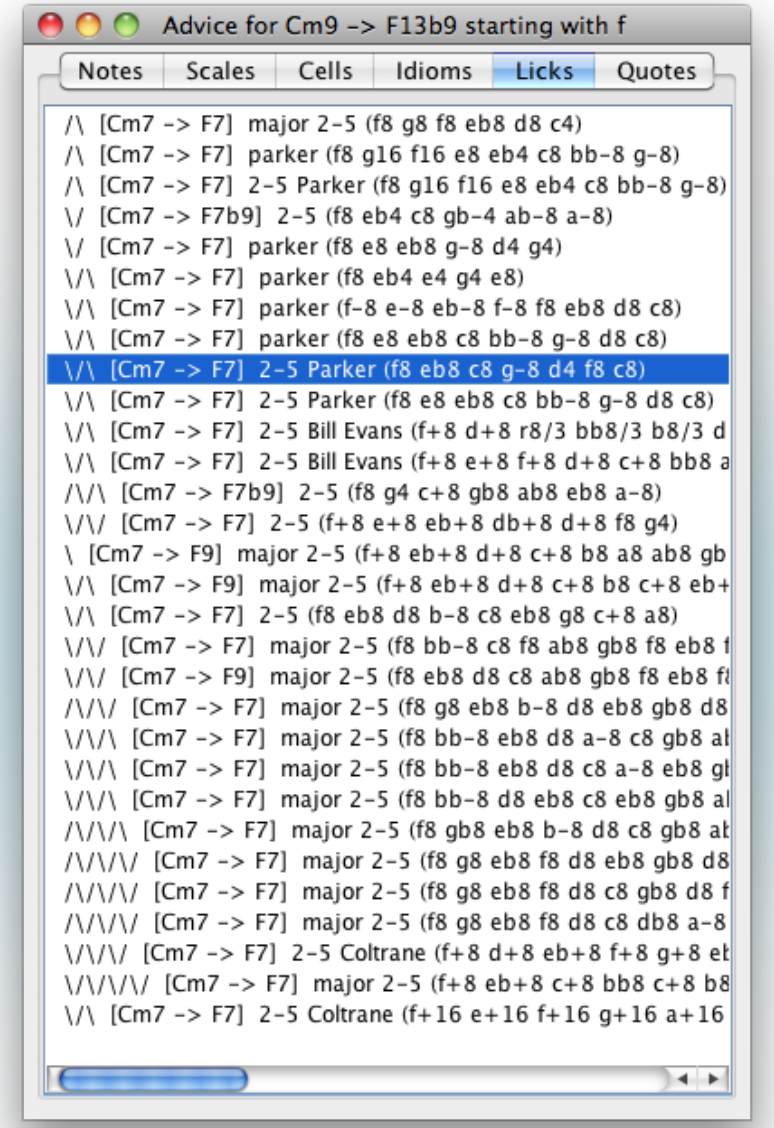
- Impro-Visor is for use in the "woodshed".

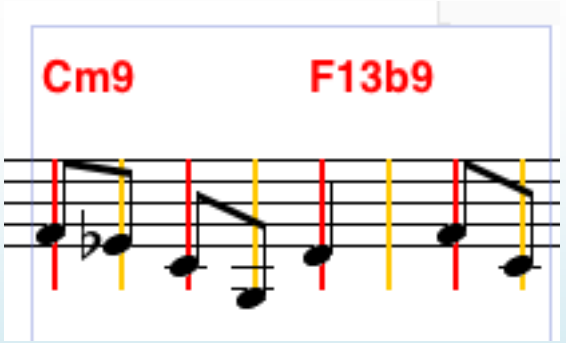
- We are not suggesting that live performance must be other than emotional and physical.

Advice for Writer's Block

- In addition to chords and scales, Impro-Visor provides a library of:
  - Cells
  - Idioms
  - Licks
  - Quotes
- The user can use these in solos.
- Users can add new ones that sound good to them.

Licks, etc. Advice





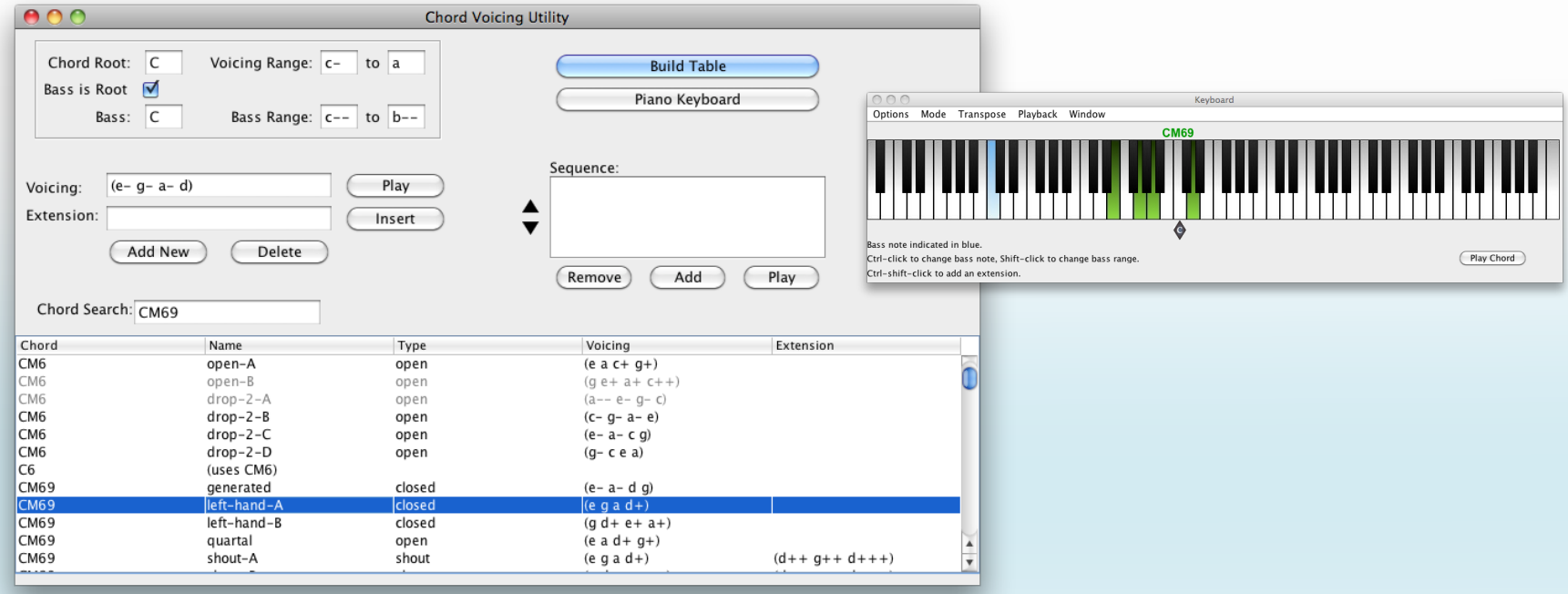
Text-Based Information

- The user or teacher can add, delete, modify musical information.
- Everything is in plain text.
- The next page shows what a chord definition entails.

Chord Definition in Vocabulary

```
(chord
   (name CM69)
   (pronounce C major six nine)
   (key c)
   (family major)
   (spell c8 e8 g8 a8 d8)
   (color b8 f#8)
   (priority d8 e8 a8 g8 c8)
   (voicings
      (left-hand-A (type closed)(notes e8 g8 a8 d+8)(extension))
      (left-hand-B (type closed)(notes g8 d+8 e+8 a+8)(extension))
      (quartal (type open)(notes e8 a8 d+8 g+8)(extension))
      (shout-A (type shout)(notes e8 g8 a8 d+8)(extension d++8 g++8 d+++8))
      (shout-B (type shout)(notes g8 d+8 e+8 a+8)(extension d++8 g++8 d+++8))
      )
   (extensions CM69#11)
   (scales
      (C major)
      (C lydian)
      (C bebop major)
      (C major pentatonic)
      (G major pentatonic)
      (D major pentatonic)
      (C major blues)
      )
   (substitute CM7 CM9 CM69#11)
   )
```

Chord Voicing Editor

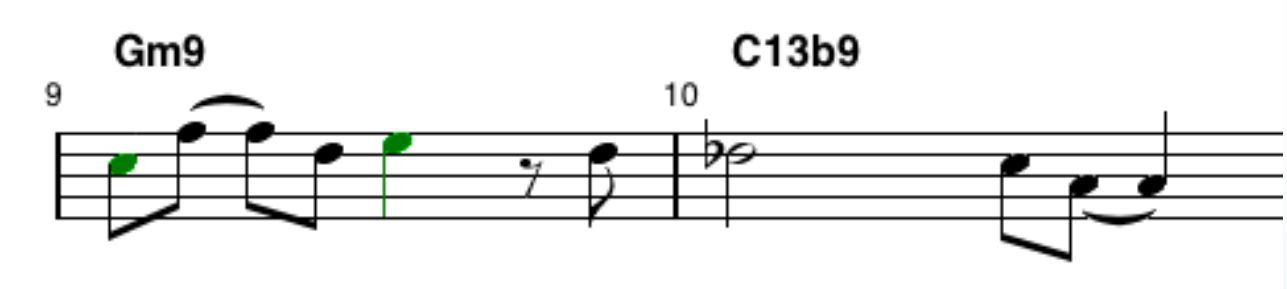


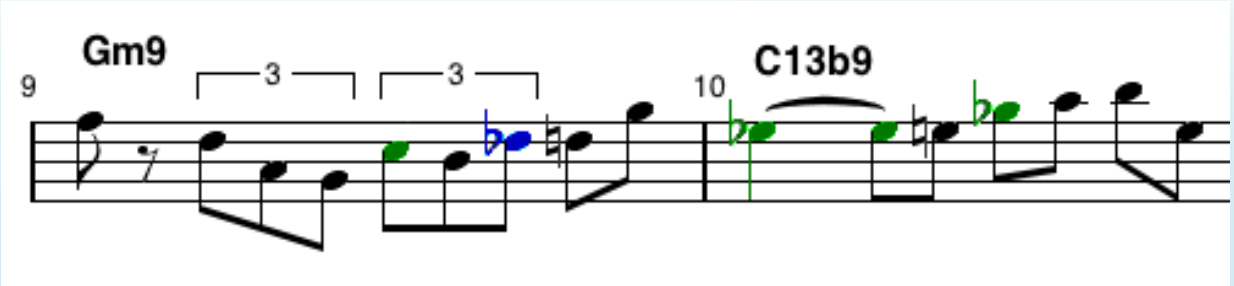
- Impro-Visor will generate a voicing if none of the ones specified is within range.
- Playback includes a voice-leading algorithm.

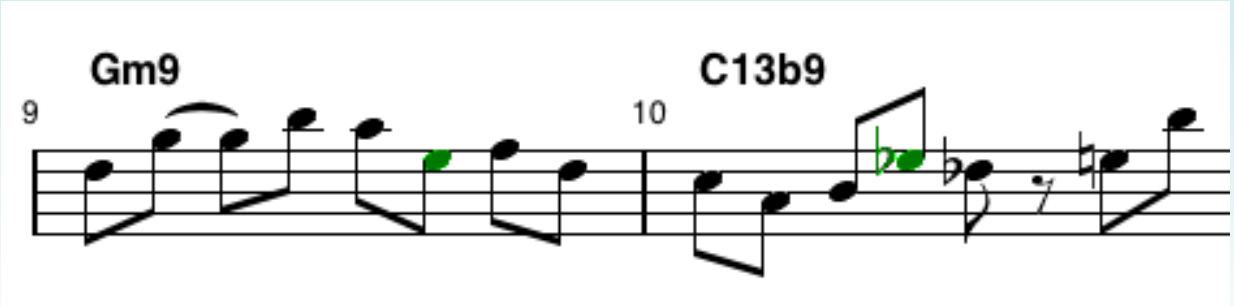
Lick Generation

- Impro-Visor will **generate** new melodic material on its own.
- Some of this material can be informed by solos learned from other players.
- There is a **grammatical** basis underlying our technology.

Examples of Generated Licks

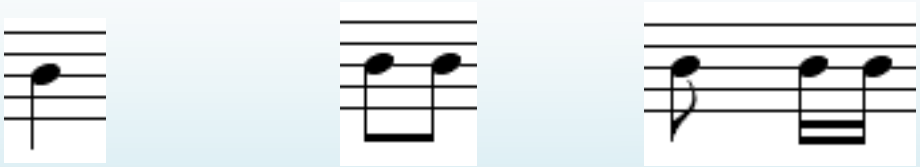






Grammar Illustration

- Let B denote one beat of music.
- We could fill a beat with a variety of rhythms:



- A grammar represents all of these **choices**:

  B → X_4

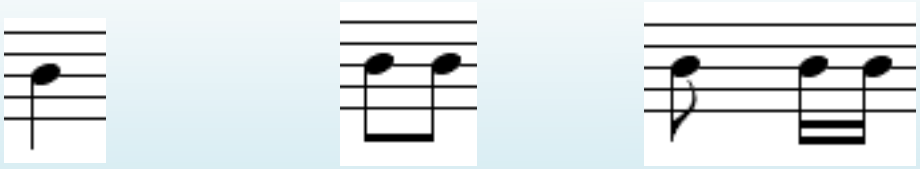
  B → X8 X8

  B → X8 X16 X16

  Here X_4, X8, X16 are understood terminal symbols, while B is a non-terminal to be expanded.

Probabilistic Grammar Illustration

- Assign a **probability** to the various choices.
- Probabilities will then dictate a prevalent style.



- A probabilistic grammar represents a distribution of these choices:

$B \rightarrow X_4$	p = 0.3	common
$B \rightarrow X8\ X8$	p = 0.6	frequent
$B \rightarrow X8\ X16\ X16$	p = 0.1	rare

Grammars Can Exhibit Hierarchy and Recurrence

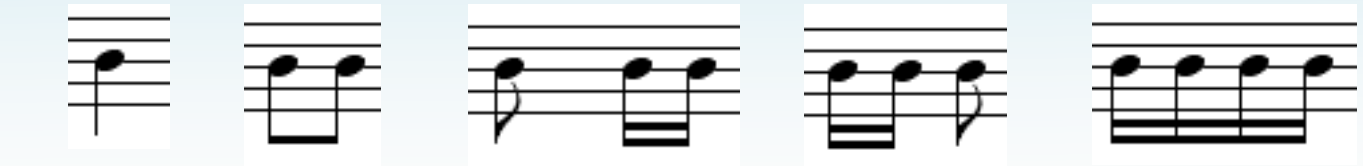
- Instead of

B → X_4	p = 0.3	common
B → X8 X8	p = 0.6	frequent
B → X8 X16 X16	p = 0.1	rare

- Use

B → X_4	p = 0.3	common
B → C C	p = 0.7	frequent
C → X8	p = 0.8	very frequent
C → X16 X16	p = 0.2	rare

- Generates

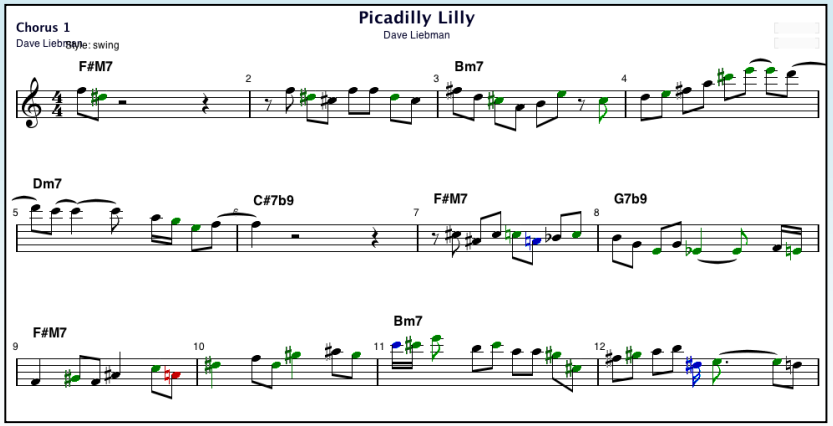


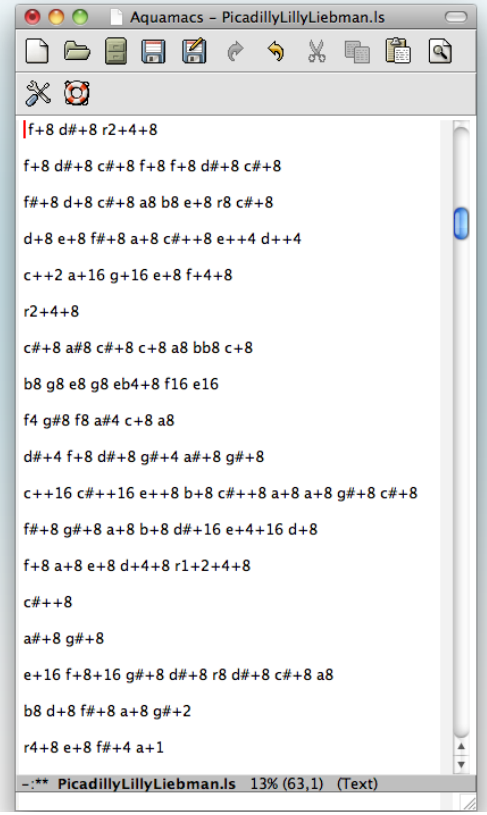
p = 0.3 p = 0.448 p = 0.112 p = 0.112 p = 0.028

Grammar Learning

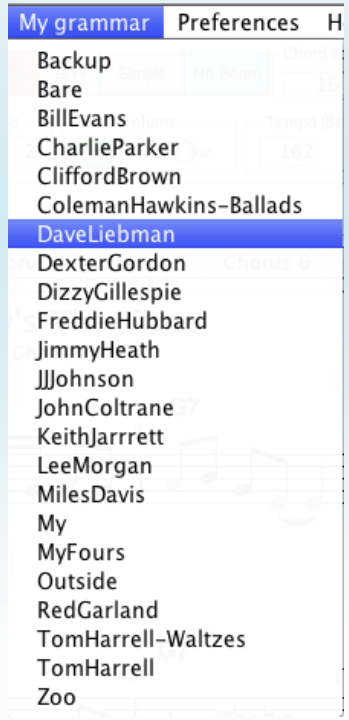
Impro-Visor's grammar learning facility enables grammars to be learned from a corpus of one or more solo transcriptions.

Transcription of Dave Liebman's Solo on Picadilly Lilly:





Learned Grammars



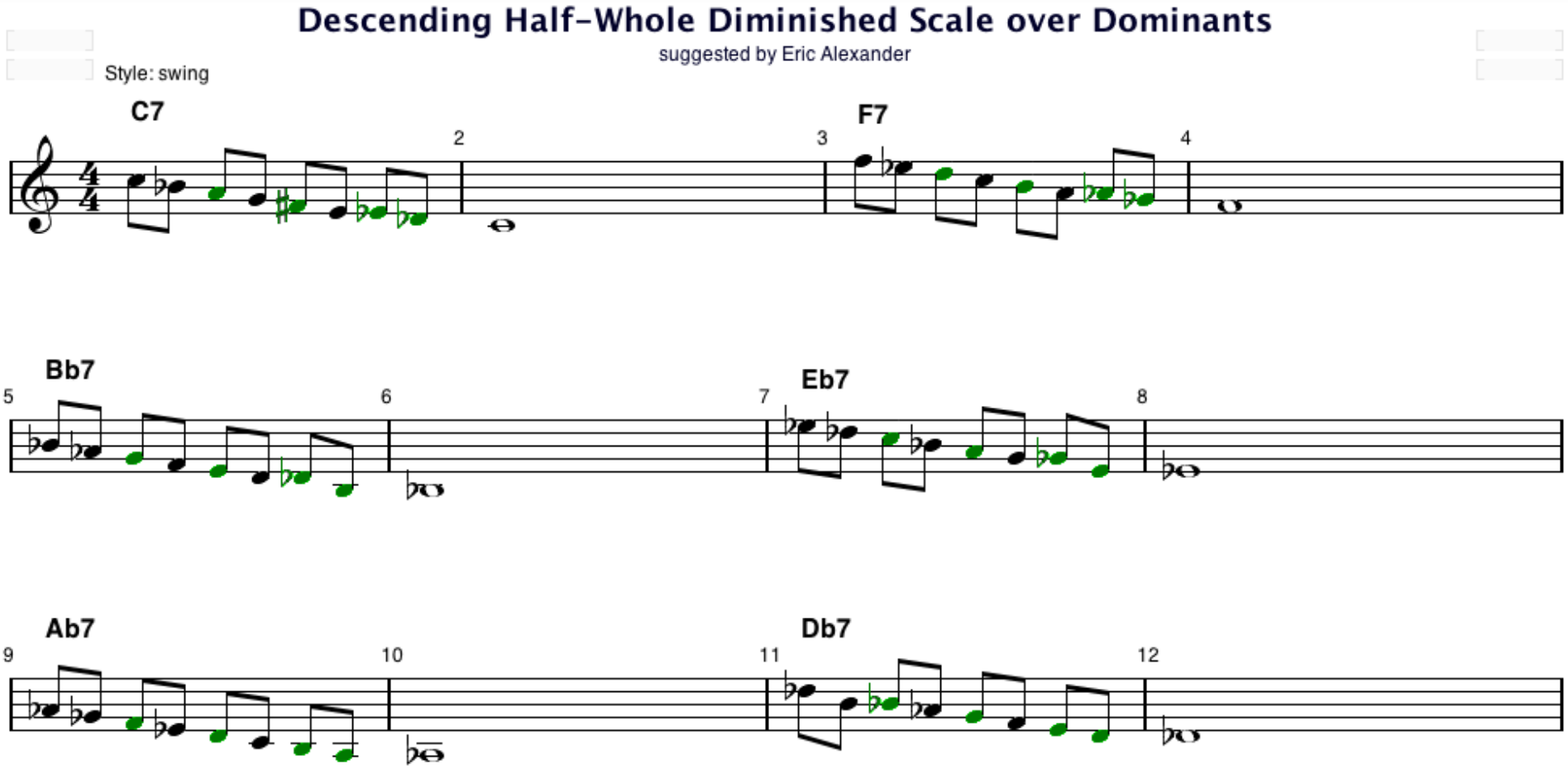
Play-Along Exercises

- These can be done in class or individually.
- Exercises with accompaniment.
- Solo with the program accompanying.
- Trade with the program.
- Comp the program as it generates a melody.
- Play bass or drums while the program plays other parts.
- Sight-reading practice.

Example: Customized Exercises

- Exercises are more fun when played with accompaniment.
- It is helpful to be able to adjust tempo, etc.
- It takes only a few minutes to construct these sorts of exercises using Impro-Visor.
- The next page shows a diminished scale exercise, suggested by Eric Alexander.

Diminished Scale Exercise



etc. over all 12 dominants

Fixed Trading with Impro-Visor

- Starting with an existing solo, delete every other group of four bars.
- Play the result and have the students trade fours with the fixed solo.
- Adjust tempo to suit the tune and abilities (30 to 300 beat-per-minute available).

Soloing with Impro-Visor

- Delete the melody entirely.
- Solo with the generated background.

Dynamic Trading with Impro-Visor

- Instead of fixed trading, Impro-Visor generates fours dynamically.
- This requires a special grammar and settings.
- Impro-Visor will trade until memory runs out.
  (It remembers everything generated).

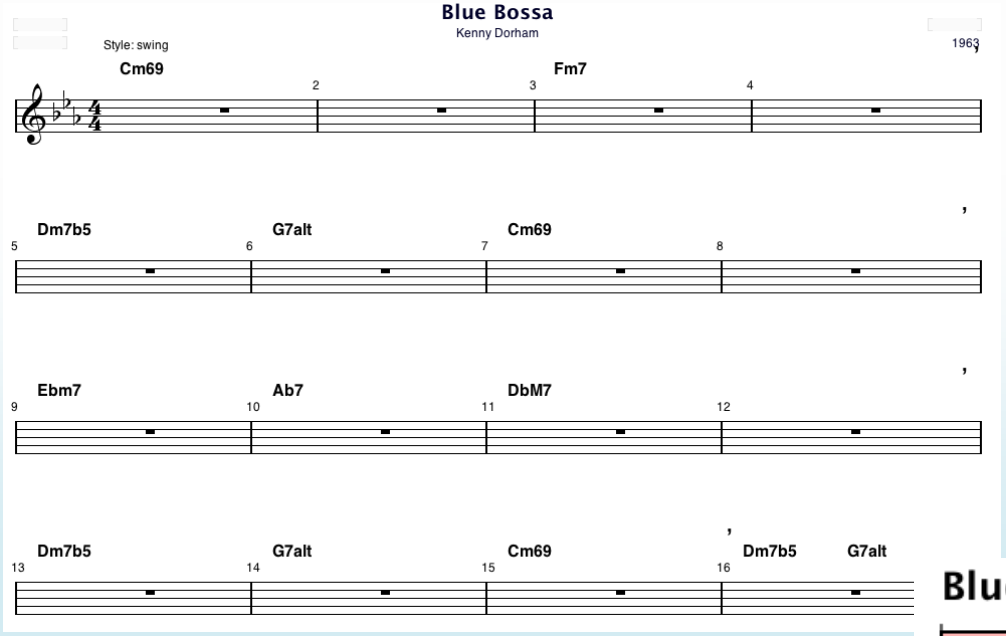
Comping with Impro-Visor

- Impro-Visor generates the solo.
- Impro-Visor plays bass and drums.
- User comps the solo on chord instrument.
- Or, user plays bass or drums, letting Impro-Visor comp.

Road Maps

- Road maps are Impro-Visor's newest feature.
- Tunes are automatically analyzed into keys and "bricks".
- Bricks are idiomatic chord progressions, such as cadences and turnarounds.
- These help the beginner to intermediate player understand the tune.
- The idea of bricks is from Conrad Cork in the U.K.

Analyzing a Tune using Bricks



Input Chords

Inferred Key

Brick Name

Join Names (yellow tags)

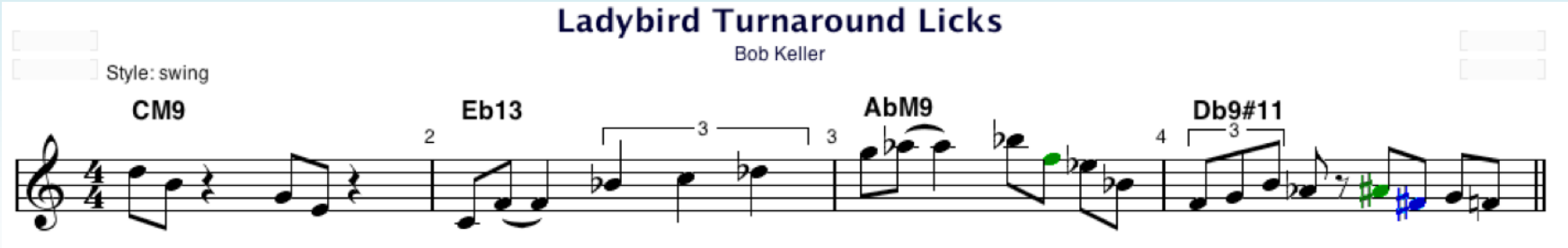
Blue Bossa

C Minor				
On Off Minor IV				
Cm69		Fm7		Backslider
C Minor				
Sad Cadence				
Dm7b5	G7alt	Cm69		Cherokee
Db Major				
Straight Cadence				
Ebm7	Ab7	DbM7		Downwinder
C Minor			C Minor	
Sad Cadence			Sad Launcher	
Dm7b5	G7alt	Cm69	Dm7b5	G7alt
		Homer		

Practicing Licks over Bricks

See: http://www.cs.hmc.edu/~keller/jazz/improvisor/licks/

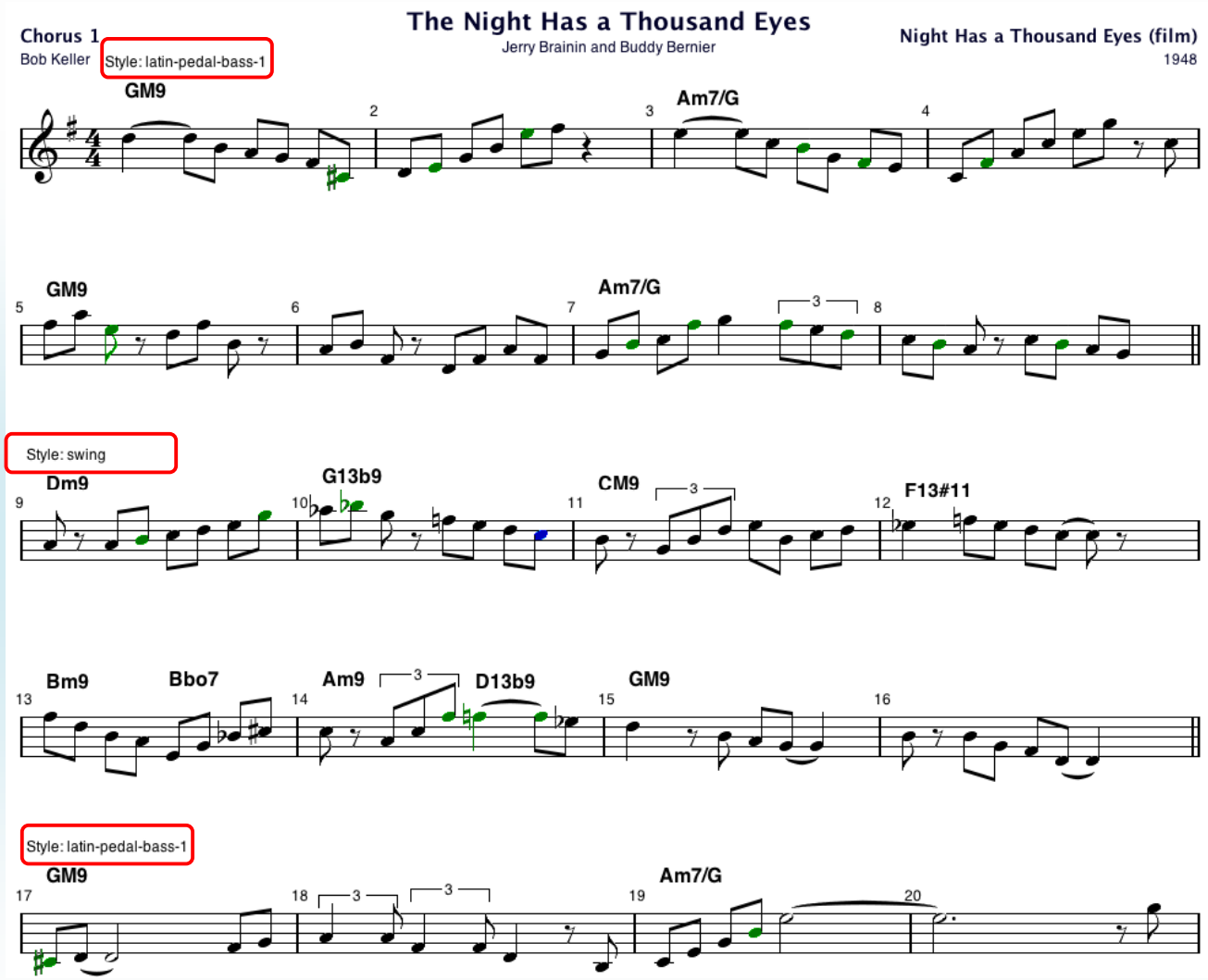
Name	Chord Progression			
Cadence + Dropback	IIm^7	V^7	I	VI^7
Sad Cadence + Dropback	IIm^{7}b5	V^7	Im	VIm^{7}b5
POT (*Plain Old Turnaround*)	I	VI^7	IIm^7	V^7
Minor POT (*Minor Plain Old Turnaround*)	Im	VI^7	IIm^{7}b5	V^7
Pullback	IIm^7	V^7	IIIm^7	VI^7
Ladybird Turnaround	I	bIII^7	bVI	bII^7
Turnaround to II + Straight Approach	I IV^7	IIIm^7 VI^7	IIm^7	V^7
Rainy Approach Turnaround	IIIm^7	bIIIo^7	IIm^7	V^7
Red Clay Turnaround	Im	bVIIm^7 bIII^7 (IIm^7 V^7 of bVI)	bVI	IIm^{7}b5 V^7



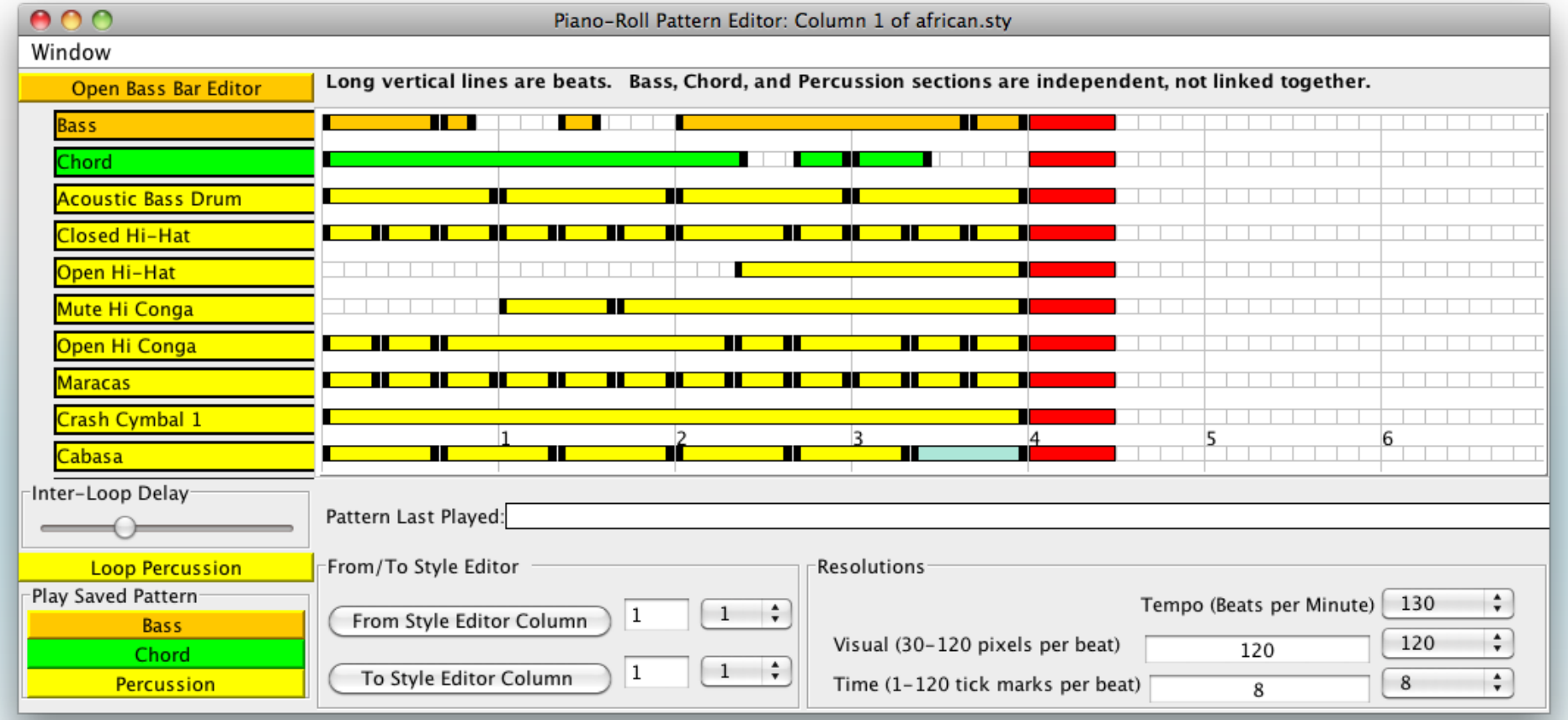
Playback Styles

- Background is automatically generated from style specification.
- Styles can switch with sections.
- Users can tweak existing styles, or create new ones.
- Style learning (from MIDI + chord sheet) is available.

Style Switching Example



Style Pattern Editor



This pattern, from an African style was learned from a MIDI performance generated by Band-in-a-Box®.

For More Information

Please consult the Impro-Visor web site for more information: www.impro-visor.com