# THE EMPEROR HAS NO CLOTHES:
# MUSIC AS IT ACTUALLY IS ON THE PIANO KEYBOARD

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## INTRODUCTION

I approached the piano as an adult beginner interested in learning to play jazz, which eventually led me to wonder how jazz pianists can improvise in terms of a music notation that seemed to me to be misleadingly complex for the piano.[1] I thought improvisation must tap into deeper musical structures that are obscured by this notation. Music notation has stood the test of time and is here to stay for piano music, even if for no more reason than the huge legacy of piano music written in it. But the piano has also stood the test of time without needing variable-pitch piano keys to play notes exactly as specified by the sharps and flats of music notation. Plus the different conventions for positioning notes on lines and in spaces of treble and bass clefs obscures the simple equivalences between the same piano keys in successive octaves. In effect, "the emperor has no clothes" — piano music is much simpler than the "clothes" of this notation make it seem.

The piano is not just for experts, but the conventional approach to teaching and learning it tends to make it so. Understanding music notation is expected to emerge by osmosis from the same extensive practicing that develops "chops." Thousands of hours at the keyboard are required to master innumerable details across a range of exercises and pieces before understanding deeper structures becomes possible. I wondered if this could be reversed by learning deeper structures first, in a manner independent of music notation.

I was encouraged to think this might be possible by the simplicity of the way people with musical ears recognize and remember melodies in terms of **skeleton melody lines** consisting of sequences of pitch intervals going up and down from a starting pitch, independent of the actual starting pitch, of durations of notes and rests, of rhythm, and of music notation. Skeleton melody lines are directly playable on the piano because pitch intervals on the piano are measured in half tones, the pitch intervals played by adjacent piano keys.

Bear with me while I summarize some simple facts that follow from this, to set the stage. A skeleton melody line of tonal music establishes a particular piano key as a **home tonic** (usually the note on which the melody line comes to rest at the end). This in turn establishes a 12-half-tone **home octave** as the source of the tonic scales that supply the melody notes. Melody notes that go outside an established home octave go to corresponding scale positions in a stack of home octaves that look the same and are harmonically equivalent. The piano provides twelve stacks of overlapping home octaves, offset by half tones, in which all the piano keys in the overlapped parts are shared, which means all the half tones are shared. Everything about the intervals of a piece of tonal music may be understood in terms of a single **conceptual home octave** determined by a symbolic home tonic that may be assigned to any piano key. Visits to secondary tonics are simple in interval terms because of the shared half

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[1] This chord progression for the haunting E ♭ blues *Goodbye Porkpie Hat* written by Mingus as a tribute to Lester Young, is a "poster child" for the complexity with which music notation represents things that are simple on the keyboard. It's presented here only as an example of the need for a simpler view. The progression is E ♭ 7♯9—B9(13)—EM9—A7♯11—D ♭ 9sus—B9(13)—D ♭ 7sus—E ♭ 7—A ♭ m11—B7(13)—Fm7 ♭ 5—B ♭ 7♯5♯9—C13♯11—F7(13)—B7—EM7—A7(13)—A ♭ 7—B ♭ 7—D ♭ 7—E ♭ 7♯9—B7—EM7♯11—A7♯11. There are 24 chords, an average of 2 per bar for 12 bars, only 5 of which (highlighted in blue) don't contain tritones. The tritone content is the basis of deep structure of startling simplicity that is the subject of this document.

tones. It turns out that intervals of two kinds that I call **building blocks** are sufficient for most purposes. One kind, tritones, splits octaves into equal geometric halves. The other kind, fifths and fourths that are their inversions, split octaves into equal pitch halves.

Combinations of these building blocks plus some obvious constraints define the notes of all the scales that can be played on the piano, which means means all possible melody lines that can be played from the scales. Harmony in these terms is simpler than melody, in the sense that different combinations of buildings blocks are harmonically equivalent, enabling one combination within the home octave to stand for all.

I call the the view of piano music that emerges from these simple concepts **PKP** standing for Picturing Keyboard Patterns. PKP is based on **parallel modes** (same tonic), in contrast to the view based on relative modes (same notes) provided by key signatures. In this view, tritones are revealed as fundamental structural elements of shapes that form scales and voice chords. This is not even imaginable in music notation because every tritone originates in a different key signature, in which it's identified by a pair of notes tied to the key signature. It's simple for the piano keyboard.

PKP provides a simple notation for annotating written music to provide contextual cues that help in learning and remembering new pieces, knowing while playing where to go next from where you are (and how you got there), recovering from getting lost, experimenting with harmonic and melodic variations, and improvising. This turns the conventional relationship between practicing and understanding on its head: understanding guides practicing instead of only emerging from it.

Is this combination of simplicity and depth only a serendipitous side effect of the organization of the piano keyboard? Or is it a fundamental property of music that's obscured by music notation? Either way, it works in practice. To discover it, I had to enter uncharted territory.

## GENESIS OF PKP

I have been asked why, if the ideas are so good, they have not been discovered before by some talented young piano student? After all, any thoughtful person approaching the piano for first time can see that the "emperor has no clothes." Why not go from there? The answers are, music notation gets in the way, everyone versed in music notation strongly advises against it, and a very large amount of time away from practicing is required to develop and test the details. Dogged persistence is required, fueled by a conviction that the complexity of music notation is so misleading that it's worth losing practice time to figure out an alternate view. Experience outside music gave me the persistence and the conviction.

Early exposure to the piano that did not "take," plus later experience as a youth playing trumpet in school bands, convinced me that music notation was more complex than it needed to be. I gave up trying to play music in early adulthood, for lack of time, but continued to enjoy listening to it, and to wonder about its notation. When I took up the piano as an adult beginner, I was a university professor of engineering engaged in developing notations for software design. I saw music notation for the piano as a different field for applying ideas about context, state and symmetry that I was finding useful for software. My conviction that this was worth spending time on came from training in math and physics that exposed me to the concept of "dual" representations of complex things providing insight into their complexity (e.g., frequency-response/time-response duality in the physics of dynamic systems, or wave/particle duality in quantum physics). I was convinced that a "dual" representation of piano music based on intervals instead of notes must exist, and I had only to find it. The final element was time becoming available to pursue my curiosity, exactly when I was ready to do so, by retirement from my

job as a university professor.

My admitted lack of musical credentials is reasonable cause for skepticism that I have anything useful to say, so the opinions of PKP of a couple of music professionals are worth quoting. Musical theorist Paul Steinbeck: "The hook ... , at least in my opinion, is that it's possible to attain a deep understanding of chords (and their constituent intervals) without recourse to Western notation. This has direct consequences for physical patterning, fingerings, etc. Essentially, your method combines the utility of a play-by-ear approach with the depth of a mathematically-informed theory of music." Jazz pianist/composer/teacher Taylor Eigsti: "… a fascinating and in-depth look at various ways that keyboard shapes can lead to a whole new way to look at notation and the piano."

**GUIDE TO READERS**

The audience I had in mind while writing this was myself when I first took up the piano. However, I see it as being of potential interest to others: novices like I was, pop and jazz musicians who are not pianists but want to explore harmony on the piano, and anyone with a stake in the piano — music teachers, "wannabe" experts, curious experts — interested in the idea of building complexity up from simplicity instead of tackling it head on.

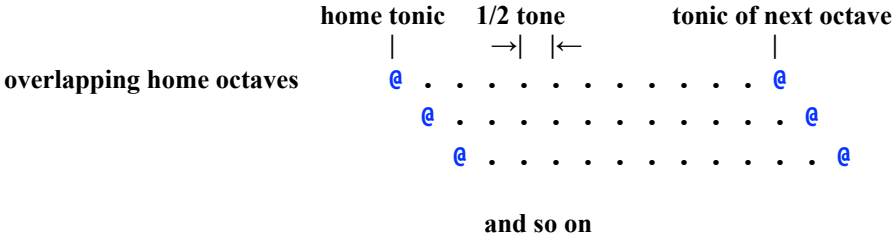
Chapter 2 develops the basic concepts and notation. Chapter 3 provides examples of a few basic pieces represented in these terms. Chapter 4 explores the building-block world in depth. Chapter 5 provides some more advanced pieces that initially puzzled me and I suspect might puzzle anyone (the first example is the piece with the footnoted chord progression on the previous page). Chapter 6 provides observations and conclusions. References, acknowledgements and comments from some readers follow. Appendix A summarizes unfamiliar terminology, Appendices B-E are about scales (B), chords (C), non-classical parallel modes (D) and the importance of hidden symmetries (E).

# CHAPTER 2: CONCEPTS & NOTATION

## A SIMPLE CONCEPTUAL MODEL

The development of concepts here is based on a representation of intervals that's independent of of note symbols in any notation. When the term "notes" is used it refers to piano keys identified by offsets from a home tonic. The interval-based concepts may be translated into notes but do not begin with them. A 12-half-tone chromatic scale is described later in the chapter, but understanding PKP requires putting note symbols out of the mind until then.

A simple but accurate conceptual model of the home octave on the emperor-has-no-clothes piano is shown below.




A half tone is the musical interval played by adjacent piano keys. A single home octave is represented by a line marked off into twelve equal parts representing half tones. The bottom **@** is the home tonic and the top **@** is at once the top note of the same octave and the tonic of the next octave up, which looks the same on the keyboard and is harmonically equivalent. Thus one conceptual home octave represents a stack of actual home octaves. The piano keyboard provides overlapping home octaves offset by half tones, in which the half tones in the overlapped parts are shared. Visits to overlapped home octaves are very simple in this conceptual picture because of this sharing.

This simple picture is complicated by the fact that the pitch sizes of the 12 half tones increase within the octave such that the pitch of the top note is double that of the bottom note. If overlapped home octaves are all to provide the same relative pitch increases, the dots cannot be exactly vertically aligned, making nominally equal half tones slightly unequal. The piano would have to provide variable pitch piano keys to capture this. It gets away with not providing them because half tones are dissonant intervals, small errors in the pitch sizes of which are relatively unimportant to the ear. Equal temperament tuning compensates by providing a uniform sound for larger intervals across the board. The worldwide popularity of the piano as a general purpose musical instrument is evidence that this is good enough (see the book *How Equal Temperament Tuning Ruined Music* for a contrary view).

Two different theories of music follow from two different judgements of what's most important here, namely the perfect pitch sizes of half tones in individual octaves (music notation), or the alignment of half tones between overlapping octaves (the piano). PKP provides a theory of the second kind that's general to the same extent that the piano is a general purpose musical instrument.

### The Emergence of Tritones

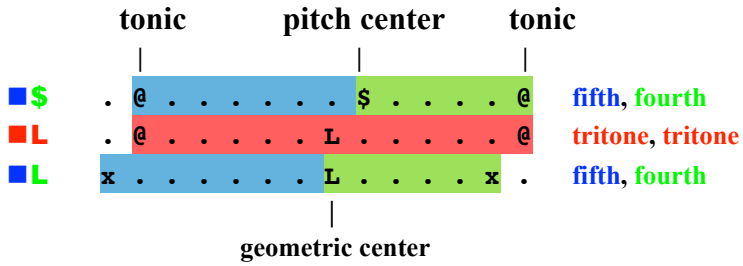
Tritones emerge as structurally fundamental in this theory, which is surprising at first because tritones are dissonant intervals when their notes are sounded together. The structural importance of dissonant tritones is analogous to the structural importance of dissonant half tones in music notation in the sense that both provide **measuring sticks**. Half tones are measuring sticks for the intervals of music notation because they're the fundamental divisions of octaves in Western music. They're useful

units of measurement even for scales that have no half tones, namely pentatonic scales. Tritones are measuring sticks for building blocks because they're the only intervals of the same size in either inversion. They provide fixed-size references for fifths and fourths, which may be understood as **morphed tritones**. This warrants the introduction of the unconventional term **fifo**, standing for a fifth or fourth. Viewing fifos as morphed from tritones reduces notational complexity dramatically, without reducing the musical importance of fifos. This is possible because details provided by context are left to context.

Viewing the structural aspects of music through the lens of these ideas provides strong evidence of the fundamental importance of tritones for all aspects, which goes strongly against conventional wisdom. The modes that define the scales of key signatures — called **classical modes** in these pages (also sometimes called "church modes" or "canonical modes") — contain single tritones that are functionally equivalent to key signatures as identifiers of the modes. This generalizes to multiple tritones of non-classical modes being functional generalizations of key signatures that identify these more general modes. Chords containing tritones are signposts of important musical events such as resolving to the tonic of a mode, changing to a parallel mode (e.g., major to minor) or changing to a different tonic for the same mode (e.g., the same major mode). "Tritone substitute" chords (same tritones in opposite inversions, all non-tritone notes different) are a staple of chord substitution in jazz. Many different kinds of chords containing tritones exist, as summarized in a table in Appendix C. The sounds of tritones, fifths and fourths in harmony **sliding** to different keyboard positions and **morphing** into each other as the music moves forward are fundamental to much music. The notes may be spread out in the music but the essence of their musical contribution is captured by their harmonically equivalent presence within the home octave.

**A Defining Picture**

PKP's unique combination of simplicity and depth follows directly from the following Lego-like view of octave shapes that are the result of splitting the home octave into equal halves in two ways.




The result is stacked opposite inversions of Lego-like **building blocks** of two kinds. The opposite inversions are pictured as overlapped at the shared central point, with upper building block on top. Symmetric octave shapes are formed of oppositely inverted tritones (size 6 half tones, or 3 whole tones). Asymmetric octave shapes that differ by a half tone from the symmetric shapes are formed by fifths (7 half tones) and fourths (5 half tones) referred to jointly as **fifos** (standing for fifths or fourths). The geometric center and the pitch center are identified by symbols **L** and **$** that **anchor** building blocks going up from them. On the left, color-coded anchor symbols identify building blocks of the same color: **$** anchors a fourth, **L** anchors a tritone, and **L** anchors a fourth. Anchor-centered octave shapes are symbolized by adding a box prefix of the appropriate color to the anchor symbol. The prefix

identifies the size of building block that completes the octave. The octave completion building block for the single tritone is a tritone symbolized by ■, and of the two fourths is a fifth symbolized by ■.

This picture is a manifestation of the importance of symmetry and asymmetry in PKP's representation of music. These properties are well known in math and physics to be cornerstones for understanding complexity, so it's logical that it might do so for music, which is complex by any measure. The only hurdle to overcome is unfamiliar concepts and notation. The concepts follow from first principles that anyone who has seen a piano keyboard can understand. The notation is symbolic but there's no math here and everyone has an intuitive understanding of symmetry and asymmetry from everyday life. This picture is fundamental to PKP, so please bear with me while I describe some notational details that are important.

The upper octave shape in this picture is a **scale frame** composed of the upper and lower tonic and the pitch center of the home octave. The scale frame is the basic consonant element of all primary tonic scales of the home octave, meaning ones including the pitch center. It's always the starting point for understanding scales. Scales without pitch centers exist but they're understood relative to ones with pitch centers. The scale frame is identified as an anchor centered octave shape by ■$ but it may also be understood as a combination of fifth going up from the bottom tonic and a fourth going down from the top tonic, which requires an anchor symbol for a building building block going down. An underlined anchor symbol does the job. Therefore another notation for the scale frame is @@, identifying a fifth **@-$** with a fourth **$-@** on top (no colors because the symbols here represent notes not building blocks). This is the only case of building blocks having defined anchors at both ends.

Except for the scale frame, all building blocks are represented by a single anchor within the home octave, to avoid ambiguity. This means that all anchors are within the bottom fifth of the scale frame and none are in the top fourth. Building blocks may go up from bass notes in the top fourth but the bass notes are the bottom ends of inversions of building blocks anchored in the bottom fifth. The tonic and pitch center are never tritone anchors, but they may be the bass notes of tritone inversions: for example, tritone L goes up from the tonic as a bass note. Other inversions have bass notes in the upper fourth: for example, the fourth L inverts into a fifth L going up from the upper note of L as a bass note.

The asymmetric octave shapes are simple morphs of the symmetric octave shape: either hold the outer ends and move the center a half tone, or hold the center and move the outer ends a half tone. These simple morphs effectively define fifos (fifths or fourths) as morphed tritones. This is significant because only 6 different symmetric stacks are anchored within the home octave, and the morphings define all 24 fifos (12 fifths, 12 fourths) that may appear in music, in a way that's direct and simple on the keyboard. The simplification is more dramatic than this because this only shows half the possible morphings of a a single symmetric octave shape. The full picture must await the definition of an alphabet of six anchor symbols within the bottom fifth (coming up).

Anchor-centered octave shapes are the primitive conceptual elements of PKP. They're very simple on the keyboard, particularly for tritones. Pick any octave on the keyboard and its geometric center is a tritone anchor. With one exception, a white-piano-key anchor goes with two black piano keys an octave apart, and a black-piano-key anchor goes with two white piano keys an octave apart. There's one all-white-key tritone on the keyboard and no all-black-key tritones. Tritones in music notation cannot be seen as fundamental because every tritone comes from a different key signature, in which it's

represented by pairs of different note symbols, possibly different for every appearance of the same tritone in different places in a piece of music. Everything involving tritones in music notation is complex. Anyone versed in music notation naturally thinks of tritones as no more than one of many different kinds of intervals represented in many different ways. Examining almost any piece of written music with an eye to identifying tritones will reveal that they do indeed have fundamental musical roles that the notation obscures (for example, see the table of tritone chords in Appendix C).

Octave shapes of these forms are standard elements of piano exercises learned by beginners as stepping stones towards voicing chord progressions, but music notation provides no simple notation for them. The unique contribution here is a simple notation for them that has deep ramifications, not only for identifying scales, but also for finding shapes to voice chords from the scales.

Tritone content identifies modes, in manner remaining to be described, but the concept can be understood independently of the details. Basic core harmony from a mode is provided by a sequence of anchor-centered, symmetric octave shapes. The selection of particular tritone inversions from these shapes establishes basic core harmonic flow. Different choices provide different, harmonically equivalent flows. Asymmetric octaves shapes morphed from the symmetric ones provide possible core fifos, one of which can be selected to fit the mode and the flow. Octave shapes based on core harmony provide stepping stones to shapes with more notes that voice chords. This is dramatically simpler than parsing chord symbols, but leads to the same results on the keyboard.

**Pronunciation of the Notation**

The visual notation is simple but begs the question: How should it be pronounced? A simple convention is to pronounce an anchor letter as a letter with an attached numeric prefix or suffix that identifies the size of the anchored building block in half tones going up or down. For example, **L** is pronounced "el-6" and its inversion **L** is pronounced "6-el." The situation is different for fifos because opposite inversions are different sizes: **L** is pronounced "el-5" and its inversion **L** is pronounced "7-el." This convention provides reminders of the sizes of the building blocks. This is useful because of a confusing mismatch between the conventional meanings of "fifth" or "fourth" as 5 or 4 scale steps in a classical mode, and their meanings as sizes in half tones. A fifth has 7 half tones, not 5; a fourth has 5 half tones, not 4; and a major third has 4 half tones.

**THE ALPHABET**

As illustrated next, the alphabet **PADMIL** provides six letters identifying the anchors of the six possible different tritones going down by half tones from the geometric center of the home octave identified by **L**. The source of the letters is the set of classical modes that provide the scales of key signatures.

| @ P A D M I L $ x x x x @ | classical modes with tritones in these positions |
|---|---|
| @ . . . . . L $ . . . . x | Lydian un-inverted, Locrian inverted |
| @ . . . . I . $ . . . x @ | Ionian, the master mode of a key signature |
| @ . . . M . . $ . . x . @ | Mixolydian (Mixo for short) |
| @ . . D . . . $ . x . . @ | Dorian |
| @ . A . . . . $ x . . . @ | Aeolian (a.k.a "natural minor") |
| @ P . . . . . x . . . . @ | Phrygian |

The 6-letter alphabet is a circular loop in the sense that traversing it in one direction goes off one

end to proceed in the same direction from the other end. Each step in such a traversal identifies a tritone (and its corresponding octave stack) offset from the previous one by a half tone. This is true even between opposite ends of the alphabet because the **P** and **L** tritones are offset by a half tone when one is inverted.

The alphabet letters are the first letters of the names of the classical modes containing tritones anchored in these relative positions. The interval sequences of these modes may be understood as determined by one mode as the master, selected by convention as the Ionian major mode. Its interval sequence is determined by all the white piano keys going up from note C. The other parallel modes are all relative modes (same notes, different tonics) of different transpositions of the master mode. For example, the parallel Aeolian mode is the relative mode, starting on the home tonic, of a transposition of the Ionian mode up a minor third. Its interval sequence is the same as all the white piano keys going up from note A, down a minor third from C. Identifying these modes as the default major and minor modes of key signatures is only a convention. The Lydian mode has been proposed by George Russell as a better master mode for jazz than Ionian. A key signature and one or more accidentals may identify other actual modes in play, which may vary all over the map, including non-classical modes that originate in no key signature. The ramifications tend to be complex in music notation because parallel modes are from different key signatures.

The naming convention for tritones connects unfamiliar concepts with music notation via the modes that determine the key-signature scales of music notation, and gives the anchor symbols intuitive meaning. It does not restrict the tritones to these modes — their existence is identified independently of any mode, classical or non-classical, in which they find themselves. Any set of six anchor symbols could provide the same identification.

**Observations on the Alphabet**

The anchor letters are normally in a special boldfaced font (Arial Black) that makes them stand out as different in kind from some of the same letters used in music notation (letter notes A and D, chord root I). Fonts cannot be used in handwritten annotations on the music page, but the same purpose is accomplished by outlining anchor letters. Different fonts are simpler in printed text.

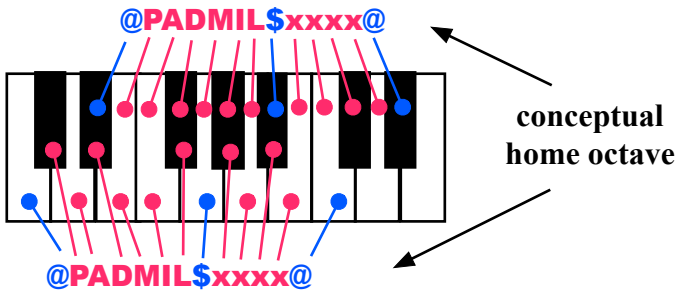
The entries in tables illustrating shapes are in a different, fixed-width font (Courier) that enables tables with aligned columns to be constructed in text, but there's no change of meaning — the Courier font is reserved for tables. The anchor letters in the header line are repeated in the building blocks for readability, but the building block positions relative to the header line are visibly sufficient without this.

Anyone familiar with classical modes will recognize that the **PADMIL** ordering is unconventional. The conventional ordering is **IDPLMAL**, identifying successive relative modes of the Ionian mode. In this order, **L** appears twice because the Lydian and Locrian relative modes have different starting notes. The **PADMIL** order is different because it's based on parallel modes. This ordering is practically useful because it puts parallel classical modes that differ by one note adjacent to each other.

**The Conceptual Home Octave on the Keyboard**

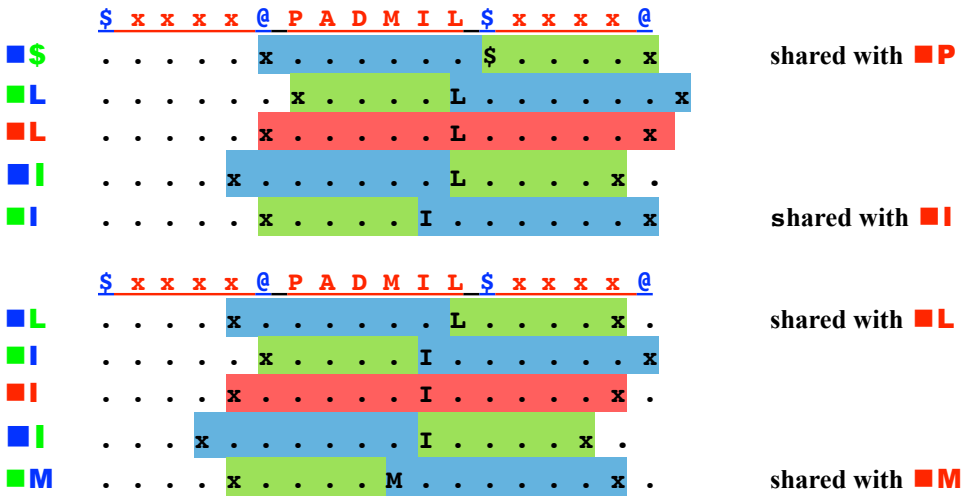
The mapping of the conceptual home octave — identified by the alphabet — to the keyboard is illustrated next for two of the twelve possible home octaves. The same conceptual home octave looks very different in different places on the keyboard. The difference is manageable because it's independent of music notation and depends only on the mapping of the six alphabet letters to six

adjacent piano keys. As said earlier, anchor-centered, symmetric octave shapes are very easy to spot because, with the exception of the C octave, the outer piano keys and the central piano key are opposite colors (white for one, black for the other). There are no all-black-key octave shapes of this kind. When playing a particular piece, keeping the piano key of its home tonic fixed in the mind is essential, to avoid confusion with some recently played piece that's still in the mind. Putting a temporary stick-on label on this piano key can be helpful.




## CONTINUING THE DEVELOPMENT OF OCTAVE SHAPES

Before going into the details of modes and chords, it will be helpful to grasp fundamental relationships between all possible building blocks in the pictorial terms introduced earlier. The following picture condenses a very large amount of detail in music notation into a simple picture that can be understood at a glance. The picture extends the previous one in two ways. It extends it to the next tritone down from **L** , namely **I**; and doubles the number of morphs to include morphs shared between tritones. The patterns repeat for the remaining four tritones .




The six patterns for six tritones define all possible fifos as morphed tritones. The picture for each tritone defines 8 fifos (4 fifths, 4 fourths) for a total of 48 fifos, which is twice the total number of fifos in an octave (24). This oversupply of fifos is a reflection of the fact that fifos are shared between parallel modes with different tritones. The same fifo in different parallel modes may be morphed from a different tritones. Some shared fifos are morphed from other fifos by a whole tone, which may be regarded as an implied morph by a half tone from a mode tritone not in the mode but with its anchor in

the mode (possible because the alphabet is property of the home octave shared between all modes).

Notating octave stacks is needed mainly for explanations. When you see a tritone or fifo anchor annotated on the written music, an anchor-centered octave shape on the keyboard should automatically spring to the eye without requiring any notation.

The building blocks in these pictures are sufficient for forming all possible scale shapes for all possible scales that can be played on the piano. Scale intervals are generally restricted to half tones, whole tones or minor thirds, and these intervals emerge from the formation process.

Octave shapes in harmony are trial chords that add no new notes but provide simple stepping stones to shapes with all notes different, which voice chords with four or more notes. Such chords are mostly shapes formed of combinations of building blocks, in which smaller or larger intervals emerge as inner or outer intervals of the combinations. The process of forming such shapes from octave shapes starts by shrinking one building block of the octave shape into a smaller interval that's understood as the projecting outer end of an unidentified building block that overlaps the remaining building block(s). Enlarging the menu of building blocks to notate such projections as smaller building blocks would add notational complexity to no useful purpose. There's a simpler way, suggested by the pronunciation convention for building blocks, but it's best left to examples.

Chords with four or more notes are represented by a wide variety of chord symbols (Appendix C). Simple chords with with three notes, called triads, are basically split building blocks, which may be represented by a very simple notation. Splitting a tritone symmetrically yields the two minor thirds of a diminished chord. This is indicated by adding superscript "●" to a tritone anchor (the circle indicates symmetry). Splitting a fifth asymmetrically, in a manner analogous to splitting an octave asymmetrically, yields the major third with a minor third on top of a major triad, or the minor third with a major third on top of a minor triad. These are indicated by adding superscripts "▼" or "▲" to a fifth anchor (the triangles point up or down indicate asymmetry). The broad end of the triangle in the superscript indicates whether the major third is on the bottom or top. Inverting a triad chord on its middle note yields a 3-note shape formed of a building block with an attached voicing interval, which does not imply an overlapped building block.

## THE FULL SET OF CLASSICAL MODES

The full set of parallel classical modes is summarized next. Six primary parallel modes are identified by **//X**, where **X** is one of the six alphabet letters and the prefix stands for "parallel." Six "tritone substitute" modes (same tritone, all non-tritone notes different) are identified by **alt-X**. Tritone inversions are important only for distinguishing between **//X** and **alt-X** modes. Once a mode has been established, tritone inversions are harmonically equivalent. The notation borrows the well known concept of tritone substitute chords from the chord domain and applies it to modes. An **alt-X** mode is determined by transposing a **//X** mode by a tritone. This inverts the tritone because transposing a tritone by a tritone is the same as inverting it. The **alt** modes are relative modes of these transpositions defined by inverting the tritone back into the home octave and transposing all the altered notes down an octave. Only one **alt** mode, namely **alt-L**, is a parallel mode because its tritone is the only one that includes the home tonic. The others come into play for changes.

All the classical modes are visibly determined by symmetric, tritone-based shapes highlighted in yellow. All the scale intervals are whole tones, except for the two half tones that are symmetrically disposed relative to the mode tritone. Symmetric shapes formed by and around tritones are a

fundamental feature of the PKP way of knowing scales.

| | | @ P A D M I L $ . . . . @ | home tonic tonality |
|---|---|---|---|
| Lydian | //L | @ . x . x . L $ . x . x @ | major |
| Locrian | alt-L | @ x . x . x L . x . x . @ x | minor |
| Ionian | //I | @ . x . x I . $ . x . x @ | major |
| | alt-I | . x . x . I x . x . x x . | minor |
| Mixolydian | //M | @ . x . M x . $ . x x . @ | major |
| | alt-M | . x . x M . x . x . x x . | dual (both minor and major) |
| Dorian | //D | @ . x D . x . $ . x x . @ | minor |
| | alt-D | . x . D x . x . x x . x . | dual |
| Aeolian | //A | @ . A x . x . $ x . x . @ | minor |
| | alt-A | . x A . x . x . x x . x . | major |
| Phrygian | //P | @ P . x . x . $ x . x . @ | minor |
| | alt-P | . P x . x . x $ . x . x . | major |

Changes between adjacent modes of the same kind visibly alter one note, provided by the new mode tritone. The tonalities on the right illustrate a general property of these modes that's shared with non-classical parallel modes, namely tonalities of a set of parallel modes related by the shared interval sequence of a master mode (starting from different notes) are all over the map.

## Modes in Lego-like Terms

The Ionian and Aeolian modes are expanded from the mode scales in Lego-like terms below. These modes don't contain all the fifos that could be morphed from their tritones (shown earlier for the Ionian mode) because some are not in the mode. The contain fifos not morphed directly from the tritone that may be considered as morphed indirectly via intermediate fifos. Octave stacks are shown only within the home octave but the others are implied as described earlier.

### //I: Ionian

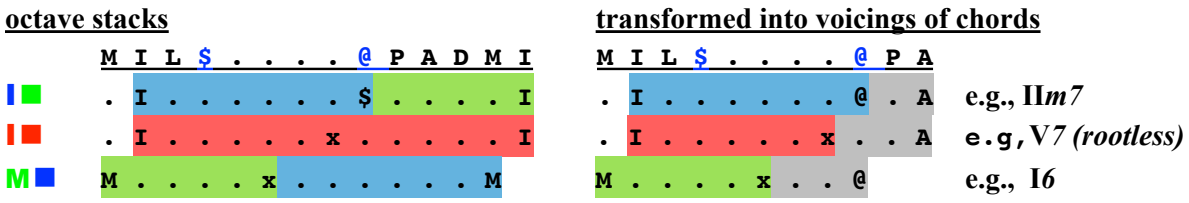
| | @ P A D M I L $ . . . . @ |
|---|---|
| | @ . x . x x . $ . x . x @ |
| frame | @ . . . . . . $ . . . . @ |
| >I | @ . . . . I . . . . . . @ |
| > I | . . . . . I . . . . . x . |
| >M | . . . . M . . . . . . x . |
| >M | . . . . M . . . . x . . . |
| A | . . A . . . . . . x . . . |
| A | . . A . . . . x . . . . . |

### //A: Aeolian

| | @ P A D M I L $ . . . . @ |
|---|---|
| | @ . x x . x . $ x . x . @ |
| frame | @ . . . . . . $ . . . . @ |
| I | @ . . . . I . . . . . . @ |
| I | . . . . . I . . . . x . . |
| >D | . . . D . . . . . . x . . |
| >D | . . . D . . . . x . . . . |
| >A | . . A . . . . . x . |
| >A | . . A . . . . x . . . . . |

The building blocks marked ">" are core. The tritone is core by definition. The frame fifo stack at the top is shared between all **//X** modes and is therefore not core in any mode. The **I** fifo stack is shared between these modes but is core in only one (Ionian). Core fifos are determined by mutual dissonance that the gives them opposite harmonic roles. They either share the tritone anchor or are anchored a half tone away. The role of the core fifos anchored a half tone away in these modes may be designated as **resolution** because the anchors identify mode tonality (major for Ionian, minor for Aeolian). The role of the other core fifo (there is only one) may be designated as **non-resolution**.

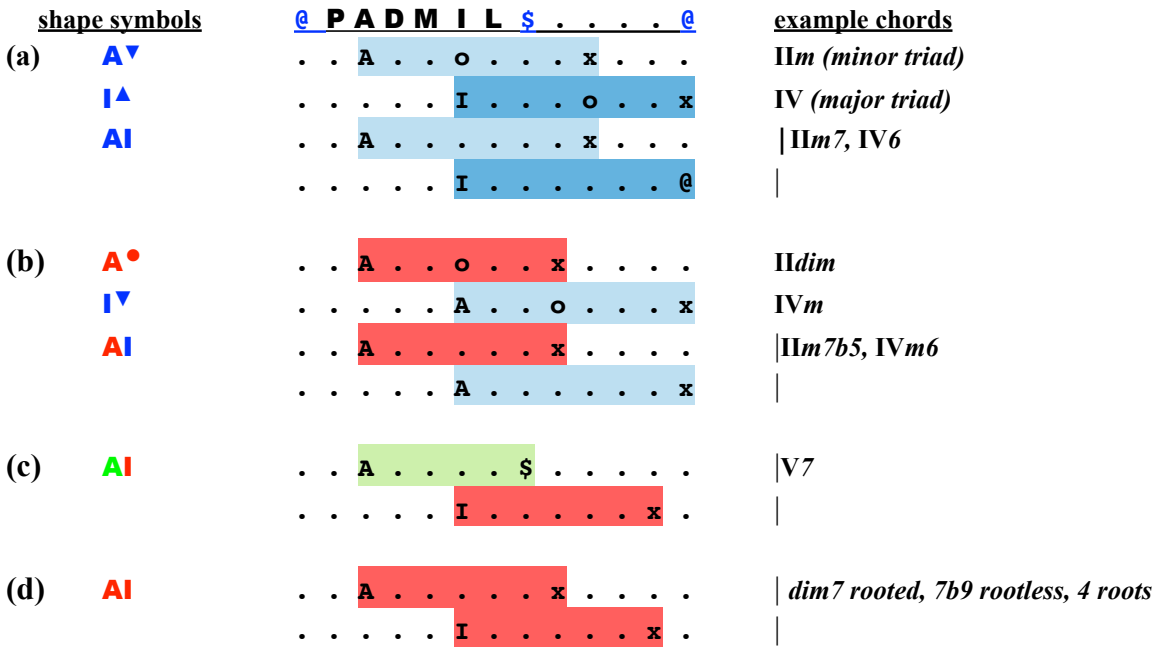
**Core Harmonic Sequences.** This assignment of roles to core fifos identifies core **anchor lines** that identify fundamental resolution sequences for a mode, for example **I-I-M** or **I-I-M** for the Ionian mode. Given a core anchor line, the first step is to play it as a sequence of octave shapes that provide harmonic depth without adding new notes, as shown next for **I-I-M**. This is transformed on the right into a 3-note voicing of a chord progression by lowering the upper note two scale steps. One voicing is rootless but the root is implied by context (it's the pitch center of the home octave). Rootless voicings of chords are common in much music, illustrating that chord roots provide references for chord notes, but are not necessarily fundamental to the sound of a chord in context. The point here is not the chord symbols but the simple way chords may be developed from the bottom up from the simple octave shapes, without reference to music notation (including its chord symbols). This particular chord progression is generally known as **II-V-I** where the RN symbols identify chord roots going down by fifths from a whole tone above the home tonic (or zig-zagging up a fourth and down a fifth within the home octave).




The grey voicing intervals follow from shrinking the upper building blocks by two steps in the mode scale, which, remember, is identified by the tritone. They're understood to be the projecting outer ends of overlapped fifos, the other ends of which are either the pitch center or a note a whole tone above it.

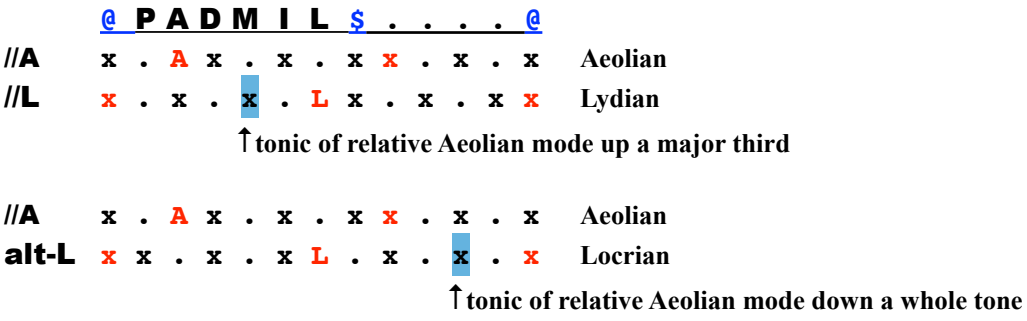
**Substitutability of Fifos.** As just explained, the chords on the right are combinations of a core building block and a non-core building block. The non-core building blocks of this mode are all consonant with each other and with the core building blocks, providing much flexility in fitting chords to context by fifo substitutions. The large number and wide variety of different chords that may be created this way is surprising to the uninitiated, and is best left to examples. Fifos are a source of both harmonic richness in music and notational complexity in music notation. This lightweight way of identifying them keeps the richness and avoids the notational complexity. Hold that thought.

**Chord Shapes.** Forming chord shapes begins with building blocks. Chord shapes in general are formed by splitting or combining building blocks, as illustrated next for selected core building blocks from these two modes (lighter shading indicates non-core fifos). This only dips a toe into deep chord waters but is sufficient to give a sense of how chords of all kinds can be understood independently of chord symbols.




## TWO SIDES OF THE SAME COIN

The two kinds of mode signatures (**//** or **alt**) provide uniformly simple representations of mode/ tonic changes that are often overwhelmingly complex in music notation. We may say that **parallel mode changes and corresponding same mode tonic changes are two sides of the same coin**. A hint of this is provided by the relationship between **//L** and **alt-L**. These modes provide alternate destinations of changes from other modes, as illustrated next for initial mode **//A** .




The anchor change **A-L** may be interpreted as change from **//A** to modes determined by opposite inversions of tritone **L**, namely up a major third to **//L** or down a whole tone to **alt-L**. The changes alter, respectively, two notes and four notes. The number of altered notes is the number of alphabet steps traversed. In general, the alphabet steps in opposite directions add up to 6, the number of half tones in a tritone.

All the possibilities are summarized in a simple, notation-free way by the following simple table. The changes in the left column are from an established mode (**//** or **alt**) identified by a tritone anchor position in the alphabet, to a parallel mode identified by a different position a given number of steps up (+) or down (-) in the alphabet as a circular loop (steps off one end wrap around to the other end). Steps

in opposite directions add up to a tritone. The yellow highlighting identifies changes that alter the fewest notes

**SAME-MODE CHANGES TO TONICS A TRITONE APART**

| tritone change | tonic change | altered notes | tonic change | altered notes | |
|---|---|---|---|---|---|
| +3 | -3 | 3 | +3 | 3 | |
| +2 | -4 | 4 | +2 | 2 | |
| +1 | -5 | 1 | +1 | 5 | |
| 0 | 0 | 0 | ± 6 | 5 | |
| -1 | +5 | 1 | -1 | 5 | |
| -2 | +4 | 4 | -2 | 2 | <— example above |
| -3 | +3 | 3 | -3 | 3 | |

The table generalizes simply and directly to multi-tritone modes, but also tends to be less important for them because tritones of such modes tend to provide sufficient harmonic variety without tonic changes.

## CHROMATICISM

Successive parallel classical modes bring chromaticism (deviation from a written key signature) into the domain of classical modes in a very simple way: one alphabet step (up or down) in a mode signature brings in a new tritone that alters one scale note; two steps alters two scale notes; three steps alters three scale notes; and so on. In each step, one altered note is provided by the tritone (the other tritone note is in both modes). The new modes are chromatic relative to the key signature of the original mode.

The chromaticism of such changes is identified in music notation by accidentals in melody lines and chromatic chords in harmony, without any explicit indication of its origin, which may be classical modes, non-classical modes, a mix of the two, or ornamentation that has no scale implications. Explicit key-signature changes indicate the origin is in classical modes, provided there are no accidentals in the melody and no chords that go outside the key signatures, but much strongly chromatic music is written with a single key signature. Even the simplest classical mode changes can be complex in music notation.

"How strange the change from major to minor" — these words from the song *Every Time We Say Goodby* (covered in Chapter 5) express, incidentally, the extremes of complexity that are possible for a simple major-to-minor parallel mode change such as **//I-//A**. Suppose the home tonic is the first black key above C, which is either C# or Db in music notation, depending on context. Then this change is from 5 flats for Db major (Ionian) to 4 sharps for C# minor (Aeolian). The change naturalizes 5 notes and then sharps 4 notes — 9 symbol changes to alter 3 notes! A particularly confusing feature of this change is the different symbols for the minor tonic (C#) and the major tonic (Db) that seem to imply slightly different pitches for the same tonic. They don't — what they actually imply is slightly different pitches for the notes C and D, when used as references for sharps or flats. The pitch differences are real independently of the piano but not for the piano, and so overcomplicate written piano music.

Going beyond classical modes requires thinking of mode signatures as a kind of functional generalization of key signatures. The contribution of PKP is understanding all such changes in a simple way in terms of tritone changes.

These are deep and complex waters in music notation. PKP concepts and notation enable probing these depths in a way but that provides insight without becoming overwhelmed by details. That said,

the probing remains challenging because music is challenging, as illustrated by the advanced examples in Chapter 5.

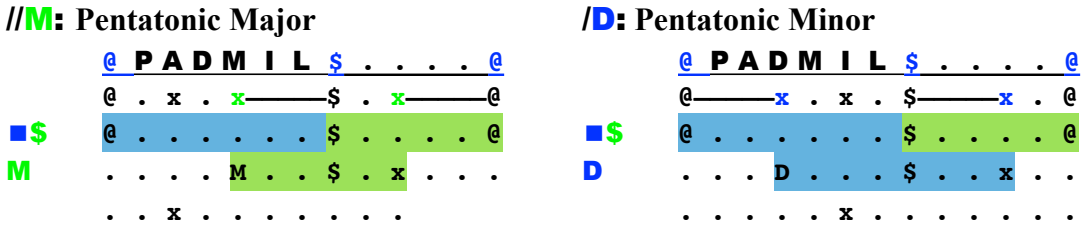
## A HIERARCHY OF PARALLEL MODES

Simple pentatonic modes are the foundation of a hierarchy of parallel modes that includes both classical and non-classical modes. Classical modes were covered first because they provide the key-signature scales of music notation, and the symbols of the anchor notation, but they're actually only one set of modes among many in this hierarchy.

Pentatonic modes are simple scales without any dissonant elements. Examples on the piano keyboard are provided by the scales formed of the black piano keys with major and minor tonics above and below the minor-third gap between them. Anyone with a musical ear can sing melodies from pentatonic modes. Harmonizing the melodies is simple because of the absence of dissonance. For these reasons, pentatonic modes are the basis of "folk music" in many cultures worldwide. The book *Modalogy* uses them as the starting points for developing other modes in terms of the "clothes" of music notation (sharps, flats and all that goes with them). The development here is both simpler and more general than there because stripping off the "clothes" reveals simple, deep structures that they obscure.

### Pentatonic Modes

The Lego-like view of pentatonic modes shown next follows from first principles. There are no tritones here so fifos are the primitive elements. The modes are formed from the scale frame by adding a fifo that establishes major or minor tonality, and doesn't introduce a half tone or a tritone (two adjacent minor thirds). This is the **M** fourth for the major mode and the **D** fifth for the minor mode. One added note splits a remaining major third into two half tones. The result is scales with two minor third intervals, identified in the scale picture by horizontal lines. Minor thirds are very distinctive scale intervals in the grand scheme of things, and so are worth highlighting this way in any scale in which they appear. The signature of each mode is the anchor letter of the tonality-determining fifo. The dots in these representations are only units of measurement, not actual half tones.




A lot of fun can be had, and insight gained, by improvising pentatonic melody and harmony on the black piano keys. Such experimentation leads straightforwardly to blues because basic blues modes add one note to these modes. In this way, blues can be understood as a coherent musical genre determined independently of music notation, in contrast to the impression music notation gives of an ad-hoc combination of disparate elements.

### Classical Modes

Parallel classical modes follow from splitting the minor thirds of the parallel pentatonic modes into a half tone and a whole tone in all possible orders. This turns the half tones from abstract units of measurement into actual half tones on the piano keyboard.

**Blues Modes**

Blues modes emerge from a **mashup** of the parallel pentatonic modes. A mashup, as the term is used in the music business, means combining different musical things to make a new musical thing that's different in kind. A mashup of parallel pentatonic modes combines all the notes to form new parallel modes that are different in kind, as shown next. Viewing blues this way appears to be novel, based on the reactions of experts I consulted. It's worth doing because of the insight it provides.

| | @ P A D M I L $ . . . . @ | |
|---|---|---|
| //M | @ . x . M———$ . x———@ | **pentatonic major (5 notes)** |
| //D | @———D . x . $———x . @ | **pentatonic minor (5 notes)** |
| //DM | @ . x D M x . $ . x x . @ | **mashup (8 notes)** |
| //DM.L | @ . x D M x L $ . x x . @ | **extended mashup (9 notes)** |

The 8-note mashup of the two pentatonic modes may be understood to follow from singers of simple pentatonic tunes "bending" selected notes by a half tone to give a sad twist to the major mode or a happy twist to the minor mode (equating "sad" with minor and "happy" with major). This has effect of changing between the parallel modes. Bending a note adds a new note without removing the unbent note. The extended mashup adds one more bent note, often called the "flatted 5th" because it's a half tone down from the 5th note of a classical mode. Degree numbers such as "5th" become confusing for scales with different numbers of notes: the "flatted 5th" is the "flatted 4th" of a pentatonic mode and also the "flatted 6th" of the 8-note mashup. The mashup is different in kind from classical modes — mixed tonality, different numbers of notes, multiple tritones, multiple half tones (including adjacent half tones forbidden in classical modes). I learned of the existence of the 9-note mode in conventional terms some years ago in a blues piano workshop at the then *Jazz School* in Berkeley (now the *Jazz Institute*). The novelty here is knowing it by a simple, tritone-only mode signature that's independent of both specific home tonics and music notation.

As shown next, basic 6-note blues modes taught to beginners as "the" blues scales are, at once, one-note extensions of the pentatonic modes and sub-modes of the 9-note family mode. "Major blues" is called that because it originates in the pentatonic major mode, but the added note makes it minor-major. In each case, the extension is a tritone anchor because it and a scale note form a tritone (red text). The fifo anchor letters in the mode signatures distinguish the modes from classical modes with the same tritone. The two 6-note modes are more than just sub-modes because their mashup forms the family mode. The extra **M** tritone of the family mode is formed of one note from each of these modes.

**major blues (actually minor-major)**

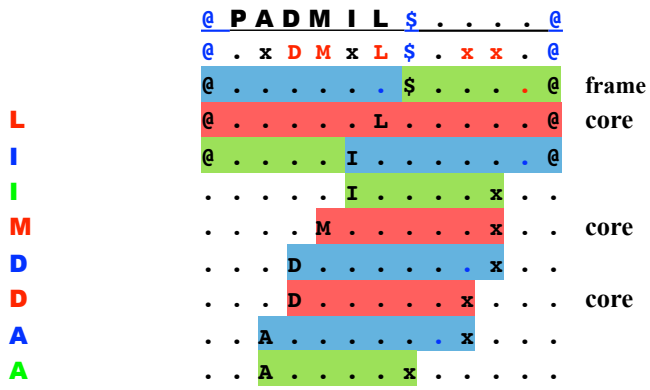
| | @ P A D M I L $ . . . . @ |
|---|---|
| //M | @ . x . M———$ . x———@ |
| //DM | @ . x D M———$ . x———@ |

**minor blues**

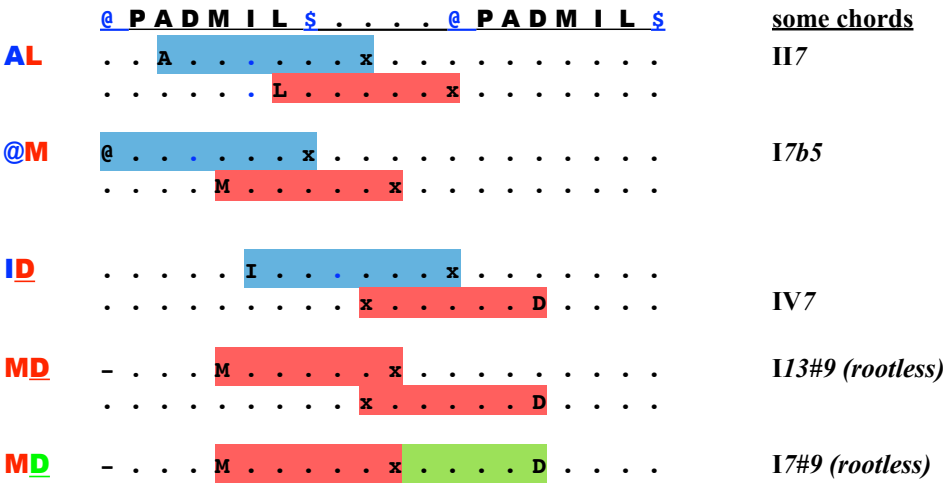
| | @ P A D M I L $ . . . . @ |
|---|---|
| //D | @———D . x . $———x . @ |
| //DL | x———D . x L $———x . x |

The following Lego-like picture summarizes the building blocks of the family mode. The three core tritones and the scale frame provide 7 of the 9 scale notes, leaving 2 notes to be implied by the origin of the mode in parallel pentatonic modes. The picture suggests core harmony sequences just as earlier pictures suggested them for classical modes. The difference here is tritones dominate the core

harmony, which is therefore very simple because tritones are very simple on the keyboard.




A few examples of chords shown next will give a sense of this The combinations of building blocks are simple but the implied chord symbols can be complex, not only individually, but because the same shape may be voicings of different chords on different roots. The double tritone **DM** is too strongly dissonant for most purposes, combining as it does two tritones offset by a half tone, but its anchors a half tone apart express a fundamental feature of blues, namely mixed minor-major tonality. This feature is captured by a 3-note shape formed of anchors **M** and **D** in different octaves with a note in between that provides a tritone-fourth stack (sometimes called "all fourths" because a tritone is an augmented fourth). See Appendix C and Chapters 3-5 for more..




## Non-Classical Major and Minor Modes

Non-classical major and minor family modes follow from a mashup of the **//A** and **//I** classical modes. Mashups of these modes cover so much ground in a useful way that there seems little need to consider other possible mashups of classical modes. That said, they're easy to add if anyone sees a need.

The immediate result of the mashup is a 4-tritone, 10-note parent mode identified by **//ADMI**. The mixed minor-major tonality of this mode provides a solid basis for sub-modes of one or the other tonality. These sub-modes follow from morphing either the **D** or **M** tritone into a scale fifo with the

same top note. The result is pair of 3-tritone, 9-note modes of minor or major tonality identified by a compound tritone/fifo signature, in which a single fifo anchor identifies the fifo morphed from the missing tritone (the fifth **D** is morphed from missing tritone **M**, and the fourth **M** is morphed from missing tritone **D**). I prefer the signature with the asterisk suffix that implies filling in all the notes in the top fourth.

| | | | |
|---|---|---|---|
| | | @ P A D M I L $ . . . . @ | |
| //ADMI | | @ . A D M I . $ x x x x @ | //**I** + //**A** mashup |
| //ADD.I | or //AD.I* | @ . x x . x . $ x x + x @ | **minor family** |
| //A.MMI | or //A.MI* | @ . x . x x . $ x + x x @ | **major family** |

The only difference between the 9-note family modes is the highlighted tonality in the bottom fifth. The forms of the family modes say something important about tonality in general, namely that it's determined by the bottom fifth of the home octave, leaving the top fourth to context.

The same concept may be applied to other mode signatures than these. Tritones **P** and **L** and the corresponding classical modes are excluded from this picture but often appear ornamentally in music from these scales as functional substitutes for tritones **A** and **I** (e.g., in sequences such as **P-A** or **L-I**).

A sampling of important 8-note and 7-note sub-modes is provided next (see Chapter 4 for more details).

| | | | |
|---|---|---|---|
| | | @ P A D M I L $ . . . . @ | |
| **minor** | //AD.I | @ . A D . I . $ x x . x @ | **"bebop" melodic minor** |
| | //D.I | @ . x D . I . $ . x . x @ | **melodic minor** |
| | //AD.I (or //AI$^{mi}$) | @ . A D . I . $ x———x @ | **harmonic minor** |
| **major** | //A.MI | @ . A . M I . $ x . x x @ | **major partner of //AD.I** |
| | //A.M | @ . A . M x . $ x . x . @ | **parallel mode of //D.I** |
| | //A.MI (or //AI$^{ma}$) | @ . A . M I . $ x———x @ | **harmonic major** |
| | //A.MI | @ . A . M I . $ x x . x @ | **bebop major** |

The melodic and harmonic modes are like classical modes in having seven notes and no adjacent half tones. The circular symmetry of the double tritone makes **//AI** an ambiguous mode signature, requiring the extra notation shown to disambiguate it, unless context clearly establishes the tonality. These modes appear in pieces of music as sub-modes of not only major and minor families but also of the blues family seen earlier. The modes are very simple, each in its own way. The melodic modes are simple because they're almost whole tone scales (yellow highlighting brings forward sequences of four whole tones). The harmonic modes are simple because their double tritones have circular symmetry, manifested as a stack of three minor thirds. An empty outer minor third (identified by a horizontal line) establishes the opposite minor third as the determiner of the master tonality. The rest of the mode follows from the scale frame and the rule of no adjacent half tones.

The melodic and harmonic modes are the only non-classical modes that have been formally developed in music notation into a set of 7 parallel modes that are analogous to the 7 parallel classical modes. The book *Modalogy* develops these modes in conventional terms, with results that are painstakingly correct but overwhelmingly complex for all but experts (Appendix D). A simple view of these modes is developed in Chapter 4. The harmonic major and minor modes are represented by an 8-

note mashup of them that I call “harmonic minor-major” ( **//AI**$^{\textbf{mami}}$ ). This mode determines a total of 8 parallel modes (instead of 2x7=14), and context generally determines the corresponding 7-note mode, if needed.

A Lego-like picture of the building blocks is not shown here because it follows the general form of the blues picture, with obvious differences of detail.

## CHROMATIC SCALE

The use of note symbols has been avoided so far to develop a view of music based on intervals as musical objects that may be understood independently of the pairs of notes of which they’re formed. Developing the same concepts in terms of note symbols bogs down in complexity. However note symbols are needed for melody lines, among other things. It may seem ironic that an interval-based view of music requires a note-based representation of melody lines, but there’s a good reason for it. Purely interval-based representations of melody lines are ruled out by the difficulty of mentally tracking successive note positions without making errors. The chromatic scale coming up adds no significant complexity to the enterprise because its 12 symbols for 12 piano keys are in direct correspondence with the symbols of the conceptual home octave.

Music notation does not provide a 12-symbol chromatic scale but the piano’s C-octave provides a simple basis for one: number the seven white keys **1-2-3-4-5-6-7** and identify the five black keys by prefixed numbers **p2-p3-p5-p6-p7**, where **p** is a position indicator standing for “phlat” and meaning next piano key down from the numbered key. The prefix is not a flat symbol of music notation because it applies only to these five piano keys (**p1** and **p4** are *not* alternate symbols for **7** and **3**), and there are no symbols corresponding to sharps. The numbers are not degree numbers that count scale notes, but position indicators in the chromatic scale of any home octave. The notation enables understanding the functions of the piano keys of any octave by mental reference to the C octave, in which the prefixed numbers represent black keys. It’s simple enough to annotate on the staff next to note symbols of a written melody line.

| | |
|---|---|
| **chromatic scale of the home octave** | **1 p2 2 p3 3 4 p5 5 p6 6 p7 7 1** |
| **conceptual home octave** | **@ P A D M I L $ x x x x @** |

Why not avoid the additional alphabet notation by identifying anchors by chromatic-scale symbols? The answer is the powerful concept of an anchor is different in kind and needs its own notation. Scale symbols used for anchors would have to be identified as such. PKP’s alphabet does this.

## Melody Lines

A first step in understanding a piece in PKP terms is annotating chromatic scale symbols next to melody notes on a staff. The annotations are an aid to interpretation. Melody modes are understood by marking the chromatic scale positions so identified in a 12-column table of the kind seen many times so far. Such a table provides a basis for identifying parallel modes in a melody line. As already explained, parallel mode changes may be understood as tonic changes if the melody indicates such changes. The notes are the same, only the order is different.

A skeleton melody line is a separate shorthand summary of what is, or could be, annotated on the staff. Such lines provide a useful basis for understanding melody plus harmony. Here follows an example skeleton melody line for a familiar piece, *Happy Birthday to You*.

**5*↗6↘5↗1↘7,  ↘5*↗6↘5↗2↘1,  ↘5*↗5↘3↘1↘7↘6,  ↗4*↘3↘1↗2↘1**

Asterisks indicate repeated notes, arrows indicate ups and downs by differently colored arrows, commas indicate phrasing, and highlighting (optional) indicates melody peaks within phrases, to help the eye see them in a line of text (the mental model is of the movement of position markers on a grid in which the keyboard is horizontal and time goes down the page).

The addition of bar lines from a specific written piece connects a skeleton melody line to it, while still leaving details of timing within bars open. For example, the following bar lines leave open the playing of this melody line in 3/4 time or 4/4 time.

**5*|↗6↘5↗1 |↘7, ↘5*|↗6↘5↗2 |↘1, ↘5*|↗5↘3↘1 |↘7↘6, ↗4* | ↘3↘1↗2 |↘1**

The essence of an entire piece of music may be represented by a skeleton melody line with an associated harmony line, which could be an alphabet-based anchor line or a walking bass line represented in the same notation as the skeleton melody line. These are the ways examples are presented in Chapters 3 and 5.

**Chords**

Full chords represented by chord symbols are results in PKP, not starting points. Identifying implied chords requires a notation for chord roots. A suitable notation is provided by replacing the numbers of the chromatic scale notation with RN symbols as shown next (tonic root "**I**" is *not* the same as Ionian anchor "**`I`**" in a mode table): **I-pII-II-pIII-III-IV-pV-V-pVI-VI-pVII-VII**. This is an adaption of a notation for chord roots used by Mehegan in his piano jazz instruction book.

**PRACTICALITY**

Very little notation is needed to use these ideas for actual pieces of music. Annotations are required on the written music to show anchor symbols above the staff next to chord symbols (the starting point is a table of tritone chords in Appendix C), and chromatic scale symbols on the staff next to melody notes. The only essential separate notations are 12-column mode tables of the kind seen many times in this chapter, used to understand melody and harmony modes. Shorthand representations of melody plus harmony in two textual lines are optional extras. They are used in the examples of Chapters 3 and 5 to avoid introducing the complexities of music notation into explanations. Beyond that, they're available for understanding tricky passages or getting an overview of a piece as a whole.

# CHAPTER 3: SOME SIMPLE EXAMPLES

The examples in this chapter are basically simple but exploring them plumbs surprising depths of musical sophistication. Anyone who has followed this so far should be able to understand and play the examples. The objective is not to show what a piece "actually is," or how the composer or arranger might have viewed it, but to arrive at a simple way of understanding it in purely keyboard terms, and annotating the understanding on the written music to guide playing it. The result is what the piece "is" to the player.

It's useful to think of music as divided into domains identified as **basic classical** (inherently not chromatic), **chromatic classical** (inherently chromatic) and **non-classical** (inherently chromatic). The term "classical" refers to the modes of key signatures, not divisions of music into categories such as classical, jazz and pop. The domains determine how chromaticism enters the picture. In the chromatic classical domain, chromaticism enters via successions of parallel classical modes (and possibly corresponding tonic changes that are the opposite side of the same coin). In the non-classical domain, chromaticism enters via scales that are more general than classical modes. Some chromatic pieces may be interpreted as being in either the chromatic classical or the non-classical domain, with the choice depending on the helpfulness of the interpretation.

For strongly chromatic pieces, the core harmony is often so tritone-intensive that core fifos may be omitted; their inclusion in some examples is sufficient to give a sense of how to include them.

I think of PKP as freeing the understanding of music from the straightjacket of music notation. This is a hard sell to musicians already expert in playing from music notation, because of the many thousands of hours at the keyboard required to get there, and because of the shared language provided by music notation for all musicians. The long hours are needed to become an expert pianist at some level, but not everyone has this ambition. It's possible to enjoy playing the piano for pleasure, without being expert at it. For people so inclined, PKP provides access to pieces that would otherwise be inaccessible. For the musically ambitious, PKP can provide helpful insight into the deep structure of piano music, independently of practicing. Nothing here requires abandoning music notation, only looking at it from a different, complementary angle.

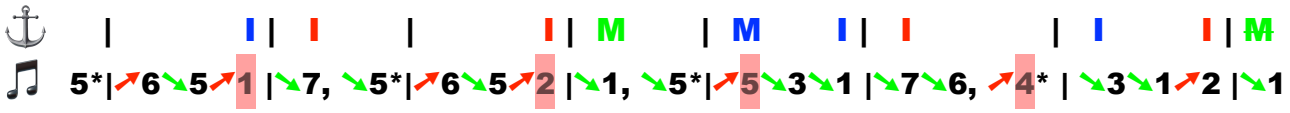
The examples are, in order:

*Happy Birthday*
*Backwater Blues*
*Straight No Chaser (walking-bass-line version)*
*Blue Monk (walking-bass-line version)*
*Summertime*
*I Got Rhythm*
*Over the Rainbow*
*Traumerai*

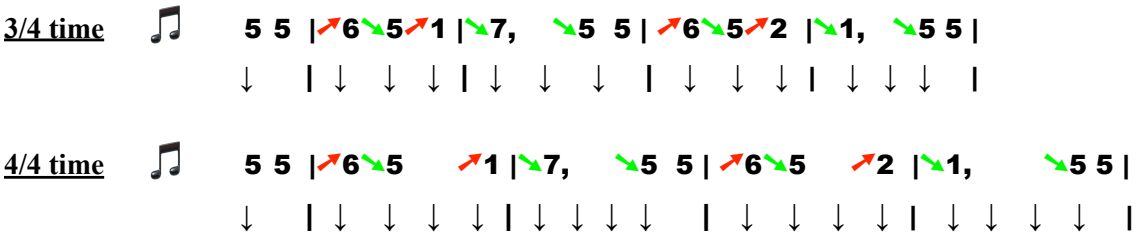
**BASIC CLASSICAL DOMAIN : "HAPPY BIRTHDAY"**

**Home Tonic - F (1 flat key signature: Ionian of F)**

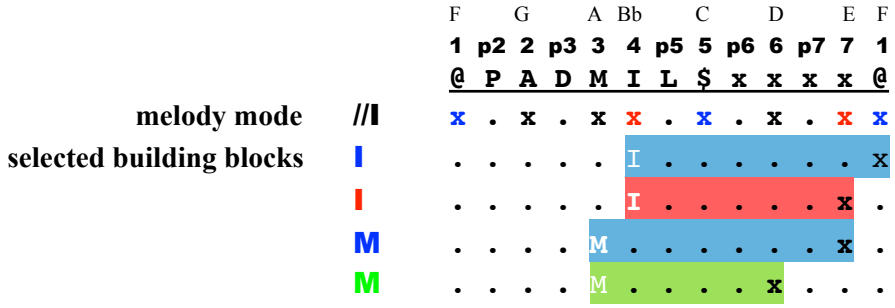
Here follows a 2-line summary of this piece. The symbols on the left identify the harmony anchor line and the melody line (seen at the end of Chapter 2).




The aim of a skeleton melody line is to provide a framework for adding harmony, not a detailed specification of melody. As illustrated next for the first few bars, this melody line is playable in 3/4 time or 4/4 time by different assignments of downbeats (↓) to notes. The above notation deliberately leaves the difference to the pianist.




The harmony anchor line follows from knowing the mode of the melody line, which requires marking the positions of all the melody notes in a 12-column home-octave table, as shown next (the table is independent of the specific home tonic but the notes for tonic F are shown for concreteness). The selected building blocks of this mode are the ones that appear in the above anchor line.




The mode tritone is positioned relative to the melody line to anticipate resolution in the mode. This is important because the melody line by itself is ambiguous until major tonality is established by the first appearance of note **3** in the third phrase. The postponement of resolution to the tonic is signified in the first and third phrases by the tritone harmonizing the final melody note of the phrase. Immediate resolution at the end of the second and fourth phrases is signified by the tritone harmonizing the pre-resolution melody note. The multiple appearances of the mode tritone "seed" the core, which is completed by fairing in fifos from the building-block menu. Core fifo anchors of suitable functionality are faired into the line of tritone anchors (**I** before **I**, **M** or **M** after **I**). The choice of ~~**M**~~ at points of

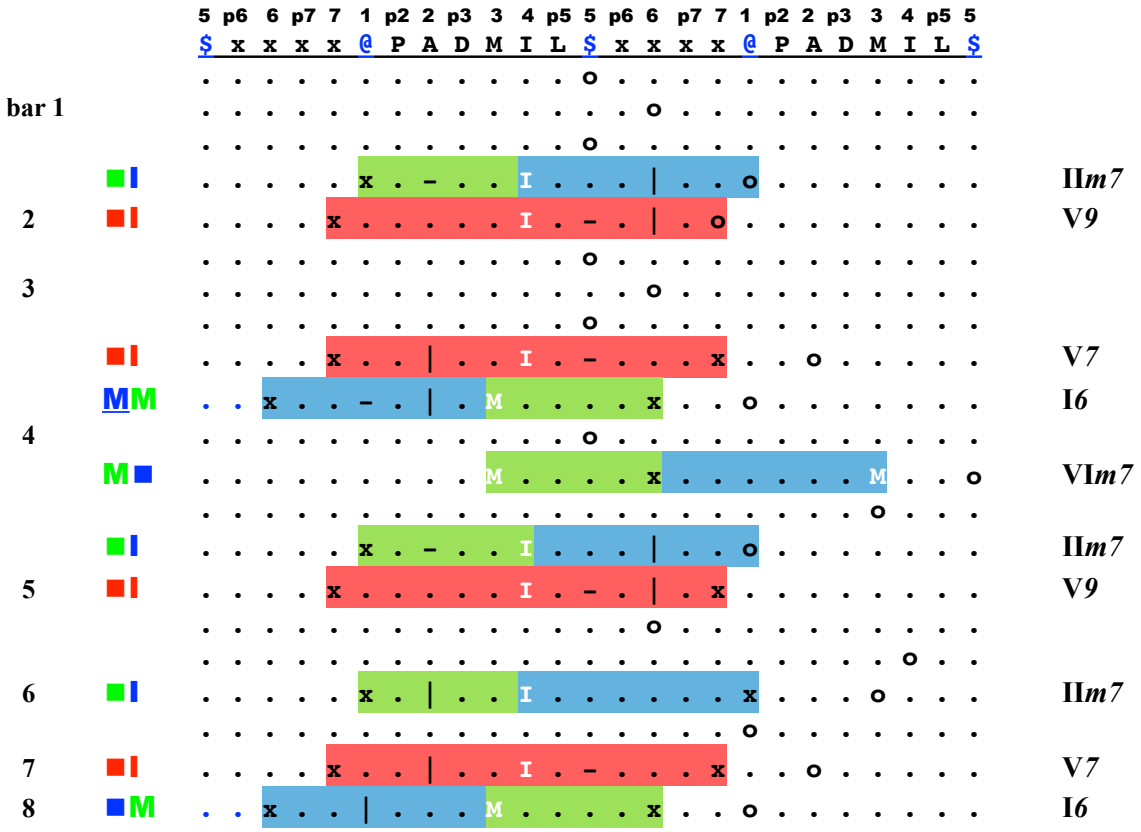
melodic resolution avoids putting a dissonant half tone below the tonic, assumed to be played in the next octave up. The lightweight notation enable fifo substitutions to be made easily, if desired.

Most transitions in this core harmony are **slides** or **morphs**. A slide moves a building block to a different keyboard position while holding its size. A morph changes its size while holding one end fixed. The exception is the **wobbly slide I-M** which changes both position and size in one step. The unusual term represents the hand movements exactly — slide the hand while moving the fingers ("wobbling" them) for the size change. The wobbly slide **I-M** may be understood as a contraction of **I-M-M** (a tritone slides down a half tone and then morphs into a fourth). Thinking this way can be useful because it suggests a 2-step anchor line that may identify mode changes (e.g., **I-M** stays in the Ionian mode, and **I-M-M** goes to the parallel Mixolydian mode).

Different added root lines for the same core yield voicings of different chord progressions. The number of different possible chord progressions with this same core tends to be startling to the uninitiated. Chord roots are only references for specifying notes, and not actually fundamental to the sound of a chord progression (more on this later). In contrast, the core building blocks are fundamental to the sound.

## From Octave Shapes to Chords

As illustrated next, octave shapes formed from anchored building blocks are stepping stones to shapes representing chords. This particular example illustrates "voice leading" harmony, in which the harmony follows the melody as closely as possible below it ("**o**" entries identify melody notes).

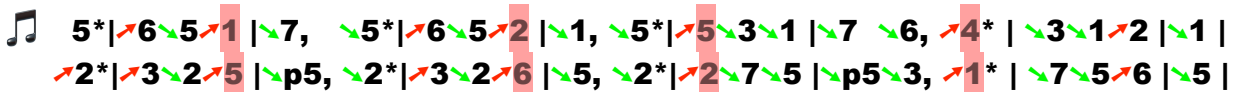


The home tonic and the mode tritone determine the scale that supplies the fifos. Chord roots identified by dashes within the shapes, are visibly provided by context. Different choices of roots yield different chords but these choices are simple and obvious. This is voice-leading harmony overall, not just in bar 4. The top harmony notes in bars 1, 2, 4 and 5 fall on top of melody notes, depriving the harmony of an extra note, which is easily fixed by shrinking the building blocks down to the vertical lines. Vertical lines in other bars suggest other shrinkages that replace other doubled notes. The shrinkages are nuances that don't change the essence of the sound. Different roots yield different chords for the same shapes (e.g., the first two shapes could voice chords **IV***M7* and **IV***M7b5*, among many other possibilities — see Appendix C).

**Same-Mode Tonic Changes vs. Parallel Mode Changes**

Same-mode changes have been said to be the "other side of the coin of parallel mode changes." This begs the question, which side of the coin is simplest for understanding a piece of music? Two examples will illustrate the issues.

**Example 1:** This follows the original melody line with a repeat of it up a fifth.




Every note of the melody *line* changes but only one note of the home-tonic melody *scale* changes. The two sides of the same coin are a same-mode tonic change up a fifth and a same-tonic mode change up an an alphabet step: **//I-//L**. The notes are the same either way. The second melody line walks through these notes starting from note **2** and eventually resolves to note **5** as a secondary tonic. It's easy to see that the scale of the second melody line is the scale of the original starting from this secondary tonic, without having to think specifically in terms of notes of transposed tonic scales. The new mode is identified by the original tritone transposed up a half tone: the tritone is transposed up a fifth and then inverted into the home octave, which puts its anchor within the home tonic up a half tone from the original.

| | | 1 | p2 | 2 | p3 | 3 | 4 | p5 | 5 | p6 | 6 | p7 | 7 | 1 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | @ | P | A | D | M | I | L | $ | x | x | x | x | @ | |
| **original bars** | **//I** | x | . | x | . | x | x | . | x | . | x | . | x | x | |
| **new bars** | **same mode up a fifth** | x | . | x | . | x | . | x | x | . | x | . | x | x | |
| | **//L** | x | . | x | . | x | . | x | x | . | x | . | x | x | **Ionian@5** |
| | | ~~x~~ | ~~.~~ | ~~x~~ | ~~.~~ | ~~x~~ | ~~x~~ | ~~.~~ | ~~x~~ | ~~.~~ | ~~x~~ | ~~.~~ | ~~x~~ | ~~x~~ | **not //I@5** |

**Example 2:** This repeats the original melody line of *Happy Birthday* down a half tone.

| | | 1 | p2 | 2 | p3 | 3 | 4 | p5 | 5 | p6 | 6 | p7 | 7 | 1 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | @ | P | A | D | M | I | L | $ | x | x | x | x | @ | |
| **original bars** | **//I** | x | . | x | . | x | x | . | x | . | x | . | x | x | |
| **new bars** | **same mode down a half tone** | . | x | . | x | x | . | x | . | x | . | x | x | . | |
| | **alt-M** | . | x | . | x | x | . | x | . | x | . | x | x | . | **Ionian@7** |
| | | ~~x~~ | ~~.~~ | ~~x~~ | ~~.~~ | ~~x~~ | ~~x~~ | ~~.~~ | ~~x~~ | ~~.~~ | ~~x~~ | ~~.~~ | ~~x~~ | ~~x~~ | **not //I@7** |

Again, every note of the melody *line* changes but this time so do most of the notes of the melody *scale*, including the home tonic, which is now missing. The new tritone transposed down a half tone and then inverted is anchored down a half tone by **M** but the new mode is not **//M** because it doesn't include the home tonic: it's the tritone substitute mode **alt-M** with all non-tritone notes different.

The comments on the right indicate it would be a mistake to notate a same-mode tonic change by using the signature for the original mode with a tonic-change suffix (e.g., **//I@5**) because this indicates a relative mode with the same notes.

These two simple examples of parallel mode changes up and down an alphabet step penetrate musical depths that can be very complex in music notation, setting the stage for more sophisticated pieces to come here and in Chapter 5. Music notation gets in the way because parallel modes bring in multiple explicit or implicit key signatures in which the **same piano keys are represented differently** (sharps, flats, naturals, on staff lines or in staff spaces). This is different in kind from a transposed melody line being identified by different chromatic scale symbols because the note symbols are from the same 12-symbol menu.

## Walking Bass Lines

There are two ways of implying a scale early in a piece of music. One is by harmony that implies the scale (e.g., the mode tritone in bar 2). The other is by a walking bass line that complements the melody to bring in all the scale notes early. Walking bass lines provide a popular alternative to chordal harmony for many kinds of music. Switching between chordal harmony and a walking bass line is good way of providing variety. A simple, 3-downbeats-per-bar walking bass line is shown next for this piece in 3/4 time. The line is identified by an anchor symbol on the left because it replaces the anchor line (or perhaps supplements it), and is shown below the melody line, where it's actually played, because showing it above like core harmony would be too confusing on a note-by-note basis.

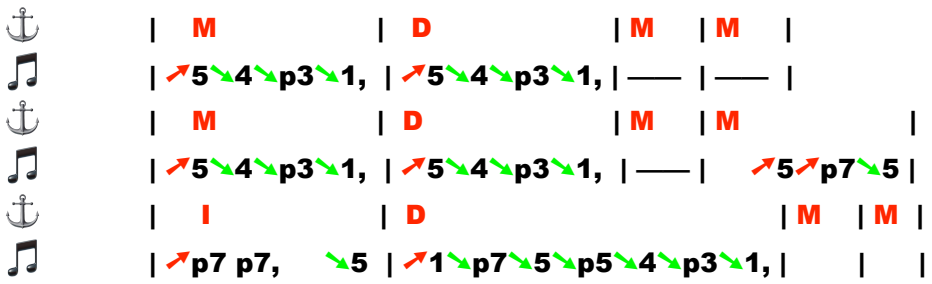

A mode table can help in forming walking bass lines, as illustrated next. This uses elements of the original core harmony but is not intended to be a formal transformation of it.

| | 1 | p2 | 2 | p3 | 3 | 4 | p5 | 5 | p6 | 6 | p7 | 7 | 1 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | @ | P | A | D | M | I | L | $ | x | x | x | x | @ | |
| //DML | x | . | x | . | x | x | . | x | . | x | . | x | x | |
| bar 1 | x | . | . | . | x | . | . | x | . | . | . | . | . | up |
| bar 2 | . | . | x | . | x | x | . | . | . | . | . | . | . | down |
| bar 3 | . | . | . | . | x | x | . | . | . | . | . | x | . | up |
| bar 4 | x | . | . | . | x | . | . | . | . | x | . | . | . | down |
| bar 5 | x | . | . | . | x | . | . | x | . | . | . | . | . | up |
| bar 6 | . | . | x | . | x | x | . | . | . | . | . | . | . | down |
| bar 7 | x | . | . | . | . | x | . | . | . | . | . | x | . | up |
| bar 8 | x | . | . | . | x | . | . | x | . | . | . | . | . | down |

## NON-CLASSICAL DOMAIN: BACKWATER BLUES

### Home Tonic - F (2-flats key signature: Mixolydian of F)

This is a simple, 3-chord, 12-bar blues in F, which I learned some years ago in a blues piano workshop at the then Jazz School in Berkeley, as representative of "probably half the blues pieces played by pop and jazz musicians." It's a simple piece but exploring it plumbs musical depths. This shows only core harmony, which will be filled in as we go along. Except for bar lines, commas delimiting phrases, and an assumption of 4 beats to a bar, timing and rhythm are left open. Placement of notes on downbeats or upbeats is left open. Commas at the ends of phrases only identify the last note, leaving open whether it's sustained or not. The concept is to convey the essence with minimum visual clutter. Nuances of timing are implicitly understood to follow from relationships between downbeats and upbeats (e.g., for swing feel, delay melody notes on upbeats to give the effect that notes on downbeats are bounced off them, also known as "long-short").




The main scales plus selected harmony building blocks are summarized below. As for classical modes, the building blocks arranged in order going down the keyboard suggest possible core harmony sequences. There are more building blocks but these are the only ones used by this core harmony.

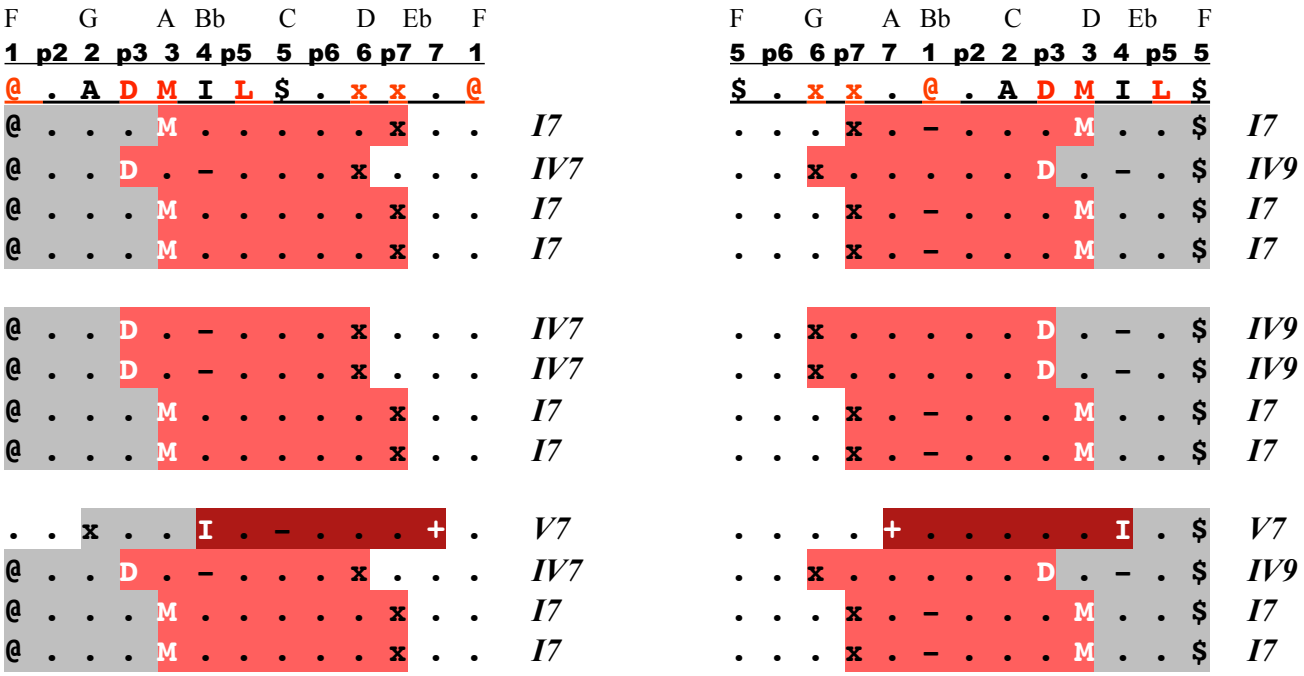
| | F | G | A | Bb | C | D | Eb | F | |
|---|---|---|---|---|---|---|---|---|---|
| | 1 | p2 | 2 | p3 | 3 | 4 | p5 | 5 | p6 | 6 | p7 | 7 | 1 | |
| | @ | P | A | D | M | I | L | $ | x | x | x | x | @ | |
| **harmony** | . | . | . | x | x | x | . | . | . | x | x | x | . | **DMI** |
| **melody** | x | . | . | x | . | x | x | x | . | . | x | . | x | **//DL (6-note minor blues)** |
| **blues family** | x | . | x | x | x | x | x | x | . | x | x | . | x | **//DM.L** |
| **selected building blocks** | . | . | . | . | . | . | L | . | . | . | . | . | @ | **L - blues family** |
| | . | . | . | . | . | I | . | . | . | . | . | x | . | **I - substitute for L** |
| | . | . | . | . | M | . | . | . | . | . | x | . | . | **M** |
| | . | . | . | D | . | . | . | . | . | x | . | . | . | **D** |

Substituting **I** for **L** follows from conventional thinking about chord roots. Dominant-7 chords on roots **I**, **IV** and **V** are conventionally regarded as standard blues chords: the tritones **M**, **D** and **I** are from these chords. The problem with this is tritones are more fundamental than chord roots to the blues. For example, a variety of blues chords with different roots emerge from tritone substitutions for dominant-7 chords (same tritone, root a tritone away, all non-tritone notes different). Chords **I***7*, **IV***7* and **V***7* have tritone substitutes **pV***7*, **VII***7* and **pII***7*. Using these substitutions muddies the chord waters, but core harmony remains clear. Tritone substitution is not limited to dominant-7 chords (or

even to chords — recall **alt** modes). The **V** chord containing **L** is **V*M7(11)***, of which chord **pII*M7(11)*** is a tritone substitute. These chords and others like them may appear in blues pieces — for example, the footnoted chord progression on the first page of Chapter 1 — defeating all but experts by their complexity in music notation.

Given the general case, it's best to start off thinking of **//DM.L** as the fundamental blues scale, and of the substitution of **I** for **L** as a means of simplifying chord progressions of simple blues pieces. In either case, the function of the single appearance of the tritone in this harmony is signaling a "turnaround" — the beginning of the last 4 bars of a 12-bar blues — as an aid to improvisors.

Harmony based on un-inverted and inverted tritone cores is shown next. It's easy to see how these simple voicing lines follow from altering tritone-based octave shapes. The simple voicing lines are sufficient because the tritones provide sufficient harmonic variety. Omitted chord roots are identified by dashes.




All-tritone core harmony is a relatively common feature of blues pieces. An all-tritone core is not only simpler than a mixed tritone/fifo core, it's also musically more definite. Assuming the family blues mode with no substitution of **L**, the fundamental core of this piece over 12 bars is remarkably simple, as shown next.

**M-(D-M-M), D-(D-M-M), L-(D-M-M)**

Chord substitution is a favorite trick of jazz musicians, often having the contrary effects of simplifying the keyboard flow of the harmony while complicating its symbolic representation in chord notation. Chord substitution for this piece boils down to holding the above core and changing a bass or treble line. For example, raising the bass line a whole tone for the last four bars on the left above,

voices the chord sequence **V*7*-IV*7b13*-I*9*-I*9***. Tritone substitute chords discussed earlier are another example. Make enough substitutions and symbolic chord progressions can quickly become difficult to comprehend for all but experts (again, see the footnoted chord progression on page 1 of Chapter 1).

**Walking Bass Lines**

Walking bass lines are popular for blues. Almost the first pieces I learned when I started out were walking-bass-line versions of Monk's *Straight No Chaser* and *Blue Monk*. I learned them from my first piano teacher, without reference to music notation, by copying her finger movements on the keyboard. After a bit more experience, I started to notate such lines for myself using the skeleton-melody-line notation. Walking bass lines are easy to represent in this notation, are easily portable in this form between different pieces, are easy to create knowing mode scales, and are easy to play. Nothing beats experimenting with walking bass lines as a way of learning to think in intervals.

All of these properties are illustrated by a walking bass line I learned for *Straight No Chaser*, shown next as harmony for *Backwater Blues* (yellow highlighting identifies ornamental passing notes). The initial four bars establish the 8-note, minor-major blues scale that's a mashup of the parallel pentatonic modes.


Understanding the bass line as 4/4 downbeats provides the timing reference for the melody. Melody notes on upbeats between downbeats are for swing feel and also to avoid direct dissonances in some bars (the avoidance is a style choice because transient dissonances go with the territory).

As said earlier, walking bass lines are easily formed using a mode table. As illustrated next for bars 1-4, this one is formed mainly of alternating up and down scale runs of the form ***2h-h-h*** and arpeggios based on building blocks. The down sequence in bar 2 ends with an ornamental passing note to the next bar. In general, ***2h-h-h*** sequences up or down sound "bluesey" because these sequences appear in many places in the blues family scale (this particular sequence isn't in the scale, but sounds right in the flow).

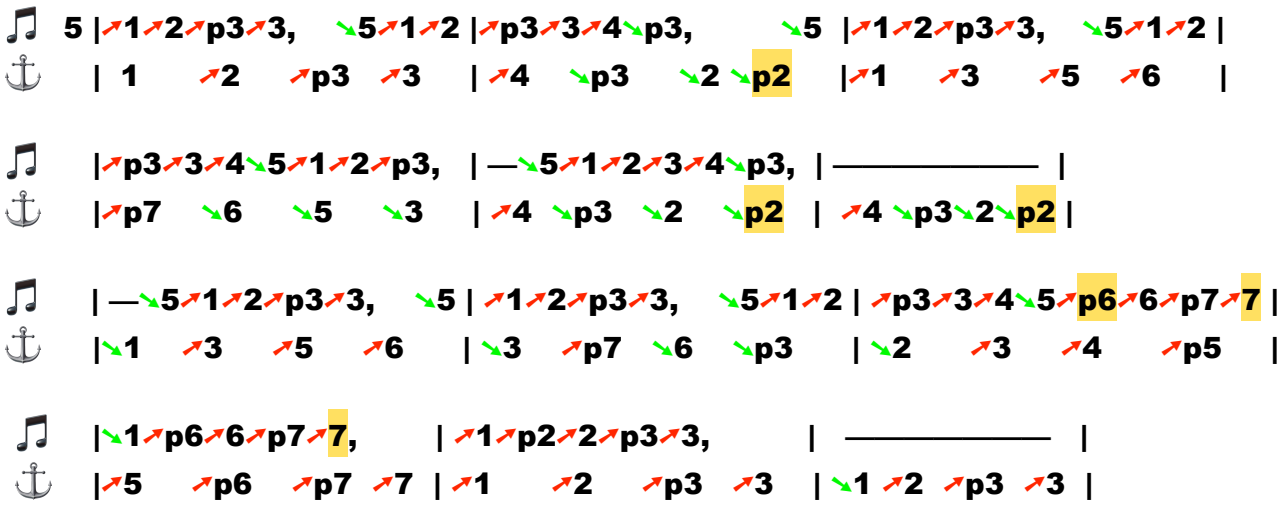
| | 1 | p2 | 2 | p3 | 3 | 4 | p5 | 5 | p6 | 6 | p7 | 7 | 1 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | @ | P | A | D | M | I | L | $ | x | x | x | x | @ | |
| //DML | x | . | x | x | x | x | x | x | . | x | x | . | x | |
| bar 1 | x | . | x | x | x | . | . | . | . | . | . | . | . | *2h-h-h* up |
| bar 2 | . | x | x | x | . | x | . | . | . | . | . | . | . | *2h-h-h* down |
| bar 3 | x | . | . | . | x | . | . | x | . | x | . | . | . | up |
| bar 4 | . | . | . | . | x | . | . | x | . | x | x | . | . | down |

## NON-CLASSICAL DOMAIN: TWO BLUES BY MONK

Although these pieces are relatively difficult in music notation because of their strong chromaticism, they're simple on the keyboard and easy to learn in this notation. They were among the first pieces I learned when I started out, and were so easy to learn that I think they belong in a set of introductory pieces. There's nothing in them requiring advanced musical knowledge or expert chops, and playing them is great fun for anyone who likes blues. A source for these and other Monk Pieces is *Thelonius Monk Fakebook*, Hal Leonard, 2002. The melody lines here are from this source, but I can cite no source for the walking bass lines.

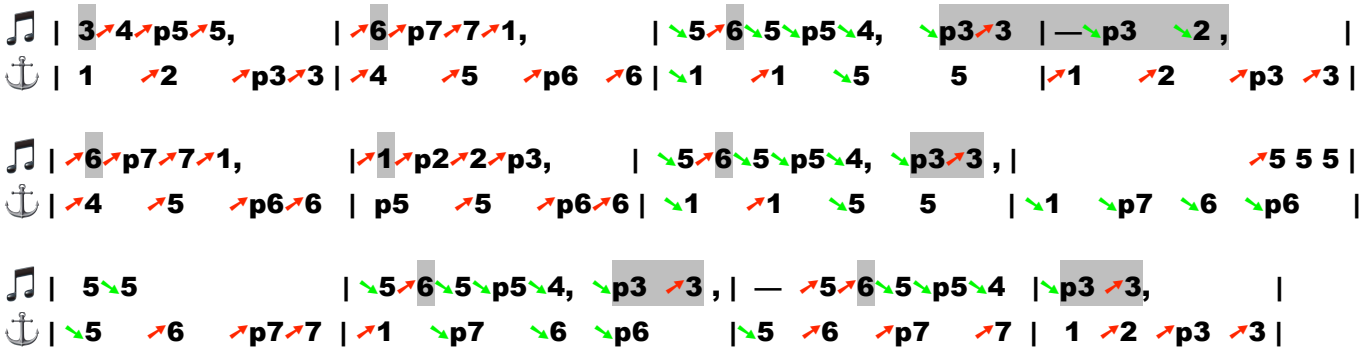
### Straight No Chaser (Home Tonic F)

This is the piece that supplied the walking bass line for *Backwater Blues*. The walking bass line provides the timing that places melody notes on downbeats or upbeats. The interleaving of melody and harmony makes the whole sound like more than the sum of the parts.

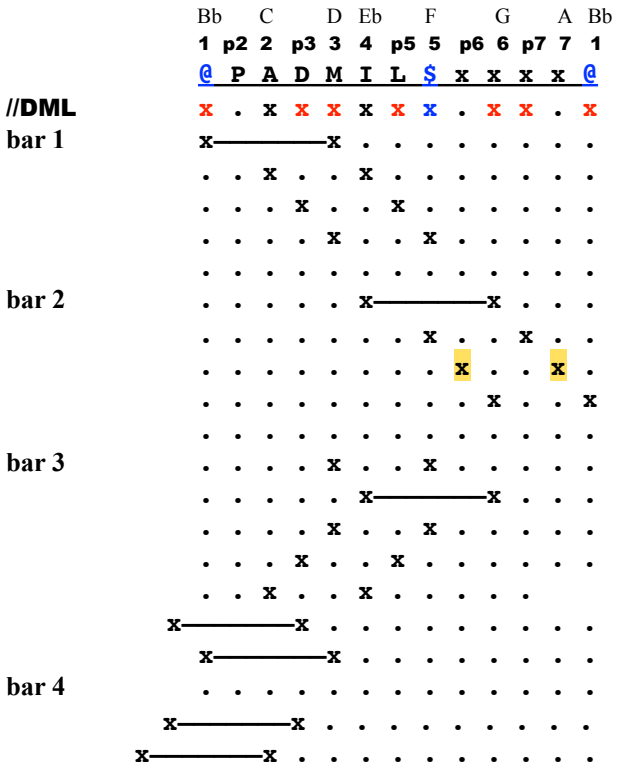



### Blue Monk (Home Tonic Bb)

The walking bass line for this piece is similar in character but different in detail, to fit the different melody line. The bass line, played an octave below the melody line, provides four downbeats per bar. The piece features a double melody line. The second melody line is not shown in note symbols below because it follows a simple pattern that's better understood without them. The second melody line is offset down from the main melody line by minor thirds, except for major thirds below the notes highlighted in grey (the double melody line is illustrated on the next page for bars 1-4).



The double melody line of the first four bars, shown next, demonstrates the simple pattern. The entire piece is remarkably easy to play once you "get" this pattern. Seeing it clearly in the written music is remarkably difficult because of the clutter of sharps, flats and naturals required to represent the chromatic intervals relative to the 2-flats key signature. The main melody line moves by half tones except for a few jumps by whole tones. The major thirds down from it (solid horizontal lines) appear when the main line jumps a whole tone. After these jumps, the second line either also jumps to keep the minor thirds going, or doesn't jump to keep the major thirds going.

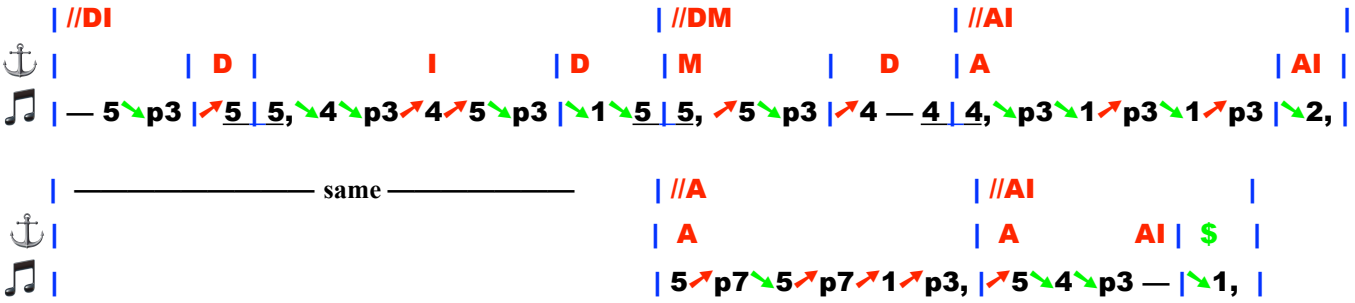


**MIXED DOMAINS : "SUMMERTIME"**

**Home Tonic - D (1 flat key signature: Aeolian of D)**

I learned this well known Gershwin piece in the form presented here some years ago in a piano comping course given by Susan Muscarella at the then Jazz School in Berkeley. In the summary below, the anchor line is from a chord progression that will be presented later as a result. The only reference I have for this version of the piece is my course notes. Like *Backwater Blues*, it's a simple piece, the exploring of which plumbs musical depths.

The 6-note melody line is pentatonic minor except for a single half tone at end of bar 8 that could imply many minor scales, but the classical assumption would be Aeolian or Dorian. The harmony is strongly chromatic but is more than ornamental because, with the exception of bar 5, the tritone core identifies a succession of sub-modes of the minor family mode identified by **//ADI×** (recall that the plus supersript means fill in the top fourth). The sub-modes are shown above the anchor line, providing an example of how modal harmony may be notated. This is a minor context in which the **//AI** mode is the harmonic minor.




The modes are summarized next. The arrows at the right indicate some possibilities for inter-mode segues that are exploited in the above anchor line.

| | D | E | F | G | A | Bb | C | D | |
|---|---|---|---|---|---|---|---|---|---|
| | **1** | **p2** | **2** | **p3** | **3** | **4** | **p5** | **5** | **p6** | **6** | **p7** | **7** | **1** | |
| | **@** | **P** | **A** | **D** | **M** | **I** | **L** | **$** | **x** | **x** | **x** | **x** | **@** | |
| **6 melody notes** | @ | . | x | x | . | x | . | $ | . | . | x | . | @ | |
| **family //AD.I*** | @ | . | x | x | . | x | . | $ | x | x | + | x | @ | |
| **melodic minor //D.I** | @ | . | x | x | . | x | . | $ | . | x | . | x | @ | ↓ **some nice segues** |
| **harmonic minor //A..I** | @ | . | x | x | . | x | . | $ | x——— | | | | x | @ ↓ |
| **Aeolian mode //A** | @ | . | x | x | . | x | . | $ | x | . | x | . | @ | ↕ |
| **ornamental mode //DM** | @ | . | x | x | x | x | . | $ | . | x | x | . | @ | ↑ |

The skeleton melody line and the anchor line shown above are sufficient to play the melody with 3-note octave shapes for the harmony. The result has depth because of the three notes, and variety because of the tritones.

Adjusting the harmony to provide more shape variety is easy, as illustrated next for bars 1-8 plus the resolution bar 16. The numeric suffixes or prefixes on anchor symbols indicate offsets of voicing notes above or below the core, measured in half tones. These could be added to the above anchor

symbols to indicate desired voicings. These shapes voice the chords on the right, if not always in place then in the flow (omitted chord roots are identified by dashes). All the voicings except for the **II** chord are rootless, demonstrating once again that chord roots are not inherently fundamental to the sound of a chord progression.

| bar | core | 1 p2 2 p3 3 4 p5 5 p6 6 p7 7 1 p2 2 p3 | a voicing of | |
|---|---|---|---|---|
| | | @ . A D . I . $ x x x x @ . A D | | |
| 2 | D■ | . . . D . – . . . x . . . . A . | IV-13 | |
| 3 | I4 | . . . . . I . – . . . x . . . x | V-7#5 | |
| 4 | D■ | . . . D . – . . . x . . . . A . | IV-13 | |
| 5 | M■ | – . . . M . . . . . x . – . . D | I-7#9 | ornamental |
| 6 | D■ | – . . D . . . . . x . . – . A . | I-m6(9) | |
| 7 | A4 | . . A . . . . . x . . . x . . . | II-m7b5 | |
| 8 | AI | . . A . . I . – x . . x . . . . | V-7b9 | |
| 16 | 4$ | – . . x . . . $ . . . . @ . . – | I-m | triad resolution |

The numeric prefixes or suffixes for the offsets down or up of voicing notes have the useful property of telling the size of a shape directly: it's the size if the building block plus the size of voicing interval. For example, a tritone with a fourth on top (often called "all fourths" because a tritone is an augmented fourth) has a size of 6+5=11 half tones, a half tone less than an octave. This makes finding the shape on the keyboard easy — find the treble note a half tone below the bass note an octave up, and complete the shape by adding an internal note a tritone above the bass note. All-fourths shapes generally imply complex chord symbols because this is not a basic chord shape from a classical mode.

As summarized next, there's a strong contrast between the simplicity of these shapes and the complexity of the chord symbols. The adjustment of basic chord symbols to fit scales, or places in scales, they don't quite fit is like "banging square pegs into round holes" — the results tend to be messy.

| **chord scale notes (bars 1-8)** | **chromatic scale notes** |
|---|---|
| root of ***I-m6(9)***, "5" of ***IV-13***, "7" of ***II-m7*** | **1** |
| root of ***II-m7b5***, "9" of ***I-m6(9)***, "13" of ***IV-13*** | **2** |
| "7" of ***IV-7***, "#5" of ***V***, "#9" of ***I-7#9*** | **p3** |
| "b5" of ***II***, "b9" of ***V-7b9*** | **p6** |
| "b5" of ***IV-7b5*** (not in the above but could be) | **7** |

## CHROMATIC CLASSICAL DOMAIN : "I GOT RHYTHM"

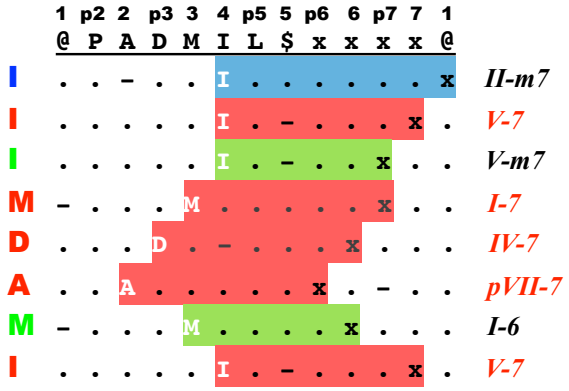
### Home Tonic - Bb (2-flats key signature: Ionian of Bb)

This Gershwin piece is the origin of widely copied chord changes called "Rhythm Changes" by jazz musicians. The source is *The Standards Real Book*, Sher Music (2000), p191. The melody line is Ionian of the home tonic (Bb) except for one highlighted "outside" note that isn't a passing note. This note is the trigger for parallel mode changes in the second eight bars (between the double bar lines).

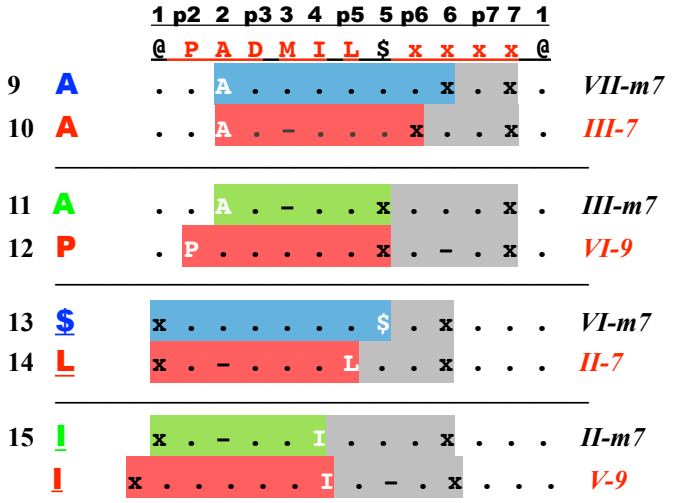

The parallel mode changes are summarized next. The other side of the same coin is Ionian tonic changes going down by fifths to the home tonic (highlighted sequence **6-2-5-1**). Because this is the other side of the same coin, there's no need to think in terms of a full Ionian scale being transposed down by successive fifths. The parallel mode changes highlighted in yellow provide the same notes. The tonic changes and corresponding note changes are easy to know going backwards from the end.

| | | Bb | | C | | D | Eb | | F | | G | | A | Bb | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | p2 | 2 | p3 | 3 | 4 | p5 | 5 | p6 | 6 | p7 | 7 | 1 | |
| | | @ | P | A | D | M | I | L | $ | x | x | x | x | @ | |
| bar 1-8 | //I | @ | . | x | . | x | I | . | $ | . | x | . | x | @ | Ionian@1 |
| bars 9-10 | altA | . | x | A | . | x | . | x | . | x | x | . | x | . | Ionian@6 |
| bars 11-12 | altP | . | P | x | . | x | . | x | $ | . | x | . | x | . | Ionian@2 |
| bars 13-14 | //L | @ | . | x | . | x | . | L | $ | . | x | . | x | @ | Ionian@5 |
| bar 15-16 | //I | @ | . | x | . | x | I | . | $ | . | x | . | x | @ | Ionian@1 |

There's nothing new in bars 1-8, but it's worth taking a quick look at the simplicity of bars 4-7



A particularly simple harmonic sequence is shown next for bars 9-16 where the mode changes occur. Each 2-bar segment is nominally in the Ionian mode of a different secondary tonic, but the modes are daisy-chained together from one to the next via shared notes instead of resolving to the secondary tonics. In terms of the 3-note shapes shown, the tritones are as ornamental as they are in the previous bars because all the non-tritone notes are from the home Ionian mode. There's one departure in the full chords — the VIIm7 chord in bar 9 includes note **p5**.



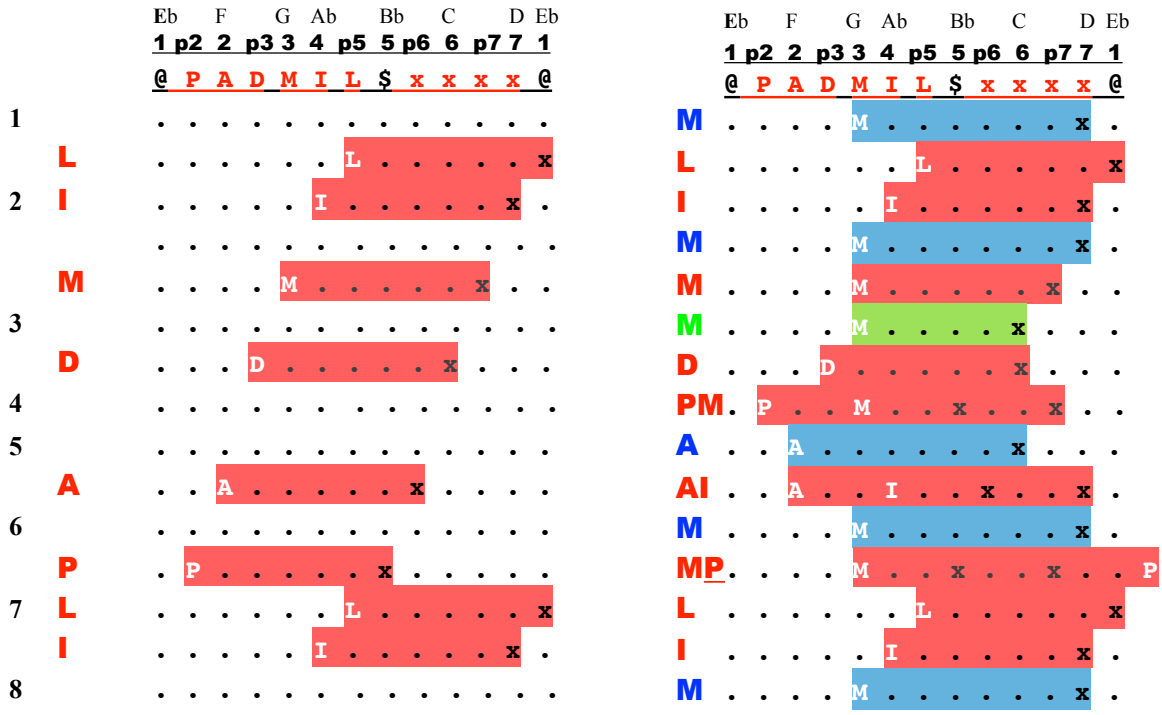

This sequence doesn't explore the scale changes to the degree it could, but the scales are available to be explored in improvisations.

**ORNAMENTED BASIC CLASSICAL : "OVER THE RAINBOW"**
**Home Tonic - Eb (3 flats key signature: Ionian of Eb)**

This is an exercise in creating strongly chromatic harmony from scratch, illustrating the extent to which chromatic harmony can be purely ornamental. The first eight bars of the piece are sufficient for the purpose, which are so well known to everyone that there's no need for a reference. The melody line is straight Ionian, trending downwards in zig-zags over an octave range.

As shown next, the downward trending melody line is given a downward trending tritone anchor line consisting of the alphabet in reverse order starting on **L** and wrapping around: **L-I-M-D-A-P-L-I**. The tritones are spread out over the melody line and positioned for consonance with it.


The simple tritone "seed" on the left below provides a framework for adding core fifos and some other variations on the right. The double tritones provide some elegant symmetric relationships between successive shapes (e.g., **PM-A** shrinks the outer notes of the double tritone inwards a half tone; and **A-AI-M** moves a fifth aligned with the bottom note of **AI** to a fifth aligned with the top note).



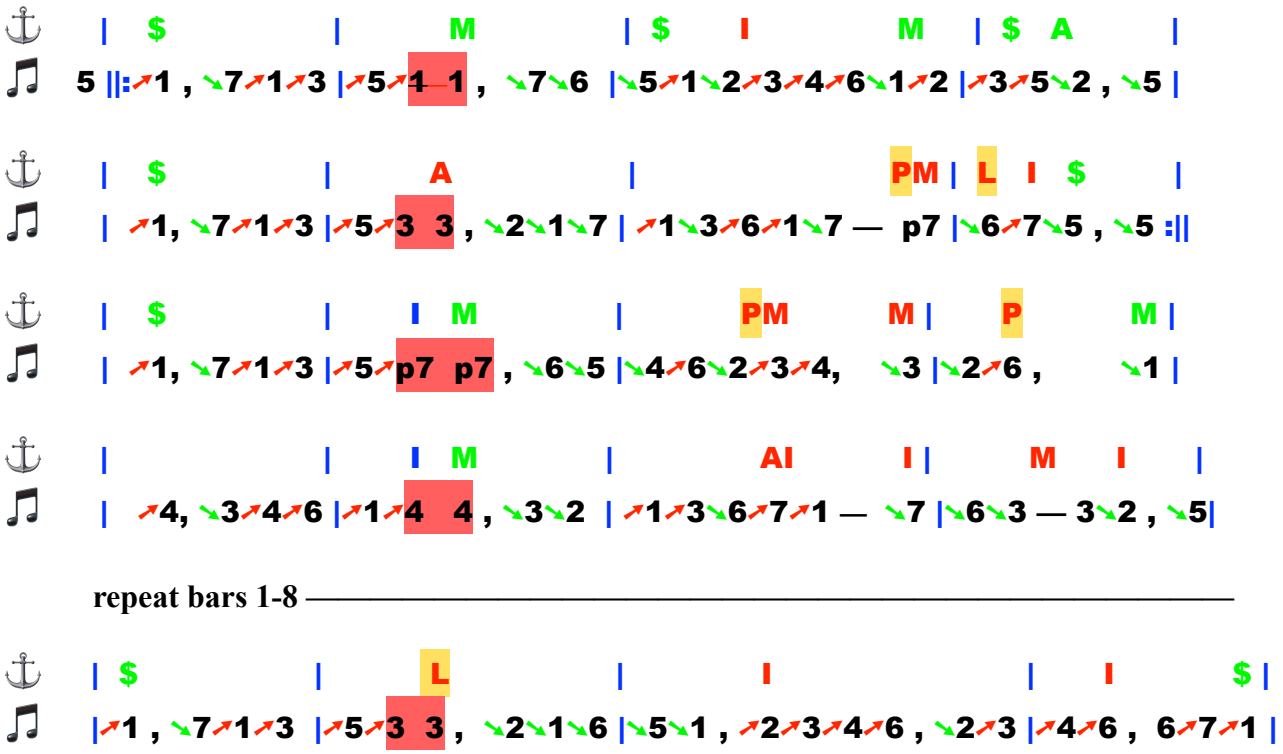

Here's a summary of the melody and final core harmony.

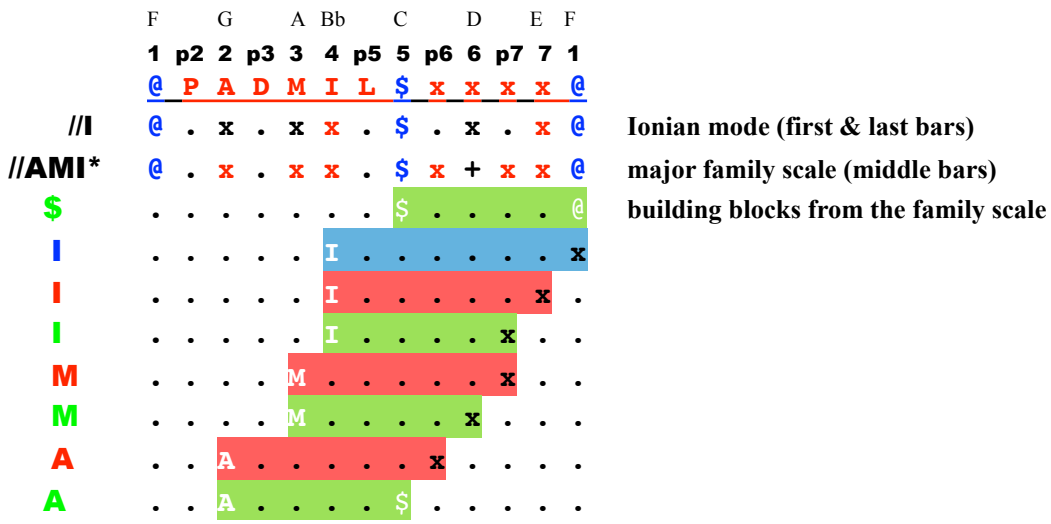
**MIXED : "TRAUMERAI" (SCHUMANN)**

**Home Tonic - F (1 flat key signature: Ionian of F)**

The reference for this beautiful classical piece is the *Classical Fake Book*, 2nd Edition, Hal Leonard (2013). It provides chord symbols that yield the anchor line shown (the chord symbols are not shown because there's nothing new in them). It opens and closes with four bars in the Ionian mode of the home tonic. In between, it can be understood as a succession of classical modes, or as a single, extended non-classical mode — the 9-note major family scale **//AMI×**. The latter is simpler for this piece because it provides all the melody and most of the harmony, and minimizes the number of mode changes to think about. Ornamental elements of the harmony (highlighted in yellow) are the common **P** and **L** functional substitutions for tritones **A** and **I**. Red highlighting identifies high notes.




The melody scales and building blocks from them are summarized next. The scales provide more building blocks than this but the others aren't used. Given this picture, reading the above anchor line is straightforward. As always, the single building blocks of the core may be played as octave shapes that add depth without adding new notes.




**Ionian mode (first & last bars)**

**major family scale (middle bars)**

**building blocks from the family scale**

# CHAPTER 4 : THE BUILDING-BLOCK WORLD

This chapter goes into the details of using building blocks to identify tonic scales and to form shapes that voice chords. There are no new concepts here, only development of ones already presented, so the chapter may be skimmed to see what's in it, as a preparation for knowing where to look for details when needed, and then to go on to the more advanced examples in the next chapter.

## TONIC SCALES FROM BUILDING-BLOCK CONTENT

The following short dictionary of mode signatures for tonic scales summarizes in half a page all the scales and more in scale dictionaries such as *The Source*. The mode signatures on the left identify scales by tritone content.

| signature | 1 p2 2 p3 3 4 p5 5 p6 6 p7 7 1 | scale type |
|---|---|---|
| PADMIL | x P A D M I L x x x x x x | chromatic (12 notes) |
| //P.DM.L | x P . D M . L x . x x . x | diminished (8-notes, min-maj) |
| //AD.IL | x . A D . I L . x x . x x | diminished (8 notes, min) |
| PA.MI | . P A . M I . x x . x x . | diminished (8 notes, maj) |
| ADMI | . . A D M I———–x x x x . | no name (8 notes, min-maj) |
| //A.M.L | x . A . M . L . x . x . x | whole tone (6 notes, maj) |
| P.D.I | . P . D . I . x . x . x . | whole tone (6 notes, min) |
| //DM.L | @ . x D M x L $ . x x . @ | min-maj blues family (9 notes) |
| //ADD.I | @ . A D . I . $ x x + x @ | aka //AD.I* : minor family (9 notes) |
| //A.MMI | @ . A . M I . $ x + x x @ | aka //A.MI* : major family (9 notes): |
| //DM | @ . A D M I . $ . x x . @ | pentatonic union (8 notes), basic blues mode |
| //D.I | @ . A D . I . $ . x . x @ | melodic minor (7 notes): master of 7 modes |
| //AD.I | @ . A + . I . $ x———–x @ | harmonic minor (7 notes) |
| //A.MI | @ . A . + I . $ x———–x @ | harmonic major (7 notes) |
| //A.MI | @ . A . + I . $ x + . x @ | "bebop" major (8 notes) |
| //ADMI | @ . A + + I . $ x———–x @ | harmonic min-maj (8 notes): master of 8 modes |
| //I | @ . A . M I . $ . x . x @ | Ionian (7 notes): master of 7 modes |
| //M | @ . A . M———–$ . x———–@ | pentatonic major |
| //D | @———–D . I . $———–x . @ | pentatonic minor |

The scales above the double line are atonal, with mirror symmetry (same interval sequence going up and down). The ones without the **//** prefix are not true parallel modes because they don't contain the home tonic. The scales below the double line are asymmetric and tonal. These scales are completed by populating the anchor sets in the lower fifth of the scale frame with fifo-only anchors. The letters **ADMI** are fundamental to these anchor sets, with different omissions of letters or different identifications of them as fifo-only anchors determining different scales. Minor-third intervals of scales

are shown as solid lines to make them stand out to the eye. These are by no means the only possible scales but the dictionary is easily extended if anyone sees a need.

The focus of PKP is tonal music but atonal scales are included because shared letters of their defining words make them visible structural parents of scales lower down in the dictionary; and also because they may be used ornamentally in tonal music. Atonal scales have no minor, major or minor-major tonality by themselves but representing them by words that place them in the context of the home tonic gives them the relative tonality shown on the right (the presence of **D**, **M** or **DM** identifies minor, major or minor-major tonality).

There are no 5-letter words because the implied scales would be too close to the chromatic scale to be usefully distinguished from it. As scale identifiers, single-letter words are reserved for scales with seven or more notes, which includes classical modes but not 6-note blues scales containing single tritones that are understood as sub-scales of higher level blues scales.

The zone within the dictionary ranging from 4-letter words down to 2-letter words that identify parallel modes is complex in music notation. Scales must be understood as enumerated notes relative to one of more than twelve possible different key signatures. The role of classical modes as the defining scales of key signatures makes music from scales that differ markedly from them misleadingly complex. The dictionary makes this zone simple by pushing note symbols and interval inversions down to a lower conceptual level. The three scales in the middle formed around three asymmetric triple tritones provide important families of tonal scales.

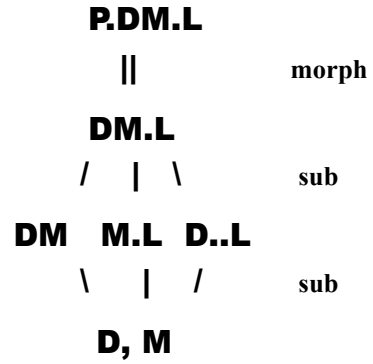
The table covers all possible mode changes. As explained in Chapter 2, tonic changes are understood to be implied by mode changes, when a melody line requires them.

**SCALE FAMILIES**

Scale families provide a simple, unified view of a very large number of scales of music notation of different kinds in different key signatures that are, in aggregate, overwhelmingly complex for all but experts.

**Blues Family**

The blues hierarchy is shown next.




At the top is the diminished scale **P.DM.L** that is a kind of "parent." This scale morphs into the **DM.L** scale (the **P** tritone morphs into a fifo while holding its upper note, the pitch center, fixed). The morphing breaks the symmetry of the diminished scale, yielding an asymmetric tonal scale that contains the other scales as sub-scales that follow from pruning anchors.

The words **M.L** and **D..L** determine parallel "melodic" and "harmonic" modes that share with

classical modes the properties of seven notes and no adjacent half tones.

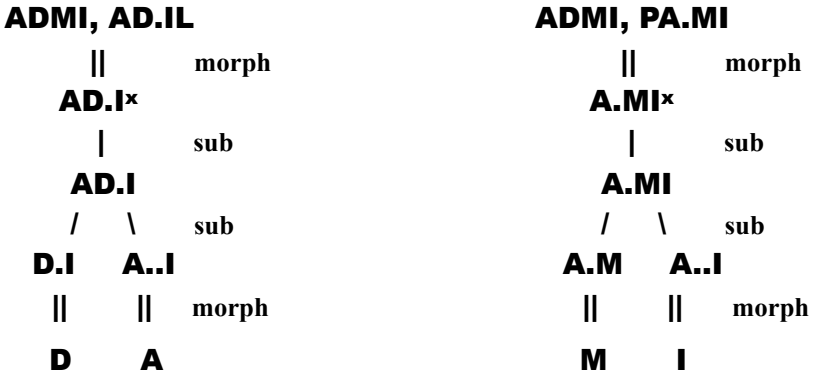
Conspicuously missing are tritones **A** and **I** from the classical modes conventionally regarded as the default minor and major modes of key signatures. Fifo anchors **A** and **I** are in the scales but the associated tritones would be ornamental extras.

Blues has high tritone content but it also has high fifo content (five possible fifo anchors from the **DM.L** scale). A strong blues sound follows from core harmony that has correspondingly high tritone content (for example, the footnoted chord progression of *Goodbye Porkpie Hat* in the opening chapter). Weakening the core tritone content in favor of in-scale fifos weakens the blues sound.

I learned the 9-note scale in conventional terms some years ago in a blues piano workshop at the then Jazz School in Berkeley, but this intuitively simple way of understanding and remembering it is my own invention and appears to be novel. Pianists and music teachers I have asked don't seem to know about it. Books I have consulted don't say anything about it.

**Minor and Major Families**

The union of the parallel Aeolian and Ionian modes forms a 10-note scale of mixed minor-major tonality determined by the word **ADMI** that is a master scale of family scales of major and minor tonality. As shown next, the minor and major hierarchies are slightly more complex than the **//DM.L** blues hierarchy because **ADMI** is not the only possible parent atonal scale, and the classical modes at the bottom are morphs of the modes above them, not sub-scales.




The **ADMI** scale reduces to 9-note minor or major family scales by morphing the **M** or **D** tritone into a fifo with the same top note. The morphed scales are identified by the augmented words **AD.I×** or **A.MI*** where the superscript indicates an extended scale in which the top fourth is filled in. The result is both interesting and simple: an all-half-tone top end for both scales, with bottom ends of different tonalities.

The double tritones **D.I** and **A..I** on the left, and **A.M** and **A..I** on the right, determine parallel "melodic" and "harmonic" modes that share with classical modes the properties of seven notes and no adjacent half tones.

**PARALLEL MODES**

The systematic development of the concept of parallel modes in music notation is restricted to single-tritone classical modes and to double-tritone, non-classical modes identified by the terms

"melodic" and "harmonic" that share with classical modes the properties of seven notes and no adjacent half tones. Classical modes were covered in the previous chapter. We now turn to these two kinds of non-classical modes.

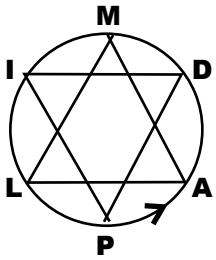
**Overview of "Melodic" and "Harmonic" Modes**

These modes are conventionally understood to be parallel modes of three master modes, namely melodic minor, harmonic minor and harmonic major. This means the parallel modes are relative modes of transposed master modes. The representation of the parallel harmonic modes is greatly simplified by defining the master mode as an 8-note, minor-major mashup of the 7-note harmonic minor and harmonic major modes. The 8-note mashup is a useful mode in its own right. If a 7-note mode is required, context makes obvious which note to omit. This is much simpler than 7x2=14 parallel modes of the harmonic minor and harmonic major that are often intricate and difficult to comprehend or remember (Appendix D).

The signatures of the melodic modes are provided by six words formed of six pairs of letters, two alphabet steps apart. The signatures of the harmonic modes are formed by repetitions in the opposite order of three pairs of letters, three alphabet steps apart. In both cases, twelve modes are determined by prefixing the six words by **//** or **alt**.

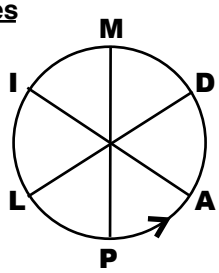
**7 melodic minor modes**

| | |
|---|---|
| **//LA** | **alt LA** |
| **//IP** | **alt IP** |
| **//ML** | **alt ML** |
| **>//DI** | **alt DI** |
| **//AM** | **alt AM** |
| **//PD** | **alt PD** |




**8 harmonic minor-major modes**

| | |
|---|---|
| **//LD** | **alt LD** |
| **//IA** | **alt IA** |
| **//MP** | **alt MP** |
| **//DL** | **alt DL** |
| **>//AI** | **alt AI** |
| **//PM** | **alt PM** |




***> identifies the master mode***
***non-parallel modes (no home tonic) are highlighted***
***anomalous modes are outlined***

The interpretation rule is the same as for classical modes, namely **//** modes include the home tonic and **alt** modes don't, unless the signature word includes **L**. The non-parallel modes are highlighted, leaving seven parallel modes on the left and eight on the right.

There is one exception to the interpretation rule for each set of modes (outlined). In each case, a word with **P** at the end wraps around from the top of the alphabet to the bottom, skipping over the tonic **@**, which means that neither **//IP** nor **//MP** is a parallel mode. The requirement that all non-tritone notes are different, plus the exclusion for these modes of adjacent half tones, determines that **alt-IP** is not a parallel mode, and **alt-MP** is. The three cases that break the rule are simple enough that there's no need to change the notation, only to remember the exceptions.

Details follow for reference, but most of the modes fall directly out of family scales in the context of particular pieces of music.

**Parallel "Melodic" Modes**

The double tritones of these modes have mirror symmetry: two different symmetric shapes in different inversions, one of which determines the mode, namely a major third sandwiched between two whole tones. Splitting the major third into two whole tones yields a stack of four whole tones, which is

one whole tone short of a whole-tone scale. Splitting one of the notes of this shape into two notes a half tone above and below it yields a **//** mode, with the master tonic as the lower note. The result, looked at from a different perspective, is one note different from a classical mode determined by one of the letters.

These modes are summarized below in the same format as for parallel classical modes to enable easy comparison. Check marks identify parallel modes. Yellow highlighting shows sequences of four whole tones going down from the transposed master tonics highlighted in blue. The tonic sequence is **6-2-5-1-4-p7** going down by fifths through the **//** modes, and continuing as **p3-p6-p2-p5-7-3** through the **alt** modes.

The tonic sub-sequence to remember is the down-by-fifths sequence **1-4-p7** for the **//** modes in the bottom half of the table. The corresponding sequence in the top half is **6-2-5** a minor third down from this. The **alt** modes follow by inspection.

| | | 1 p2 2 p3 3 4 p5 5 p6 6 p7 7 1 | |
|---|---|---|---|
| | | @ P A D M I L $ x x x x @ | |
| secondary | | | home tonic tonality |
| ✔ | //LA | x . x . x . x . x x . x x | major |
| ✔ | alt-LA | x . x x . x x . x . x . x | minor |
| | //IP | . x x . x x . x . x . x . | major |
| | alt-IP | . x . x . x . x x . x x . | minor |
| ✔ | //ML | x . x . x . x x . x x . x | major |
| ✔ | alt-ML | x x . x x . x . x . x . x | dual |
| > ✔ | //DI | @ . x x . x . x . x . x x | minor |
| | alt-DI | . x . x . x x . x x . x . | minor |
| ✔ | //AM | x . x . x @ . x x . x . x | major |
| | alt-AM | . x x . x . x . x . x x . | major |
| ✔ | //PD | x x . x . x . x . x x . x | minor |
| | alt-PD | . x . x x . x x . x . x . | dual |

## Parallel "Harmonic" Modes

The double tritones of these modes have circular symmetry: all inversions have the same shape, namely a stack of three minor thirds. The master mode is determined by leaving the upper minor third empty and filling in the lower minor third with half tones. This yields 6 notes. The remaining two notes are provided by a symmetric shape formed of the empty minor third with a half tone above and below it. The determinative position of the empty minor third is a half tone below the transposed master tonic (blue highlighting). The master-tonic sequence is **3-6-2-5-1-4** going down by fifths through the **//** modes, and continuing as **p7-p3-p6-p2-p5-7** through the **alt** modes.

The tonic sub-sequence to remember is the down-by-fifths sequence **5-1-4** in the in-order part of

the table (meaning the letters of the mode signature are in alphabet order), which determines the modes **//DL-//AI-//PM**. The corresponding sequence in the out-of-order part of the table is a minor third down from this, namely **3-6-2**, which determines the modes **//LD-//IA-//MP**. The **alt** modes follow by inspection.

The dual tonality of the master mode (notes highlighted in yellow) has an effect on the home octave tonality only in the few cases were the highlighted notes overlap the **p3-3** notes of the home octave. Otherwise, it makes little difference to the end result whether the master mode is minor-major, minor or major. The minor-major mode is simpler because of its visibly simple symmetries and because it replaces 2x7=14 parallel modes (Appendix D) with 8 parallel modes.

| | | @ P A D M I L $ x x x x @ | |
|---|---|---|---|
| | | 1 p2 2 p3 3 4 p5 5 p6 6 p7 7 1 | |
| **out of order** | | | **home tonic tonality** |
| ✔ | **//LD** | x———D x . L x x x . x x | **dual** |
| ✔ | **alt-LD** | x x x D . x L———x x . x | **minor** |
| ✔ | **//IA** | x x A . x I———x x . x x | **major** |
| | **alt-IA** | ———A x . I x x x x . x— | **minor** |
| | **//MP** | —P x . M x x x . x x——— | **major** |
| ✔ | **alt-MP** | x P . x M———x x . x x x | **dual** |
| **in order** | | | |
| ✔ | **//DL** | x . x D———L x . x x x x | **minor** |
| ✔ | **alt-DL** | x x . D x x L . x x———x | **dual** |
| > ✔ | **//AI** | x . A x x I . x x———x x | **dual** |
| | **alt-AI** | . x A———I x . x x x x . | **ambiguous** |
| ✔ | **//PM** | x P———M x . x x x x . x | **major** |
| | **alt-PM** | . P x x M x . x———x x . | **dual** |

An example of the **//DL** mode determined by blues family context is shown next.

| | 1 p2 2 p3 3 4 p5 5 p6 6 p7 7 1 | |
|---|---|---|
| **//DM.L** | x . x D M x L $ . x x . x | |
| **//DL** | x . x D———L $ . x x x x | |
| **fitted to the blues** | x . x D———L $ . x x . x | **e.g., "Romanian" (Appendix D)** |

## OTHER MODES

This doesn't exhaust all the possible modes that may be identified by alphabet words but it covers all the modes presented in scale dictionaries such as *The Source*, and more. The definition of modes is open-ended so other modes are easily added if needed.

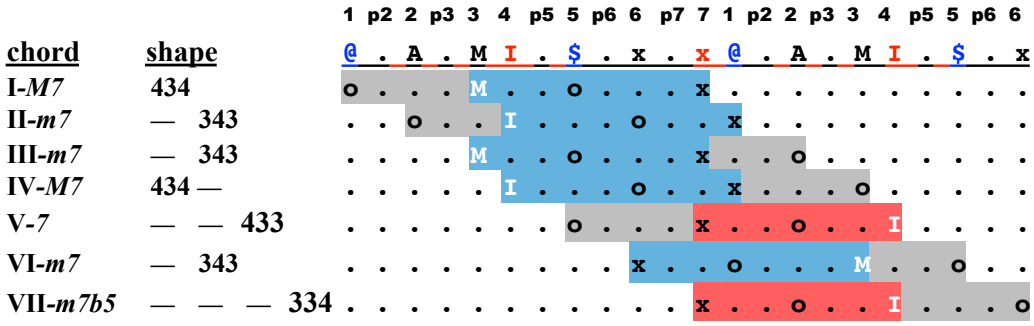
## CHORDS FROM BUILDING BLOCKS

When piano music is fully written out on the grand staff, the flow of the music is directly visible. The problem is the amount of complex detail is overwhelming for all but experts. When music is

separated into melody on a staff and harmony represented by chord symbols above the staff, only the flow of melody is visible because chords may be voiced in different ways to give different harmonic flows that complement the melody line in different ways.

A piano teacher once told me to learn chords by picturing the chord symbols on the keyboard. I bought a chord symbol wall chart that did exactly this. As I looked at it while trying to learn pieces with these chords, I began to see it as hiding simple keyboard shapes that move in simple ways behind a facade of misleading complexity. This led me to see voicings of chord progressions as built up from harmonic cores without reference to chord symbols beyond identifying tritones. Knowing the scales of origin of the harmony from mode signatures provided by the tritones makes transforming cores into shapes to voice chords simple.

Mode signatures provide the building blocks that combine to make chords, as illustrated below for seventh chords from the Ionian mode that provide the basic symbols of chord notation.



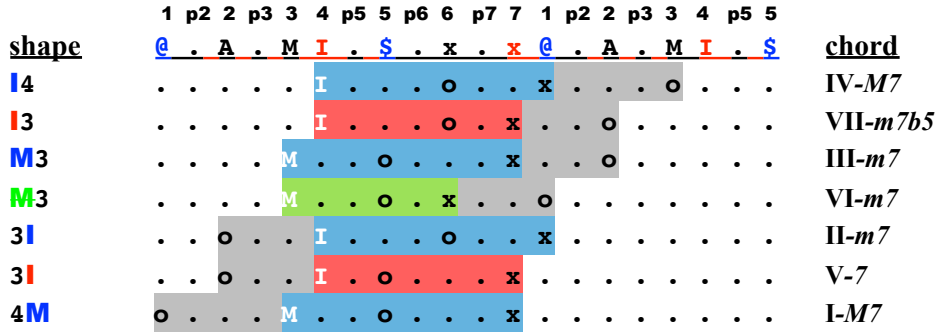

The core building blocks, shown in color, are analogous to "guide intervals" used in standard chord voicing practice. Guide intervals are usually the 3rd-7th intervals of chord scales. These are the core building blocks of chords I, II and V here, but not of the others. The core building block of a chord in PKP is the most unique building block of the chord in the tonic scale. This is always a tritone for chords containing a tritone. Otherwise it's one of the two fifos of the scale anchored a half tone apart (e.g., fifths anchored by **I** and **M** for the Ionian mode). Think of the bottom or top segments shown in grey as the visible parts of enrichment fifos, of sizes to be determined, "snapped onto" the core building blocks underneath them at scale points (the **o–o** fifos are all fifths for basic seventh chords going up from these roots, but these are not the only possibilities).

The shapes in the second column represent interval stacks created by the combinations of building blocks. The numbers are counts of half tones: **3** represents a minor third, **4** represents a major third. This is a variation of a notation called "figured bass notation" (Appendix C), in which different numbers represent counts of scale steps, not half tones, between chord notes. In this variation, the building blocks are partial stacks: **33** is a tritone, **43** and **34** are fifths. The shapes are exact for any position on the keyboard. Pinpointing the position is conventionally accomplished by specifying chord roots (e.g., the IV*M7* chord could be written **IV434**). In PKP, the pinpointing is accomplished by core anchors. A core anchor with a a single outside voicing note above or below it provides a 3-note voicing of a chord that's often sufficient in context. The voicing note for these chords and this mode is always a major or minor third above or below the building block, with the choice determined by the scale.

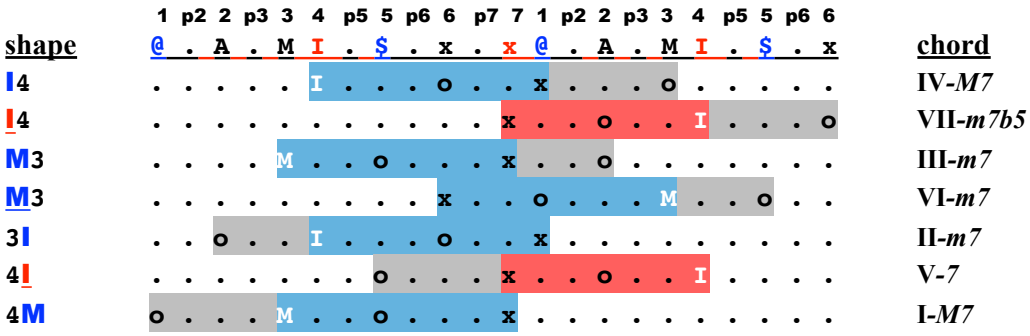
## Chords From Core Building Blocks

Putting the chord roots in down-by-fifths order brings forward to the eye the simple way in which chord progressions for the Ionian mode may be formed around two **I-I-M** core anchor lines joined by morphing the final fifth **M** of the first line into the fourth **M**. The transtions are all morphs except for one wobbly slide. Three-note voicings are completed by adding major or minor thirds determined by the scale above or below the core, and notated by adding a numeric prefix or suffix to the anchor symbol, specifying the size of the thirds.

The chords are core building blocks (anchored) with overlapped enrichment fifos (**o–o**). The 3-note voicings omit the inner note of the enrichment fifos, which in this case is either the pitch center of the octave or a note a whole tone above it, both of which tend to be implied by context in passages of music from the scale. The intervals above and below the core are not not themselves building blocks, but the projecting ends of overlapped fifos.



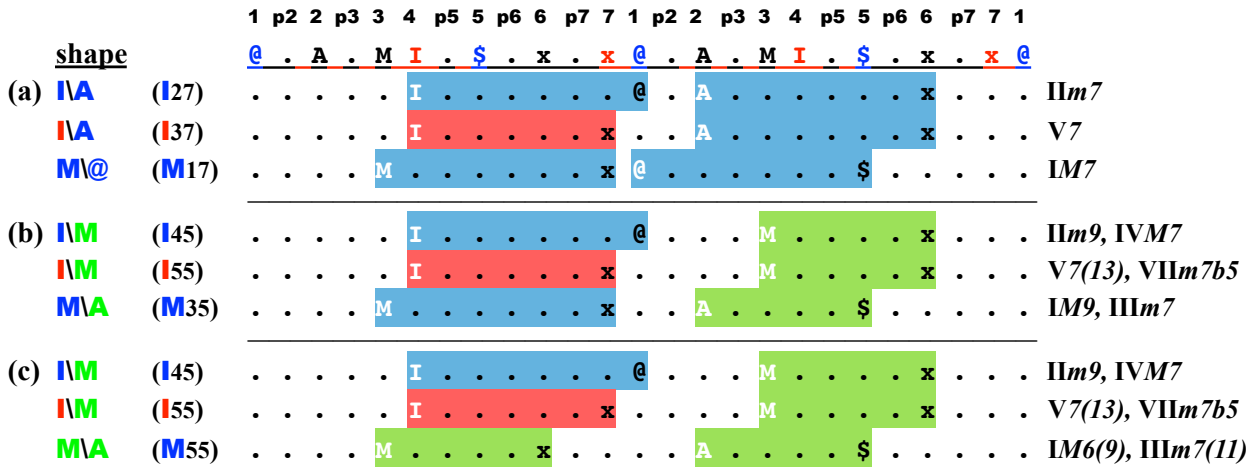

Transforming this so the chords go up from the roots yields the difficult-to-play result shown next. This is difficult to play because the hand must be lifted and moved by large jumps, while also adjusting the fingers for "wobbles" between minor and major thirds. Such shape progressions may also be understood as sliding a fixed "scale shape," with 2 scale steps between each note, to different positions in the scale. This is conceptually simple but doesn't represent the wobbles, which are specific to particular modes and must be learned from practicing. Understanding such progressions in terms of actual keyboard shapes enables knowing the shapes for any mode and root sequence independently of practicing them.



There's obvious benefit in learning the easier-to-play morphed version first and then switching to this jumpy version, if desired, by inverting selected building blocks (which is always easy when building blocks are known by their anchors).

**Open Voicings**

Returning to the original 4-note chords, the 4-note open voicings of them in (a), next, follow from inverting the enrichment fifos upward into the next octave and identifying the inversions by anchors The shapes are represented by symbols of the form **X\Y** in which the backslash emphasizes that the building blocks are separated, one above the other, not overlapped. The shapes could be identified by the notation shown on the left in parentheses, but parsing the numeric notation is cumbersome and error prone.




Examples (b) and (c) are simple variations that provide voicings of a variety of complex-looking chord symbols. This vividly illustrates the banging-square-pegs-into-round-holes nature of chord symbols. Simple variations in the building blocks yield complex variations in the chord symbols because of having to adjust them to "holes" in scales they don't quite fit.

Example (c) is particularly simple: move one note down a scale step and then move all notes down a scale step. The shapes in the last two steps are "all fourths" (counting the tritone as an augmented fourth). These are far from the only possible variations but they give a good sense of the often deceptively complex nature of chord progressions.

The double-anchor notation covers the 3-note shapes described earlier: simply omit the top note of the upper building block. That said, it's simpler to work with core building blocks and offsets from them if 3-note shapes are sufficient.

**OBSERVATIONS**

Chord symbols in tonal music often way over-specify notes because many of their notes are provided by context (mode scale, melody line, neighboring chords). A chord root is no more than a reference for an accurate specification of a set of notes. Inversions are often notated as radically different chords on different roots. Many different roots may provide chord symbols that do the job, perhaps with the addition of suffixes indicating extended or altered notes (often this is like "banging square pegs into round holes" — the result is messy). The mutual substitutability of many scale fifos

offers many mutually consonant or harmonically equivalent chords.

Tritones are the only fixed elements provided by chord symbols (same size in either inversion, not substitutable in the ordinary sense of mutual consonance or harmonic equivalence), and so can be relied upon to provide a fixed element of any chord containing them. They identify parallel modes from which building blocks may be chosen to form shapes that provide suitable voicings of, or substitutes for, written chords. Knowing the scales makes it easy to fill in core fifos that morph to or from tritones, and to add enrichment fifos determined by bass or treble lines below or above the core.

Early in my musical adventure, I learned about simple "open" voicings of complex chord progressions in a "piano comping" course given by jazz pianist Susan Muscarella at the Jazz School in Berkeley (now the Jazz Institute). The voicings were based on chord progressions that were complex to begin with, making figuring out the often-rootless voicings in terms of reorganized degree numbers a complex process with difficult-to-remember results.

At the time, jazz pianist Taylor Eigsti was an artist in residence at the Jazz school who, I heard, was teaching a chord-symbol-free way of understanding and playing chord progressions. This resonated with my developing ideas about building blocks, so I contacted him to learn about his method. He told me that he recommends, to beginning jazz piano students, a practicing regime of moving fixed scale shapes (determined by fixed sequences of counts of scale steps between successive notes) to different positions in classical modes, without reference to chord symbols. The objective is developing the instinctive moves required of jazz pianists. The method has no notation and is learned from exercises. The lack of a notation makes it difficult to generalize the method to more irregular modes that violate the constraints of seven notes and no adjacent half tones. Fixed keyboard shapes enter the picture (e.g., the "all fourths" shapes mentioned several times up to now).

I decided to find for myself a simple, common notation for such different ways of understanding and playing chord progressions. PKP is what I found.

# CHAPTER 5: ADVANCED EXAMPLES

This chapter explores a smorgasbord of example pieces that I found difficult to understand when I first encountered them in music notation because of strong departures from classical modes, often combined with difficult or multiple written key signatures. The idea of a smorgasbord is to offer something for everyone.

A takeaway from this chapter is confirmation that tritones are structurally fundamental to music understood in interval terms, and that a DNA-like alphabet is sufficient to cover any tonic scale or chord progression that may be played on the piano, independently of the key signature(s) in which a piece may be written. This is different in kind from "the score is sacred" view of many classical musicians.

In a famous session of PBS's *Piano Jazz*, Bill Evans, in conversation with Marian Macpartland, said words to the effect that he advocated taking a piece apart to understand its architecture before putting it back together in an improvisation. I thought this was a great concept but wondered how "architecture" could be conceptualized. I suggest that the concept of musical domains introduced in Chapter 3 provides a way. The domains identified there, namely **basic classical** (not chromatic), **chromatic classical** (chromaticism introduced via parallel classical modes) and **non-classical** (uses non-classical modes that are inherently chromatic), are explored in some depth in this chapter.

I have heard it said, and believe it to be true, that composition is frozen improvisation. Therefore it, like improvisation, requires a sense of architecture. I suggest that exactly such a sense of architecture is revealed by the examples in this chapter. The fact such a sense can be extracted from such a wide variety of pieces without any information other than that provided by the piece itself suggests that it was put there by a composer or arranger, based on an intuitive understanding that's no doubt different in kind from PKP, but that can be represented simply by PKP.

The examples are intended to be understood by playing them, not just looking at pages, and so should be approached in front of a piano on which they can be tried. Start with the melody line and the tritone core to establish basic flow. Play the tritone core as octave shapes first. Then play the actual shapes shown, including interpolated fifo shapes. Then try variations.

The examples are as follows, in order of presentation:

*Goodbye Pork Pie Hat*
*Prelude to an Afternoon of a Faun*
*Giant Steps*
*Round Midnight*
*Body and Soul*
*Laura*
*When Sunny Gets Blue*
*Every Time We Say Goodbye*
*All of Me*
*No Greater Love*
*All the Things You Are*
*Chelsea Bridge*
*Lush Life*
*The Peacocks (the only one in annotated music notation)*

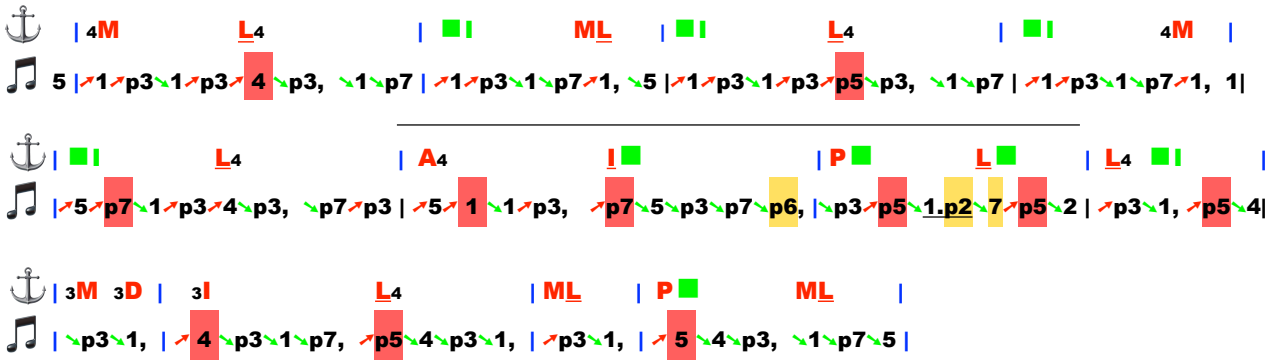
**NON-CLASSICAL DOMAIN : "GOODBYE PORKPIE HAT"**

**Home Tonic - Eb (3 flats key signature: Ionian of Eb)**

This blues in Eb is a poster child for chromatic music that's difficult in music notation for all but experts. My source for this piece is *Mingus Fakebook*, Hal Leonard (1991). Trying to learn this piece from this source was one of the stimuli that sent me down the path to PKP.

The key signature of 3 flats and the home tonic of Eb jointly identify the Ionian mode **//I** as the reference mode for the accidentals that determine blues notes. This is an example of the often misleading nature of key signatures. A 5-flats or 6-flats key signature indicating Dorian or Aeolian modes of Eb would be closer to the blues.

The simple melody line shown in the following summary of the piece is mostly in the 6-note minor blues scale that's an extension of the pentatonic minor mode. Red highlighting identifies high notes, which otherwise tend to fade into the background in the linear textual representation. Over-lined bars 6-7 are a variation that brings in ornamental chords and ornamental melody notes (the latter highlighted in yellow). In bar 7, the **1.p2** notation means the first note is "crushed" into the second note on the same beat.




Tritone sequences in the harmony provide the "seed" around which the rest of the harmony is organized. This is contrary to conventional wisdom, which does not recognize tritones as fundamental to the structure of music. The tonic and tritones from the chords identify the mode, and the fifo shapes from the mode are morphed into or from the tritones to fit context. The harmony line captures the result

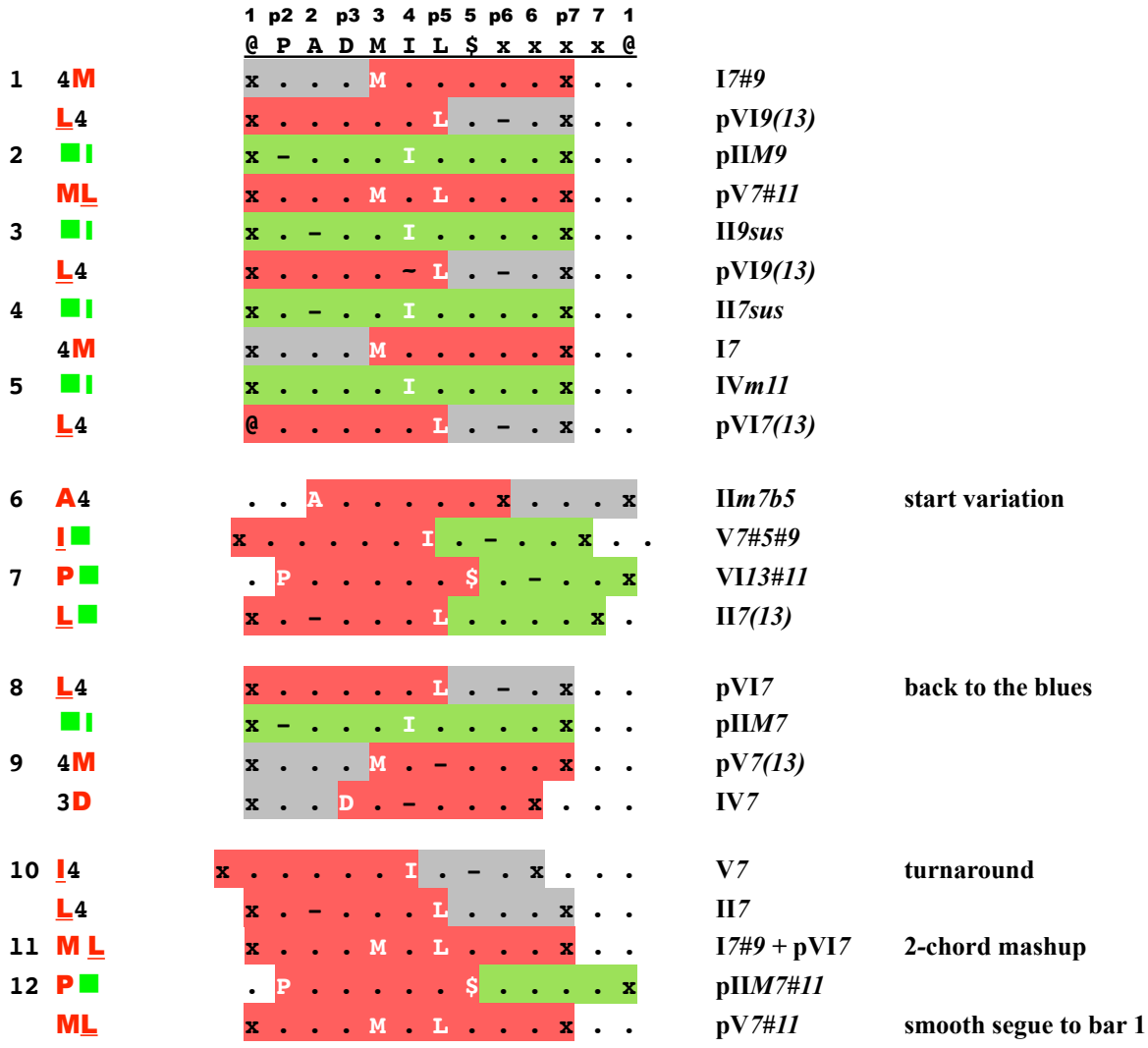
The harmony line determines the harmonic flow shown next, which is almost all 3-note rootless voicings of written chords (the omitted roots are identified by dashes). The idea is to hold a picture like this is in the mind's eye while playing, not necessarily to write it down. The free use of tritone substitute chords (e.g., **I*7*/pV*7*, **II*7*/pVI*7*, **pII*M7#11*/V*M7#11*) makes for a complex written chord progression. These chords have all non-tritone notes different (including roots a tritone apart) but the same harmonic function; in other words, they combine different fifos with the same tritone.

The all-green shapes are stacks of two fourths (■I) that voice an complex variety of transition chords. For a start, the **pII** roots of the major seventh chords are byproducts of tritone substitutions, not indicators of visits to a mode containing this note. Beyond that, so much harmonic variety is provided by the tritone chords that fifo chords need only provide smooth transitions between them. The stack of two fourths does the job. A more accurate voicing of the *sus* chords would be a stack of fourths up a whole tone from this (■$) but the stack shown is sufficient to get started.

Many of the chord alterations shown on the right are from the melody line. For example, ***#9*** of the

**I*7#9*** chord in bar 1 is melody note **p3**.

The bass line provided by the chord roots is missing but could easily be added back underneath if desired. That said, this harmony evokes the haunting, rich sound of the piece in a very satisfying way — small note changes in a smoothly flowing keyboard pattern make big sound changes.

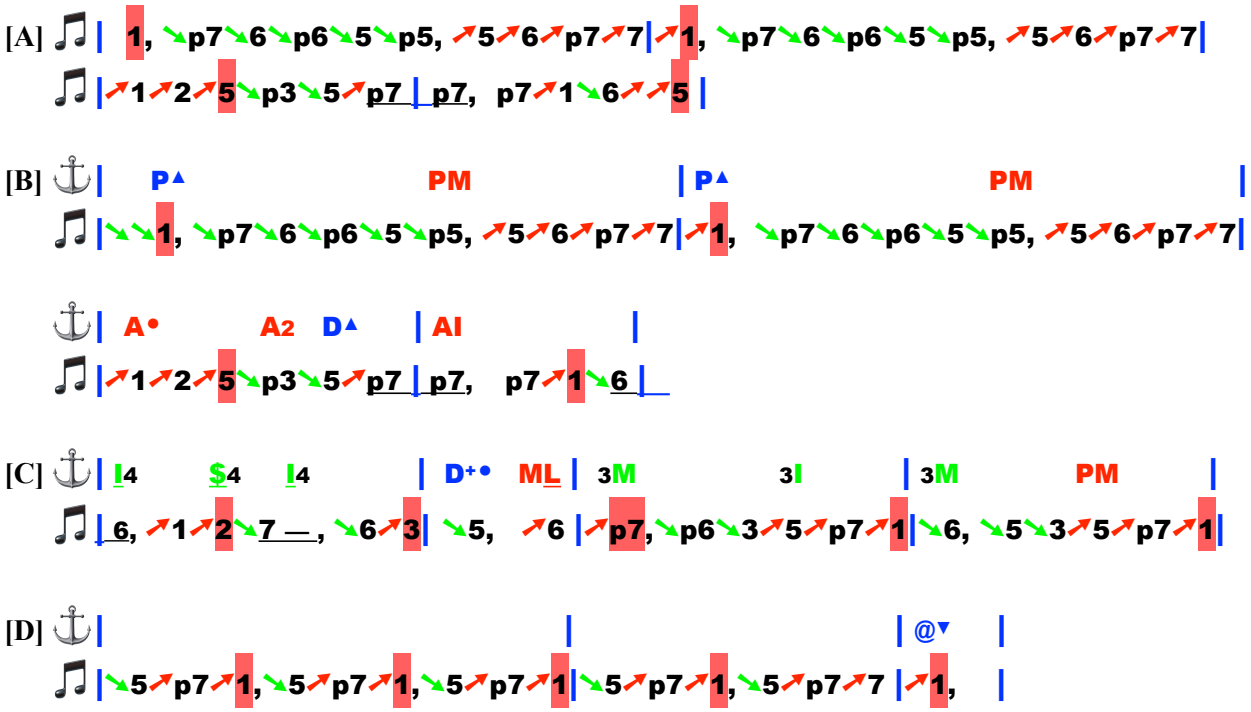



The variation in bars 6-7 is an example of a sophisticated harmonic sequence formed from fixed keyboard shapes that's easy to play and sounds good in context. The three tritones not in the blues scale emphasize the melodic departure from it in bars 8-9, while their "all fourths" voicings (augmented fourth with a fourth on top) provide a bluesy sound in a blues context. The segue from bar 5 slides its final shape (a tritone with a major third on top) up a whole tone. The shape then slides down a minor third while morphing into the first all-fourths shape. The final all-fourths shape segues smoothly back to the original blues by morphing into the same shape as at the end of bar 5. Thinking this way guides playing without reference to complex chord symbols.

**NON-CLASSICAL DOMAIN : "PRELUDE TO AN AFTERNOON OF A FAUN"**
**Home Tonic - C# (4 sharps key signature: Aeolian of C#)**

This piece and *Goodby Porkpie Hat* have something unexpected in common, namely the **//DM.L** blues scale. I was motivated to investigate this piece by things said about its creative violation of music convention in the article *Beauty in the Void,* Alex Ross, The New Yorker, Oct. 29, 2018. I was curious about the non-classical modes it might use. My source for the written music is the *Classical Fake Book*, 2nd Edition, Hal Leonard (2013), page 222. The key signature is 4 sharps and the home tonic is C#, identified by the final note of the melody line.

The melody lines of [A] and [B] differ only in the final bar. The only unusual notational feature below is the double arrow at the end of [A], indicating a jump into the second octave up. Red highlighting identifies high notes.




Transposing all the melody notes outside the home octave into corresponding positions in it (below) reveals the scales in play. The melody of [A]-[C] uses the blues scale plus two ornamental passing notes. The harmony of [A]-[C] is from this scale and also borrows from the nearby diminished scale. Appearances of the **A** and **I** tritones in bars 7-8 are ornamental. These excursions outside the blues scale are analogous to similar excursions in *Goodbye Porkpie Hat*.

| | C# | D# | E | F | F# | G | G# | | A# | B | | C# | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | p2 | 2 | p3 | 3 | 4 | p5 | 5 | p6 | 6 | p7 | 7 | 1 | |
| | @ | P | A | D | M | I | L | $ | x | x | x | x | @ | |
| P.DM.L | x | x | . | x | x | . | x | x | . | x | x | . | x | 8-note atonal diminished scale |
| //DM.L | x | . | x | x | x | x | x | $ | . | x | x | . | x | [A]-[C] melody: 9-note blues family scale |
| | | | | | | | | + | | | | + | | ornamental passing notes |
| //D | @ | . | . | x | . | x | . | $ | . | . | x | . | @ | [D] melody: pentatonic major |

The blues family scale provides a structural handle on the piece that's missing otherwise. That music notation provides no structural handle is verified by the amazement expressed in the referenced article at Debussy's "departures from music convention."

The annotated harmony shown next in Lego form satisfies the written chords mostly in place, and always in the flow. The harmony building blocks from the family scale that appear in *Goodbye Porkpie Hat* also appear here.

These passages use many triad chords, which are 3-note shapes consisting of symmetrically split tritones (e.g., dim chord **A•** ) or asymmetrically split fifths (e.g., major triad **P▲**). Fitting the triads into the flow sometimes inverts them or converts them into seventh chords (e.g., **I•** in bar 8 is converted into a diminished seventh chord, the outer notes of which drop a whole tone to bar 9).

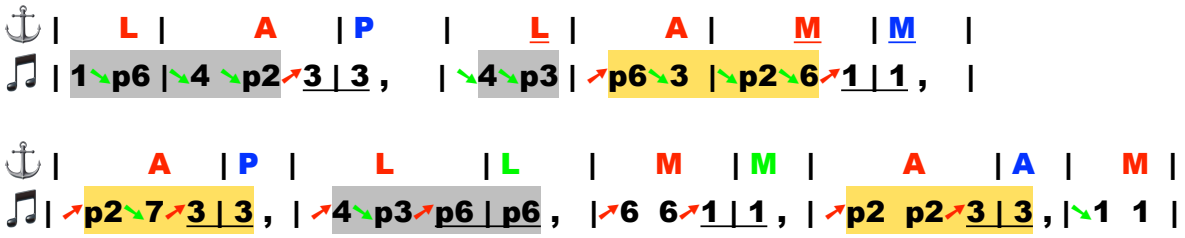
| | | C# | D# | F | F# | G# | A# | B | C# | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | **1** | **p2** | **2** | **p3** | **3** | **4** | **p5** | **5** | **p6** | **6** | **p7** | **7** | **1** | |
| | | @ | P | A | D | M | I | L | $ | x | x | x | x | @ | |
| **[A]** | **1-4** | - | . | . | . | . | . | . | . | . | . | . | . | . | - |
| **[B]** | **5** | **P▲** | . | P | . | . | . | x | . | . | x | . | . | . | . | D |
| | | **PM** | . | P | . | . | M | . | . | . | . | . | x | . | . | B*dim*/D=D*dim7* |
| | **6** | **P▲** | . | P | . | . | . | x | . | . | x | . | . | . | . | as above |
| | | **PM** | . | P | . | . | M | . | . | . | . | . | x | . | . | as above |
| | **7** | **A•** | . | . | A | . | . | x | . | . | x | . | . | . | . | D#*dim* |
| | | **A2** | . | . | A | . | . | . | . | . | x | . | x | . | . | B*7* |
| | | **D▲** | . | . | . | D | . | . | . | $ | . | . | x | . | . | F |
| | **8** | **3I• = AI** | . | . | x | . | . | I | . | . | x | . | . | x | . | F#*dim* |
| **[C]** | **9** | **I4** | x | . | . | . | . | I | . | . | . | x | . | . | . | F#/D# |
| | | **$4** | . | . | x | . | . | . | . | $ | . | . | . | x | . | G# |
| | | **I4** | x | . | . | . | . | I | . | . | . | x | . | . | . | F#/D# |
| | **10** | **D+•** | . | . | . | D | . | . | . | . | . | . | . | x | . | C+ (stacked major thirds) |
| | | **ML** | x | . | . | . | M | . | L | . | . | . | x | . | . | B*7b5* |
| | **11** | **3M** | . | x | . | . | M | . | . | . | . | x | . | . | . | A# |
| | | **3I** | . | . | x | . | . | I | . | . | . | . | x | . | . | B*6* |
| | **12** | **3M** | . | x | . | . | M | . | . | . | . | x | . | . | . | A# |
| | | **3M• = PM** | . | P | . | . | M | . | . | x | . | . | x | . | . | F*dim* |
| **[D]** | **13-14** | - | . | . | . | . | . | . | . | . | . | . | . | . | . | - |
| | **15** | **@▼** | @ | . | . | x | . | . | . | x | . | . | . | . | . | E*6* |

**CHROMATIC CLASSICAL DOMAIN : "GIANT STEPS"**

**Home Tonic - F# (empty key signature plus accidentals)**

Coltrane's jazz classic (*The Real Book*, 6th Edition, Hal-Leonard) is famously difficult. The melody notes and chord sequences are from distant Ionian scales with tonics G, B and Eb that differ by 4 notes from each other (their implicit key signatures are 1 sharp, 4 sharps and 3 flats). Tonic changes are rapid, often one every bar.

The melody line and incomplete core harmony are shown next for home tonic F#=**1** (highlighting is of segments from different modes explained following this summary). Resolutions to home tonic **1** and to secondary tonics A#=**3** and Eb=**6** establish the primary melody tonality relative to the home tonic as major to the ear. The core harmony includes all of the tritones but only selected fifos. The remaining fifos follow from obvious morphings. Learning the piece from this summary and then adding the morphed fifos by eye and ear is easier than trying to learn everything at once because the alignments between melody and full core harmony are sometimes counter-intuitive.

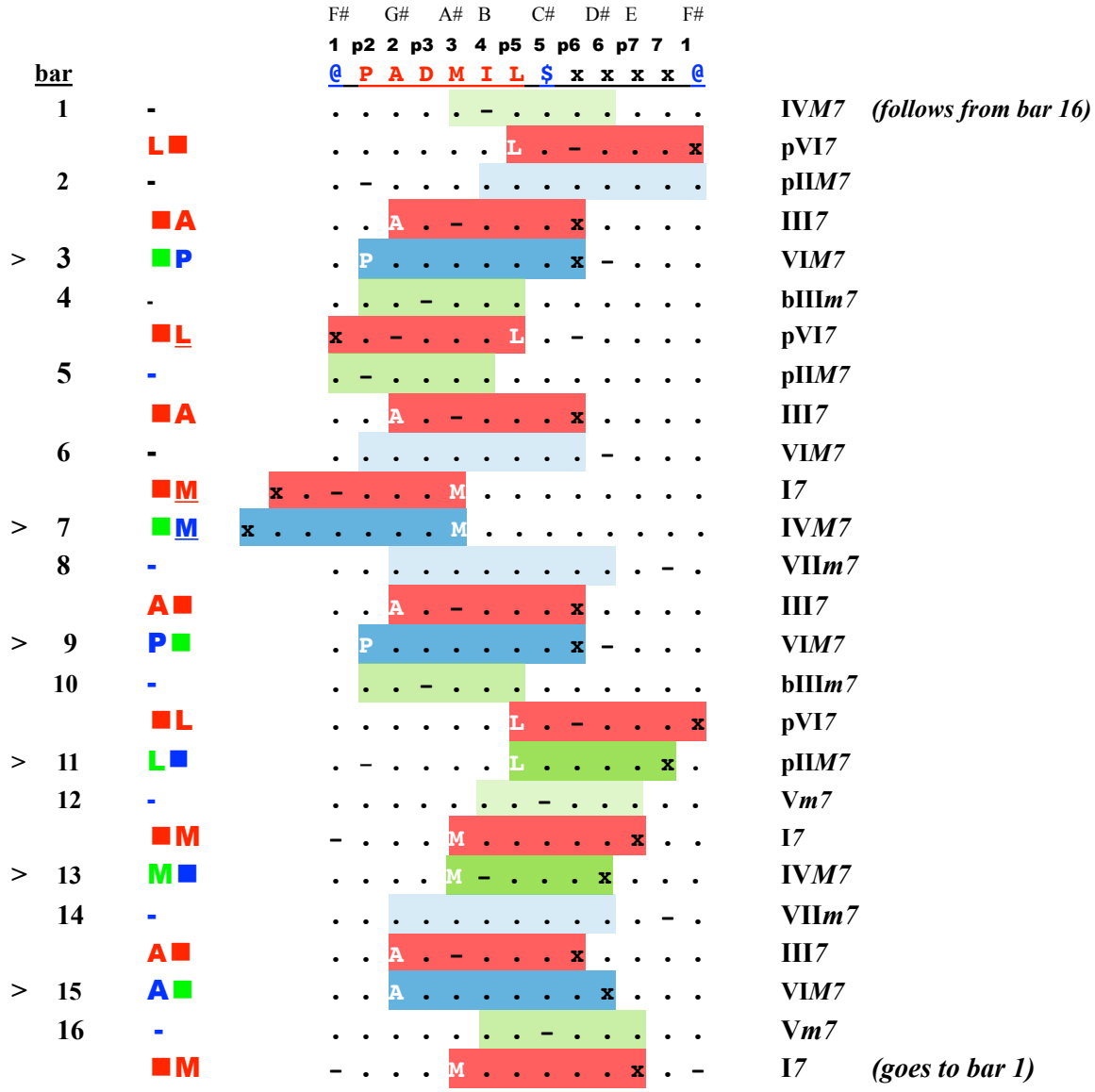



As shown in the following table, the melody scale considered by itself is an altered harmonic-minor-major mode of tonic **6**: the unaltered mode is determined by double tritone **A..I**; the alteration substitutes tritone **D** for tritone **A**. This only substitutes the anchor because the other note is already in the scale. This is the clearest way of identifying the alteration (identifying it by an altered degree number would be confusing because the 8-note scale has an extra degree number in it its bottom fifth). The melody scale is actually an assembly of fragments of the Ionian modes but it's useful to know it from a mode signature. Playing the melody line knowing this mode is easy by itself. Playing the full core harmony is easy by itself. The only difficulty is the sometimes confusing alignment between the two.

| | F# G | | A# B | | | Eb | | F# | |
|---|---|---|---|---|---|---|---|---|---|
| | 1 | p2 2 | p3 3 | 4 | p5 5 | p6 | 6 | p7 7 | 1 | |
| | @ | P A | D M | I | L | $ x | x | x x | @ | |
| **melody** | x | x . | D x | I | ——— | x | x | . x | x | **altered-harmonic-minor-major@6** |
| **//M** | x | . x | . M | x | . x | . | x | . x | x | **Mixolydian@1** |
| **alt-L** | x | x . | x . | x | L . | x | . | x . | x | **Locrian@1** |
| **alt-A** | . | x A | . x | . | x . | x | x | . x | . | **tritone partner of Aeolian@1** |

The unhighlighted segments in the melody line are from **//M** and the highlighted ones from the **alt** modes. The different tritones of the melody line cross over between these modes. The highlighted melody segments in bars 1-2 and 5-6 are **4h↘3h↘4h** sequences from **alt-L**, **alt-A** and the melody mode.

The core harmony is best learned first without the lightly-shaded fifos, which can be added later by simple morphing. Melodic resolutions to the home and secondary tonics are marked “>” on the left. The morphs are all downward, with one exception (**A-A** in bars 14-15 because the context leading up to it is different from before). This core harmony fits the written chords as shown on the right. Dashes indicate omitted roots. Octave shapes that go well with the flow of the melody are indicated on the left.

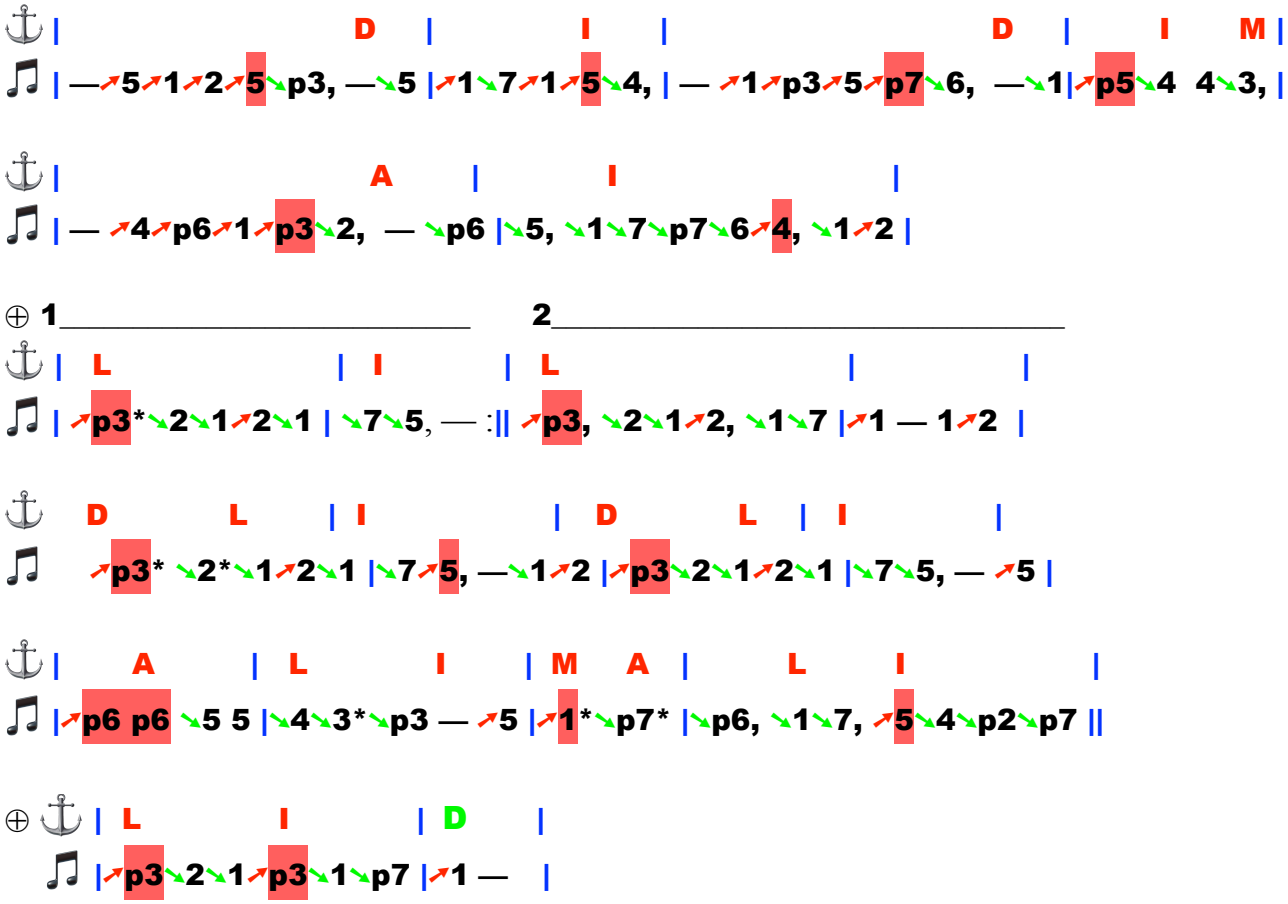



Improvisations could be based on the single melody mode. Or they could be based on the two main harmony modes **//M** and **alt-L**. The **alt-A** mode may be considered ornamental because it has only one note not in the other two modes (**7**). Among other possibilities, this suggests blues improvisations.

**NON-CLASSICAL DOMAIN : "ROUND MIDNIGHT" (MONK)**

**Home Tonic - Eb (6 flats key signature: Aeolian of Eb)**

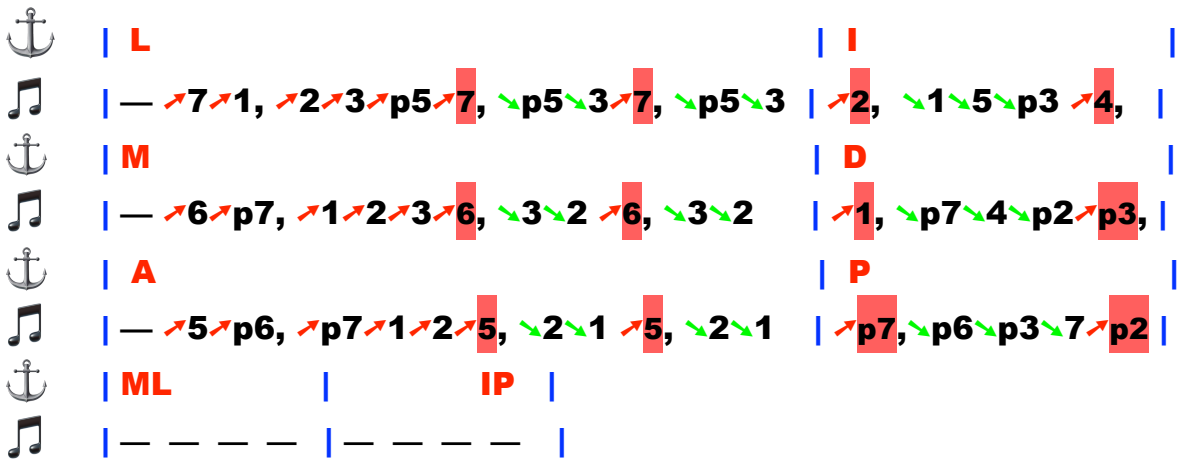
The sources are *The Ultimate Jazz Fakebook*, Hal Leonard, 1988, p. 322 for the main part of the piece (shown first) and *Standards Real Book*, Sher Music, 2000, p. 369 for an optional introduction (next page).




The main melody scale is as follows. Much of the harmony is from this scale, with a few ornamental elements that fit the flow (e.g., **L-I**, **I-M**).

| | Eb | F | Gb | Ab | Bb | Cb | Db | Eb |
|---|---|---|---|---|---|---|---|---|
| | 1 | p2 | 2 | p3 | 3 | 4 | p5 | 5 | p6 | 6 | p7 | 7 | 1 |
| | @ | P | A | D | M | I | L | $ | x | x | x | x | @ |
| **AD.I*** | @ | . | x | x | . | x | . | $ | x | x | x | x | @ |
| **ornamental** | | + | | | + | | + | | | | | | |

Here follows an optional, 8-bar introduction (or conclusion) that's visibly based on whole-tone intervals and tritones in highly structured ways. Each 2-bar segments repeats the previous one down a whole tone down. Each starts on the non-anchor note of harmony tritone of the second bar and ends on the anchor note in the next octave up. The final 2-bar segment is a rhythmic pattern with no specific melody notes.

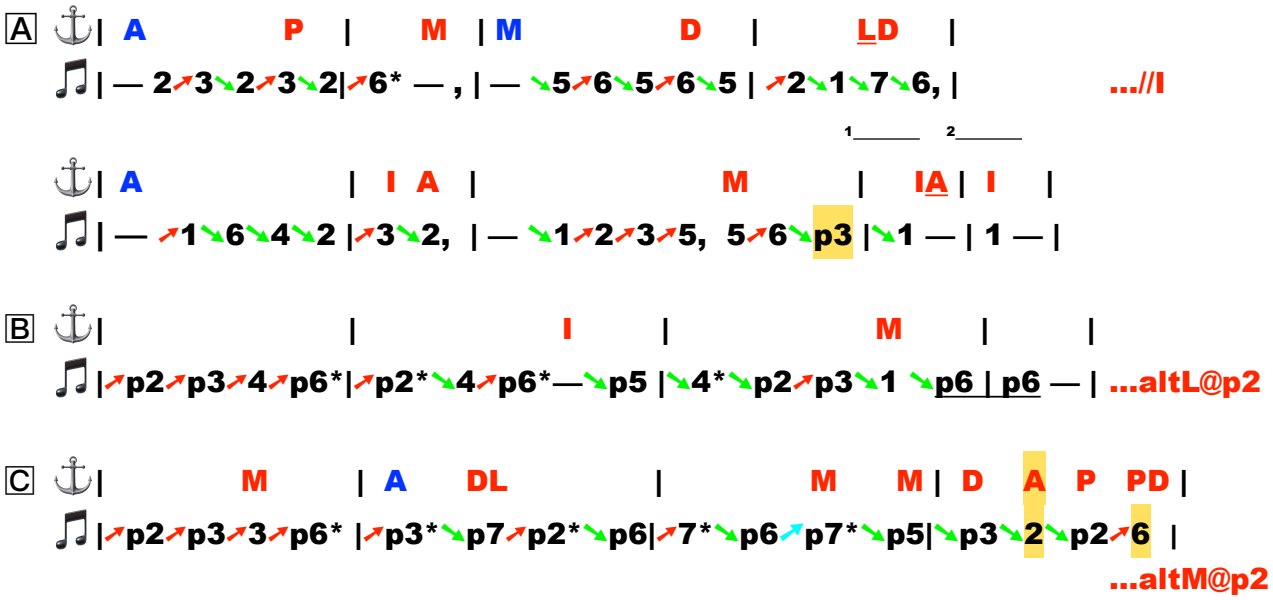


## CHROMATIC CLASSICAL DOMAIN : "BODY AND SOUL"

**Home Tonic Db (5 flats key signature: Ionian of Db)**

This piece is strongly chromatic in a way that's particularly complex in music notation. My source for the written music is *The Ultimate Jazz Fakebook*, Hal-Leonard (1988), p67. Three successive sections have three different key signatures: [A] 5 flats (Db-Ionian); [B] 2 sharps (D-Ionian); [C] 1 flat (D-Aeolian, but actually Dorian due to a natural in the written melody line). Ionian and Dorian of tonic D are nearby parallel modes (only 2 notes different). Ionian of Db is a distant from these, with many notes different (5 notes different from [B]). The obvious home tonic is Db because [A] starts and ends the piece. The large distance between [A] and [B] is more than compensated by the simplicity of every note of [B] being a half tone up from every note of [A].



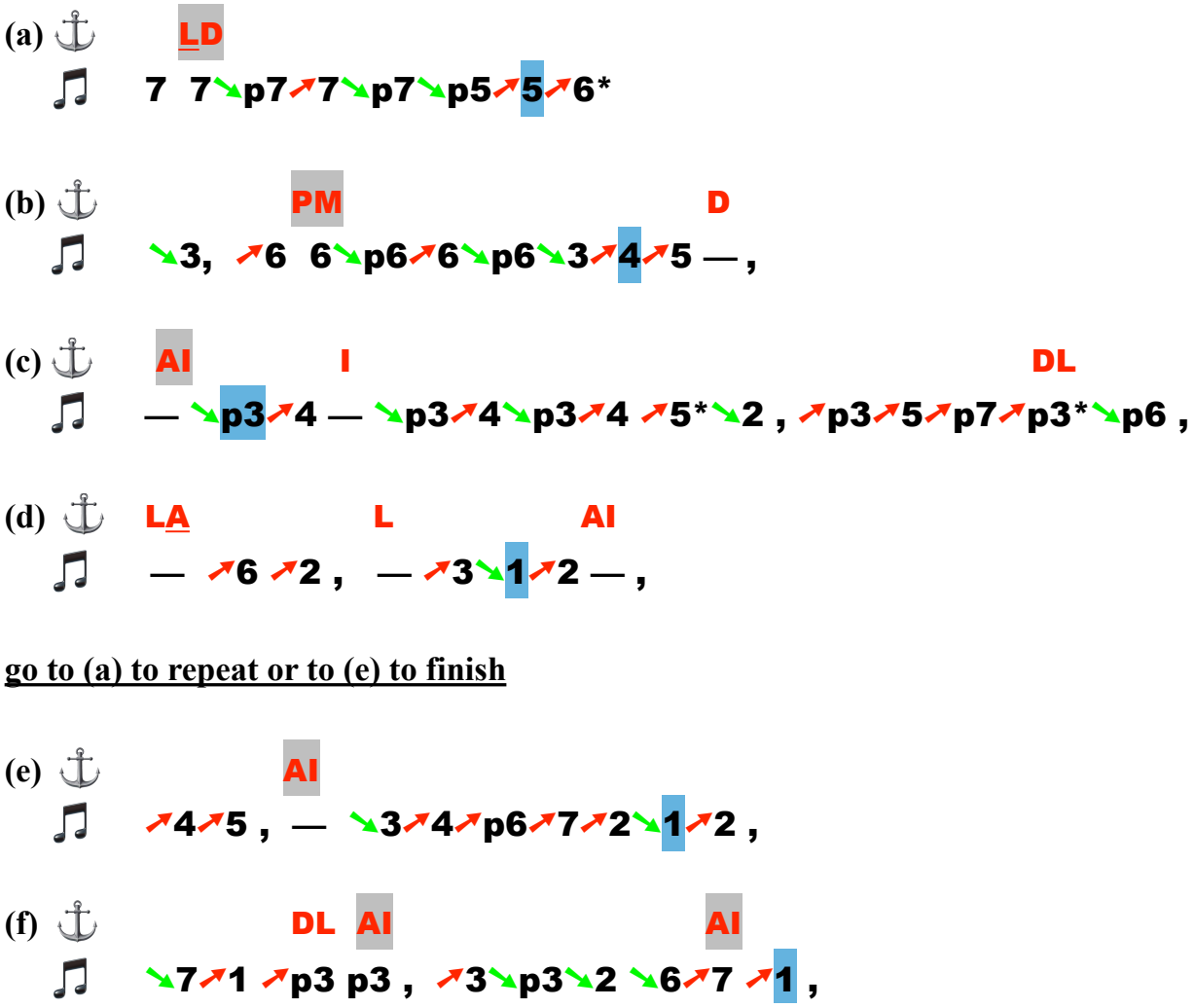

The melody scales are classical modes. The strongly chromatic harmony is not, but is consistent with the melody. When I first encountered this piece, I struggled with trying to understand how this harmony implied the melody scales and finally realized I had it backwards. Here follow the melody scales.

| | | Db | | Eb | F | Gb | | Ab | | Bb | | C | Db | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | p2 | 2 | p3 | 3 | 4 | p5 | 5 | p6 | 6 | p7 | 7 | 1 |
| | | @ | P | A | D | M | I | L | $ | x | x | x | x | @ |
| [A] | //P.DM.L | x | x | . | x | x | . | x | x | . | x | x | . | x |
| | //A.MI | @ | . | x | . | x | x | . | @ | x | . | x | x | @ |
| | //I | @ | . | x | . | x | x | . | $ | . | x | . | x | @ |
| [B] | //A.MI | @ | . | x | . | x | x | . | @ | x | . | x | x | @ |
| | altL@p2 | x | x | . | x | . | x | x | . | x | . | x | . | x |
| [C] | //P.DM.L | x | x | . | x | x | . | x | x | . | x | x | . | x |
| | altM@p2 | . | x | . | x | x | . | x | . | x | . | x | x | . |

| |
|---|
| harmony (first 4 bars) |
| harmony (last 4 bars) |
| melody (all) |
| harmony |
| melody: Ionian of tonic p2 |
| harmony, ending returns to [A] |
| melody: Dorian of tonic p2 |

**NON-CLASSICAL DOMAIN: "LAURA"**
**Home Tonic - C (empty key signature)**

My source for this piece is *The Jazz Book*, John Brimell, CPP/Belwin, 1989, p24. The source book is sub-titled *Today's Easy Adult Piano* but this piece is "easy" only in the sense that the density of notes on the page is low. Playing it without thinking about the changes is easy, but provides no handle on the changes. Getting a handle on the changes is made difficult by the sparseness of some of the melody lines, and the repetition of harmony that's determinative in one section and ornamental in others. The highlighted elements of harmony and melody are determinative for the interpretation presented here: highlighted harmony (grey) identifies melody modes, highlighted melody (blue) identifies tonics. This is easy to play without thinking about the interpretation. Bar lines of the written piece are omitted because they break up the flow in a confusing way. Once you "get" the flow, relating it to the written bar lines is easy.




**go to (a) to repeat or to (e) to finish**




This interpretation provides a simple handle on a piece that otherwise seems a muddle of disparate chromatic elements. All sections — except the turnaround section (d) in pentatonic major — are in the

harmonic-minor-major (**hmm**) mode of the tonic sequence **5-4-p3-1** highlighted in blue in the melody line. The modes don't resolve to these tonics (except **1**) but go directly to the next mode by an interval that always sounds right, independently of the current mode (e.g down a fifth, down a minor third, up a half tone) The tonics provide an easy way of remembering the parallel modes. The **hmm** mode is very simple: the double tritone provides a stack of 3 minor thirds going up from a whole tone above the highlighted tonic; the bottom minor third (closest to the tonic) is filled with half tones and the top minor third (farthest away) is empty; the scale frame adds two notes. The parallel modes of the home tonic are relative modes of these modes. A feature of this interpretation is the absence of the ornamental passing notes that would be required by a different interpretation in terms of successive classical modes.

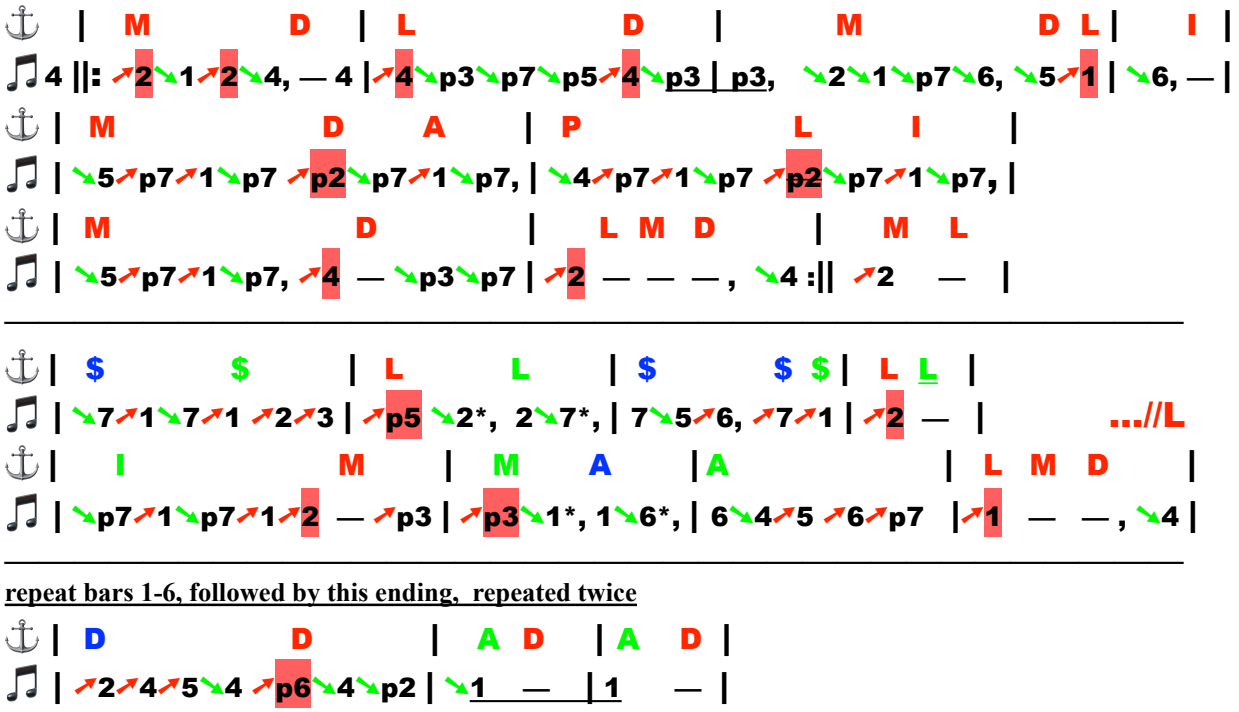
The following table shows the actual melody notes and the notes of the corresponding harmonic-minor-major mode determined by the indicated double tritones and secondary tonics. There are other ways of parsing this, but this is only way I have found that gives a uniform scale picture without ornamental passing notes. Harmony tritones not in the melody mode of a section are ornamental.

| | | C D E F G A B C | |
|---|---|---|---|
| | | **1 p2 2 p3 3 4 p5 5 p6 6 p7 7 1** | |
| | | **@ P A D M I L $ x x x x @** | |
| **(a)** | **melody notes** | . . . . . . x x . x x x . | |
| | **//DL** | x . x x———x x . x x x x | **hmm@5** |
| **(b)** | **melody notes** | . . . . x x . x x x . . . | |
| | **//PM** | x x———x x . x x x x . x | **hmm@4** |
| **(c)** | **melody notes** | . . x x . x . x x . x . . | |
| | **//AI** | ———x x . x x x x . x x— | **hmm@p3** |
| **(d)** | **melody notes** | x . x . x . . . . x . . x | |
| | **//M** | x . x . x . . x . x . . x | **pentatonic major** |
| **(e)** | **melody notes** | x . x . x x . x x . . x x | |
| | **//AI** | x . x x x x . x x———x x | **hmm@1** |
| **(f)** | **melody notes** | x . x x x . . . . x . x x | **(e)+(d)** |

**NON-CLASSICAL DOMAIN: WHEN SUNNY GETS BLUE**

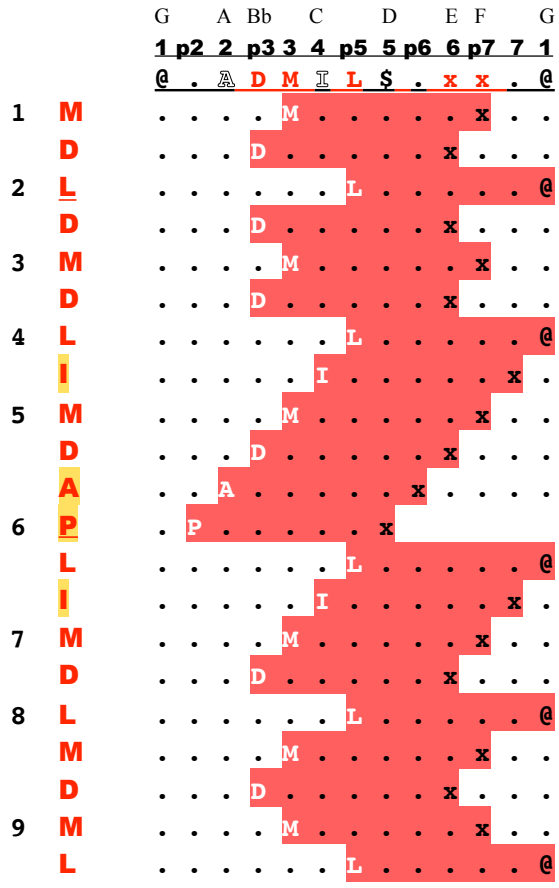
**Home Tonic - G (1 flat key signature: Dorian of G)**

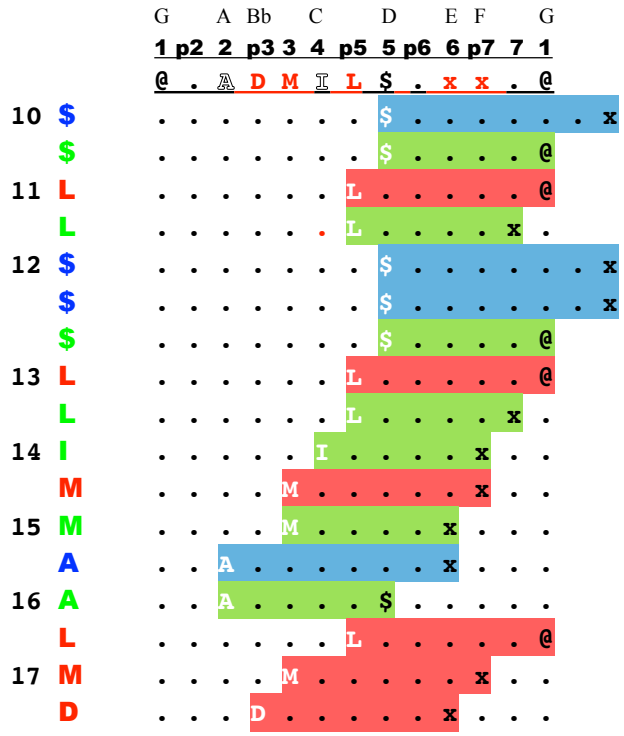
My source for this piece is sheet music by Jack Segal and Marvin Fisher from Hal-Leonard (1956), publication number HL00351105. The melody line from this source is a **//DM.L** blues in G, with a 4-bar section in the bridge that visits **//L**. The harmony shown below is a modification of the written harmony, which is a mix of fifo and tritone chords that sound fine but are confusingly irregular.




Play the harmony in the first instance as octave shapes by doubling the treble line of the core an octave down. The 5-tritone runs down by half tones in bars 4-5 and 6-7 are very easy to play and sound good with the melody line. They include ornamental tritones **I**, **A** and **P** that are easily morphed into in-scale fifos, if desired.

The Lego-like harmony is shown next. Keep in mind that this is only for illustration because it's implied by the anchor line. The harmony of the first four bars of the bridge is in the **//L** mode (Lydian). The final four bars of the bridge return to the original blues scale. The transition between them in bars 13-14 is marked by the distinctive sound of a fourth-fourth slide down a half tone.

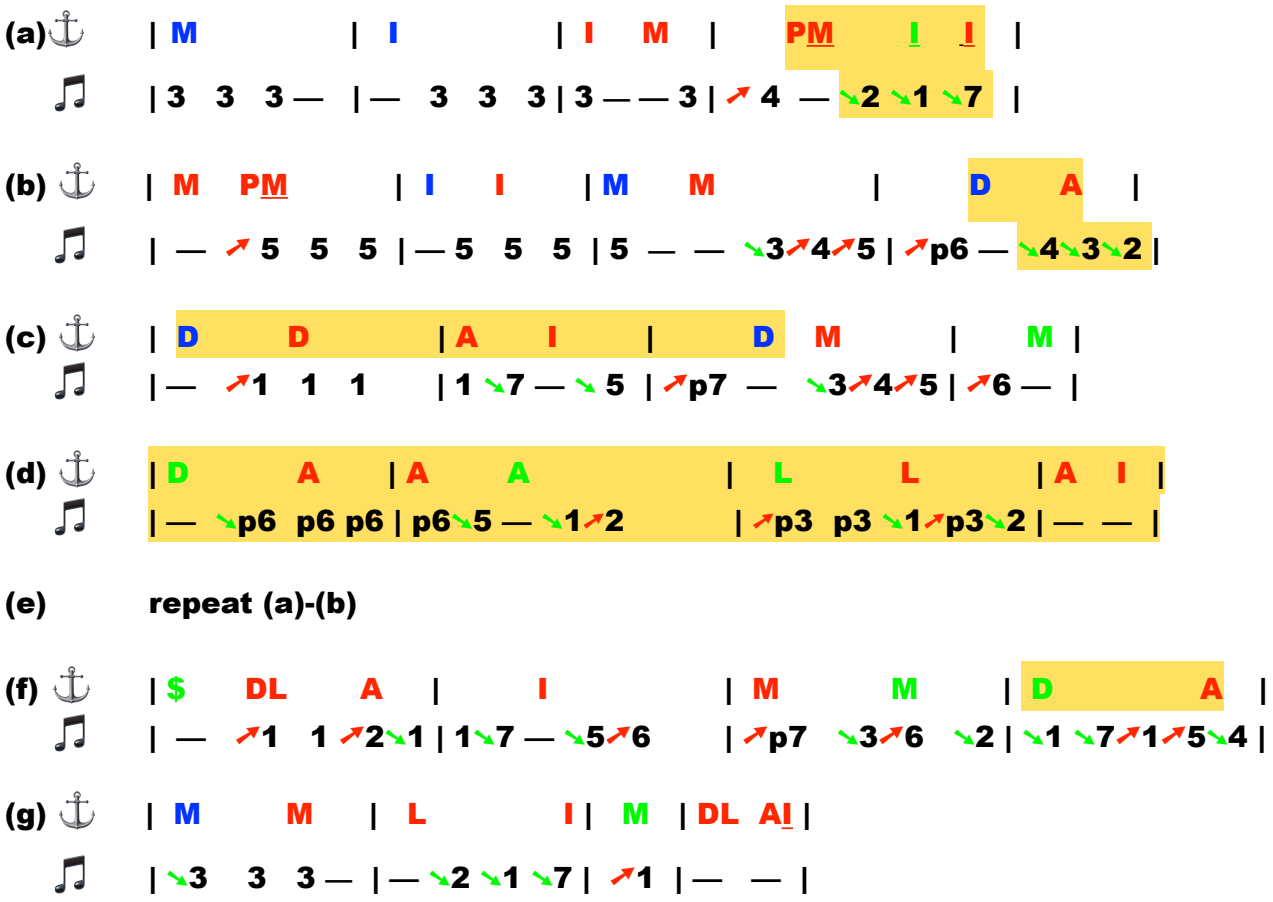

G A Bb C D E F G
1 p2 2 p3 3 4 p5 5 p6 6 p7 7 1
@ . A D M I L $ . x x . @
1 M . . . . M . . . . . x . .
D . . . D . . . . . x . . .
2 L . . . . . L . . . . . @
D . . . D . . . . . x . . .
3 M . . . . M . . . . . x . .
D . . . D . . . . . x . . .
4 L . . . . . L . . . . . @
I . . . . . I . . . . . x .
5 M . . . . M . . . . . x . .
D . . . D . . . . . x . . .
A . . A . . . . . x . . . .
6 P . P . . . . . x
L . . . . . L . . . . . @
I . . . . . I . . . . . x .
7 M . . . . M . . . . . x . .
D . . . D . . . . . x . . .
8 L . . . . . L . . . . . @
M . . . . M . . . . . x . .
D . . . D . . . . . x . . .
9 M . . . . M . . . . . x . .
L . . . . . L . . . . . @


G A Bb C D E F G
1 p2 2 p3 3 4 p5 5 p6 6 p7 7 1
@ . A D M I L $ . x x . @
10 $ . . . . . $ . . . . . x
$ . . . . . $ . . . @
11 L . . . . . L . . . . @
L . . . . . L . . . x .
12 $ . . . . . $ . . . . . x
$ . . . . . $ . . . . . x
$ . . . . . $ . . . @
13 L . . . . . L . . . . @
L . . . . . L . . . x .
14 I . . . . . I . . . x . .
M . . . . M . . . . x . .
15 M . . . . M . . . x . . .
A . . A . . . . . x . . .
16 A . . A . . . $ . . . . .
L . . . . . L . . . . @
17 M . . . . M . . . . x . .
D . . . D . . . . . x . . .

**NON-CLASSICAL DOMAIN: EVERY TIME WE SAY GOODBYE**

**Home Tonic - Eb (3-flats key signature: Ionian of Eb)**

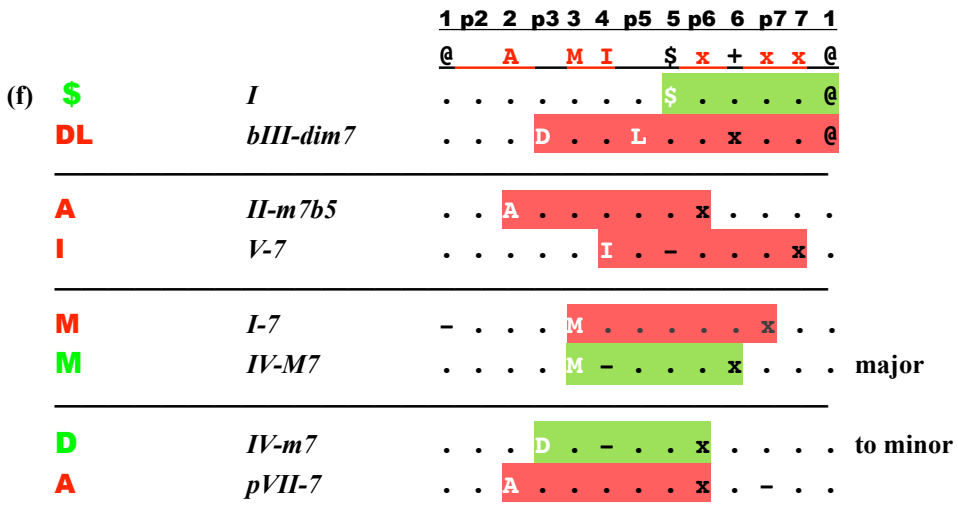
This piece is hauntingly lovely, with ambiguous changes that go well with the words about love and loss. The melody line comes to rest at the end on the home tonic **1** in the unmistakeable Ionian-mode sequence **5-4-3-2-1-7-1** and much of the melody line is in the major family scale **//A.MI*** of which Ionian is a sub-scale. Minor (or minor-ish) segments in melody and harmony are highlighted in yellow. Except for one, all-minor, 4-bar section, minor touches are brief and sometimes in opposition (minor in melody and major in harmony, or vice versa). There's sufficient ambiguity in much of this piece that there's little point in overthinking scale implications, which is why there are no annotated mode signatures or identified secondary tonics. The ambiguity is a deliberate feature of the piece by a creative composer.




The relative timing of the melody line and the rich, mixed harmony is organized in an irregular way that I have always found impossible to remember in chord terms. The chords sometimes harmonize melody notes and sometimes provide transitions between them, in patterns that are easy to get wrong. It's much easier to get the core harmony right because the flow cues what comes next to the eye and ear.

In phrase (f) shown next, the two melody bars with the famous words "how strange the change

from major to minor" stay resolutely in major for the melody, while the highlighted harmony, in these bars only, goes from major to minor. The harmony of the first two of these bars is intricate in chord terms but simple on the keyboard. The final voicing for the second bar implies the double tritone **AI** that's a half tone down from **DL** in the first bar. In effect, the core sequence of the first two bars is **DL-AI** down a half tone. Octave voicings for the remaining bars are sufficient.



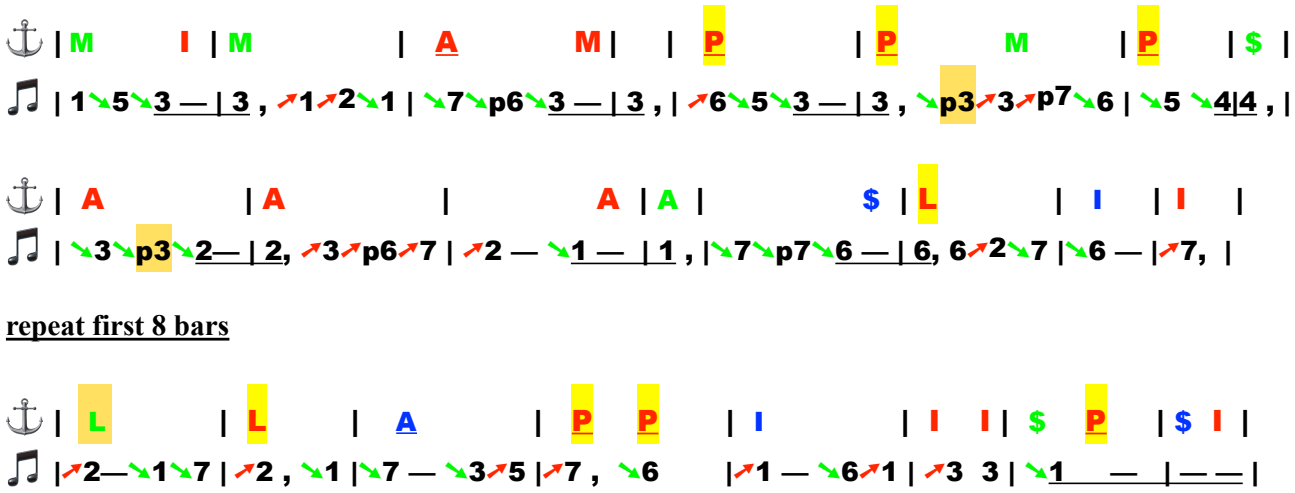

The sound of the piece is relatively insensitive to the exact placement of the harmony relative to the melody. When the melody is on a downbeat, playing the harmony on the following upbeat — and vice versa — often sounds fine. For this reason, the harmony placements shown don't necessarily align exactly with the chord placements in the written music. Many of the harmony shapes are rootless voicings of the written chords.

**NON-CLASSICAL DOMAIN : "ALL OF ME"**

**Home Tonic - C (empty key signature: Ionian of C)**

I learned this version of *All of Me* in C (along with *No Greater Love* in Bb coming up) in Susan Muscarella's piano comping course some years ago at the then Jazz School in Berkeley (now the Jazz Institute), as an example of using 4-note "open" voicings of extended and altered seventh chords to accompany soloists. The chord progression is strongly chromatic and therefore complex in chord symbol terms. The open voicings rearrange the chord notes and sometimes omit the roots. The standard way of explaining such voicings is by rearranged degree numbers of chord scales, in which the same notes from adjacent chords have different degree numbers relative to different roots that are sometimes omitted. Such representations are indirect relative to the keyboard, difficult to comprehend as a whole, or remember, and difficult to annotate on the written music because they require too many symbols. This complexity goes away when the shapes are understood in terms of core building blocks.

The skeleton melody line and harmony anchor line are shown next. Trying to understand this as a succession of classical modes bogs down in complexity. The simplest way of remembering it is this: melody and harmony are both from the 9-note, major family mode **A.MI*** (**//I** plus notes **p6** and **p7**), with the passing ornamentation shown highlighted in yellow. The two appearances of minor note **p3** in the melody line are passing notes because omitting them has no substantive effect on the sound. The appearances of **P** and **L** in the harmony are ornamental substitutes for **A** and **I** because substituting the latter for them sounds fine.

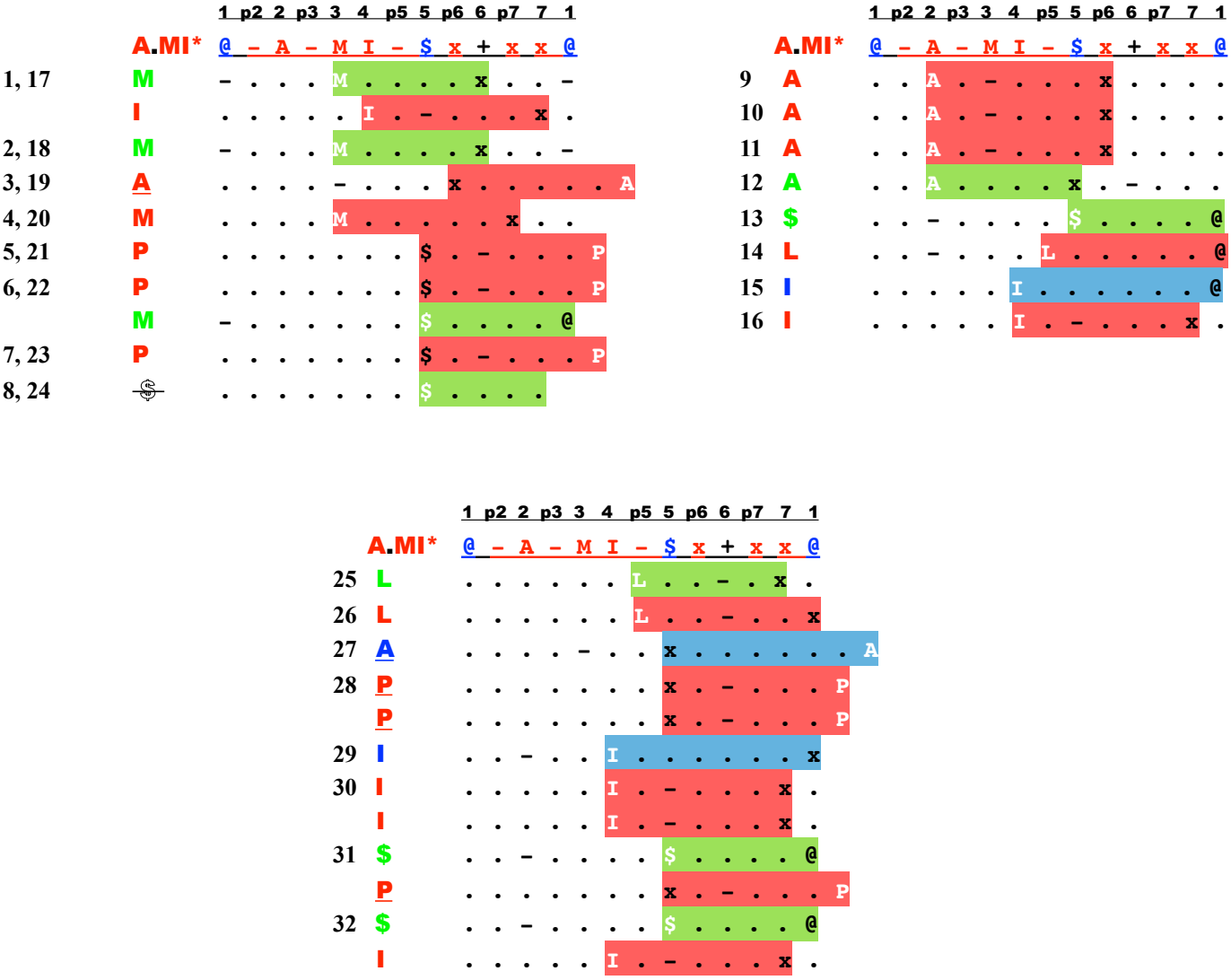



**Scales**

| | 1 | p2 | 2 | p3 | 3 | 4 | p5 | 5 | p6 | 6 | p7 | 7 | 1 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | @ | P | A | D | M | I | L | $ | x | x | x | x | @ | |
| **//A.MI*** | @ | . | x | . | x | x | . | @ | x | x | x | x | @ | **melody & harmony (first 16 bars)** |
| **//I** | @ | . | x | . | x | x | . | @ | . | x | . | x | @ | **melody & harmony (last 8 bars)** |
| **P, L** | | | + | | | | + | | | | | | | **ornamental subs for A, I (all harmony)** |

The next picture shows what this looks like in terms of successive building blocks on the keyboard. This intended to represent a picture in the mind's eye implied by the above, not something to be written

down. Play this harmony in the first instance as octave shapes formed by doubling the treble line of the core an octave down. The only exception is bars 3-4 in which the tritones establish outer notes a minor seventh apart that may be held for both, only moving the middle note.

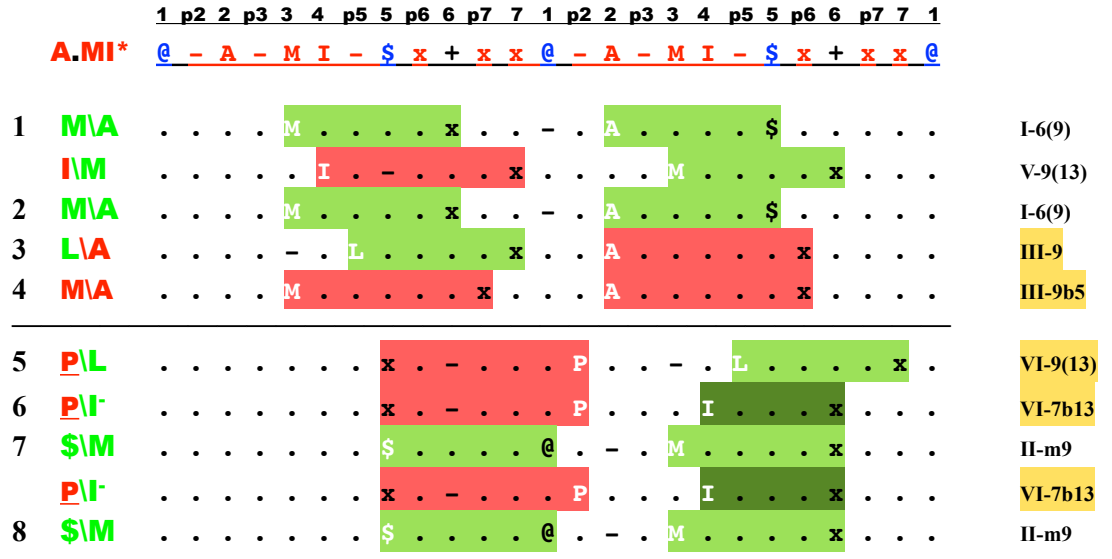



## Open Voicings

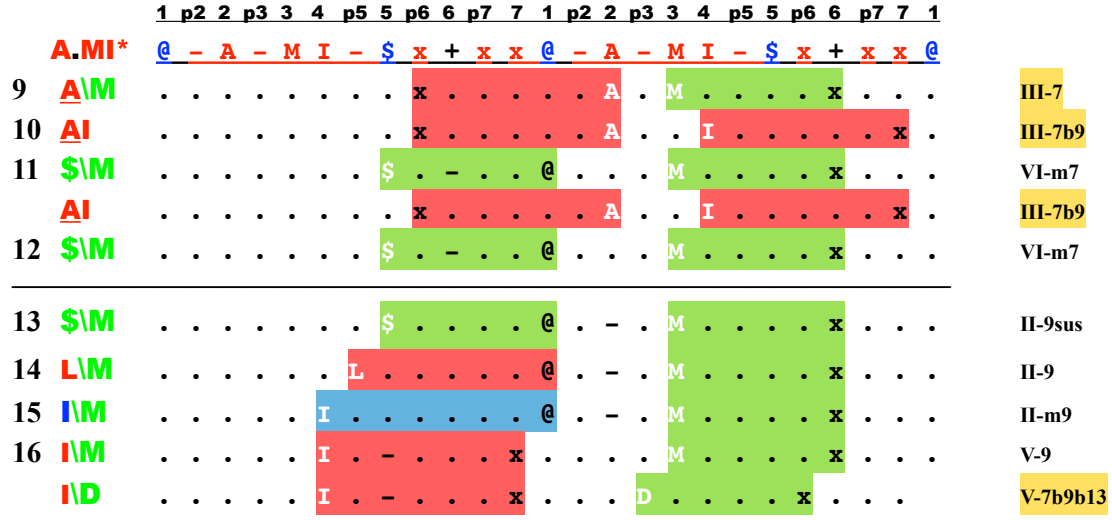
Four-note "open" voicings developed from the same core are shown next. This is intended to represent a picture in the mind's eye implied by the notation in the below left column (which would be annotated above the staff). The **X\Y** notation identifies non-overlapping building blocks **X** on the bottom and **Y** on top (the backslash distinguishes this from from overlapped building blocks represented by **XY**). The shapes are voicings of the chords shown on the right. Chords on roots I, II and V are from the Ionian mode. The other chords (highlighted in yellow) provide visibly simple segues between the Ionian voicings. The chord symbols are all satisfied serially in the flow. This is remarkably

simple, conceptually, compared to the standard way of understanding the same thing in terms of degree numbers of chord scales. The four notes are difficult to play with the left hand, but easy-to-play 3-note voicings of the same chords follow from omitting the top notes; the top notes can be added by the left hand under the melody line.

## Bars 1-8

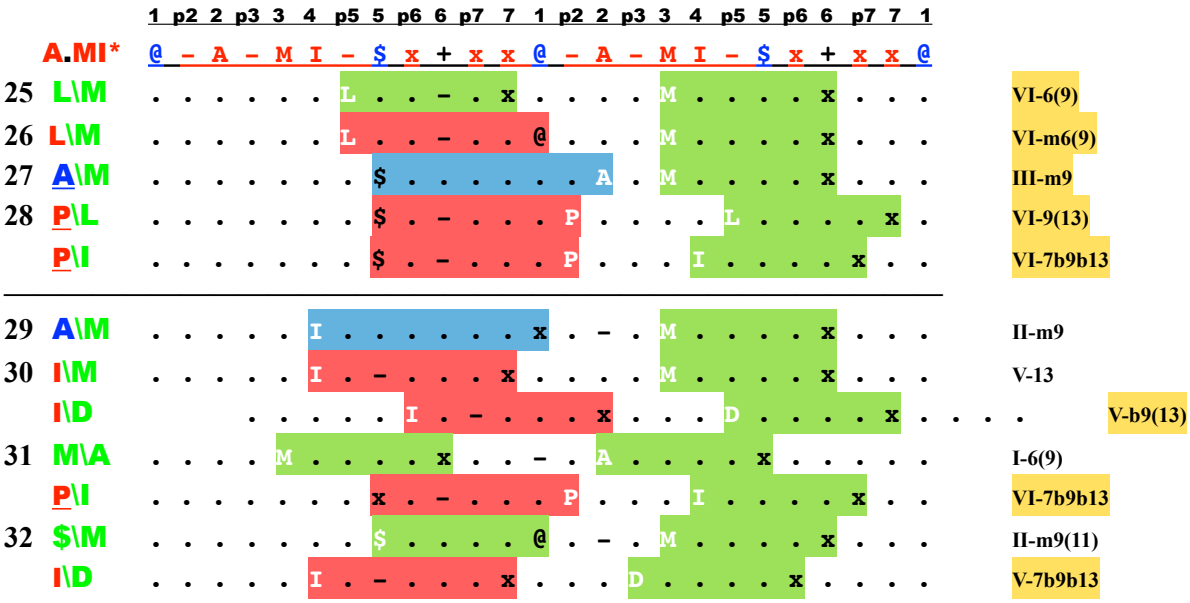



## Bars 9-16




## Bar 17-24 - repeat bars 1-8

**Bars 25-32**



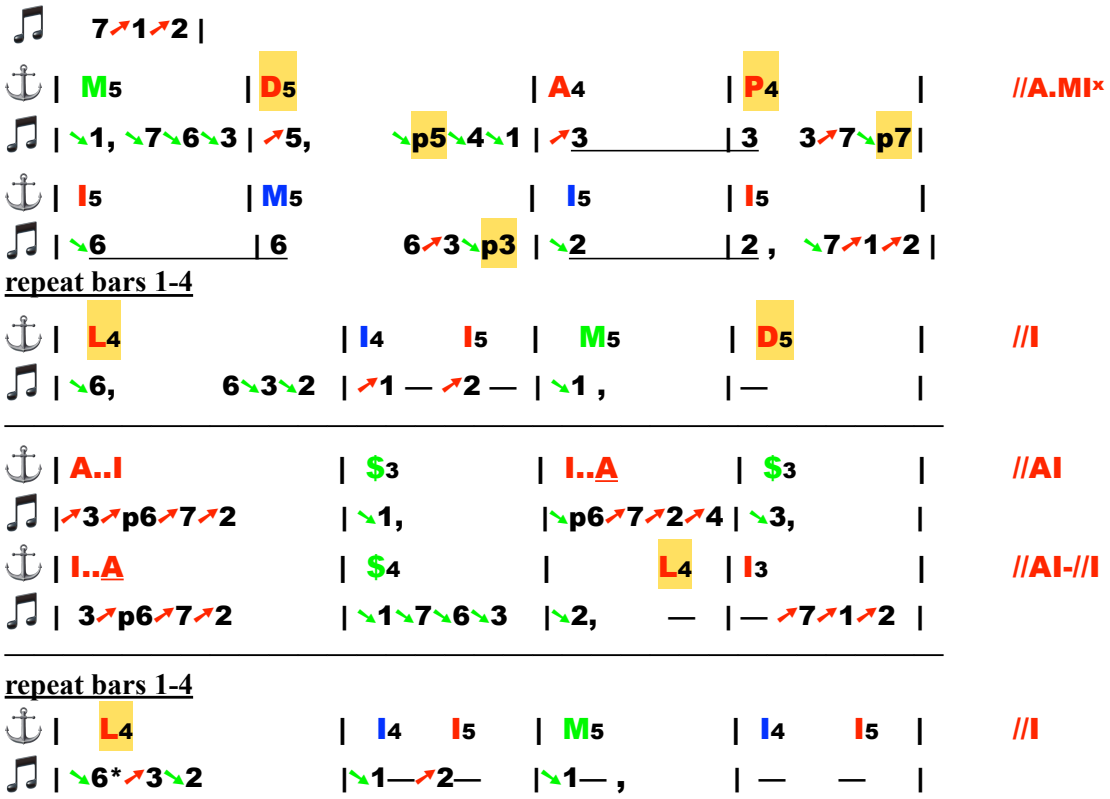

Understanding how the shapes satisfy the chord symbols requires knowing the relationship between the numeric suffixes of the chord symbols and the chromatic scale. I explain this only to make clear that the shapes satisfy the written chords, not to suggest figuring the shapes out this way. In bars 3-4, chord suffix "9" is chromatic scale note **p5** and chord suffix "b5" is chromatic scale note **p7**. The 3-note voicings in bars 3-4 don't include **p5** but it's included in bar 5, thus satisfying the bar-4 chord in the flow. The bar-4 shape jumps up a minor third in bar 5, with a wobble that puts a fourth on top instead of a major third. The wobble provides degree "13" of the chord. It also provides degree "9" of the bar-4 chord, thus satisfying two chord symbols at one stroke.

## NON-CLASSICAL DOMAIN : "NO GREATER LOVE"

### Home Tonic - Bb (2 flats key signature: Ionian of Bb)

I learned this piece in Bb major in Susan Muscarella's piano comping course at the then Jazz School in Berkeley. The melody mode is major-family **//A.MI*** throughout, with passing notes highlighted in yellow. The strongly chromatic harmony is in this mode, with the addition of ornamental tritones **P**, **D** and **L** that don't change the melody mode (this includes the altered harmony pattern in the bridge). The numeric suffixes in the anchor line identify voicing notes by the number of half tones they are above the core (i.e., above the anchored building block). There's nothing new in the harmony so no Lego-like view of it is presented.




### Scales

| | 1 | p2 | 2 | p3 | 3 | 4 | p5 | 5 | p6 | 6 | p7 | 7 | 1 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | @ | P | A | D | M | I | L | $ | x | x | x | x | @ | |
| **//A.MI*** (major family) | @ | . | x | . | x | x | . | @ | x | x | x | x | @ | |
| **//AI** (harmonic major) | @ | . | x | . | x | x | . | @ | x | . | . | x | @ | |
| **//I** (Ionian major) | @ | . | x | . | x | x | . | @ | . | x | . | x | @ | |
| **P,D,L** | | + | | + | | | + | | | | | | | ornamental |

**Walking Bass Line**

The following walking bass line was provided in class. I found it difficult to remember the pattern as written out in music notation, and even as written out below. However, looking at it in a mode table reveals a simple pattern.

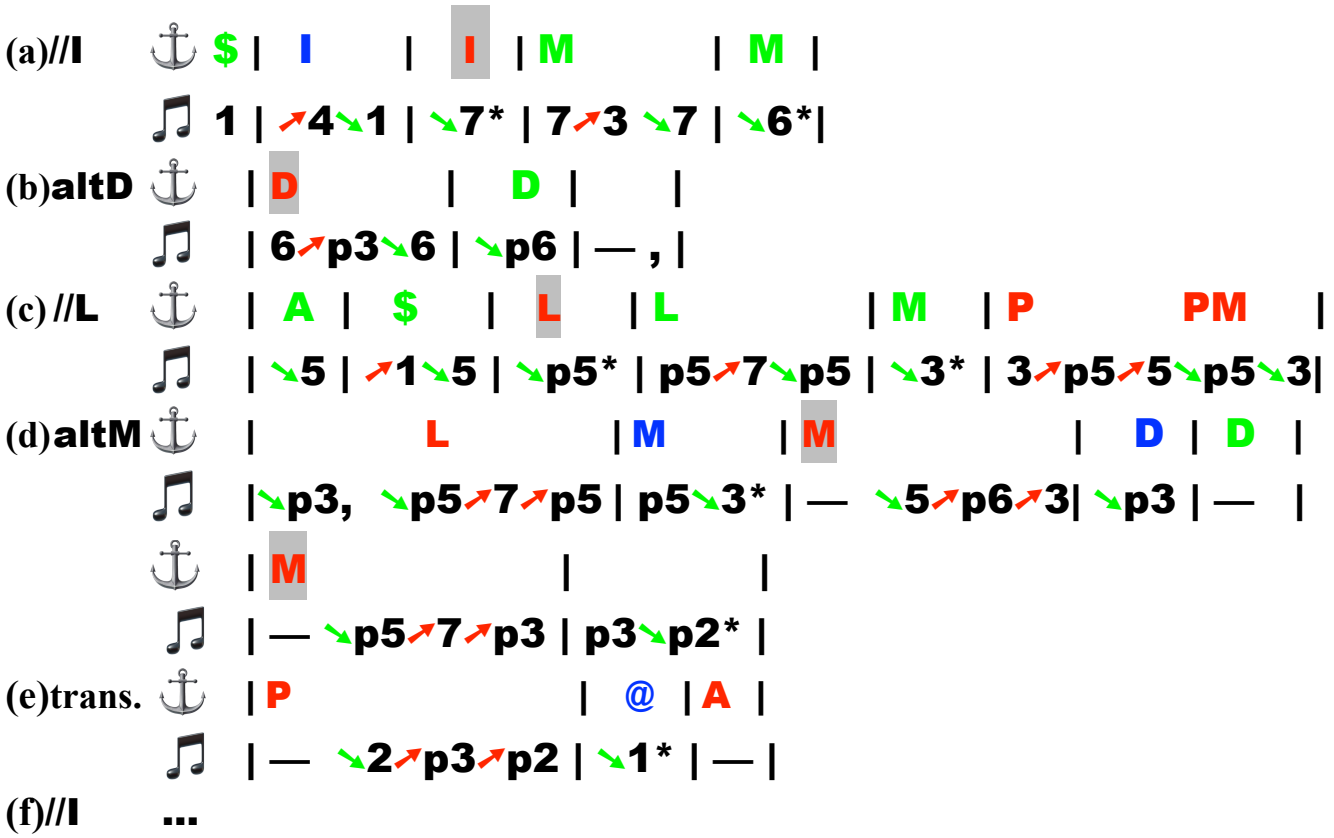
| | | | |
|---|---|---|---|
| 7↗1↗2 \| | | | |
| \| ↘1↘7↘6↘3 | \| ↗5↘p5↘4↘1 | \| ↗3 , — | \| — 3↗7↘p7 \| |
| 1 5 1 3 | 4 1 4 7 | p7 4 p7 4 | 6 3 6 p3 |
| \| ↘6 , — | \| — 6↗3↘p3 | \| ↘2 , — | \| — ↘7↗1↗2 \| |
| 2 6 2 p3 | 2 6 2 p2 | 2 6 2 p6 | 5 2 5 p2 |
| repeat bars 1-4 … | | | |
| \| ↘6, 6↗3↘2 | \| ↘1 ↗2 — | \| ↘1, — | \| — \| |
| 2 6 2 p2 | 2 p6 5 7 | 1 3 4 p2 | 5 7 1 p6 |
| \| 3↗p6↗7↗2 | \|↘1, — | \| ↘p6↗7↗2↗4 | \| ↘3, — \| |
| 7 4 3 p6 | 6 p6 6 p7 | 7 4 3 p7 | 6 3 6 p7 |
| \| ↘3↗p6↗7↗2 | \|1↘7↘6↘3 | \|↘2 , — | \| — ↗7↗1↗2 \| |
| 7 4 3 p6 | 6 p6 6 p3 | 2 2 6 p7 | 5 7 2 7 |
| repeat bars 1-4 … | | | |
| \| ↘6*↗3↘2 | \|↘1—↗2— | \|↘1, — | \| — \| |
| return to chordal harmony | | | |

The following table reveals the beginning of simple pattern in terms of building blocks (the pattern is easy to continue). Building blocks are outlined (**x**) in an order that goes with the melody line, and passing notes inside or outside the building block (**o**) transition to the next building block. The only passing notes outside the scale are **p2** and **p3** at the ends of bars. Remembering the building blocks provides a reminder of how to play the pattern, or to vary it.

| 1 | p2 | 2 | p3 | 3 | 4 | p5 | 5 | p6 | 6 | p7 | 7 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| @ | P | A | D | M | I | L | $ | x | x | x | x | @ |
| @ | . | x | . | x | x | . | @ | x | x | x | x | @ |
| x | . | . | . | o | . | . | x | . | . | . | . | . |
| . | . | . | . | . | x | . | . | . | . | . | o | x |
| . | . | . | . | . | x | . | . | . | . | x | . | . |
| . | . | . | o | x | . | . | . | . | x | . | . | . |
| . | . | x | o | . | . | . | . | . | x | . | . | . |
| . | o | x | . | . | . | . | . | . | x | . | . | . |
| . | . | x | . | . | . | . | . | o | x | . | . | . |
| . | o | x | . | . | . | . | x | . | . | . | . | . |

**CHROMATIC CLASSICAL DOMAIN : "ALL THE THINGS YOU ARE"**
**Home Tonic - Ab (4 flats key signature: Ionian of Ab)**

I learned this strikingly beautiful piece early in my musical adventure, and found it easy to learn because the keyboard sequences are simple, but difficult to understand in music notation. The source is *The Ultimate Jazz Fakebook*, Wong, Hal Leonard (1988). The skeleton melody line and associated core harmony for bars 1-26, where all the changes occur, are shown below. In this interpretation, the determining tritones of the melody modes are **I-D-L-M** highlighted in grey in the harmony. The modes — summarized on the next page — are interpreted for melody phrases (a)-(b)-(c)-(d) as Ionian modes of tonics **1-3-5-7**. Tonics **1** and **5** are obvious from the melody lines but this is less so for tonics **3** and **7**. Tonic **3** is not even in the melody line in (b) and tonic **7** is only a passing note in (d). These tonics are provided by the determining tritones in the harmony. The low visibility of the secondary tonics is a result of resolutions to them being replaced by transitions to the next mode via shared notes. Passage (e) provides an "interesting" transition back to Ionian of the home tonic. There is no definite melody mode.




Here follows a summary of the modes of this interpretation ("notes" in the left column means actual melody notes). The sometimes-sparse melody lines are open to different interpretations but this interpretation is solid because it provide all the melody notes. The half-tone tonic change in (e) is not in any particular mode. The melody is sparse. The harmony suggests modes **//P** and **//A** but the melody moves between them. My piano teacher at the time said he had always thought something was odd

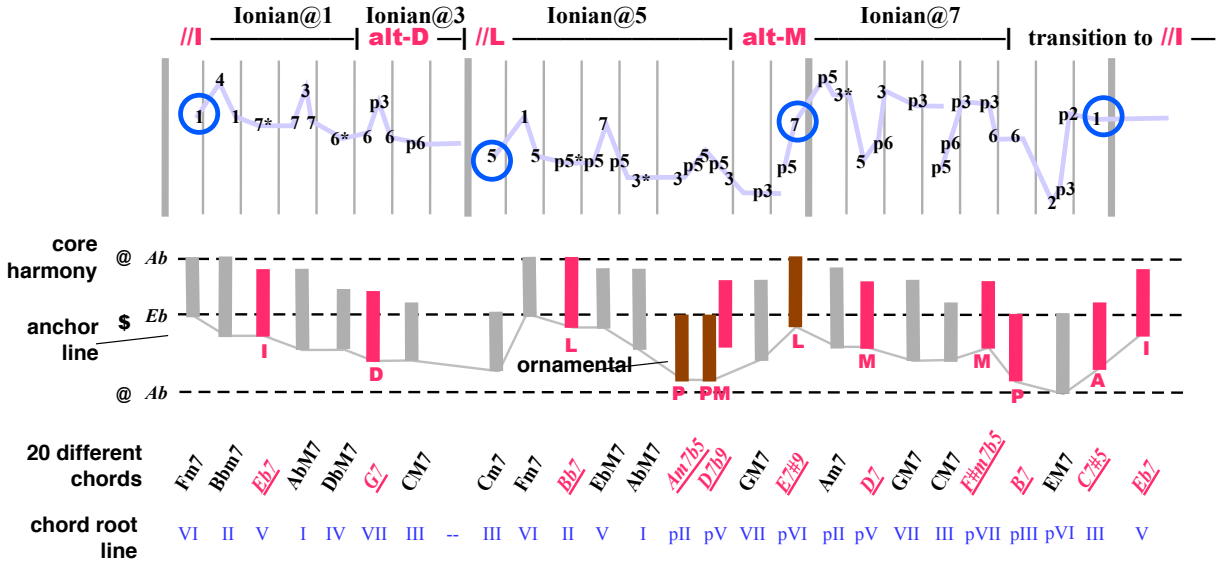
about this transition, and suggested I just memorize it. And so I did, but I kept worrying away at understanding it in more fundamental terms (described following the table).

| | | Ab | | Bb | | C | | D | Eb | | F | | G | Ab | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | p2 | 2 | p3 | 3 | 4 | p5 | 5 | p6 | 6 | p7 | 7 | 1 | |
| | | @ | P | A | D | M | I | L | $ | x | x | x | x | @ | |
| (a) | notes | x | . | . | . | x | x | . | . | . | x | . | x | x | |
| | //I | x | . | x | . | x | x | . | x | . | x | . | x | x | **Ionian@1 (Ab)** |
| (b) | notes | . | . | . | x | . | . | . | . | x | x | . | . | . | |
| | altD | . | x | . | x | x | . | x | . | x | x | . | x | . | **Ionian@3 (C)** |
| (c) | notes | x | . | . | . | x | . | x | x | . | . | . | x | x | |
| | //L | x | . | x | . | x | . | x | x | . | x | . | x | x | **Ionian@5 (Eb)** |
| (d) | notes | . | x | . | x | x | . | x | . | x | . | x | x | . | |
| | altM | . | x | . | x | x | . | x | . | x | . | x | x | . | **Ionian@7 (G)** |
| (e) | notes | x | x | x | x | . | . | . | . | . | . | . | . | x | **sparse, ambiguous** |
| | //P | x | x | . | x | . | x | . | x | x | . | x | . | x | **– *harmony modes*** |
| | //A | x | . | x | x | . | x | . | x | x | . | x | . | x | |
| (f) | //I | x | . | x | . | x | x | . | x | . | x | . | x | x | **Ionian@1 (Ab)** |

Here's the (d)-(e)-(f) harmony transition (missing chord roots are identified by dashes).

| | | Ab | | Bb | | C | | D | Eb | | F | Gb | | Ab | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | p2 | 2 | p3 | 3 | 4 | p5 | 5 | p6 | 6 | p7 | 7 | 1 | |
| | | @ | P | A | D | M | I | L | $ | x | x | x | x | @ | |
| (d) | M | . | x | . | . | x | . | . | . | . | . | x | . | . | ***pVIIm7b5*** |
| (e) | P | . | x | . | – | . | . | . | x | . | . | . | . | x | ***pIII7*** |
| | @ | x | . | . | . | . | . | . | x | – | . | . | . | x | ***pVIM7*** |
| | A | . | . | x | . | – | . | . | . | x | . | . | . | x | ***III7#5*** |
| (f) | I | . | . | . | . | x | . | – | . | . | . | x | . | | ***V7*** |

The following overview picture is helpful in getting a handle on the piece as a whole.

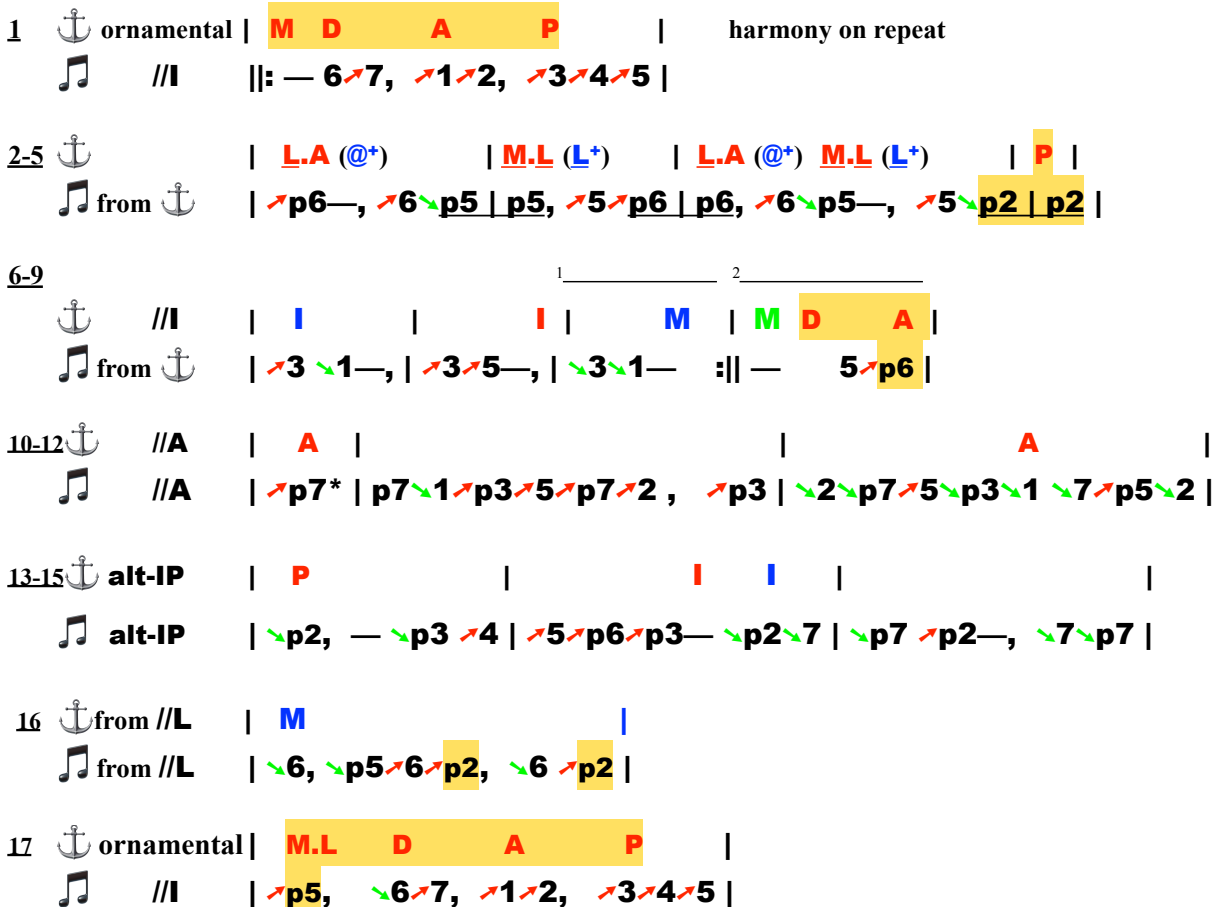


**NON-CLASSICAL DOMAIN : "CHELSEA BRIDGE"**

**Home Tonic - C#/Db (4 sharps for Aeolian of C#, 5 flats for Ionian of Db)**

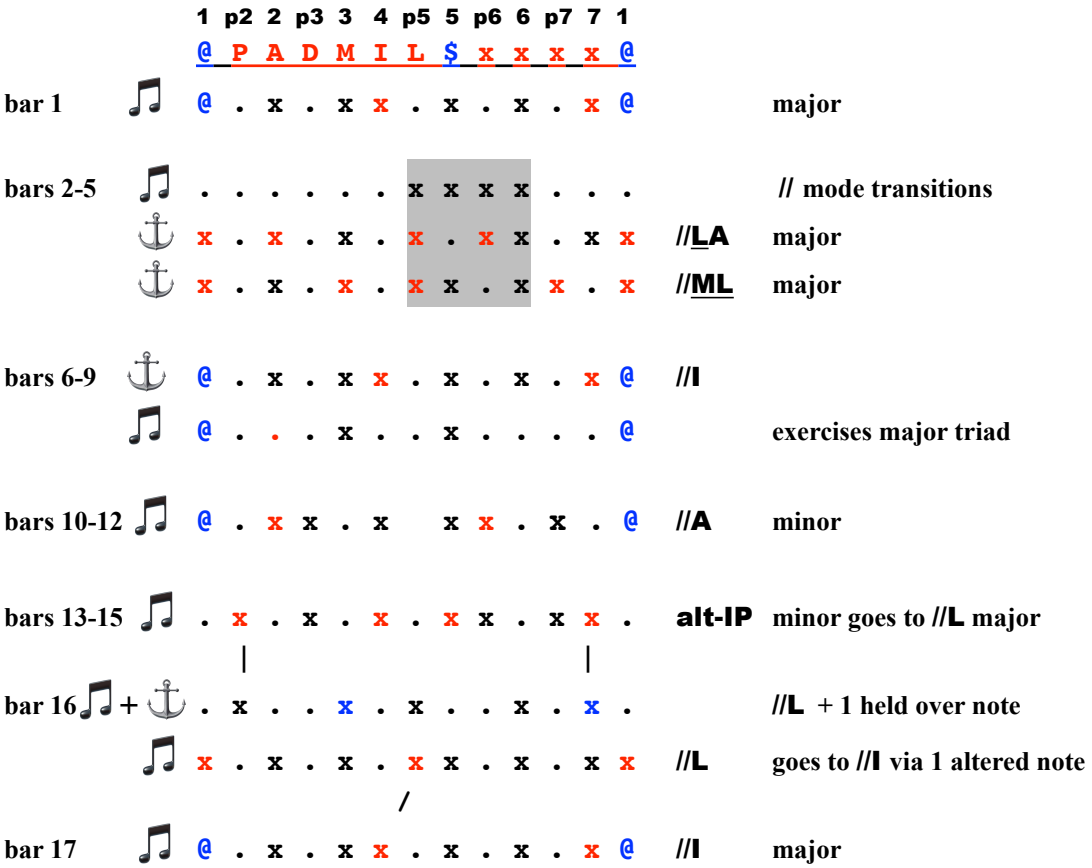
The source for this hauntingly beautiful Strayhorn piece is *The Ultimate Jazz Fakebook*, Wong, Hal Leonard (1988). There are two key signatures but only one home tonic, the black key identified by both Db and C#. The notational complexity that follows from this has been discussed elsewhere in these pages. This piece multiplies the complexity by returning to the 5-flats Ionian mode at the end via naturals relative to the 4-sharps key signature. Between these parallel classical modes are chromatic passages that multiply the notational complexity once more. The result is a confusing muddle of many more than twelve note symbols relative to the two written key signatures. The piece is musically sophisticated by any measure, but this notational complexity is way out of proportion to the sophistication.

I first learned this piece by rote with great difficulty from the written music, but thought that anything that sounds this good must have simple musical logic behind it. It does, as shown below: the basic structure is major-minor-major where the major and minor sections open with **//I** and **//A** and then branch out into non-classical modes of the same tonality. The concluding major section is **//I**. Yellow highlighting identifies ornamental elements relative to identified scales. Parallel modes of the melodic minor determine melody and harmony scales in bars 2-5. All the scales are shown on the next page.

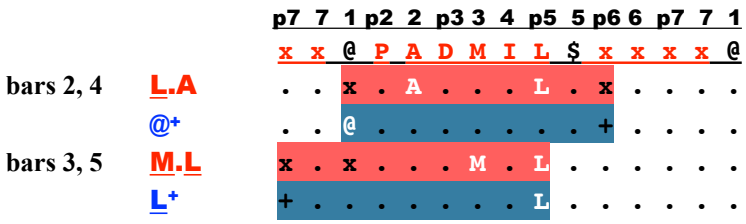



Here are the melody scales. In bars 2-5, the melody line sequences transition back and forth

between the **LA** and **ML** modes. A slide of an augmented fifth up and down by a whole tone captures the transitions (illustrated following this). In bars 6-9, the sparse melody line exercises the major triad of the **//I** mode identified by the harmony. One note is held over from bar 15 to 16. Bar 16 is both sparse and ambiguous but thinking of it as basically providing a transition back to **//I** via **//L** is useful.




In bars 2-5, the melody is sparse but melody plus harmony identify parallel modes of the melodic minor. The mode tritones may be implied by playing their outer notes as augmented fifths moving down and up by whole tones, as shown next. Playing these augmented fifths with the sparse melody line is very easy, and sounds good.

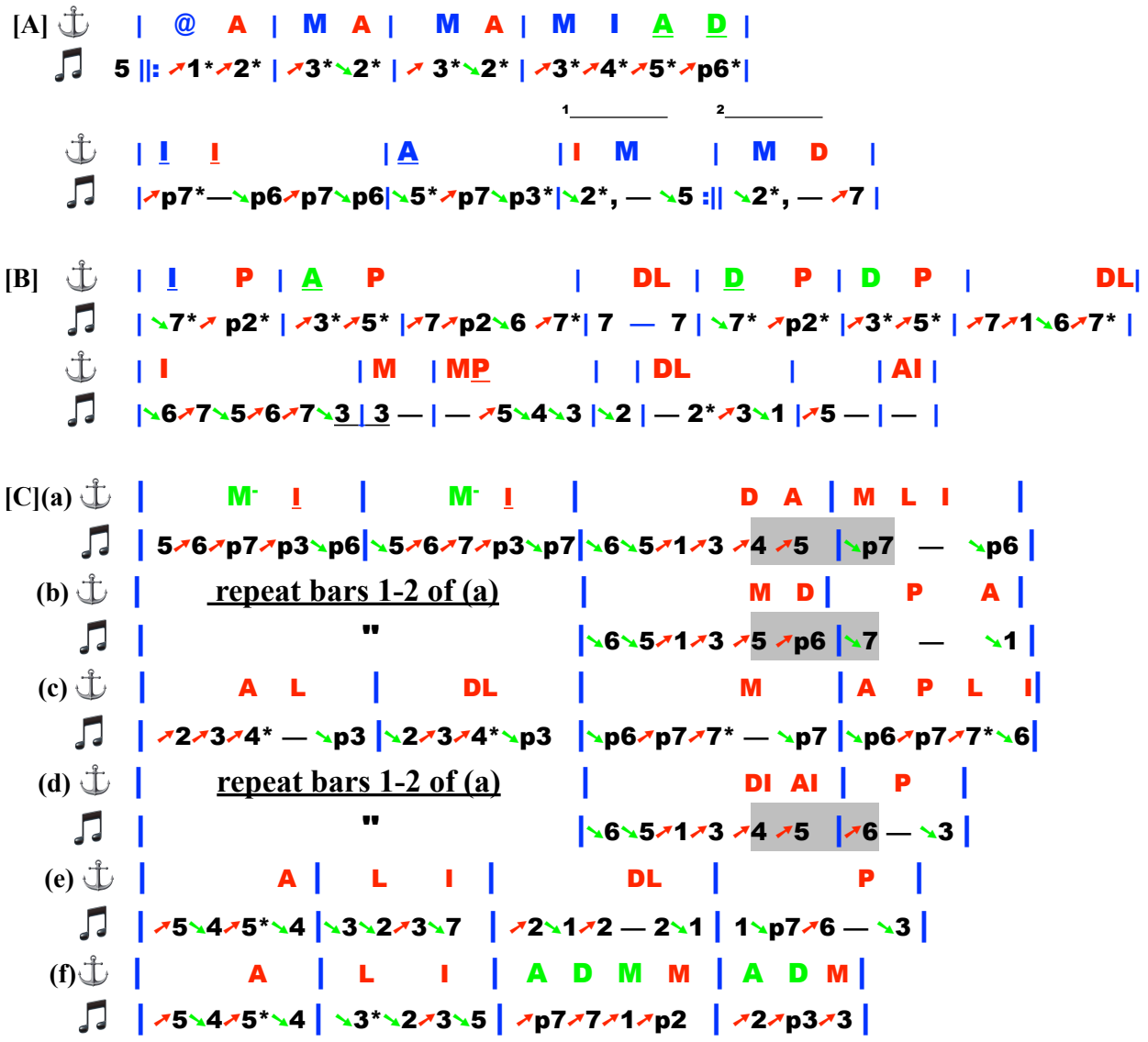



The melody and harmony have an elegant simplicity in these terms that's easy to understand, remember and play.

**NON-CLASSICAL DOMAIN : "LUSH LIFE"**

**Home Tonic - Db (5 flats key signature: Ionian of Db)**

This beautiful Strayhorn piece is melodically and harmonically rich, and challenging to play from the written music because there are often two or more chords per bar, many of them chromatic relative to the written key signature of five flats (major tonic Db). The piece is so chromatic that there is more than one way of understanding it. It can be seen as daisy-chained, short segments of successive parallel classical modes, but this quickly bogs down in complexity. The view of it here is in terms of two non-classical parallel modes of the home tonic for both melody and harmony: one is the 10-note **//ADMI** minor-major mode in the verse [A] and chorus [C]; the other is the **alt-IP** mode (Ionian sharp one) in the bridge [B].



These modes lead naturally to short, easy-to-remember segments in classical and other modes that follow from the flow. For example, **alt-IP** morphs into **//I** halfway through [B] by altering one note. From time to time, the harmony of the different sections substitutes **P** and **L** for **A** and **I**, but thinking of these as ornamental relative to the **//ADMI** keeps things conceptually simple. The grey shading in [C] highlights differences.

There are no voicing extensions because the intent is to play octave shapes for single tritones and for fifos, which adds depth without adding new notes (the piece is so melodically and harmonically rich that the voicings don't have to add variety). Harmony fifos are mostly omitted for simplicity, except for characteristic sequences of them in [A] and the ending bars of [C].

The double tritones **PM**, **AI** and **DL** that appear in many places in the harmony are diminished seventh chords, commonly used ornamentally in any context in which they sound good. The double tritones have circular symmetry (all intervals are minor thirds), so only three of them with different notes exist. They can be played as four notes but they can also be voiced with three notes (a tritone with a minor third on top, or the opposite) or even with two notes (outer notes a major sixth apart), when the context implies the other note(s). A sequence of two or three of them, often used as an ornamental transition between modes, can be played as as sequence of major sixths anchored by any three of six tritone anchors (e.g., **P-A-D** going up and **L-I-M** going down, to name just two possibilities — others require inversions of individual tritones).

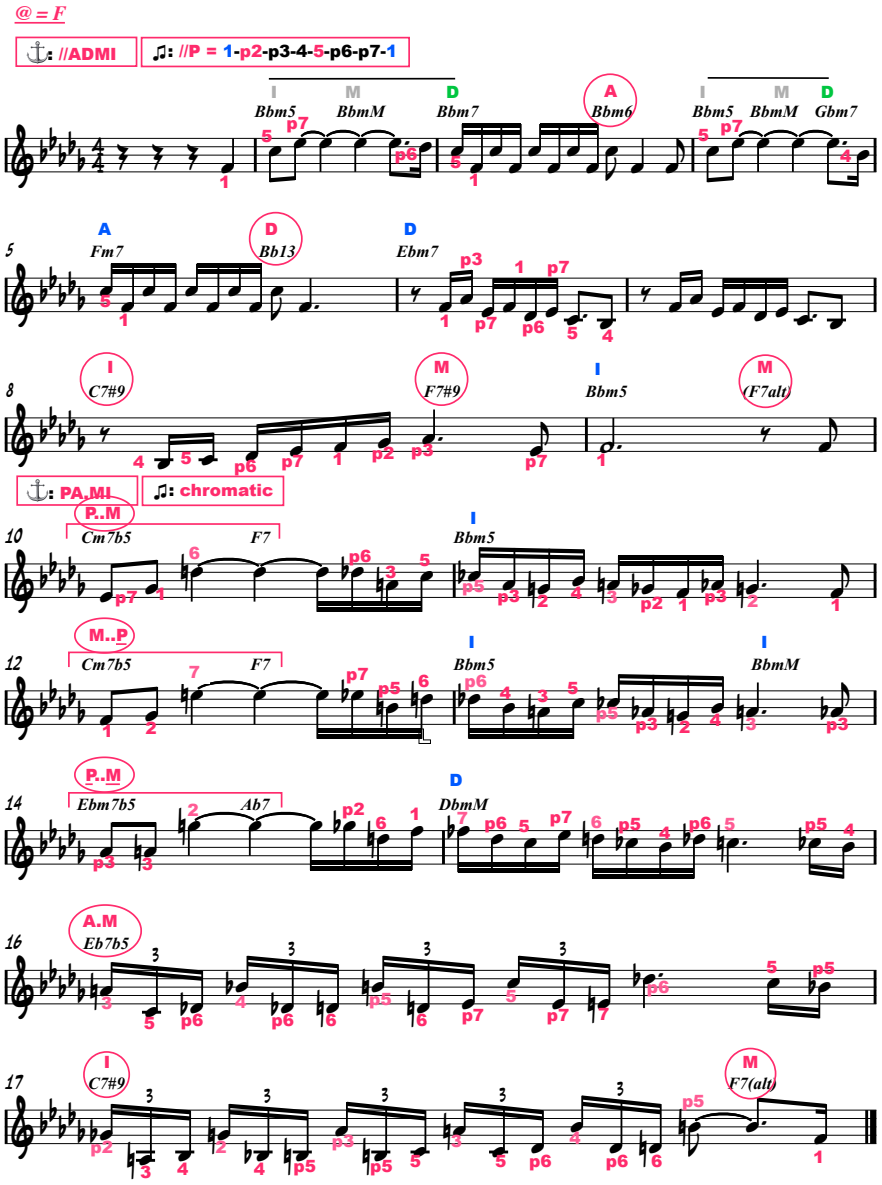
The chromatic melody-line run in the final two bars is a signature of the piece.

**MIXED DOMAIN : "THE PEACOCKS"**

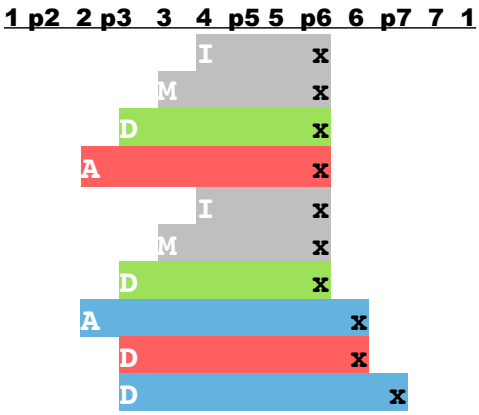
**Home Tonic - F (5 flats key signature: Phrygian of F)**

This wraps up the chapter with an example in annotated music notation (in handwritten annotations, circling tritone anchors, or their chords of origin, or both is helpful). This strongly chromatic piece is one of the most haunting jazz pieces I have heard or learned to play. It sounds so "right" as written that jazz improvisations rarely stray far from it.

The home tonic is determined to be F by the final notes of bars 9 and 17. In bars 1-9, the combination of the 5 flats key signature, the home tonic and the lack of accidentals in the melody line identifies the melody scale as Phrygian of the home tonic (mode signature **//P**). The melody line in bar 8 runs up through all the notes of this scale starting a fourth up (fifth down) from the tonic. The contrasting harmony is chromatic. The over-lines in bars 2 and 4 indicate held treble notes.



Harmony in bars 2-9 contrasts strongly with the melody. The core harmony in these bars, the first part of which is shown next, is visibly from the atonal **ADMI** scale (which is minor-major relative to the home tonic).




The melody of the second section consists mainly of individually simple sequences from the full chromatic scale that are prompted by the harmony.

| | | | |
|---|---|---|---|
| **bar 11:** | **p5↘p3↘2↗4** | **↘3h↘h↗3h** | **net ↘h** |
| | **3↘p2↘1↗p3** | | |
| **bar 13:** | **p6↘4↘3↗5** | | |
| | **p5↘p3↘2↗4** | | |
| **bar 15:** | **7↘p6↘5↗p7** | | |
| | **6↘p5↘4↗p6** | | |
| **bar 16:** | **3↘5↗p6** | **↘9h↗h** | **net ↘8h (aug. fifth)** |
| | **4↘p6↗6** | | |
| | **p5↘6↗p7** | | |
| | **5↘p7↗7** | | |
| **bar 17:** | **p2↘3↗4** | | |
| | **2↘4↗p5** | | |
| | **p3↘p5↗5** | | |
| | **3↘5↗p6** | | |
| | **4↘p6↗6** | | |

# CHAPTER 6: OBSERVATIONS & CONCLUSIONS

Music notation is here to stay and must be lived with, but this this doesn't preclude alternate views of piano music from a different perspective. I looked for an alternate view of harmony and found one based on intervals.

The central role of tritones in PKP tends to seem inappropriate to people savvy in music notation, for several reasons. In general, it goes against received musical wisdom. More specifically, tritones cannot even be written down in music notation until a key signature is established, so imagining them as identifiers of scales is difficult. Anything involving multiple tritones is complex in music notation because it implicitly brings in other key signatures — the more tritones, the more complexity. The very concept of fifos is unconventional and even more so is the concept that they can be treated as morphed tritones, understood from context. The payoff is insight into deep structure that is difficult to see in music notation. Appreciating these things requires stepping outside the box of music notation, at least momentarily.

Thinking in notes and thinking in intervals *is* different in kind. Many experts who have learned the hard way to think in notes apparently find thinking in intervals too alien to contemplate. Comments from them have run the gamut from "obviously wrong" to "wrong headed" to "naively simplistic" to "overwhelmingly complex." One expert said I had "found a tritone hammer and saw everything as a nail" as if the very existence of tritones as measuring sticks was unthinkable. The book *Modalogy*, devotes 50 or so complex pages to parallel modes without ever mentioning the possibility that tritones might simplify things by providing defining notes.

Because I started out seeing intervals and notes as dual views of the same thing, I came to find it natural to switch back and forth. I have made my best effort in this document to convey the simplicity of this. I believe, based on my personal experience as an adult beginner, that any beginner could easily learn to think this way.

I know from personal experience that PKP helps with learning and remembering new pieces, knowing while playing where to go next from where you are (and how you got there), recovering from getting lost, experimenting with harmonic and melodic variations, and improvising. It turns the conventional relationship between practicing and understanding on its head: instead of practicing being required to develop understanding, understanding guides practicing.

The jumpy chord root lines in many of the examples demonstrate that referring chords to constantly moving roots creates misleading complexity. This complexity is both conceptual (the underlying, smoothly flowing core harmony is obscured) and actual (playing the jumpy harmony is technically difficult because all the fingers must be lifted and moved by large intervals). It's easier to learn the core harmony and introduce the jumps later, if desired, via inversions, which are always easy on the keyboard, given an anchor line.

## GENERAL BENEFITS

**PKP annotations above the staff tell you many things.** Combined with context provided by the melody line, they tell you where to go next from where you are and how you got there. They tell you what notes will sound right or not right at any point by identifying tonic scales in play in a very immediate way. They tell you about transitions between major and minor tonality and between different tonics. The provide a basis for enrichment and improvisation.

**Scale, modes and chords are seen as part of a continuum expressed in the same terms.** This seems to me to be a very powerful benefit, compared to seeing everything beyond classical modes as

special cases identified by accidentals (which includes chromatic chords with suffixes that imply accidentals). The representations of scales and chords in terms of tritone clusters are unfamiliar to expert pianists but the interval stacks that they imply on the keyboard are completely familiar.

With PKP, playing music is guided by note-based symbology on the music page (one dual view) plus PKP annotations above the staff (the other dual view) that suggest core harmony and make changing tonic scales and tonics directly visible to the eye in terms of changing dictionary words.

**A scale dictionary of less than a page covers much ground.** The PKP dictionary provides a novel, high-level, conceptual view of tonic scales that's easier to hold in the mind's eye than the very much larger number of spelled out tonic scales in music notation. The dictionary covers 12x39=468 scales of 12 different tonics in music notation (more than is covered by scale dictionaries such as *The Source*). Words of 1-4 letters from the 6-letter alphabet identify, by tritone content, 39 tonic scales/ modes with 7 or more notes, 1-4 tritones, and no intervals larger than a minor third. The count of 39 scales/modes includes 11 single scales covered by single words and 4x7=28 parallel modes covered by transpositions of 1-2 letter master words (only the master mode is identified in the dictionary). A selected home tonic anchors all of this to the keyboard.

The words are analogous to the words of biological DNA in the sense that they identify deep structure without spelling out the details. Words of biological DNA are "expressed" as proteins, the building blocks of life. **PADMIL** words are "expressed" as building blocks of scales and harmony. Biological DNA is "extracted" from biological samples and interpreted by sophisticated machines called "sequencers." **PADMIL** scales and building blocks are "extracted" and "sequenced" from musical lines by sophisticated machines called human eyes. Biological DNA is "inherited" from parents. **PADMIL** words are "inherited" from general knowledge about them encoded in the dictionary.

**Symmetry breaking in the scale dictionary and symmetry breaking in core harmony are two sides of the same coin.** In the dictionary, it yields scales with fewer tritones. In harmony, it releases the tension of dissonance to produce consonance. Seeing the simplicity of this requires forming mental images of it relative to the schematic tonic octave that are independent of specific assignments of the octave to the keyboard.

**Understanding harmony is possible independently of practicing.** Keyboard symmetries centering around tritones enable high-level representations of harmony that are simple in their own terms and deep in harmonic meaning in any terms.

**Music is freed from its key-signature straightjacket.** Harmony scales are understood at a glance from dictionary words aggregated by eye, instead of having to be figured out or remembered from key signatures, accidentals and chromatic chord symbols. Tonic changes are no more difficult than any other changes.

**Anchor lines that define harmonic cores replace chord root lines as the fundamental musical lines of harmony.** Chord roots are visibly secondary elements in the flow of the music because inversions move them into the body of the chord, where they become no more than another chord note that may be omitted if implied by context.

**Sight reading anchor lines provides deep context.** Anchor lines tell you where to go next from where you are and how you got there. They tell you what notes will sound right or not by identifying tonic scales in play. They tell you about transitions between major and minor tonality and between different tonics.

**Multiple explicit or implicit key signatures become a non-issue.** This is true whether the key

signatures imply tonic changes or only scale changes for the same tonic. Tonic changes amount to no more than moving (conceptually) a tonic pointer within the home octave and reinterpreting the alphabet letters relative to it, without changing any notation.

**Chord symbols become a non-issue.** Chord complexities that result from banging square pegs (chord symbols) into round holes (places in scales where they don't quite fit) are misleading. Chords described by chord symbols are, on the keyboard, almost universally composed of combinations of PKP's two kinds of building blocks, of which only tritones are always core. A melody line plus an anchor line above the staff imply a voicing of an unidentified chord progression. Specific chords are identified by assigning roots.

**Relating the notation to the keyboard is simple.** Different home octaves look very different on the keyboard because of different mixes of black and white piano keys, but the difference is manageable for two reasons: mapping the notation to the keyboard boils down to assigning a 6-letter alphabet to 6 adjacent piano keys; and the C octave provides a mental reminder of the meaning.

**Learning blues prepares you for anything music notation can throw at you.** Blues is an example of "folk music" that evolved independently of music notation and therefore tends to be regarded as naive when measured against its depth and complexity. This condescending view is unwarranted. Blues is harmonically sophisticated in a highly organized way that makes it, to my mind, a better starting point than classical modes of key signatures for understanding many forms of music.

**Sharps and flats are not needed.** Building blocks are the same number of half tones no matter how they are notated. This enables PKP to dispense with sharps and flats without any loss of musical accuracy. Expert pianists tend to think they are still needed to identify context because they have learned to use them for that, but note positions relative to tonics are sufficient.

**The simple flow of harmony in harmonic cores, in which building blocks slide or morph into other building blocks, is universal.** Nothing constrains harmony to be played this way but the flow is so natural and easy to play that much is to be gained by learning pieces this way and then transitioning to other playing styles if desired.

**Tritone-intensive harmonic cores of much music provide so much harmonic variety that voicing them requires only adding depth.** Depth is easily added by doubling the treble line of the harmonic core an octave down, or the bass line an octave up, and then making adjustments to move points on the line closer to the core, if desired.

**No more piano wizardry is required to have fun playing music than the ability to sight-read melody lines in music notation.** Anyone with eyes to see intervals on the keyboard can play harmonic cores from anchor lines annotated above the staff, and remember them.

**The simple way harmony is represented provides great freedom in choosing how to play it.** Playing styles may range between the extremes of smoothly flowing harmony within the octave of the home tonic of piece to jumpy harmony in which all harmony notes go up from a chord root line. Improvisation follows naturally and is fun, even if not expertly done.

**The simplification provided by the alphabet is different in kind from simplifying chord symbols.** Any sophistication in the harmony is in the tonic scales of origin of the chords.

**Mode signatures** provide an above-the-staff markup notation for the concept of "modal jazz" which is otherwise a concept without a notation.

**PKP annotations above the staff are not always necessary.** With experience, straightforward chord progressions may be sight-read in PKP terms.

## SOME REFERENCES


1. Barta, *The Source: The Dictionary of Contemporary and Traditional Scales*, Hal Leonard (1995), for helping me to be sure I was not missing important scales.
2. Mehegan, *Jazz Improvisation 1: Tonal and Rhythmic Principles*, Watson-Guptil (1984), for Roman-numeral chord notation, and for teaching me (unintentionally) that it is not a solution for complex chromatic chord progressions, but a problem if pushed beyond its basic function of specifying chord root lines.
3. Eskelin, *Lies My Music Teacher Told Me*, Stage Three Publishing (1994) for insight into the nature of scales and musical "perfection," and for encouraging me to think outside the box.
4. Dmitri Tymoczko, *A Geometry of Music* (2011) for stimulating discussions of how to think about music from different angles.
5. Mark Levine, *The Jazz Theory Book*, Sher Music Co. (1995) for providing examples of well known jazz scales and harmonic forms in conventional notation, against which to verify PKP coverage.
6. George Russell, *The Lydian Chromatic Concept of Tonal Organization*, http://www.georgerussell.com/lc.html, for making me aware that PKP covers the concept, because nothing is changed by replacing the Ionian mode by the Lydian mode as the default reference major mode for any piece of music.
7. Edward Frenkel, *Love and Math: The Heart of Hidden Reality*, Perseus (2013) (on Kindle), for many insights into the usefulness of symmetry.
8. Jeff Brent with Schell Barkley, *Modalogy — Scales, Modes & Chords: the Primordial Building Blocks of Music,* Hal Leonard (2011), for the most comprehensive treatment I have found of this subject. The result is painstakingly accurate but overwhelmingly complex because it sticks to representations based on sharps and flats that follow from the misalignment of pitches of notes of overlapping octaves.
9. Ross W. Duffin, *How Equal Temperament Tuning Ruined Harmony (and Why You Should Care)*, W.W. Norton (2007), for an understanding of the piano's deviation from musical perfection.
10. Stephon Alexandar, *The Jazz of Physics: The Secret Link Between Music and The Structure of the Universe*, Basic Books (2016). This amazing book resonates strongly with my own ideas. The author is a jazz musician and physicist who speaks of doing physics as informing the playing of jazz and playing jazz as informing the doing of physics. Both require rising above formalisms to form conceptual representations, with symmetries highlighted as particularly important.

# ACKNOWLEDGMENTS

I did not take this musical journey alone. I received comments and help from many people over the decade or so the ideas were germinating and consolidating.

Music theorist Paul Steinbeck encouraged me to continue writing at a time when I was becoming discouraged about finding a way of bringing my ideas before the music community. Jazz pianist, teacher and composer Taylor Eigsti has been an inspiration to me. Although I have never been a piano student of his, I have learned much from him in sporadic discussions in person and by email. I am deeply grateful for his willingness to take time away from a busy schedule to engage in these discussions. A short series of piano lessons from SF jazz pianist Michael Parsons helped me to see more clearly the relationship between my ideas and standard jazz-piano practice.

Thanks to SMT (Society for Music Theory) members Charise Hastings, Peter Shultz and Neil Newton for insightful email comments and encouragement following announcements of my website on an SMT mailing list. Thanks to music professor Robert Rawlins for email encouragement, and for helpful examples and comments. Aaron Blumenfeld and Susan Muscarella gave helpful courses at the Jazz School in Berkeley (now the Jazz Institute) that provided many examples to chew on (including, from Susan Muscarella's course, some interesting variations on *Summertime* in D minor that helped me understand ornamental scales). Amateur pianist and Jazz School Board Chair Susan Brand, and concert pianist and music entrepeneur Robert Taub, provided early encouragement.

My piano teacher in San Francisco for several years, Ken Fishler, provided inspiration and how-to information on chord voicings, while patiently tolerating and responding to my question-everything approach. My first piano teacher in Ottawa, Canada, Sally Robinson, started me off right as an adult beginner by helping me to learn favorite harmonically sophisticated pieces by following her fingers on the keyboard without understanding anything about what I was doing except that it sounded right — being able to play these pieces, even if clumsily and by rote, enabled understanding to seep in gradually. I think that without this particular way of starting out — fingers on the keyboard first, written music later — I would not have started thinking about keyboard harmony in the way I did. It forced to my attention the large gap between simplicity on the keyboard and complexity of the full notation that represents it.

I wore out the patience of many music professionals by bombarding them with unsolicited email requests for comments on my ideas. I would like to thank four in particular, who politely responded to numerous emails in spite of being uncomfortable with my ideas: Harry Likas, Dmitri Tymoczko, Jeff Brent and Daniel Glover. Their criticisms helped me change my explanations without changing my mind.

Thanks to friends Marva Black, Mike Budde, Peter Marchant and Selinda Spugies for helpful insights on aspects of this material that helped me to understand how to get the ideas across better.

My wife Sheila's accurate musical ear helps me know what does and does not sound good on the piano, in addition to making my life generally interesting. My grandsons Joshua and Ethan Feiber provided encouragement and comments; Joshua set up the website www.pianotheoryman.com as birthday gift; Ethan, who learned very young to play the piano impressively well by ear, has experimented with the notation and found it helpful for approaching written music.

## SOME COMMENTS FROM READERS

The following comments provide a kind of history of the development of PKP (the dates on the left identify when the commenters read different drafts of this material). The unconventionality of putting tritones on center stage has tended to get in the way of expert musicians accepting the ideas at all, let alone seeing them as simple, which has not been helped by the fact that it took me a long time to find the simple way of explaining the ideas that appears in this document. I continue to think the ideas are important for learning the piano in a less restrictive manner than is conventional but have not yet been able to find an audience. At the very least, the more recent comments show that the PKP method is more than just a fantasy of an over-enthusiastic amateur.

**(2016) Taylor Eigsti more recently than below.** "… a fascinating and in-depth look at various ways that keyboard shapes can lead to a whole new way to look at notation and the piano."

**(2011) Paul Steinbeck. Assistant Professor of Music Theory; Washington University, St. Louis**

"The hook ... , at least in my opinion, is that it's possible to attain a deep understanding of chords (and their constituent intervals) without recourse to Western notation. This has direct consequences for physical patterning, fingerings, etc. Essentially, your method combines the utility of a play-by-ear approach with the depth of a mathematically-informed theory of music."

**(2009) Robert Rawlins. University Music Department Chair (Rowan University); jazz musician; teacher; author of several books on jazz**

"I became aware of Raymond Buhr's novel method for analyzing and voicing chromatic chord progressions in 2008 through a draft of a paper he wrote on the subject. I have kept up to date on developments of the method and we have had many email exchanges discussing issues of interpretation and application. I am a member of his intended target audience—a jazz musician who is not a pianist who needs to work out harmonic patterns on the piano from time to time. I am also a music teacher who has actually tried out aspects of his method on students. I can vouch from personal experience for his method's helpfulness in dealing with complex chromatic chord progressions."

**(2009) Susan Brand. Board Chair, The Jazz School in Berkeley; amateur pianist**

"When Raymond Buhr consulted me about his theory of chromatic chord progressions, I was immediately struck by his ability to analyze and attempt to simplify this complex subject. Mr. Buhr brings a unique perspective and a great deal of enthusiasm, depth of understanding and originality of viewpoint to the subject. Over the years I have watched the continuous work that he has put into editing and rethinking his work. He has had ongoing consultations with many knowledgeable musicians/ teachers/editors and all have contributed to the development of the method described in this book. His ideas offer a way of understanding musical theory that will add greatly to the field and will be extremely helpful to musicians and music educators."

**(2008) Taylor Eigsti. Jazz pianist, composer, teacher, former Artist in Residence at The Jazz School in Berkeley**

"Through the brilliant lens of an engineer, Raymond Buhr has laid out an analysis of harmony that is a unique and complex look at the right-brain from the left-brain's perspective."

# APPENDIX A: UNCONVENTIONAL ELEMENTS

## TERMINOLOGY & NOTATION

- **anchor:** identifies a building block by the position of its bottom end relative to the home tonic
- **anchor set:** set of tritone and fifo anchors that define a scale by construction
- **anchor line:** anchor sequence written above the staff
- **alphabet: PADMIL** identifies anchors by the first letters of the names of classical modes
- **building block:** tritones or fifos (fifths or fourths) anchored at alphabet positions (size distinctions determined by color coding).
- **chromatic scale: 1-p2-2-p3-3-4-p5-5-p6-6-p7-7-1**
- **context:** provided by mode signatures for melody and harmony plus flow of both
- **core:** sequence of building blocks of harmony identified by an anchor line
- **family:** a set of sub-scales of a family scale defined by a single mode signature
- **fifo:** fifth or fourth that are opposite inversions (add up to an octave)
- **flow:** formed by morphs and slides of building blocks
- **frame:** defined by the tonic **@** and pitch center **$** of a tonic octave (plus sometimes by tonality)
- **mode signature:** word identifying a tritone cluster and implying an anchor set via the scale dictionary
- **pattern:** organized arrangement of intervals on the keyboard or over time
- **pitch center:** note identified by a fifth/fourth octave split, symbolized by **$**
- **morph:** small change in the size of a building block while holding one end fixed
- **outside:** not in a given tonic scale (as distinct from "chromatic" meaning not in a key-signature scale)
- **shape:** combination of building blocks
- **slide:** size-preserving movement of a building block
- **phlat:** prefix **p** identifying chromatic-scale notes in the whole tone gaps of the major scale of a tonic
- **tonic pointer:** suffix of form **@t** attached to an anchor symbol to indicate a secondary tonic
- **wobbly slide:** combined morph and slide
- **word:** set of alphabet letters with optional dots indicating skipped letters

## ABOUT THE ALPHABET

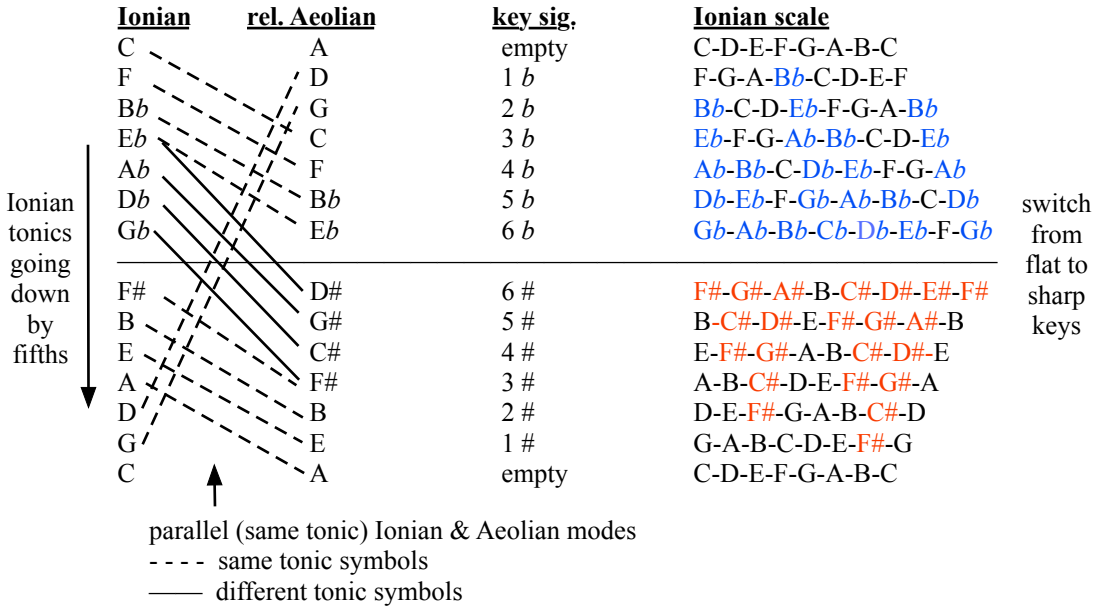
An effort must be made to avoid confusing letters of the **PADMIL** alphabet with other uses of the same letters in music theory and notation (**A**, **D** and **I** are particularly troublesome). In principle, any six letters would do for the alphabet, but the connection made to classical modes by this alphabet is too useful to discard. I thought of substituting the Greek letters epsilon (**ϵ**) and delta (**Δ**) for **A** and **D** and the English letter **Y** for **I**, to yield **PϵΔMYL**, pronounced almost the same and therefore easy to remember as having the same meaning (epsilon represents "Ae" of Aeolian). However, the mix of different alphabets introduces a different kind of confusion. I also thought of **PQRMYL** as an arbitrary way of getting rid of **A**, **D** and **I** . Or even **UVWXYZ**, which has the undesirable side effect of also getting rid of useful **P**, **M** and **L**. I have not been able to think of anything better than **PADMIL**.

# APPENDIX B: ABOUT SCALES

## KEY-SIGNATURE SCALES

The following summary of the standard interpretation of the major and natural minor tonic scales of key signatures (Ionian and Aeolian modes) is a helpful reference. It shows the sharped notes of sharp scales in red and the flatted notes of flat scales in blue. Although there are only five black piano keys, scales with six flats or sharps exist because of the scale-spelling rule that the same letter note cannot appear on both sides of a half-tone interval. For example, note B is C*b* in a 6-flats scale.

Major (Ionian) and relative minor (Aeolian) scales are shown on the same line because they have the same key signature. Parallel minor scales (diagonal lines) have the same tonic, which does not necessarily mean the same note symbol because the same piano key may be represented by different note symbols (e.g., the parallel D*b* major and C# sharp minor scales, which have the same black-key tonic on the piano, have different note symbols for it).




Avoiding multiple written key signatures by using accidentals to identify implicit key changes replaces one kind of complexity by another because accidentals have many more uses than this (e.g., ornamental passing notes, or identifying scales that originate in no key signature). Sorting out the possibilities requires considerable head-scratching at a very low conceptual level.

Key-signature-based music notation has stood the test of time and is here to stay because of the huge legacy of music written in it. But the piano has also stood the test of time without needing adjustable piano keys to play the nominally slightly different pitches identified for each piano key by music notation.

## CROSS REFERENCES

Cross-referencing music notation and PKP notation requires the following table. This is the simplest case. More generally, naturals may enter the note-symbol picture to cancel sharps or flats of key signatures, and white piano keys may be represented by sharps or flats (B=Cb, C=B#, F=E#, E=Fb) to satisfy the scale-spelling rule that the same letter note must not appear twice. Experts develop rules of

thumb about sharps and flats as indicators of what's going on, and see PKP as discarding these clues — not so, the clues are present in PKP in a different way.

| 1 | p2 | 2 | p3 | 3 | 4 | p5 | 5 | p6 | 6 | p7 | 7 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| @ | P | A | D | M | I | L | $ | x | x | x | x |
| C | C#/Db | D | D#/Eb | E | F | F#/Gb | G | G#/Ab | A | A#/Bb | B |
| C#/Db | D | D#/Eb | E | F | F#/Gb | G | G#/Ab | A | A#/Bb | B | C |
| D | D#/Eb | E | F | F#/Gb | G | G#/Ab | A | A#/Bb | B | C | C#/Db |
| D#/Eb | E | F | F#/Gb | G | G#/Ab | A | A#/Bb | B | C | C#/Db | D |
| E | F | F#/Gb | G | G#/Ab | A | A#/Bb | B | C | C#/Db | D | D#/Eb |
| F | F#/Gb | G | G#/Ab | A | A#/Bb | B | C | C#/Db | D | D#/Eb | E |
| F#/Gb | G | G#/Ab | A | A#/Bb | B | C | C#/Db | D | D#/Eb | E | F |
| G | G#/Ab | A | A#/Bb | B | C | C#/Db | D | D#/Eb | E | F | F#/Gb |
| G#/Ab | A | A#/Bb | B | C | C#/Db | D | D#/Eb | E | F | F#/Gb | G |
| A | A#/Bb | B | C | C#/Db | D | D#/Eb | E | F | F#/Gb | G | G#/Ab |
| A#/Bb | B | C | C#/Db | D | D#/Eb | E | F | F#/Gb | G | G#/Ab | A |
| B | C | C#/Db | D | D#/Eb | E | F | F#/Gb | G | G#/Ab | A | A#/Bb |

## SCALES AS INTERVAL STACKS

The representation of scales as interval stacks is an adaption of a notation called "Figured Bass Notation" (Wikipedia) for identifying harmony by annotating bass notes on a staff with number stacks that represent counts of scale steps going up from the bass notes. The adaption replaces counts of scale steps with counts of half tones, and lists the stacks horizontally instead of vertically. For representing scales, the numbers are restricted to **1** (half tone **h**), **2** (whole tone **2h**) and **3** (minor third **3h**). Any scale may be spelled out as a stack of these numbers that adds up to twelve. For example, the Ionian mode is identified by **|2212|221|** and the Aeolian mode by **|2122|122|**, where the vertical lines indicate the scale frame. The Ionian stack also identifies inter-note interval sequence of the singer's solfege scale **do-re-mi-fa-so-la-ti-do**. The interval stacks are the same for parallel or relative modes, which aids clear thinking about the nature of modes and the relationships between them. For example, the interval stack of the Aeolian mode is visibly a rotation of that of the Ionian mode.

# APPENDIX C: ABOUT CHORDS

Chords identified by chord symbols with four or more notes boil down to combinations of the two kinds of building blocks. Here follow some examples. Two fifos (fifths or fourths) form major-7, minor-7 or major-6 chords. One fifo and one tritone form dominant-7, half-diminished-7 (a.k.a. minor-7-♭5) or minor-6 chords. Three fifos or two fifos and a tritone form 9th, 1lth and 13th extensions of these chords. When tonic scales depart from key signatures, the same kinds of building blocks are available from the scales but now more than one tritone is available. For example, two tritones form diminished-7 or dominant-7-♭5 chords. Two tritones and one fifo (that may share a note with a tritone) form variations of other chord types such as dominant-7♭9. Omitting inner notes of combinations may yield different intervals, or thinned voicings of chords. For example, an augmented fifth (8 half tones) is combination of two tritones a whole tone apart with their inner notes omitted; and a 3-note voicing of a 4-note seventh chord is composed of the outer notes plus the most important inner note.

## ANCHOR LETTERS FROM TRITONE CHORDS

The following table of tritone chords summarizes the simplest examples of chords with tritones in different positions.

| offset of tritone bass note above root R | suffixes on root symbol R | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 7 | 7♯9(13) | 9♭13 (or ♯5) | 7♭9 | 7♭5 (or ♯4 or ♯11) | dim7 (or o7) | m7♭5 | m6 | M7(11) | ♭9 | M7♯11 (or ♭5) |
| fourth | | | | | | | | | x | | |
| major third | x | x | x | x | x | | | | | | |
| minor third | | x | | | | x | | x | | | |
| whole tone | | | x | | | | | | | | |
| half tone | | | | x | | | | | | x | |
| 0 | | | | | x | x | x | | | | x |

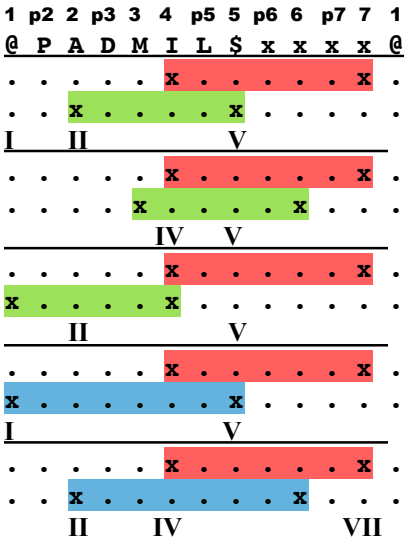
Only chord variations that alter tritone content are included. For example, R7, R9, R7#9, R13 and R9(13) are all variations of R7 with the same tritone content and so are all represented in the table by R7 (variations are left to context). Diminished seventh chords (Rdim7) have no counterpart in classical modes. Sus chords are not shown because they have no tritones. They are typically V-7♯3 chords. A Vsus-V-I progression is a substitute for a II-V-I progression in which one note is altered between the first two steps.

Inverting the tritone of a chord into the home octave (if it isn't already there) determines its PKP anchor. For example, The tritone of a V-7 chord is partially outside the home octave but its inversion is within it. The bass note of its inversion is a fourth above the home tonic which makes its anchor **I**.

Double tritones are the normal upper limit for tritone content of chords encountered above the staff in fake books, lead sheets and sheet music.

## MISLEADINGLY COMPLEX CHORD SYMBOLS

A startling variety of chords are voiced by simple shapes formed of a tritone combined with different fifos, as illustrated next for the Ionian mode (some are rootless, all are in the mode).




V*7*, IIm*7(13)*, I*M9(11)*

V*9(13)*, IV*M7b5*

V*7(11)*, II*m7(13)*

V*13(11)*, I*M7b5*

VII*m7b5*, IV*M6b5*, II*m6*

Non-classical modes provide many new chords. Here follow some examples.

| | 1 | p2 | 2 | p3 | 3 | 4 | p5 | 5 | p6 | 6 | p7 | 7 | 1 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | @ | P | A | D | M | I | L | $ | x | x | x | x | @ | |
| **minor family** | @ | . | x | x | . | x | . | $ | x | x | x | x | @ | |
| **AD** | . | . | A | D | . | . | . | . | x | x | . | . | . | IV*7#9(13)*, VII*7#9(13)* |
| **D.I** | . | . | . | D | . | I | . | . | . | x | . | x | . | IV*7b5*, VII*7b5* |
| **A..I** | . | . | A | . | . | I | . | . | x | . | . | x | . | II*dim7*, IV*dim7*, pVI*dim7*, VII*dim7* rootless *7b9* rel. to roots a 1/2 tone down |
| **A•** | . | . | A | . | . | x | . | . | x | . | . | . | . | II*dim* |
| **3D+** | x | . | . | D | . | . | . | . | . | . | . | x | . | I*mM7*, pIII*M+* |
| **4$** | . | . | . | x | . | . | . | $ | . | . | . | . | @ | I*m* (minor triad @▾, spread out) |
| **major family** | @ | . | x | . | x | x | . | $ | x | x | x | x | @ | |
| **MI** | . | . | . | . | M | I | . | . | . | . | x | x | . | pII*7#9(13)*, V*7#9(13)* |
| **A.M** | . | . | A | . | M | . | . | . | x | . | x | . | . | III*7b5*, pVII*7b5* |
| **A..I** | . | . | A | . | . | I | . | . | x | . | . | x | . | as above |
| **3$** | . | . | . | . | x | . | . | $ | . | . | . | . | @ | I (major triad, spread out) |
| **blues family** | @ | . | x | x | x | x | x | $ | . | x | x | . | @ | |
| **DM** | . | . | . | D | M | . | . | . | . | x | x | . | . | I*7#9(13)*, pV*#9(13)* |
| **M.L** | . | . | . | . | M | . | L | . | . | . | x | . | x | pV*7b5*, I*7b5* |
| **D..L** | . | . | . | D | . | . | L | . | . | x | . | . | x | analogous to **A..I** |

The strongly dissonant chords formed of two tritones offset by half tone would tend to be voiced in context as a stacked tritone and fourth with no internal half tones. This shape has a rich sound with a dissonant edge. The weakly dissonant chords formed of two tritones offset by a whole tone can be

played with all notes in any inversion. The chords formed of two tritones offset by a minor third have a circular symmetry (same shape in all inversions) that produces a unique sound I have come think of as "sweet" because too much of it sets my teach on edge, like ingesting too much of a sugary sweet.

**FIGURED BASS NOTATION; EXTENDED CHORDS**

Figured bass notation provides a simple representation of chords from scales with 7 notes and no adjacent half tones. It represents chords by stacks of numbers going up from a bass note, in which each number is a count of the scale steps to the next note up. The stacks are annotated on a staff as literal stacks of numbers (vertical lists). I write them here as horizontal lists separated by plus signs. For classical modes, a major or minor third is always two scale steps and whole tone is always one scale step (e.g., a seventh chord is **2+2+2** and a sixth chord is **2+2+1**).

Figured bass notation can be helpful for understanding extended chords of classical modes that follow from splitting chord steps of size **2** into **1+1** sequences and then moving the added note up an octave. The **+4** on top of two of the extended chords on the right is a consequence of avoiding **1+1+1** sequences in the in-place forms. The corresponding chord symbols have degree-number suffixes 6, 9, 11 or 13 added to basic symbols to identify the extensions.

| chord type | (2) = split | in place | extended |
|---|---|---|---|
| seventh | 2+2+2 | 2+2+2 | – |
| ninth | (2)+2+2 | 1+1+2+2 | 2+2+2+2 |
| eleventh (seventh+11th) | 2+(2)+2 | 2+1+1+2 | 2+2+2+2+4 |
| thirteenth (ninth+13th) | (2)+2+(2) | 1+1+2+1+1 | 2+2+2+2+2+4 |

# APPENDIX D: ABOUT PARALLEL MODES

## MODES FROM *MODALOGY*

The non-classical parallel modes identified as "melodic" and "harmonic" presented in the book *Modalogy* are summarized next, except with notes in numeric-chromatic-scale notation, instead of in the RN (Roman Numeral) notation with sharps, flats and naturals used in the book. Corresponding PKP mode signatures are shown on the left.

The purpose is twofold. One is to verify the PKP view of the modes relative to *Modalogy*. The other is to highlight the complexity that results from using sharps, flats and naturals. For example, the tritone anchored by **D** that is a component of many of the minor modes is understood as **p3-6** in the symbolic chromatic scale, and that's it. Inversions in different places in harmony are left to context. In *Modalogy*, tritone anchor **p3** is ♭III or ♯II and tritone anchor **6** is VI or 𝄫VII, and that's only the anchors.

The alphabet soup of names and the intricate details of the scales makes them very difficult to distinguish functionally, or to remember as enumerated scales. Seeing the possibility that tritones might be fundamental scale-defining objects for these modes is effectively impossible in the terms used in *Modalogy*. This impossibility is demonstrated by a discussion of defining and non-defining notes of the many and various modes that never mentions tritones.

PKP's way of knowing the modes by 2-letter mode signatures from a 6-letter alphabet is simple and unambiguous, as explained in Chapter 4. It enables seeing the modes as emerging from family context instead of as independent entities that give no hint of where they might be used. It simplifies the harmonic modes by making the master mode harmonic minor-major, thus reducing 2x7=14 parallel modes to 8 parallel modes. An 8-note minor-major mode is easily reduced to a 7-note harmonic minor or major mode to fit context.

## Parallel Modes of the Melodic Minor |WhWW|WWh|

| | | |
|---|---|---|
| //LA | 1-2-3-p5-p6-6-7-1 | Lydian Augmented |
| alt-LA | 1-2-p3-4-p5-p6-p7-1 | Aeolian Diminished |
| //ML | 1-2-3-p5-5-6-p7-1 | Lydian Dominant |
| alt-ML | 1-p2-p3-3-p5-p6-p7-1 | Jazz Altered |
| //DI | 1-2-p3 -4-5-6-7-1 | Melodic, or Jazz, Minor |
| //AM | 1-2-3-4-5-p6-p7-1 | Jazz Mixolydian |
| //PD | 1-p2-p3-4-5-6-p7-1 | Jazz Phrygian |

## Parallel Modes of the Harmonic Minor |WhWW|hW+h|

| | | |
|---|---|---|
| //DL | 1-2-p3-p5-5-6-p7-1 | Romanian, Dorian ♯4, Mishebarakh |
| alt-DL | 1-p2-p3-3-p5-p6-6-1 | Leading Tone Minor Diminished, Super Locrian ♭7 |
| //LD | 1-p3-3-p5-5-6-7-1 | Lydian Blues Major, Lydian ♯2 |
| alt-LD | 1-p2-p3-4-p5-6-p7-1 | Jazz Phrygian Diminished |
| //AI | 1-2-p3-4-5-p6-7-1 | Harmonic Minor, Aeolian ♮7, Jazz Minor ♭6, Mohammedan |
| //IA | 1-2-3-4-p6-6-7-1 | Ionian Augmented |
| //PM | 1-p2-3-4-5-p6-p7-1 | Phrygian Dominant |

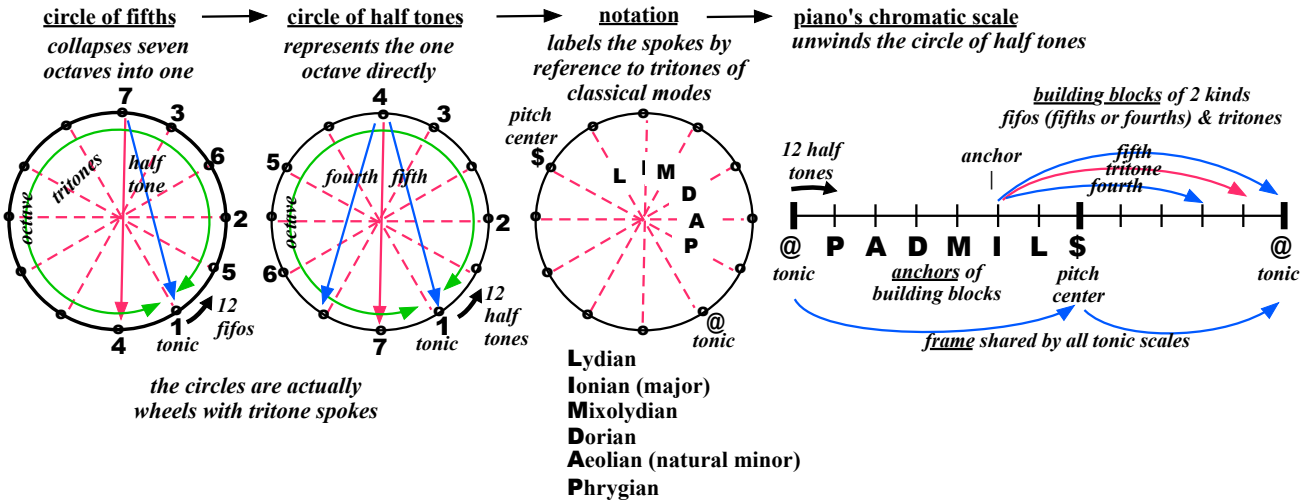
## Parallel Modes of the Harmonic Major |WWhW|hW+h|

| | | |
|---|---|---|
| //DL | 1-p3-3-p5-p6-6-7-1 | Lydian Blues Augmented, Lydian Augmented ♯2 |
| alt-DL | 1-2-p3-4-p5-6-p7-1 | Jazz Minor ♯4, Lydian Diminished |
| //LD | 1-2-p3-p5-5-6-7-1 | Lydian Melodic Minor, Lydian ♭3 |
| alt-LD | 1-p2-p3-4-p5-p6-6-1 | Leading Tone Major Diminished, Locrian ♭7, Locrian Diminished-7 |
| //AI | 1-2-3-4-5-p6-7-1 | Harmonic Major |
| //PM | 1-p2-3-4-5-6-p7-1 | Jazz Phrygian Dominant, Mixolydian ♭2 |
| alt-MP | 1-p2-p3-3-5-p6-p7-1 | Altered Phrygian Dominant, Phrygian ♭4, Superlocrian ♮5, Superphrygian |

# APPENDIX E: ABOUT SYMMETRY & SYMMETRY-BREAKING

The elements of PKP are summarized here in a way that provides a link between the concept of symmetry breaking in these pages and in the book *The Jazz of Physics*. This kind of thing is fascinating to anyone with a mathematical bent but possibly not to anyone else.

The circle of fifths shown below left presents the basic elements of tonic scales and chord progressions from them in one simple picture. The points going counterclockwise around the circle are 12 notes a fifth apart (7 half tones) across 7 keyboard octaves (12 fifths x 7 half tones = 7 octaves x 12 half tones). The circle is manifestly a wheel with tritone spokes. The notes of the major scale are the numbered points around the half circle delimited by the highlighted tritone spoke (6 half tones).




The circle visibly establishes two kinds of Lego™-like **building blocks** as fundamental elements of music, namely fifths or fourths referred to jointly as **fifos** for simplicity, and tritones. The circle as labeled identifies fifths going up the keyboard through 7 octaves or fourths going down the keyboard through 5 octaves. For the major scale, it identifies a basic chord root line going down by five fifths (3½ octaves) or five fourths (2½ octaves) to the tonic (equivalent to progressively zig-zagging down a fifth and up a fourth within one octave).

The pictorial geometry of the circle of fifths and the musical geometry of its interpretation are different in a way that is counterintuitive (different numbers of octaves going around the circle for fifths and fourths, very different musical sizes of lines of almost the same pictorial length that cut across the circle). This becomes confusing for more general chord progressions of this and other scales.

The circle of half tones rearranges the spokes of the circle to put the labeled points around it in scale order. Around the circle remains an octave and across any spoke remains a tritone. The half tones across the circle now go around it and the fifos around the circle now go across it.

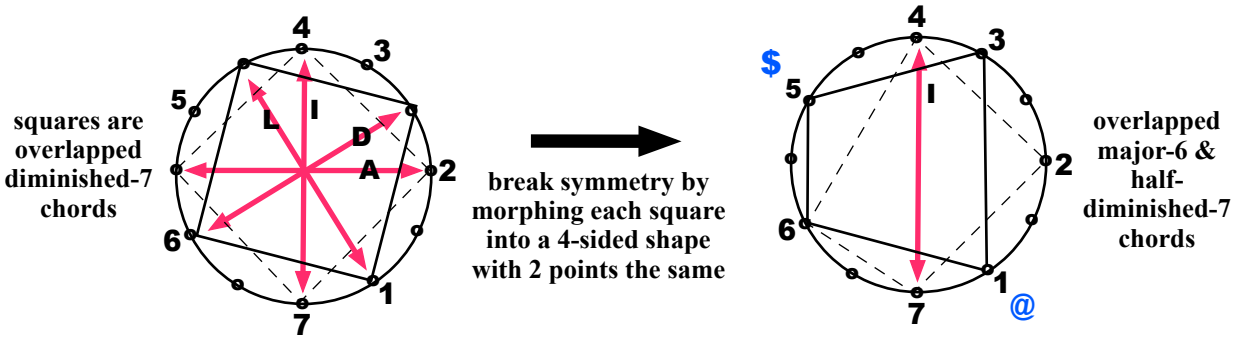
The end points of all the spokes of either circle visibly identify all the points around it, suggesting a notation that labels spokes (building blocks) instead of points (notes). This simple observation is the twist that leads to PKP's unique combination of simplicity and depth. The spoke labels, called **anchors**, directly identify tritones but also identify fifos. In the chromatic scale that unwinds from the circle, each anchor letter identifies a tritone and two fifos morphed from it. The letters identify relative positions of the anchors in the chromatic scale. Tritone anchors are unambiguous independently of

context and fifo anchors are ambiguous but the ambiguity is generally resolved by context. No anchors are needed in the top pitch half of the octave because inversions cover them.

The letters of the **PADMIL** alphabet mark the relative positions of the anchors of the single tritones of classical modes, but this is only to provide a correspondence between PKP notation and music notation. It does not bind the letters to the classical modes, or to tritones. The letters are in a special boldfaced font to distinguish them from other uses of some of them in music notation/theory (there is no actual possibility of confusion because the different notations are never mixed together).

## SYMMETRY BREAKING IN THE CIRCLE OF FIFTHS

According to *The Jazz of Physics*, symmetry-breaking is a deep feature of how both music and the universe work. Here's a view of breaking the symmetry of a diminished scale to yield a major scale that corresponds to an example on page 66 of the book (in the book, the dotted square and its transformation are not shown and no mention is made of tritones).




The symmetry-breaking is shown next in progressive steps that morph tritones into fifos.