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, 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. Music notation acts as "clothes" that obscure the simplicity of the relationship between what the eye sees on the keyboard and what the ear hears. In the words of the fairy tale, "the emperor has no clothes." Full music notation may be required for composition or professional performance of composed pieces but the resulting written music is so full of detail that edifying deep structure is obscured for all but experts.

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 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 identifying deeper structures that are more directly related to the keyboard.

I was encouraged to think this might be possible by the simplicity of the way people with musical ears recognize and remember melodies. They do so 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 piano keys 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. This enables everything about the intervals of a piece of tonal music to be understood in terms of a single **conceptual home octave** determined by a symbolic home tonic that may be assigned to any piano key.

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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 (Chapter 5 provides the 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.

Intervals of two kinds I call **building blocks** are sufficient to understand scales and chords in terms of intervals. The two kinds are **tritones** (6 half tones) and **fifos** (fifths or fourths of sizes a half tone larger or smaller than tritones). Tritones split octaves into equal keyboard halves. Fifos split octaves into equal pitch halves that are unequal keyboard halves (a fifth on the bottom with a fourth on top). The unconventional term fifo is warranted because it captures the concept of a non-tritone building block of a size that may be determined by context.

The basic notation is a 6-letter, DNA-like alphabet that identifies the different kinds of split octaves, that yield different kinds of building blocks, by **anchors** that identify the positions of their mid points relative to the home octave. Combinations of split octaves determine scales, and sequences of them provide harmonic shapes that are almost chords, and are easily adjusted from context provided by the scales to be voicings of chords. The anchor symbols are color coded to identify the different kinds of building blocks that determine the splits, leading naturally to a useful mental model of the building blocks as Lego-like physical blocks of different sizes and colors. Words of one or more letters provide **mode signatures** that identify home-tonic scales. Sequence of letters or 2-letter words determine **core harmony**.

In music notation, scales that depart from written key signatures, such as the 9-note blues scale that provides the notes of the piece footnoted on the previous page, are identified by accidentals (sharps, flats, naturals) that don't distinguish musically important scale notes from ornamental passing notes. The novel contribution here is bundling all the important notes of any home-tonic scale into a single scale identified by a mode signature from the alphabet.

The alphabet provides simple annotations for written music that provide contextual cues to 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.

I call the the view of piano music that emerges from these simple concepts **PKP**, standing for Picturing Keyboard Patterns. PKP views music in terms of **parallel modes** (same tonic), in contrast to the view based on relative modes (same notes) provided by key signatures. PKP is not a replacement for music notation but a lightweight complement to it that combines simplicity and depth. Is this combination 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, conventional wisdom is strongly against it, the central concepts are not intuitively obvious from music alone, and strong motivation is required to make giving up practicing time to tinker with concepts seem worthwhile.

I had, perhaps, an unusual combination of experience and motivation. 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 that some of the ideas I was developing could be the basis of an interval-based notation for piano music that would be simpler than music notation. 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.

I had many questions about music notation but one stands out: Given that scales are determined by key signatures, how can altering a particular note by a half tone not only tell the ear that the scale has changed but also what the new scale is? PKP provides the answer.

My admitted lack of musical credentials is reasonable cause for skepticism that I have anything useful to say, so the opinions 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, "wannabe" expert pianists, and anyone with a stake in the piano and curiosity about these issues.

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 (the first example is the piece with the footnoted chord progression on the opening page). Chapter 6 provides observations and conclusions. References, acknowledgements and comments from some readers of earlier drafts follow. Appendix A summarizes unfamiliar terminology, Appendices B-E are about relationships to conventional representations of scales (B), chords (C), non-classical parallel modes (D), and on the importance of hidden symmetries (E).

There is no music notation in the form of notes on a staff in this document, except for one example at the end of Chapter 5. This is to avoid becoming bogged down in the complexities of the "clothes" while explaining concepts that are independent of them. I've been accused of creating an engineer's view of music that somehow complicates matters and subverts artistry. To be sure, the notation doesn't resemble music notation, and so seems alien to anyone versed in it, but this is because it represents the essence of things in a dramatically simpler way. This way, once you "get it," is so directly related to how the ears hear music that it can encourage the experimentation that's the source of all artistry.

CHAPTER 2: CONCEPTS & NOTATION

A SIMPLE CONCEPTUAL MODEL

A simple but accurate conceptual picture of a home octave on the piano is a line divided into 12 equal parts identifying 12 half tones. A half tone is the musical interval played by adjacent piano keys, so the 12 half tones identify 13 piano keys. The bottom @ is the home tonic and the top @ is the 13th piano key, which 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.

```
                                  home tonic   1/2 tone          tonic of next octave
                                       |        →|  |←                  |
overlapping home octaves               @ . . . . . . . . . . . . @
                                         @ . . . . . . . . . . . . @
                                           @ . . . . . . . . . . . . @

                                              and so on
```

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.

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, making the notes mutually consonant. If overlapped home octaves are 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 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 judgments 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 an interval-based theory of the second kind that's general to the same extent that the piano is a general purpose musical instrument.

Conceptual Foundations of PKP

The following picture splits the home octave into parts of equal keyboard size, and of equal pitch size but unequal keyboard size. The parts are shown as Lego-like building blocks of different sizes and colors, which combine into characteristic octave shapes. The points labeled **$** and **L** are the pitch center and keyboard center of the shapes. The Lego-like concept requires picturing different colored building blocks overlapping at the center points, but this is only pictorial.

```
                                  tritone          tritone
tritone shape (symmetric)         @ . . . . . L . . . . . @     only 6 of these exist
fifo shape (asymmetric)           @ . . . . . . $ . . . . @     this is morphed from the above
                                  fifth            fourth
```

The octave shape determined by the upper and lower tonic and the pitch center is a **scale frame** shared by all primary tonic scales (the few tonic scales without pitch centers are understood by reference to scales with them).

This simple picture displays the three conceptual foundations of PKP described next. Foundations 2 and 3 are so unconventional that they tend to be unbelievable to anyone versed in music notation.

<u>Foundation 1:</u> Building blocks are identified by "anchors" that identify their size, position and orientation, instead of by pairs of notes. The anchor **position** determines the building block position. Color coded symbols identify the **size**: red for tritones (e.g., L), blue for fifths (e.g., @) and green for fourths (e.g., $). The default **orientation** is up from the anchor, changed to down from the anchor by underlining the symbol. For example, the tritone going up from L inverts into a tritone going down from L identified by <u>L</u>. The bass note of the inverted tritone is just a bass note, not a tritone anchor (the bass note of <u>L</u> happens to be the lower tonic of the scale frame, which is never a tritone anchor in this scheme).

The letter L is one letter of a 6-letter, DNA-like alphabet (coming up) that labels the six points of the home octave within the lower fifth of the scale frame. The symbols @ and $ frame the alphabet but are not part of it; their ability to anchor building blocks is limited to the frame fifos. The same anchors that identify tritones also identify fifos by different color coding. The color coding is illustrated by the scale frame (the inversion of the fourth going up from $ is a fifth going down from it, identified by <u>$</u>) but extends beyond it. For example, the inversion of the fourth going up from L is a fifth going down from it, identified by <u>L</u> (the fifth extends outside the home octave, but is provided by the home octave because it's anchored within it. There are no anchors in the top fourth of the scale frame because building blocks with bass notes there are covered by inversions of building blocks anchored in the bottom fifth.

In summary, the scale frame plus 6 letters color-coded for size and underlined for inversions cover all the building blocks that can be provided by the home octave, namely 6 tritones, 12 fifths and and 12 fourths.

This notation is conceptually and visually simple but begs the question: How should it be pronounced? Phrases such as "tritone going up from el" for L, or "fifth going down from el" for <u>L</u> are cumbersome. A simple answer is pronounce the character names with the color or preceding the name to indicate up or down: "el red" instead of "tritone going up from el" for L; or "blue el" instead of "fifth going down from el" for <u>L</u>; and so on.

The foregoing picture shows anchor-centered octave shapes as a default interpretation of "anchor." Such shapes are easily understood without without any extra notation but extra notation is sometimes useful. A specific notation is an anchor symbol with a box prefix or suffix ■, ■ or ■ indicating octave completion by an interval of the size indicated by the color (e.g., the anchor-centered octave shapes in the picture are ■L and ■$).

<u>Foundation 2:</u> Tritones provide context. This is subliminal in music notation because tritones are not singled out by it. They're one among many intervals identified by pairs of note symbols that must be parsed to understand what they are. They can't be used for context identification because they can't even be written down without a key-signature reference that already establishes context. Looking deeply into what music notation represents on the keyboard reveals tritones as unique intervals that can

be used for context identification in lieu of key signatures. They are fixed in size and few in number. The six tritones within the home octave identified by six anchor letters are all the tritones that exist in any home octave, which means on the entire keyboard.

Their anchor letters form a DNA-like alphabet that defines a **conceptual home octave** that may be written as **@PADMIL$xxxx@** (or this with the "**x**"s replaced by dots). Letter **L** has been introduced already and the other letters are identical in kind. Context identification is provided by letters and words from the alphabet.

```
@ P A D M I L $ . . . . @
. . . . . . x . . . . . x
. . . . . x . . . . . x .
. . . . x . . . . . x . .
. . . x . . . . . x . . .
. . x . . . . . x . . . .
. x . . . . . x . . . . .
x . . . . . x . . . . . .
```

The letters are in a fixed-width font (Courier) in the table to provide vertical alignment but are otherwise shown in a more distinctive font (Arial Black) that makes them stand out as different in kind from some of the same letters used in conventional music theory and notation. Outlining handwritten letters in annotations on written music accomplishes the same purpose.

For information only at this point, the letters are the first letters of the names of the parallel classical modes that have tritones in these relative positions, namely **P**hrygian, **A**eolian, **D**orian, **M**ixolydian, **I**onian and **L**ydian/**L**ocrian, This choice of anchor symbols is only to provide a link to music notation — any symbols would do, in principle. Thinking of the mode scales in conventional terms as sequences of note symbols would only be distracting at this stage. In PKP, modes are determined by tritone content.

The combination of a tritone anchor and the scale frame provides a set of note positions that may be identified as follows (illustrated by **L**). The compound symbol **L$** identifies note positions relative to the scale frame. Tritone **L** is a special case because it includes the home tonic but the concept is the same for the other tritones that don't include it.

```
    @ . . . . . . $ . . . . @    home octave scale frame
L$  x . . . . . x x . . . . x    note positions
```

This sets the stage for the following picture showing all the possible fifo shapes that may be morphed from the octave shape of a single tritone (illustrated by **L**) by either holding the outer notes and moving the inner one, or holding the inner note and moving the outer ones (which are the same note, harmonically). These morphings are asymmetric, meaning they hold one note and move the other. The resulting compound shapes are **cores** that determine tonic scales. For any tritone, there are only two possible cores, which are mutually incompatible and determine mutually incompatible contexts. The cores are represented by the symbol combinations **$LL** and **LLI**, written in an order that identifies a downward trend in the successive morphs.

```
      @ P A D M I L $ . . . . @
$     @ . . . . . . $ . . . . @
L     @ . . . . . . L . . . . . @
L   x . . . . . . L . . . . x
```

```
      @ P A D M I L $ . . . . @
L       x . . . . L . . . . . . x
L   x . . . . . . L . . . . . @
I   x . . . . I . . . . . . @
```

The deep significance here is that fifos on the left and right morph symmetrically into each other by altering both notes. They share no notes and are mutually dissonant, making the cores of which they're parts mutually incompatible.

```
top left     @ . . . . . . $ . . . . @
top right      x . . . . L . . . . . . x
```

```
bottom left  x . . . . . . L . . . . x
bottom right   x . . . . I . . . . . . @
```

Given the establishment of one of these cores, moving one tritone note a half tone in the opposite direction from the one that established the core will sound wrong to the ear, suggesting the opposite core. This answers a question in opening chapter: How can altering one particular note by a half tone not only tell the ear that the scale has changed but also identify the new scale? The answer is changing a tritone note this way implies a core change that determines a different classical mode.

The cores **$LL** and **LLI** are — borrowing a well known term from the chord domain — **tritone substitutes** of each other that share the same tritone and have all non-tritone notes different. As shown next, the notes of each core combine on the keyboard to form a shape with two symmetrically disposed half tones, either both inside the tritone or both outside it.

Because the shapes are determined by the tritone, they're identified at right by **core signatures** consisting of the tritone anchor prefixed by **//** (standing for "parallel") for the primary core and by **alt** for its tritone substitute core. The cores represented this way establish tonics a tritone apart. This is so because the tritone substitute core is the result of transposing the primary core by a tritone. Transposing a tritone by a tritone inverts it, so the result in the home octave is the same tritone with all non-tritone notes different, identifying a secondary tonic a tritone away. Because of the position of this particular tritone, the primary tonic here is the home tonic.

```
core   @ P A D M I L $ . . . . @      <—highlighted tonics
$LL    . . . . . . L $ . . . x x        primary //L
LLI    . . . . . I L . . . . . x x      tritone substitute altL
```

Cores of this form *become* classical modes when the blanks are filled in by whole tones, but the cores exist independently of the modes. This independence is a deep structural property of music. The same cores may be present for some of the tritones in multi-tritone, non-classical modes, indicating sub-modes that are classical modes.

<u>Foundation 3:</u> Fifos are morphed tritones. The six tritones of the home octave each have a corresponding building-block picture of the same form. This means that each tritone may be regarded as the "seed" of eight fifos (4 fifths, 4 fourths) that may be morphed from it to fit context, for a total 48 fifos for all 6 tritones. This is twice the number of fifos on the keyboard because each fifo is morphed from two different tritones.

This is important because the numerous fifos in pieces of music are at once important to the sound and the source of much complexity in music notation. Every fifo is notated in music notation as if it

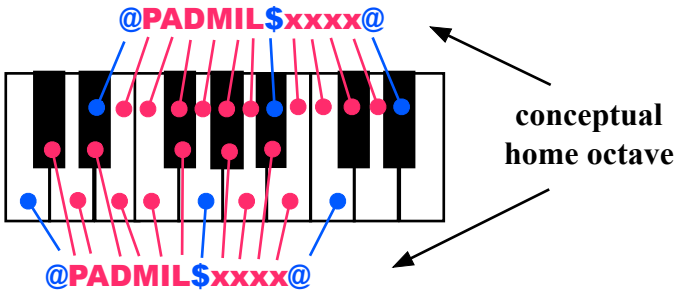
was a stand-alone interval, independent of context.

In contrast, tritones are few in number, simple on the keyboard, and present in most kinds of music. Music without tritones exists but it may be understood as originating in sub-scales of scales containing tritones (e.g., pentatonic modes without tritones are sub-scales of classical modes). Viewing tritones as the "seeds" of fifos profoundly simplifies notating fifos because the notation is simple and opens the possibility of leaving fifos that are determined by context to context (such fifos may be identified by grey anchor symbols). This easy because of Foundation 2.

This is a remarkably simple way of understanding, in the same simple terms, anything from "toy" beginner's pieces that never stray from a simple key signature, to pieces that inhabit deep and murky waters in music notation, determined by difficult key signatures and strong chromaticism. Even pieces easy for novices to play may inhabit these waters, for example many blues and minor pieces. The complexity of the corresponding music notation tends to be shocking to novices when first encountered.

ON THE KEYBOARD

The conceptual home octave maps to the keyboard as illustrated next for two of the twelve possible home octaves (the blue text for the scale frame is only for contrast with black piano keys). The mix of black and white piano keys is visibly very different for different home octaves but the difference is manageable because the scale frame is simple, the alphabet is simple, and both are independent of any notation for notes. The only caveat is the necessity of keeping the piano key of the home tonic fixed in the mind, to avoid confusion with recently played pieces that may contain some of the same building blocks identified relative to different home tonics.



Octave shapes are very simple on the keyboard because octaves are the easiest intervals to find on the keyboard next to half tones. Symmetric octave shapes are particularly simple. The octave notes and the keyboard center are, with one exception, opposite kinds of piano keys (white vs. black). The easy-to-remember exception is the B octave, the keyboard center of which is F, both of which are white piano keys. There are no all-black-key tritones.

Fifos morphed from tritones are determined by moving the keyboard center or the outer notes by a half tone. No counting of half tones is necessary. Once the shapes are determined on the keyboard, it's easy to invert them into anchor-bounded shapes, or to select individual building blocks from them, without writing down any additional notation.

THE GENERAL CASE

The following picture generalizes this to all the tritones identified by the alphabet. When the classical modes on the right are needed, the signatures on the left identify them but the cores identified

by the signatures are more general than the classical modes. They pop up also in non-classical modes that have classical modes as sub-scales.

The primary shapes in this picture alternate between green highlighting (the tritone morphs into fourths) and blue highlighting (the tritone morphs into fifths). The result is pairs of half tones alternating between inside the tritone and outside it for successive primary cores.

The tonality column reveals a striking property of the alphabet that's both simple and useful. The four middle letters **ADMI** determine opposite tonalities for primary and alt contexts. The primary tonality is known by inspection and the opposite tonality follows from tritone partner cores having the same tonality for a different tonic, and therefore a different tonality (in parentheses) for the same tonic. The minor-major tonalities in the middle follow from the tritone anchors themselves determining one tonality. The **P** and **L** cores are different in kind because the primary tonalities are not determined by them alone. However, the primary and alt tonalities are always opposite and the tonalities shown in parentheses are determined from the pattern of the other cores.

signature	core	core on the keyboard @ P A D M I L $ . . . . @	tonality	implied classical mode
//L	$LL	x . . . . . L $ . . . x x	(major)	Lydian
altL	LLI	x . . . . I L . . . . . x x	(minor)	Locrian
//I	MIM	@ . . . M I . $ . . . x @	major	Ionian
altI	IIL	. . . . . I L . . . x x .	(minor)	
//M	MMI	@ . . . M I . $. x x . @	major	Mixolydian
altM	DMM	. . . D M . . . . . x x .	minor-major	
//D	ADD	@ . A D . . . $. x x . @	minor	Dorian
altD	DDM	. . . D M . . . x x . . .	minor-major	
//A	AAD	@ . A D . . . $ x . . . @	minor	Aeolian
altA	PAA	. P A . . . . . x x . . .	(major)	
//P	@PP	@ P . . . . . x x . . . @	(minor)	Phrygian
altP	PPA	. P A . . . x x	(major)	

CLASSICAL MODES

The seven named classical modes follow from filling in the blanks of each primary core with whole tones going up the keyboard, and of the alt core with every non-tritone note different. The **altL** mode is a parallel mode because the tritone contains the home tonic, but this is not the general case. The **altL** core shown here is the inversion of **LLI** shown above, to fit the repeated pattern. Each mode has one note different from the one above it, provided by the tritone (the other tritone note is shared). The anchors of the building blocks are shown in the order that presents the morphings of the building blocks as trending downwards.

signature	core	@ P A D M I L $ . . . . @	name (tonality)
//L	LL$	@ . x . x . L $. x . x @	Lydian (major)
//I	IIM	@ . x . M I . x . x . x @	Ionian (major)
//M	IMM	@ . . . M I . $. x x . @	Mixolydian (major)
//D	DDA	@ . A D . . . $. x x . @	Dorian (minor)
//A	DAA	@ . A D . x . $ x . x . @	Aeolian (minor)
//P	PP@	@ P . x . x . x x . x . @	Phrygian (minor)
altL	LLI	@ P . x . I L . x . x . @	Locrian (minor)

Example: The shared frame and the core of the **//I** mode are shown next as combinations of building blocks. The mode includes three secondary building blocks **M**, **A** and **A** not shown.

	x @ . A . M I . $. x . x @	
$	. I . . . . . $ x	frame
I	. x . . . . I x	) core
I	x . . . . . I . . . . . x .	)
M	x . . . . M . . . . . x .	)

CHORDS

The core determined by a tritone provides a simple basis for understanding the deep structure of chord progressions. As illustrated next, two repetitions of the core **I-I-M** sequence of octave shapes of the **//I** mode, joined by the scale frame, provide the core of one of the most basic chord progressions of music called the "diatonic cycle." The octave shapes become chords by shrinking the bottom building blocks inwards to the vertical white lines that establish new bass notes (white circles) one or two scale steps below the core anchor line. The bass notes are anchors of overlapping enrichment fifos that provide the inner notes of the upper building blocks (white circles). The overlaps establish intervals smaller than building blocks between successive notes (whole tones, minor and major thirds) and larger than building blocks between outer notes (augmented fifths, major sixths, minor and major sevenths) without requiring any additional notation for them.

core	add-on	I II III IV V VI VII I x @ . A . M I . $. x . x @	root	implied type
I	A	x . |o . . I . . . o . . x	IV	*M7 (major seventh)*
I	A	x . . |o . . I . . . o . x .	VII	*m7b5 (1/2 diminished seventh)*
M	A	x . . |o . M . . o . . . x .	III	*m7 (minor seventh)*
$	M	x . . . |o . . $. o . . x	VI	*m7 "*
I	A	x . |o . . I . . . o . . x	II	*m7 "*
I	A	x . . |o . . I . o . . . x .	V	*7 (dominant seventh)*
M	@	x|o . . . M . . o . . . x .	I	*M7 (major seventh)*

The chord symbols on the right follow from assigning roots going down by fifths from the second

shape and then wrapping around to the first one. The resulting chord progression illustrates the most fundamental 4-note chords of music, of which many chords of music are extensions or alterations identified by suffixes.

This is only one among many possibilities for creating a chord sequence from an anchor-centered sequence of octave shapes. For example, an analogous shrinkage from the treble end to the nearest white circles closer to the center would yield a treble line above the inverted building blocks that provides inversions of the same chords. Different inversions are harmonically equivalent (same notes in different orders) but this doesn't mean they sound the same. The deep structure is combinations of building blocks, inversions of which can be selected to fit context.

The concept of chord symbols is notes going up from roots as bass notes, but that's the case here only for roots **I** and **II** (the root symbol **I** is not the same as **I** in the table) The rest are harmonically equivalent inversions. In the inversions, the inner notes of the core building blocks are often omitted, including any that are roots (e.g., **V** and **VI** here). Inversions of chords are often given separate chord symbols. For example, **II*m6*** is an inversion of **VII*m7b5***, **I*M6*** is an inversion of **VI*m7***, and **IV*M7*** is an inversion of **II*m7***. If your mental model of chord with four or more notes is notes going up from roots, the details can be endlessly confusing. Combinations of building blocks tell it like it is.

Not all shapes representing chords are combinations of building blocks. They may also be single building blocks with one added note within the building block (triad chords) or outside it (inversions of triad chords, and 3-note voicings of 4-note chords). Such refinements are nuances that would only be distracting at this stage, and so are left to a section at the end of the chapter. A mental model of chords as combinations of building blocks is sufficient until then and useful in general.

MODE CHANGES

One of the simplest and most distinctive parallel mode changes to the ear is the major-minor change **//I-//A** (or the reverse). This change alters 3 notes — the 3rd, 6th and 7th scale notes of **//I** go down a half tone.

```
      @ P A D M I L $ . . . . @
//I   @ . x . M I . x . x . x @
//A   @ . A D . x . $ x . x . @
```

The contrast between this uniform simplicity and the variable complexity of the same thing in music notation is stark. Consider the case where the home tonic is the first black key above C. This black key is either C# or Db in music notation, depending on context. The change is from Db major (5 flats) to C# minor (4 sharps). The change naturalizes 5 notes and then sharps 4 notes — 9 symbol changes to move 3 notes down a half tone! 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. These different pitches don't exist on the piano but they have to be dealt with in music notation as if they do.

TONIC CHANGES

Parallel mode changes and same-mode tonic changes are "two sides of the same coin" — knowing one means knowing the other. A same-mode tonic change is a combination of a parallel mode change that alters notes and relative mode change that alters no notes. The new parallel mode provides the same harmony notes for any of its relative modes. A relative mode only reorders the same notes.

Therefore parallel-mode changes cover all possible harmony changes, and relative mode changes may be left to melody lines. This makes things that are complex in relative-mode-based music notation simple in PKP (see Chapters 3-5).

CHROMATICISM

Chromaticism enters the picture when music departs from a written key signature. Most interesting music is chromatic to some degree. One way of introducing chromaticism is by moving between successive classical modes. The idea is to establish a mode via a melody line, a core harmonic sequence, or both, before going on to the next mode. For example, the **//I-//M** mode sequence is established harmonically by the core anchor line **I-I-M-I-M-M**. Harmonic resolution in the first mode occurs before going on to the next mode.

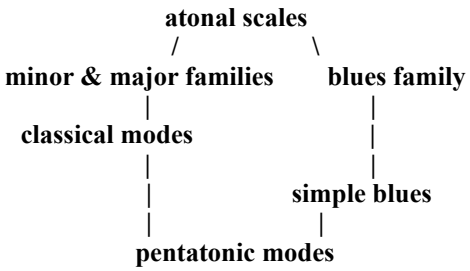
Changes jazz musicians have come to call "Rhythm Changes," because they were inspired by Gershwin's *I Got Rhythm*, keep only the tritones of successive modes as a basis for ornamental chords. For example, the sequence **I-I-(M-D-A)-I-M** underlies a chord progression in one passage of the Gershwin piece. The passage is in the Ionian mode with ornamental **M-D-A** tritones voiced in the mode as altered or extended dominant-seventh chords.

Yet another approach to chromaticism is to bundle tritones into non-classical modes, of which there are many in regular use.

A HIERARCHY OF MODES

The many different approaches to chromaticism may be organized into the following hierarchy of modes determined by words from the alphabet. The hierarchy provides the framework for developing and understanding parallel modes in a systematic way, bottom up, starting from simple pentatonic modes. Classical modes and simple blues are at singular levels because the steps from pentatonic modes to basic blues and to classical modes yield scales that are different in kind, and the steps from there to family modes widens the difference. The hierarchy covers all the modes in scale dictionaries such as *The Source*, and beyond. The new contribution here is representing them in a manner that's independent of both music notation and specific home octaves, by alphabet words of 1-4 letters — called **mode signatures** — that identify family relationships. Viewed from the perspective of music notation, the non-classical modes bundle scales notes of key signatures and non-ornamental accidentals into a single modes represented by simple mode signatures.

The reason for presenting classical modes before presenting this hierarchy is they provide the alphabet, and the alphabet provides a link to music notation, thus grounding this unconventional material in something that's understood by anyone who studies the piano.



The following development goes up the right path and then back down the left path to the already described classical modes.

PENTATONIC MODES

Pentatonic modes shown next are the foundation of folk music in different cultures worldwide. They're foundation modes because they have no half tones or tritones, and so no dissonance, enabling anyone to sing or harmonize tunes from them. Yellow highlighting brings forward a shared interval sequence **WWW+W**, where **W=2h** is a whole tone, **W+=3h** is a minor third, and the half tone **h** is only a unit of measurement. The notes of these modes are often "bent" by half tones to form different styles of folk music, of which an example is simple blues.

parallel mode	@ P A D M I L $ . . . . @	signature
pentatonic major	@ . x . M———$. x———@	//M
pentatonic minor	@———D . x . $———x . @	//D

These are the only modes in the hierarchy for which the signature is a fifo anchor. The shared scale frame provides 2 notes, the signature fifo provide 2 notes, and the 5th note is provided by splitting the remaining major third into two whole tones, following the rule of no half tones. Horizontal lines in the linear scale representation highlight the distinctive, empty minor thirds, providing a reminder that "no notes go here." The most visible instances of these modes on the piano are the clusters of 5 black piano keys (the major mode starts on the bottom black key of the 3-tritone cluster, and the relative minor mode on the next black key down).

As before, different harmonic cores are determined by mutually dissonant fifos.

	$ x x x x @ P A D M I L $ x x x x @
frame octave	. . . . . x . . . . . $ x
major core	. . x . . . . . M . . . . x . . .
minor core	. . . x . . . . D . . . . . x . .

These cores are the source of all the chords that pentatonic modes can provide, namely major and minor triads, and minor seventh chords that invert into major sixth chords.

BLUES

Blues comes next because it's a very simple extension of pentatonic modes. Adding one note to each pentatonic mode yields modes taught to beginners as "the" blues modes. Yellow highlighting identifies the shared interval sequence **WhhW+W**, which is the same as above, except with the second whole tone **W** split into **hh**, immediately diverging from classical modes, which never have adjacent half tones.

signature	@ P A D M I L $ . . . . @	
//MD	@ . x D M———$. x———@	6-note major blues (actually minor-major)
//DL	x———D . x L $———x . x	6-note minor blues

Major blues is the pentatonic major mode plus the flatted 3rd of the mode (it's identification as major follows from its origin in the major mode). Minor blues is the pentatonic minor mode plus the flatted 5th of the mode. The added notes are tritone anchors because each forms a tritone with a scale note. The compound signatures distinguish these modes from the classical modes identified by the same tritones.

The mashup of these two modes yields a **blues family mode** with the all tritone-core **DM.L** (the dot indicates a skipped alphabet letter). The mashup adds the tritone **M**, formed of one note from each of the contributing modes. The mashup has 9 notes, 7 of which are determined by the scale frame plus the core (not 8 notes because tritone **L** includes the home tonic). The other two notes follow from the pentatonic origin. The 7-note scale without these notes is itself a viable blues scale.

signature	@ P A D M I L $ . . . . @	
//DM.L	x . x D M x L $. x x . x	9-note mashup
	x . . D M . L $. x x . x	7-note frame-plus-core

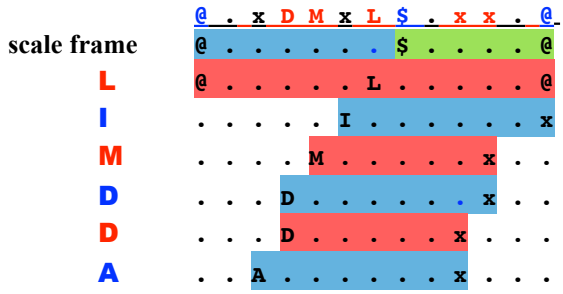
The all-tritone blues core determined by **DM.L** is analogous to but different in kind from the mixed cores seen earlier. A brief diversion is appropriate here to highlight the differences. An all-tritone core is simpler because there's only one kind of building block, and it's the simplest kind on the keyboard. The three tritones determine more notes because there are no shared anchors. The core anchors **D** and **M** provide the mixed minor-major tonality that's the source of the distinctive sad-happy sound of blues. The **XX.X** form of the defining word is asymmetric, automatically providing a tonal scale. This asymmetric form and its opposite number **X.XX** both appear in the minor and major family modes coming up, with the difference that minor and major tonality are in different modes.

Each of these forms spawn a number of parallel modes as direct sub-modes, or as parallel modes or morphs of sub-modes. Many of these spawned modes are shared between different families at the same level of the hierarchy. The sharing means a few simple words for the sub-modes — of the form **XX**, **X.X** and **X..X** — not only cover a lot of scale ground but are also often determined by context. The **X..X** form is ambiguous on its own because of circular symmetry of the implied 4-note shape, but family context plus, occasionally, a bit of extra notation makes it unambiguous.

Important sub-modes of **//DM.L** are shown next. Sub-modes that come from other families in the hierarchy appear here from context without giving any thought to the other families.

//DM	@ . x D M x . $. x x . @	mashup of pentatonic modes
//M.L	x . x . M . L $. x x . x	parallel mode of the minor family's //D.I
//D..L	x . x D———L $. x x . x	parallel mode of the minor family's //Ax.I
//M	@ . x . M x . $. x x . @	classical
//D	@ . x D . x . $. x x . @	classical

The following Lego-like picture shows the scale frame and a selected set of building blocks from the family mode.



The wide variety of building blocks that can be combined or split to form chords offers the possibility of considerable harmonic richness that tends to be represented in music notation in complex ways, as illustrated by the footnoted blues chord progression in the opening chapter. The presence of the two classical modes **//M** and **//D** means they bring their cores with them, namely **IMM** (not explicitly shown but present in the scale) and **DDA** (shown).

Blues Chords

Here follow a few examples of tritone chords that give a sense of their simplicity on the keyboard. An amazing amount of chord complexity can be introduced by altering the enrichment fifos in simple ways. The fifo additions in the second column over-specify the chords because the internal notes of the tritones are normally implied by context. This is where octave shapes come in handy, because the fifo note outside a single tritone follows from moving one of its outer notes to an obvious scale note closer to the anchor, leaving the inner note to be implied by context. Again, the point here is the composite shapes, not the chord symbols on the right, which are shown only for illustration.

		I	II	III	IV	V															
	addition	@	.	A	D	M	I	L	$	.	x	x	.	@	.	A	D	M	I	L	$	**chord**
M	@	@	.	.	.	M	.	.	o	.	.	x	.	.	.	.	.	.	.	.	.	**I*7***
M	D	.	.	.	.	M	.	.	.	.	.	x	.	–	.	.	D	.	.	.	.	**rootless I*7#9***
L	A	.	.	A	.	.	.	L	.	.	o	.	.	x	.	.	.	.	.	.	.	**II*7***
D	I	.	.	.	D	.	o	.	.	.	.	x	.	.	@	.	.	.	.	.	.	**IV*7***
I	$	.	.	.	.	.	.	I	.	o	.	.	.	x	.	.	x	.	.	.	.	**V*7*, an "outside" chord**
L	$	.	.	.	.	.	.	.	L	o	.	.	.	.	x	.	x	.	.	.	.	**VM*7(11)***
DL	—	.	.	.	D	.	.	L	.	.	o	.	.	x	.	.	.	.	.	.	.	**dim*7*, rootless *7b9* (8 roots)**

Simple 3-chord blues pieces often use mostly dominant seven chords containing tritones **D**, **M** and **I**, the last of which is not actually in the family scale. The dominant seventh **V** chord containing this tritone is such a familiar feature of music that it tends to be borrowed for 12-bar blues to provide a signpost of the arrival of the "turnaround" last four bars. This is so common that many musicians seem to think blues is defined by these three chords. It's not — sophisticated blues pieces use chords of so many different kinds, including tritone substitute chords, that characterizing blues by chord content is unhelpful. Tritone content is more helpful and the **//DM.L** signature is particularly helpful because it captures fundamental features of the blues in a compact and intuitive way.

NON-CLASSICAL MAJOR AND MINOR MODES

The jumping off point is a mashup of the **//A** and **//I** classical modes.

	@ P A D M I L $ . . . . @	
//ADMI	@ . A D M I . $ x x x x @	**10-note mashup of //A & //I**
//AD.I+	@ . A D . I . $ x x + x @	**9-note minor family**
//AD.I	@ . A D . I . $ x x . x @	**8-note frame-plus-core, aka bebop melodic minor**
//A.MI+	@ . A . M I . $ x + x x @	**9-note major family**
//A.MI	@ . A . M I . $ x . x x @	**8-note frame-plus-core, no particular name**

The mashup yields a 10-note minor-major mode identified by **//ADMI** that sometimes appears in strongly chromatic pieces (e.g., *Lush Life* in Chapter 5). Omitting the major or minor tritone anchor, and leaving the other note of the tritone, yields 9-note scale that's an augmentation of the 8-note frame-plus-core scale. The augmentation is identified by plus superscripts on the 3-letter cores **AD.I** and **A.MI**.

Here follows a sampling of important 8-note and 7-note sub-modes. The double tritone determined by **A..I** is circularly symmetric and therefore ambiguous. The ambiguity is resolved in different ways.

Parallel classical modes are not sub-scales but morphs that lower one note by a half tone. For example lowering the top notes of the melodic and harmonic minor modes a half tone yields the Dorian and Aeolian modes.

The melodic and harmonic modes are like classical modes in having seven notes and no adjacent half tones. They 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 reality is these modes seldom have to be determined from scratch because they appear in pieces of music as sub-modes of the blues, and of minor and major family modes.

	@ P A D M I L $ . . . . @	
//D.I	@ . x D . I . $. x . x $	**melodic minor (7 notes, whole tones highlighted)**
//Ax.I	@ . A x . I . $ x———x $	**harmonic minor (7 notes)**
//A.M	@ . A . M x . $ x . x . @	**parallel mode of //D.I**
//A.xI	@ . A . x I . $ x———x $	**harmonic major (7 notes)**
//A.MI	@ . A . M I . $ x x . x $	**bebop major (8 notes)**
//AxxI	@ . A x x I . $ x———x $	**harmonic minor-major (8 notes)**

The book *Modalogy* develops the melodic and harmonic modes from scratch in conventional terms, with results that are painstakingly correct but overwhelmingly complex (Appendix D). The harmonic minor-major mode reduces 2x7=14 harmonic minor and major modes to 8 simpler minor-major modes, each of which is easily reducible, if desired, to one of the 14 modes by omitting one obvious note (see Chapter 4 for more on parallel modes in PKP terms).

A Lego-like picture of the building blocks would add nothing conceptually new here (see Chapters 3-5 for more).

ATONAL SCALES

Representing atonal scales by words of the home alphabet identifies tonality relative to the home tonic. Whole tone scales have circular symmetry and diminished scales have mirror symmetry. Breaking their symmetry creates related tonal scales.

word	type	@ P A D M I L $ . . . . @	related to
ADMI	nameless	———A D M I———x x x x——	//ADMI, //AD.I, //A.MI
P.D.I	whole tone	. P . D . I . x . x . x .	//DI
A.M.L	"	x . A . M . L . x . x . x	//AM
PA.MI	diminished	. P A . M I . x x . x x .	//A.MI
AD.IL	"	x . A D . I L . x x . x x	//AD.I
P.DM.L	"	x P . D M . L x . x x . x	//DM.L

REVISITING CHORDS

So far, chords have been understood as combinations of building blocks: for more on such chords see Chapter 4. Shapes to voice such chords often omit notes implied by context (melody plus harmony), leaving at least one stand-alone note that belongs to no identified building block. Triad chords are inherently not combinations of building blocks, but split building blocks composed of one building block and one internal or external note. Our concern here is with representation of such shapes in interval terms. This only provides the notation. Examples are provided in Chapters 3 and 5.

The notation for triad chords is very simple, namely an anchor symbol with a superscript indicating the kind of split. Major and minor triads are asymmetric splits of fifths identified by superscripts ▲ or ▼ indicating the larger interval is on the bottom or top (e.g., **M▲** is a major triad formed of a major third with a minor third on top, and **M▼** is a minor triad formed of a minor third with a major third on top). Dim chords are symmetric splits of tritones identified by superscript • (e.g., **M•** is a diminished chord formed of two minor thirds). The benefit of representing triad chords this way is preserving the visibility of the formative building blocks.

Unlike combinations of building blocks, split building blocks invert into shapes that are different in kind. A triad cord inverts into a tritone or fourth with the original inside note outside it (e.g., the major triad **M▲** inverts into either **o...M** or **M..o**, in which "**o...**" or "**..o**" identify offsets down a major third or up a minor third). This inversion notation is a simple but cumbersome. The same meaning may be conveyed more compactly by a numeric prefix or suffix that provides a count of the number half tones down or up (e.g., **4M** instead of **o...M**, and **M3** instead of **M..o**).

The shapes of inverted triad chords have the same form as 3-note shapes that voice 4-note chords (e.g., **o...M** and **4M** are equivalent 3-note representations of a major seventh tonic chord).

The outer intervals of the inverted triad chords **4M** and **M3** are a major sixth (9 half tones, 2 half tones larger than a fifth) and an augmented fifth (8 half tones, 1 half tone larger than a fifth). This suggests the possibility of representing inverted triad chords by these outer intervals, expressed as expanded fifths using plus superscripts on anchors. Details are best left to examples, but hold the thought.

A SINGLE 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. An interval-based view of music requires a note-based representation of melody lines, which may seem ironic. Purely interval-based representations of melody lines are ruled out by the difficulty of mentally tracking accumulated intervals up and down to know note positions, without making errors.

The piano's C-octave provides a simple basis for a chromatic scale notation: 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. The notation 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.

Building Blocks in Chromatic Scale Notation

Building blocks are determined in alphabet notation by color-coded anchors that identify pairs of notes by single anchor symbols. Knowing the following pairs of chromatic scale symbols of the six tritones is worthwhile because they provide the basis for identifying all possible building blocks and inversions of building blocks appearing in melody lines or their scales of origin.

L	**p5-1**
I	**4-7**
M	**3-p7**
D	**p3-6**
A	**2-p6**
P	**p2-5**

Fifos determined by these anchors are a half tone larger or smaller than tritones (e.g., the fifth **M** is **3-7** and the fourth **M** is **3-6**). This is a 3:1 reduction in the number of symbols required to identify building blocks, plus the removal of any need to parse pairs of note symbols in music notation to identify what they represent. What's more, the identity of inverted building blocks is preserved by the convention of underlining anchor symbols to represent inversions going down (e.g., **3-7** is the fifth **M**, and **7-3** is the fourth **M** in which **7** is an implied bass note a fourth down from the anchor).

Chord Roots in Chromatic Scale Notation

The chord root notation is the chromatic scale in RN symbols (tonic root "**I**" is *not* the same as Ionian anchor "**I**" in a mode table). This is an adaption of a notation for chord roots used by Mehegan in his piano jazz instruction book.

chord root notation **I-pII-II-pIII-III-IV-pV-V-pVI-VI-pVII-VII**.

Melody Lines in Chromatic Scale Notation

A first step in understanding a piece in PKP terms is annotating chromatic scale symbols next to melody notes on a staff. The annotations provide a way of writing down skeleton melody lines directly, as shown next for a familiar piece, *Happy Birthday to You*. Bar lines would be added to represent a melody line from written music. Asterisks indicate repeated notes, differently colored arrows indicate ups and downs, commas indicate phrasing, and optional red highlighting indicates melody peaks within phrases, to help the eye see them in a line of text.

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

Timing is left to memory, which is fine for familiar songs with words but is sometimes insufficient otherwise. Intricately detailed timing is determined by music notation but this is often too much information for casual playing or for improvising. Thinking in terms of three or four downbeats per bars is natural for such playing, with multiple notes of very short duration dealt with by squeezing them into time intervals between downbeats in a way that sounds good. “Swing feel” is accomplished by playing notes on upbeats close to following downbeats to give a sense of “bouncing” one off the other.

As illustrated next, for the first few bars of this piece, an often sufficient representation of basic timing is provided by placing downbeat markers (**^**) below the melody line. This illustrates the marker concept without intending to suggest they would be required for such a simple piece. Downbeat markers are add-ons that indicate timing without altering anything else, in contrast to music notation, which which requires intricate changes to note symbols for different timing. For example, it’s easy to change this from 3/4 time to 4/4 time by adding an extra beat marker in the middle of each bar that stretches the time duration of a note or rest.

5 5 |↗6↘5↗1 |↘7, — ↘5 5 | ↗6↘5↗2 |↘1, — ↘5 5 |
^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^

Given a written melody line in some key signature, the chromatic scale symbols for the melody notes relative to the home tonic would be annotated on the staff and then transferred to a home-octave table to identify the mode as **//I** (Ionian). The mode here is exact because the melody line uses all its notes and no others, but melody modes in general are seldom this exact. For example, a melody may include passing notes that have no scale implications, or may move between different modes. Movements between different modes may be understood as movements within a single mode that’s a mashup of the different modes. And so on. The point of finding a melody mode is not to determine what the piece actually “is” but to find a helpful reference for playing it.

GOING FORWARD

Very little notation is needed to use these ideas for pieces of written music. Annotations are required 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-identification tables. Shorthand representations of melody plus harmony in two textual lines are optional extras. They are used in the examples in Chapters 3 and 5 to avoid introducing the “clothes” of music notation into explanations. Beyond that, they’re available for understanding tricky passages or getting an overview of a piece as a whole.

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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.

Modes are only ways of getting a handle on pieces, not of limiting them. Pieces of music commonly depart from identified modes by, for example, using passing notes or shapes that can be omitted without altering the essence of the piece. Any piece can be represented by a classical mode with ornamental departures. The purpose of non-classical modes is to bundle the departures that characterize a piece into a single mode, leaving only purely ornamental elements outside the mode.

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

The Emergence of Tritones

The examples illustrate that viewing piano 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 classical modes that define the scales of key signatures 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 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), changing to a different tonic for the same mode (e.g., the same major mode), or signposting blues turnarounds. "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 and fifos 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.

Chromaticism

Departures from written key signatures are termed "chromatic." Parallel classical modes determined by a key signature and pentatonic modes that are sub-scales of them are chromatic relative to different key signatures than the one that determines them. Parallel classical modes bring chromaticism into the domain of classical modes in a very simple way: one alphabet step (up or down) in the alphabet 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. Pentatonic modes contain no tritones but they're sub-scales of classical modes and so are bundled in with them.

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.

PKP concepts and notation enable probing deep and complex waters in music notation without becoming overwhelmed by details. That said, the probing remains challenging because music is challenging, as illustrated by the advanced examples in Chapter 5.

Musical Domains

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.

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).

```
⚓  |        I |  I     |        I |  M     | M     I |  I        |  I      I | ~~M~~
♫  5*|↗6↘5↗1 |↘7, ↘5*|↗6↘5↗2 |↘1, ↘5*|↗5↘3↘1 |↘7↘6, ↗4* | ↘3↘1↗2 |↘1
```

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.

		F	G	A	Bb	C	D	E	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 mode	//I	x	.	x	.	x	x	.	x	.	x	.	x	x
selected building blocks	I	.	.	.	.	.	I	.	.	.	.	.	.	x
	I	.	.	.	.	.	I	.	.	.	.	.	x	.
	M	.	.	.	.	M	.	.	.	.	.	.	x	.
	M	.	.	.	.	M	.	.	.	.	x	.	.	.

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.

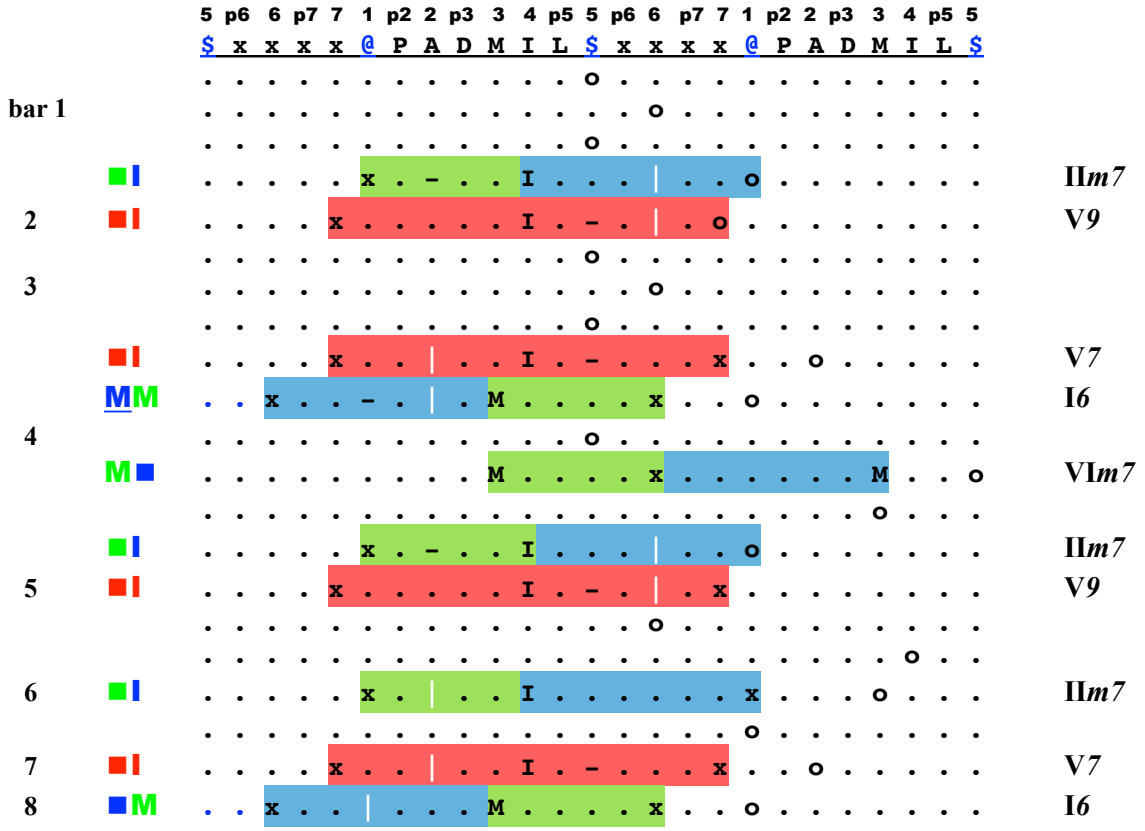
Most transitions in this core harmony are **slides** or **morphs**. A slide moves a building block to a different keyboard position while holding its size. A morph changes its size while holding one end fixed. The exception is the **wobbly slide I-M** which changes both position and size in one step. 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).



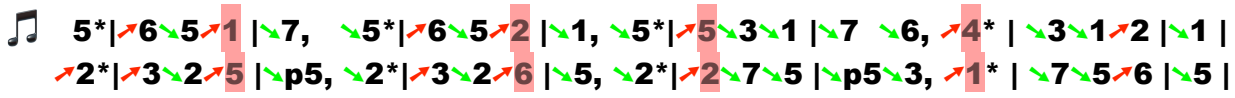
The home tonic and the mode tritone determine the scale that supplies the fifos. Chord roots identified by dashes within the shapes, are visibly provided by context. Different choices of roots yield different chords but these choices are simple and obvious. This is voice-leading harmony overall, not 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 (down a fourth).



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. 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 same piano keys are *not* represented differently.

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").

```
⚓  | M          | D          | M   | M   |
♫  | ↗5↘4↘p3↘1, | ↗5↘4↘p3↘1, | —— | —— |
⚓  | D          | D          | M   | M          |
♫  | ↗5↘4↘p3↘1, | ↗5↘4↘p3↘1, | —— |  ↗5↗p7↘5 |
⚓  | I          | D                  | M   | M |
♫  | ↗p7 p7,  ↘5 | ↗1↘p7↘5↘p5↘4↘p3↘1, |     |   |
```

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	.
melody	x	.	.	x	.	x	x	x	.	.	x	.	x
blues family	x	.	x	x	x	x	x	x	.	x	x	.	x
selected building blocks	.	.	.	.	.	.	L	.	.	.	.	.	@
	.	.	.	.	.	I	.	.	.	.	.	x	.
	.	.	.	.	M	.	.	.	.	.	x	.	.
	.	.	.	D	.	.	.	.	.	x	.	.	.

DMI
//DL **(6-note minor blues)**
//DM.L
L - blues family
I - substitute for L
M
D

Substituting **I** for **L** follows from conventional thinking about chords. 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. One of the problems with this is the introduction of an extraneous potential dissonance between melody note **p7** and note **7** of the **V***7* chord.

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.

F	G	A	Bb	C	D	Eb	F	
1	**p2**	**2**	**p3**	**3**	**4**	**p5**	**5**	
@	**.**	**A**	**D**	**M**	**I**	**L**	**$**	
@	.	.	.	M	.	.	.	*I7*
@	.	.	D	.	–	.	.	*IV7*
@	.	.	.	M	.	.	.	*I7*
@	.	.	.	M	.	.	.	*I7*
@	.	.	D	.	–	.	.	*IV7*
@	.	.	D	.	–	.	.	*IV7*
@	.	.	.	M	.	.	.	*I7*
@	.	.	.	M	.	.	.	*I7*
.	.	x	.	.	I	.	–	*V7*
@	.	.	D	.	–	.	.	*IV7*
@	.	.	.	M	.	.	.	*I7*
@	.	.	.	M	.	.	.	*I7*

F	G	A	Bb	C	D	Eb	F	
5	**p6**	**6**	**p7**	**7**	**1**	**p2**	**2**	
$	**.**	**x**	**x**	**.**	**@**	**.**	**A**	
.	.	.	x	.	–	.	.	*I7*
.	.	x	.	.	.	.	.	*IV9*
.	.	.	x	.	–	.	.	*I7*
.	.	.	x	.	–	.	.	*I7*
.	.	x	.	.	.	.	.	*IV9*
.	.	x	.	.	.	.	.	*IV9*
.	.	.	x	.	–	.	.	*I7*
.	.	.	x	.	–	.	.	*I7*
.	.	.	.	+	.	.	.	*V7*
.	.	x	.	.	.	.	.	*IV9*
.	.	.	x	.	–	.	.	*I7*
.	.	.	x	.	–	.	.	*I7*

F	G	A	Bb	C	D	Eb	F	
3	**p3**	**4**	**p5**	**5**				
M	**D**	**I**	**L**	**$**				
M	.	.	.	$				*I7*
D	.	–	.	$				*IV9*
M	.	.	.	$				*I7*
M	.	.	.	$				*I7*
D	.	–	.	$				*IV9*
D	.	–	.	$				*IV9*
M	.	.	.	$				*I7*
M	.	.	.	$				*I7*
I	.	.	.	$				*V7*
D	.	–	.	$				*IV9*
M	.	.	.	$				*I7*
M	.	.	.	$				*I7*

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.

```
♫ | 5↘4  ↘p3  ↘1,  | ↗5↘4  ↘p3  ↘1,      | ———————— | ———————— |
⚓ | 1  ↗2  ↗p3  ↗3 | ↗4  ↘p3  ↘2  ↘p2    |↗1 ↗3 ↗5 ↗6 |↗p7 ↘6 ↘5 ↘3 |

♫ |↗5↘4  ↘p3  ↘1,  | ↗5↘4  ↘p3  ↘1,      | ———————— |      ↗5↗p7↘5 |
⚓ | ↗4  ↘p3  ↘2  ↘p2 | ↗4  ↘p3  ↘2  ↘p2  |↗1 ↗3 ↗5 ↗6 |↘3 ↗p7  ↘6 ↘p3 |

♫ |↗p7 p7,        ↘5 |↗1↘p7↘5↘p5↘4↘p3  ↘1, | ———————— | ———————— |
⚓ | ↘2  ↗3 ↗4 ↗p5  |↗5  ↗6  ↗p7  ↗7  |↗1 ↗2 ↗p3 ↗3 |↘1 ↗2 ↗p3 ↗3 |
```

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

These pieces were among the first I learned when I started out. 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.

```
♫  5 |↗1↗2↗p3↗3,   ↘5↗1↗2 |↗p3↗3↗4↘p3,      ↘5  |↗1↗2↗p3↗3,   ↘5↗1↗2 |
⚓    | 1    ↗2    ↗p3  ↗3   | ↗4   ↘p3   ↘2 ↘p2   |↗1   ↗3    ↗5   ↗6    |

♫    |↗p3↗3↗4↘5↗1↗2↗p3,  | —↘5↗1↗2↗3↗4↘p3,  | ————————— |
⚓    |↗p7   ↘6   ↘5   ↘3   | ↗4  ↘p3  ↘2   ↘p2  | ↗4 ↘p3↘2↘p2 |

♫    | —↘5↗1↗2↗p3↗3,   ↘5 | ↗1↗2↗p3↗3,   ↘5↗1↗2 | ↗p3↗3↗4↘5↗p6↗6↗p7↗7 |
⚓    |↘1   ↗3   ↗5   ↗6   | ↘3   ↗p7  ↘6   ↘p3   | ↘2   ↗3   ↗4   ↗p5   |

♫    |↘1↗p6↗6↗p7↗7,     | ↗1↗p2↗2↗p3↗3,      | ————————— |
⚓    |↗5   ↗p6   ↗p7  ↗7  | ↗1   ↗2   ↗p3  ↗3  | ↘1 ↗2  ↗p3  ↗3 |
```

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).

```
♫ | 3↗4↗p5↗5,      | ↗6↗p7↗7↗1,        | ↘5↗6↘5↘p5↘4,   ↘p3↗3  | —↘p3   ↘2 ,       |
⚓ | 1   ↗2   ↗p3↗3 | ↗4   ↗5   ↗p6  ↗6 | ↘1   ↗1   ↘5    5    |↗1   ↗2   ↗p3  ↗3 |

♫ | ↗6↗p7↗7↗1,      |↗1↗p2↗2↗p3,     | ↘5↗6↘5↘p5↘4,  ↘p3↗3 , |                ↗5 5 5 |
⚓ | ↗4   ↗5   ↗p6↗6  | p5   ↗5   ↗p6↗6 | ↘1   ↗1   ↘5    5    | ↘1   ↘p7  ↘6  ↘p6   |

♫ |  5↘5              | ↘5↗6↘5↘p5↘4,  ↘p3  ↗3 , | —  ↗5↗6↘5↘p5↘4  |↘p3 ↗3,        |
⚓ | ↘5   ↗6   ↗p7↗7  | ↗1   ↘p7   ↘6  ↘p6     |↘5  ↗6   ↗p7   ↗7 |  1  ↗2  ↗p3  ↗3 |
```

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 (double 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.

Learn it first with only the main melody line and then add the second one underneath.

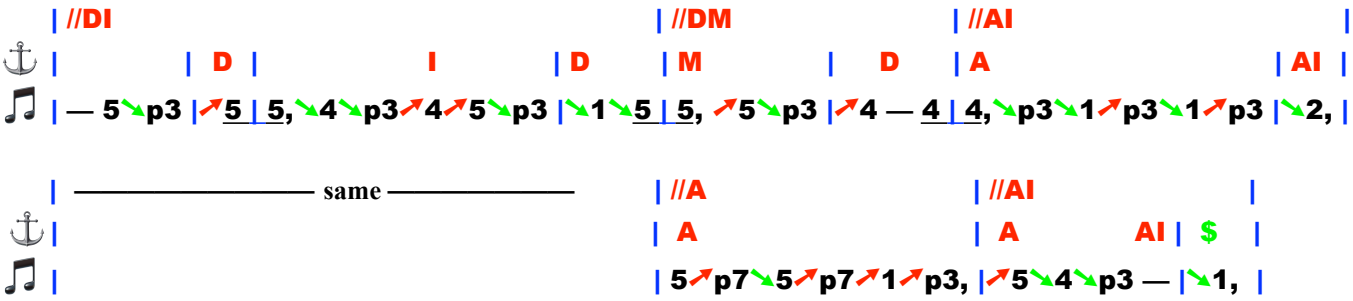
```
                Bb   C    D  Eb   F    G   A  Bb
                1 p2 2 p3 3 4 p5 5 p6 6 p7 7 1
                @ P A D M I L $ x x x x @
//DML           x . x x x x x x . x x . x
bar 1           x=======x . . . . . . . .
                . . x———x . . . . . . . .
                . . . x———x . . . . . . .
                . . . . x———x . . . . . .
                . . . . . . . . . . . . .
bar 2           . . . . . x=======x . . .
                . . . . . . . x———x . . .
                . . . . . . . . x———x . .
                . . . . . . . . . x———x .
                . . . . . . . . . . . . .
bar 3           . . . . x———x . . . . . .
                . . . . . x=======x . . .
                . . . . x———x . . . . . .
                . . . x———x . . . . . . .
                . . x———x . . . . . .
              x=======x . . . . . . . . .
                x=======x . . . . . . . .
bar 4           . . . . . . . . . . . . .
             x=======x . . . . . . . . .
           x=======x . . . . . . . . . .
```

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).

```
⚓|        | I  I |     | I  I | I  M | D   A     | M  I       | M  I |
♫| — 5↗6 |↗1↗2  | 2↘1 |↘6↘5 | 5↗6 |↗1↗2↗4↘2 |↗3*↘2↗3↘2 |↘1  — |

⚓|| A   | A     || A   | P   || $   | L   || I   | I   ||
♫| ↗3↗3 |↗3↗p5  | ↘3  3 | 3↘6  | ↗2  2 | 2↗3 | ↘2↘2 |↘5  |
```

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

	1	p2	2	p3	3	4	p5	5	p6	6	p7	7	1	
	@	P	A	D	M	I	L	$	x	x	x	x	@	
I	.	.	–	.	.	I	.	.	.	.	.	.	x	*II-m7*
I	.	.	.	.	.	I	.	–	.	.	.	x	.	*V-7*
I	.	.	.	.	.	I	.	–	.	.	x	.	.	*V-m7*
M	–	.	.	.	M	.	.	.	.	.	x	.	.	*I-7*
D	.	.	.	D	.	–	.	.	.	x	.	.	.	*IV-7*
A	.	.	A	.	.	.	.	.	x	.	–	.	.	*pVII-7*
M	–	.	.	.	M	.	.	.	.	x	.	.	.	*I-6*
I	.	.	.	.	.	I	.	–	.	.	.	x	.	*V-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**.

		1	p2	2	p3	3	4	p5	5	p6	6	p7	7	1	
		@	P	A	D	M	I	L	$	x	x	x	x	@	
9	A	.	.	A	.	.	.	.	.	.	x	.	x	.	*VII-m7*
10	A	.	.	A	.	–	.	.	.	x	.	.	x	.	*III-7*
11	A	.	.	A	.	–	.	.	x	.	.	.	x	.	*III-m7*
12	P	.	P	.	.	.	.	.	x	.	–	.	x	.	*VI-9*
13	$	x	.	.	.	.	.	.	$	.	x	.	.	.	*VI-m7*
14	L	x	.	–	.	.	.	L	.	.	x	.	.	.	*II-7*
15	I	x	.	–	.	.	I	.	.	.	x	.	.	.	*II-m7*
	I	x	.	.	.	.	.	I	.	–	.	x	.	.	*V-9*

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

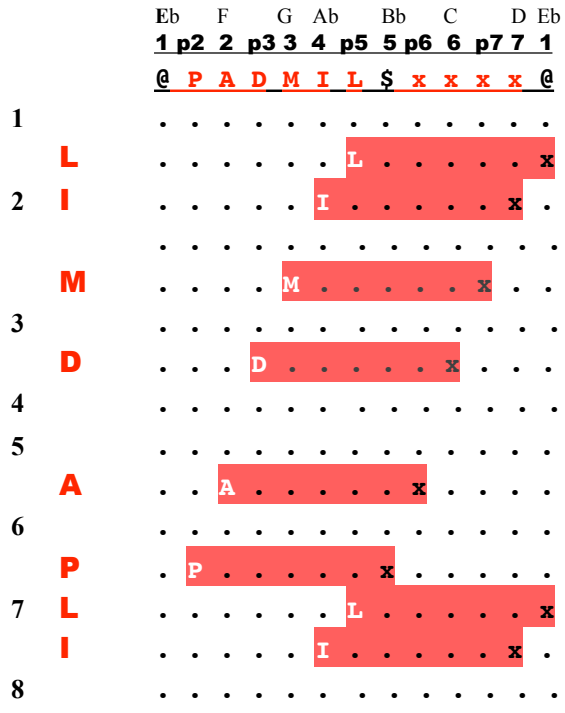
ORNAMENTED BASIC CLASSICAL : "OVER THE RAINBOW"

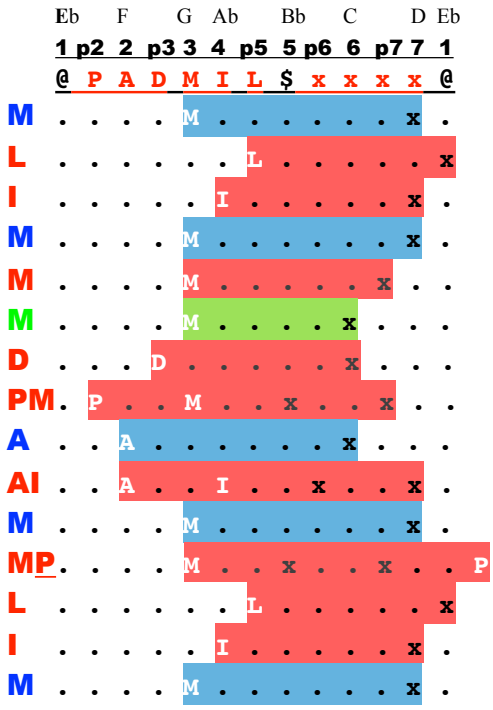
Home Tonic - Eb (3 flats key signature: Ionian of Eb)

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).

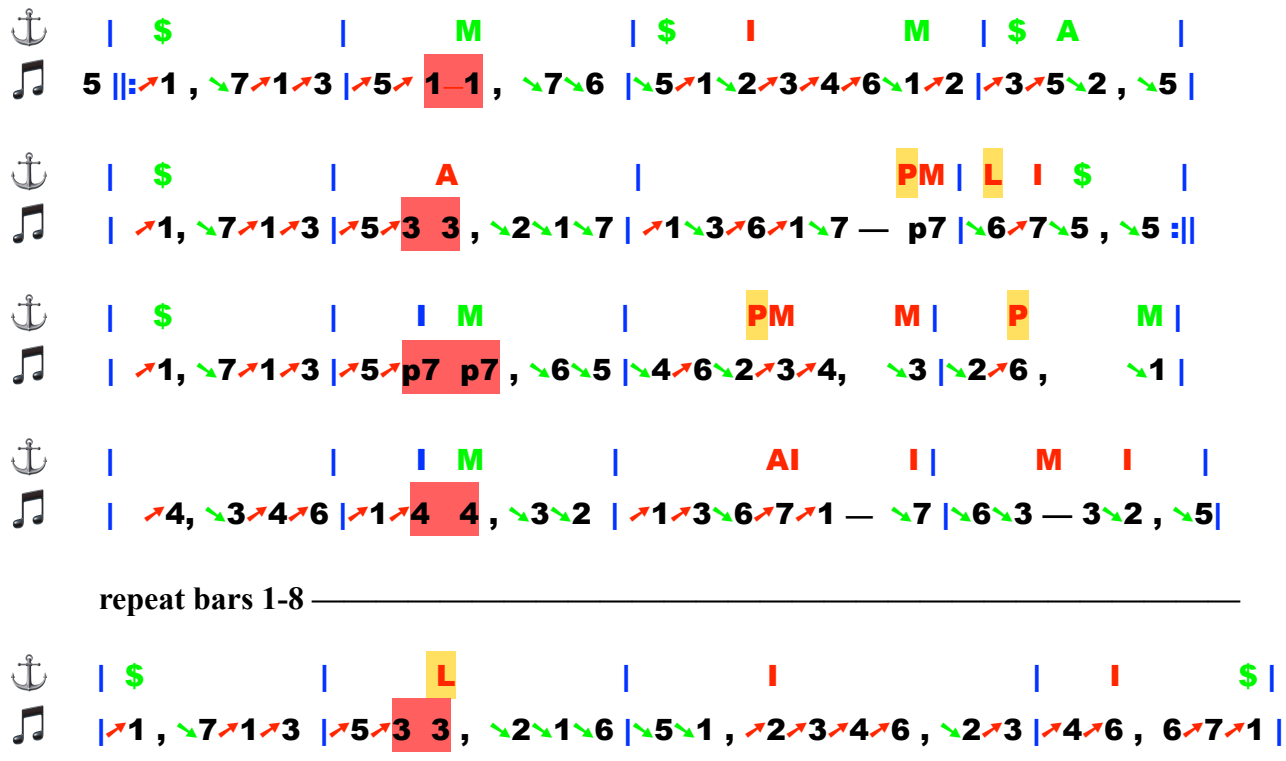




Here's a summary of the melody and final core harmony.

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.

	F		G		A	Bb		C		D		E	F	
	1	p2	2	p3	3	4	p5	5	p6	6	p7	7	1	
	@	P	A	D	M	I	L	$	x	x	x	x	@	
//I	@	.	x	.	x	x	.	$	.	x	.	x	@	Ionian mode (first & last bars)
//A.MI+	@	.	x	.	x	x	.	$	x	+	x	x	@	major family scale (middle bars)
$	.	.	.	.	.	.	.	$	.	.	.	.	@	building blocks from the family scale
I	.	.	.	.	.	I	.	.	.	.	.	.	x	
I	.	.	.	.	.	I	.	.	.	.	.	x	.	
I	.	.	.	.	.	I	.	.	.	.	x	.	.	
M	.	.	.	.	M	.	.	.	.	.	x	.	.	
M	.	.	.	.	M	.	.	.	.	x	.	.	.	
A	.	.	A	.	.	.	.	.	x	.	.	.	.	
A	.	.	A	.	.	.	.	$	.	.	.	.	.	

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*.

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)
//AD.I+	@ . A D . I . $ x x + x @	minor family (9 notes)
//A.MI+	@ . A . M I . $ x + x x @	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
//Ax.I	@ . A + . I . $ x------x @	harmonic minor (7 notes)
//A.xI	@ . A . + I . $ x------x @	harmonic major (7 notes)
//A.MI	@ . A . + I . $ x + . x @	"bebop" major (8 notes)
//AxxI	@ . A + + I . $ x------x @	harmonic min-maj (8 notes): master of 8 modes
//I	@ . A . M I . $. x . x @	Ionian (7 notes): master of 7 modes
//MD	@ . A D M------$. x------@	major blues (actually minor-major)
//DL	x------D . I L $------x . x	minor blues
//M	@ . A . M------$. x------@	pentatonic major
//D	@------D . I . $------x . @	pentatonic minor

The scales above the double line are atonal. The scales below the double line are tonal. The letters **ADMI** are fundamental to these anchor sets, with different omissions of letters or different identifications of them as fifo-only anchors or plain notes 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 relative 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. 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.

```
          P.DM.L
            ||            morph
          DM.L
         /  |  \          sub
     DM   M.L  D..L
         \  |  /          sub
          D, M
```

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.

```
ADMI, AD.IL                    ADMI, PA.MI
     ||        morph                ||        morph
  AD.I×                          A.MI×
     |         sub                  |         sub
  AD.I                           A.MI
  /    \       sub               /    \       sub
D.I    A..I                    A.M    A..I
 ||     ||      morph            ||     ||      morph
 D      A                       M      I
```

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 tone.

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.

Tonic & Mode Changes: Two Sides of the Samc Coin

Parallel mode changes and same-mode tonic changes are "two sides of the same coin" — knowing one means knowing the other. Tonic changes are in the domain of melody lines; a parallel-mode change covers all possible changes to relative modes of secondary tonics, so the parallel-mode-changes side of the coin is always sufficient. That said, an example of the other side of the coin helps to give a sense of things.

Consider the **D-I** tritone change shown below, from an established **//D** mode. The change could be ornamental, or it could be one of the mode changes **//D-//I** or **//D-altI**. The "other side of the coin" of these mode changes is same-mode tonic changes to relative Dorian modes. The tonics of **//I** and **alt I** modes are a tritone apart so the tonics of relative Dorian modes will be a tritone apart. The **D-I** change is 2 steps up, so the possible tonic changes will be 2 steps up for **//I** (altering 2 notes) or 4 steps down for **alt I** (altering 4 notes). The highlighted tonics are Dorian tonics because each is a minor third below one end of the **I** tritone as new the Dorian tritone of a secondary tonic.

```
4 steps down |<————————|——>| 2 steps up
        $ . . . . @ P A D M I L $ . . . . @
        . . x . . . . . D . . . . . x . . .
        . . . . x . . . . . I . . . . . x .
                             |——>| 2 steps up
```

In general, possible tritone changes are covered by 1, 2 or 3 steps up or down from an alphabet position and 6 minus this number of steps in the opposite direction. The numbers here are 2 steps up and 6-2=4 steps down. The process is the same for all changes.

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 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	<— example above
+1	-5	1	+1	5	
0	0	0	± 6	5	
-1	+5	1	-1	5	
-2	+4	4	-2	2	
-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.

Overview of "Melodic" and "Harmonic" Modes

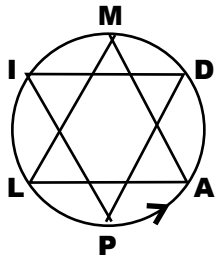
These modes are conventionally understood to be parallel modes of three master modes, namely melodic minor, harmonic minor and harmonic major. This means the parallel modes are relative modes of transposed master modes. The representation of the parallel harmonic modes is greatly simplified by defining 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**.

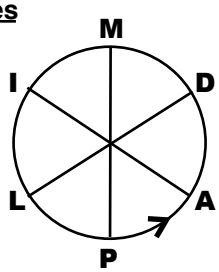
7 melodic minor modes

//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. The results are far from simple in music notation: this point is sufficiently well illustrated by chords formed of combinations of building blocks, without extending the exploration to include triad chords.

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.

		1	p2	2	p3	3	4	p5	5	p6	6	p7	7	1	p2	2	p3	3	4	p5	5	p6	6
chord	**shape**	@	.	A	.	M	I	.	$	.	x	.	x	@	.	A	.	M	I	.	$	.	x
I-*M7*	434	o	.	.	.	M	.	.	o	.	.	.	x	.	.	.	.	.	.	.	.	.	.
II-*m7*	— 343	.	.	o	.	.	I	.	.	.	o	.	.	x	.	.	.	.	.	.	.	.	.
III-*m7*	— 343	.	.	.	.	M	.	.	o	.	.	.	x	.	.	o	.	.	.	.	.	.	.
IV-*M7*	434 —	.	.	.	.	.	I	.	.	.	o	.	.	x	.	.	.	o	.	.	.	.	.
V-*7*	— — 433	.	.	.	.	.	.	.	o	.	.	.	x	.	.	o	.	.	I	.	.	.	.
VI-*m7*	— 343	.	.	.	.	.	.	.	.	.	x	.	.	o	.	.	.	M	.	.	o	.	.
VII-*m7b5*	— — — 334	.	.	.	.	.	.	.	.	.	.	.	x	.	.	o	.	.	I	.	.	.	o

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.

	1	p2	2	p3	3	4	p5	5	p6	6	p7	7	1	p2	2	p3	3	4	p5	5	
shape	@	.	A	.	M	I	.	$	.	x	.	x	@	.	A	.	M	I	.	$	**chord**
I4	.	.	.	.	.	I	.	.	.	o	.	.	x	.	.	.	o	.	.	.	IV-*M7*
I3	.	.	.	.	.	I	.	.	.	o	.	x	.	.	o	.	.	.	.	.	VII-*m7b5*
M3	.	.	.	.	M	.	.	o	.	.	.	x	.	.	o	.	.	.	.	.	III-*m7*
M3	.	.	.	.	M	.	.	o	.	x	.	.	o	.	.	.	.	.	.	.	VI-*m7*
3I	.	.	o	.	.	I	.	.	.	o	.	.	x	.	.	.	.	.	.	.	II-*m7*
3I	.	.	o	.	.	I	.	o	.	.	.	x	.	.	.	.	.	.	.	.	V-*7*
4M	o	.	.	.	M	.	.	o	.	.	.	x	.	.	.	.	.	.	.	.	I-*M7*

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.

	1	p2	2	p3	3	4	p5	5	p6	6	p7	7	1	p2	2	p3	3	4	p5	5	p6	6	
shape	@	.	A	.	M	I	.	$	.	x	.	x	@	.	A	.	M	I	.	$	.	x	**chord**
I4	.	.	.	.	.	I	.	.	.	o	.	.	x	.	.	.	o	.	.	.	.	.	IV-*M7*
I4	.	.	.	.	.	.	.	.	.	.	.	x	.	.	o	.	.	I	.	.	.	o	VII-*m7b5*
M3	.	.	.	.	M	.	.	o	.	.	.	x	.	.	o	.	.	.	.	.	.	.	III-*m7*
M3	.	.	.	.	.	.	.	.	.	x	.	.	o	.	.	.	M	.	.	o	.	.	VI-*m7*
3I	.	.	o	.	.	I	.	.	.	o	.	.	x	.	.	.	.	.	.	.	.	.	II-*m7*
4I	.	.	.	.	.	.	.	.	o	.	.	.	x	.	.	o	.	.	I	.	.	.	V-*7*
4M	o	.	.	.	M	.	.	o	.	.	.	.	x	.	.	.	.	.	.	.	.	.	I-*M7*

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.

	shape		1	p2	2	p3	3	4	p5	5	p6	6	p7	7	1	p2	2	p3	3	4	p5	5	p6	6	p7	7	1	
			@	.	A	.	M	I	.	$	.	x	.	x	@	.	A	.	M	I	.	$	.	x	.	x	@	
(a)	I\A	(I27)	.	.	.	.	.	I	.	.	.	.	.	.	@	.	A	.	.	.	.	.	.	x	.	.	.	II*m7*
	I\A	(I37)	.	.	.	.	.	I	.	.	.	.	.	x	.	.	A	.	.	.	.	.	.	x	.	.	.	V*7*
	M\@	(M17)	.	.	.	.	M	.	.	.	.	.	.	x	@	.	.	.	.	.	.	$	.	.	.	.	.	I*M7*
(b)	I\M	(I45)	.	.	.	.	.	I	.	.	.	.	.	.	@	.	.	.	M	.	.	.	.	x	.	.	.	II*m9*, IV*M7*
	I\M	(I55)	.	.	.	.	.	I	.	.	.	.	.	x	.	.	.	.	M	.	.	.	.	x	.	.	.	V*7(13)*, VII*m7b5*
	M\A	(M35)	.	.	.	.	M	.	.	.	.	.	.	x	.	.	A	.	.	.	.	$	.	.	.	.	.	I*M9*, III*m7*
(c)	I\M	(I45)	.	.	.	.	.	I	.	.	.	.	.	.	@	.	.	.	M	.	.	.	.	x	.	.	.	II*m9*, IV*M7*
	I\M	(I55)	.	.	.	.	.	I	.	.	.	.	.	x	.	.	.	.	M	.	.	.	.	x	.	.	.	V*7(13)*, VII*m7b5*
	M\A	(M55)	.	.	.	.	M	.	.	.	.	x	.	.	.	.	A	.	.	.	.	$	.	.	.	.	.	I*M6(9)*, III*m7(11)*

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.

Some Misleadingly Complex Chord Symbols from Classical Modes

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	.	V*7*, II*m7(13)*, I*M9(11)*
.	.	x	.	.	.	.	x	.	.	.	.	.	
.	.	.	.	.	x	.	.	.	.	.	x	.	V*9(13)*, IV*M7b5*
.	.	.	.	x	.	.	.	.	x	.	.	.	
.	.	.	.	.	x	.	.	.	.	.	x	.	V*7(11)*, II*m7(13)*
x	.	.	.	.	x	.	.	.	.	.	.	.	
.	.	.	.	.	x	.	.	.	.	.	x	.	V*13(11)*, I*M7b5*
x	.	.	.	.	.	.	x	.	.	.	.	.	
.	.	.	.	.	x	.	.	.	.	.	x	.	VII*m7b5*, IV*M6b5*, II*m6*
.	.	x	.	.	.	.	.	.	x	.	.	.	

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

Chords From Non-Classical Modes.

	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
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**

This illustrates that non-classical modes provide many new chords. 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.

Chords From Tritones

Tritone chords may be identified directly on the keyboard as indicated by the following selection of examples. Context would determine which one fits.

3-note chords						R	.	.	o	.	.	x			**R*dim***
		o	.	.		x	.	.	.	.	.	R			**R*dim* (inverted)**
						x	.	.	.	.	.	x	.	.	R	**R*dim* (inverted)**
4-note chords	R	.	.	.		x	.	.	o	.	.	x			**R7 (3 note voicing omits inner note)**
		R	.	.		x	.	.	.	o	.	x			**Rm6 (3 note voicing omits inner note)**
						x	.	R	.	.	.	x			**R7 (3 note voicing of inversion)**
						R	.	.	o	.	.	x	.	.	o	**Rm7b5**
						x	.	.	.	o	.	R			**Rm7b5 (3-note voicing of inversion)**
						x	.	.	o	.	.	x	.	R		**R7 (inverted)**

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)

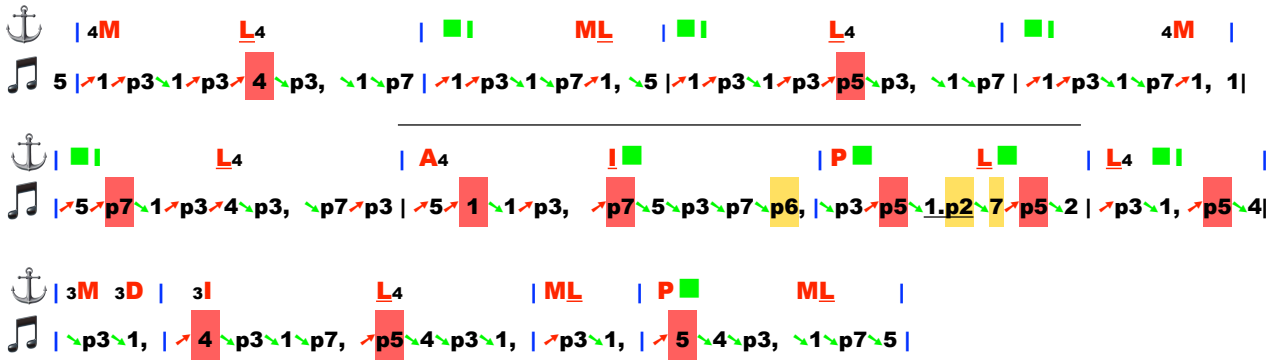
NON-CLASSICAL DOMAIN : "GOODBYE PORKPIE HAT"

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., **I7/pV*7*, II7/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 a 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 sounds fine and 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.

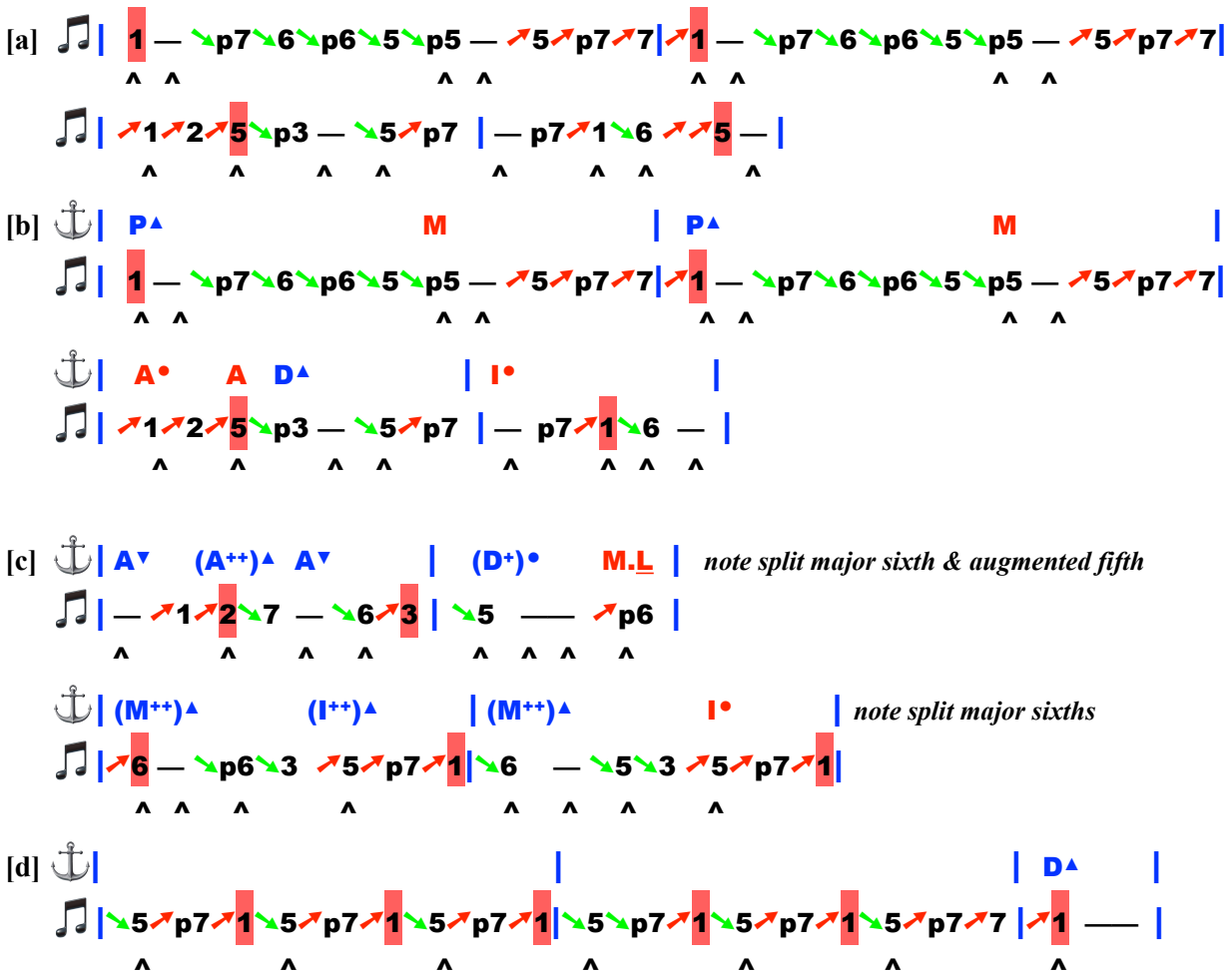
		1	p2	2	p3	3	4	p5	5	p6	6	p7	7	1		
		@	P	A	D	M	I	L	$	x	x	x	x	@		
1	4M	x	.	.	.	M	.	.	.	.	.	x	.	.	I*7#9*	
	L4	x	.	.	.	.	.	L	.	–	.	x	.	.	pVI*9(13)*	
2	■I	x	–	.	.	.	I	.	.	.	.	x	.	.	pII*M9*	
	ML	x	.	.	.	M	.	L	.	.	.	x	.	.	pV*7#11*	
3	■I	x	.	–	.	.	I	.	.	.	.	x	.	.	II*9sus*	
	L4	x	.	.	.	.	–	L	.	–	.	x	.	.	pVI*9(13)*	
4	■I	x	.	–	.	.	I	.	.	.	.	x	.	.	II*7sus*	
	4M	x	.	.	.	M	.	.	.	.	.	x	.	.	I*7*	
5	■I	x	.	.	.	.	I	.	.	.	.	x	.	.	IV*m11*	
	L4	@	.	.	.	.	.	L	.	–	.	x	.	.	pVI*7(13)*	
6	A4	.	.	A	.	.	.	.	.	x	.	.	.	x	II*m7b5*	**start variation**
	I■	x	.	.	.	.	.	I	.	–	.	.	x	.	.	V*7#5#9*
7	P■	.	P	.	.	.	.	.	$	.	–	.	.	x	VI*13#11*	
	L■	x	.	–	.	.	.	L	.	.	.	.	x	.	II*7(13)*	
8	L4	x	.	.	.	.	.	L	.	–	.	x	.	.	pVI*7*	**back to the blues**
	■I	x	–	.	.	.	I	.	.	.	.	x	.	.	pII*M7*	
9	4M	x	.	.	.	M	.	–	.	.	.	x	.	.	pV*7(13)*	
	3D	x	.	.	D	.	–	.	.	.	x	.	.	.	IV*7*	
10	I4	x	.	.	.	.	.	I	.	–	.	x	.	.	V*7*	**turnaround**
	L4	x	.	–	.	.	.	L	.	.	.	x	.	.	II*7*	
11	M L	x	.	.	.	M	.	L	.	.	.	x	.	.	I*7#9* + pVI*7*	**2-chord mashup**
12	P■	.	P	.	.	.	.	.	$	.	.	.	.	x	pII*M7#11*	
	ML	x	.	.	.	M	.	L	.	.	.	x	.	.	pV*7#11*	**smooth segue to bar 1**

The variation in bars 6-7 provides 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. 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. My source for the written music is the *Classical Fake Book*, 2nd Edition, Hal Leonard (2013), page 222. The music in the fake book looks innocently (and misleadingly) simple — a melody line with a few accidentals and some chord symbols above it for mostly triad chords. The problem is it gives almost no sense of the scales in play beyond the fact that all the notes of the chromatic scale enter the picture somewhere.

This is one of those awkwardly difficult pieces that visit both a sharp key for minor tonality (4 sharps, C sharp minor) and a flat key for major tonality (5 flats, D flat major), while sticking to neither. The time signature is 9/8, nominally dividing each bar into 3 groups of 3 eighth notes (sometimes subdivided). This is the only piece for which downbeat markers (**^**) seemed necessary to get a handle on timing. The timing shown is 4/4, which requires squeezing some note sequences between beats without any timing guidance, and implies some slightly extended notes. However the downbeat markers are add-ons that don't alter representations of melody and harmony that are straight from the written music, and so are easily altered without affecting anything else.



Here follows a summary of scales that provide a helpful handle on the piece, in the sense that they help in determining what will sound right, next, at any point in the piece. Keep in mind that the letters D and A identifying notes of the key signature are different from alphabet letters **D** and **A**.

	C#	D#	E	F#	G#	A	B	C#	<—written key sig.
	1	**p2**	**2**	**p3**	**3**	**4**	**p5**	**5**	**p6**	**6**	**p7**	**7**	**1**	
	@	P	A	D	M	I	L	$	x	x	x	x	@	
melody [a, b, c]	@	.	x	x	x	x	x	$	+	x	x	+	@	//**DM.L** blues w. passing notes
melody [d]	@	.	.	x	.	x	.	$	.	.	x	.	@	//**D** pentatonic minor sub-scale
harmony [b, c, d]	x	x	.	x	x	.	x	x	.	x	x	.	x	**P.DM.L** diminished scale (blues parent)
	@	.	x	x	x	x	.	$	x	x	x	x	@	//**ADMI** scale

Here follows a summary of the harmony, which moves back and forth between two scales that share the minor-major **DM** part of the **//DM.L** mode signature and differ by outer tritones **P, L** and **A, I**. Among other things, the **ADMI** scale provides the passing notes for the blues scale. The in-context column provides shapes that capture the essence of the chords in the context of melody plus harmony. In [c], the symmetrically split augmented fifth and several asymmetrically split major sixths represent triad inversions using direct extensions of the triad notation to larger intervals: the somewhat awkward notations represent something very simple. I like to play more strongly blues-based harmony not shown here (more blues tritones, fewer fifos). Anyone who has followed this material so far should be to able to make a stab at doing so.

		chord	in-context	C#	D#	E	F#	G#	A	B	C#	<—written key sig.
				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	.	.	.	.	pII
		M•	M	.	x	.	.	M	.	.	.	.	.	x	.	.	pVII*dim*/p2
	6	P▲		.	P	.	.	.	x	.	.	x	.	.	.	.	pII
		M•	M	.	x	.	.	M	.	.	.	.	.	x	.	.	pVII*dim*/p2
	7	A•		.	.	A	.	.	x	.	.	x	.	.	.	.	II*dim*
		A.x	A	.	.	A	.	.	.	.	.	x	.	x	.	.	pVII7
		D▲		.	.	.	D	.	.	.	x	.	.	x	.	.	pIII
	8	I•		.	.	.	.	.	I	.	.	x	.	.	x	.	IV*dim*
[c]	9	A..I	A▼	.	.	A	.	.	x	.	.	.	x	.	.	–	IV/2 (II*m7*)
		$▲	(A⁺⁺)▲	.	.	A	.	.	.	.	$	.	.	.	x	.	V (outer notes)
		A..I	A▼	.	.	A	.	.	x	.	.	.	x	.	.	–	IV/2 (IIm7)
	10	(D⁺)•		.	.	.	D	.	.	.	$	.	.	.	x	.	VII⁺ (stacked major thirds)
		M.L		.	.	.	.	M	.	L	.	.	.	x	.	x	pVII7*b5*
	11	P..M	(M⁺⁺)▲	.	.	.	.	M	.	.	.	.	–	.	.	.	x	VI
		A..I	(I⁺⁺)▲	.	.	.	.	.	I	.	–	.	.	–	.	.	.	x	pVII*6* (outer notes)
	12	P..M	(M⁺⁺)▲	.	.	.	.	M	.	.	.	.	–	.	.	.	x	VI (outer notes)
		I•		.	.	.	.	.	I	.	.	x	.	.	x	.	IV*dim*
[d]	13-14	—		.	.	.	.	.	.	.	.	.	.	.	.	.	—
	15	D▲		.	.	.	D	.	.	.	$	.	.	x	.	.	pIII*6* (outer notes)

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 parallel 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.

```
⚓ |   L |     A   | P    |    L |    A |    M   | M   |
♫ | 1↘p6 |↘4 ↘p2↗3 | 3 ,  | ↘4↘p3 | ↗p6↘3 |↘p2↘6↗1 | 1 ,  |

⚓ |     A   | P  |    L     | L    |   M   | M  |    A    | A  |  M |
♫ |↗p2↘7↗3 | 3 , |↗4↘p3↗p6 | p6 ,  |↗6  6↗1 | 1 , |↗p2  p2↗3 | 3 ,|↘1  1 |
```

As shown in the following table, the melody scale considered by itself is an altered harmonic-minor-major (**hmm**) 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 hmm@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 harmony is shown next in Lego-like terms. Melodic resolutions to the home and secondary tonics are marked “>” on the left. These are the only places where fifos are needed (the grey-shaded fifos are optional add-ons). The morphs of the colored building blocks 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 shown on the right. Dashes indicate omitted roots. Octave shapes that go well with the flow of the melody are indicated on the left.

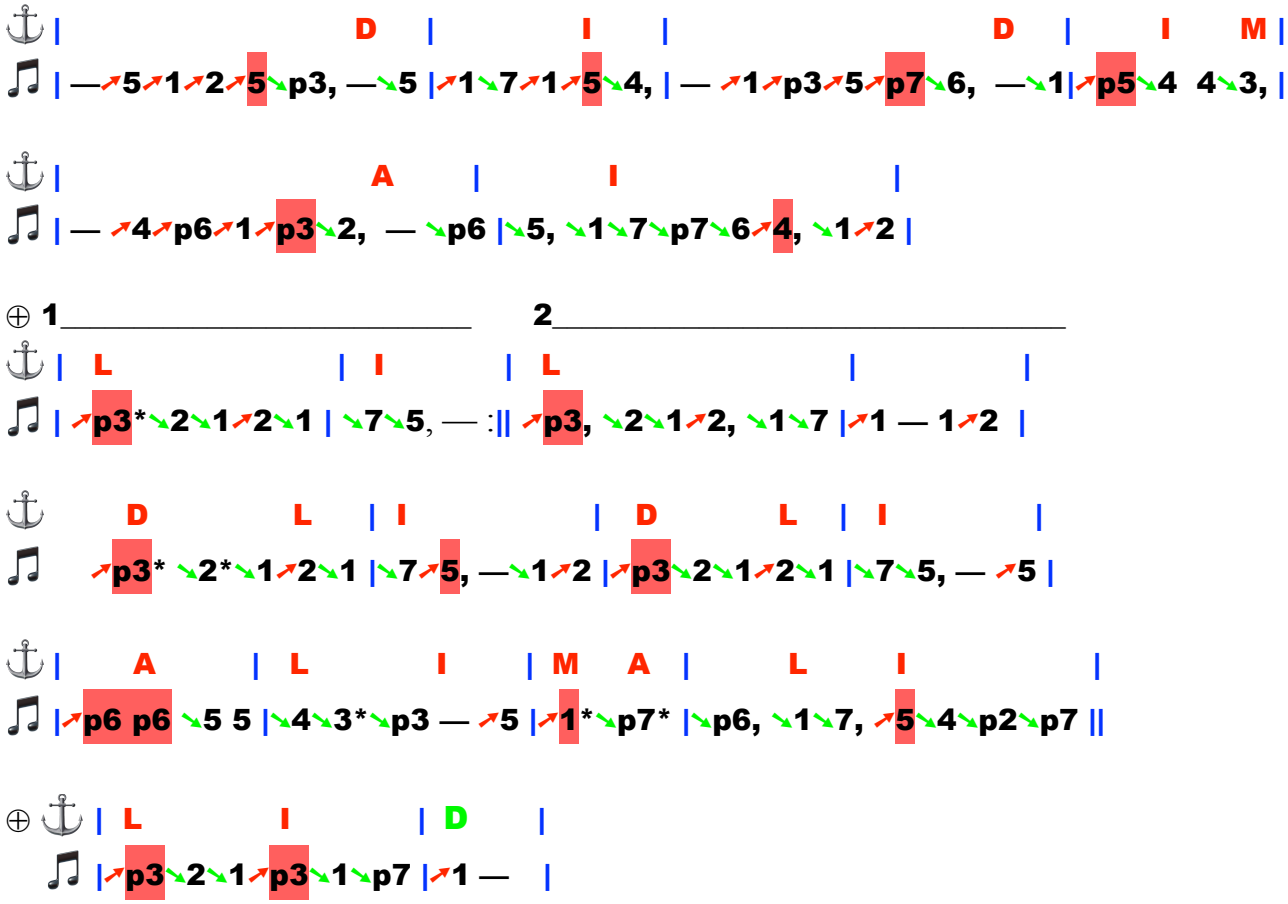
			F#	G#	A#	B	C#	D#	E	F#		
			1	p2 2	p3 3	4	p5 5	p6 6	p7 7	1		
	bar		@	P A	D M	I	L $	x x	x x	@		
	1	-	.	. . .	.	–	. . .	. .	. .	.	IV*M7*	*(follows from bar 16)*
		L■	.	. . .	. .	.	L .	– .	. .	x	pVI*7*	
	2	-	.	– . .	. .	.	. . .	. .	. .	.	pII*M7*	
		■A	.	. A .	– .	.	. .	x .	. .	.	III*7*	
>	3	■P	.	P . .	. .	.	. .	x –	. .	.	VI*M7*	
	4	-	.	. . –	. .	.	. .	. .	. .	.	bIII*m7*	
		■L	x	. – .	. .	.	L .	– .	. .	.	pVI*7*	
	5	-	.	– . .	. .	.	. .	. .	. .	.	pII*M7*	
		■A	.	. A .	– .	.	. .	x .	. .	.	III*7*	
	6	-	.	. . .	. .	.	. .	. –	. .	.	VI*M7*	
		■M	x . –	. .	. M	.	. .	. .	. .	.	I*7*	
>	7	■M	x . .	. . .	. M	.	. .	. .	. .	.	IV*M7*	
	8	-	.	. . .	. .	.	. .	. .	. –	.	VII*m7*	
		A■	.	. A .	– .	.	. .	x .	. .	.	III*7*	
>	9	P■	.	P . .	. .	.	. .	x –	. .	.	VI*M7*	
	10	-	.	. . –	. .	.	. .	. .	. .	.	bIII*m7*	
		■L	.	. . .	. .	.	L .	– .	. .	x	pVI*7*	
>	11	L■	.	– . .	. .	.	L .	. .	. x	.	pII*M7*	
	12	-	.	. . .	. .	.	. –	. .	. .	.	V*m7*	
		■M	–	. . .	M .	.	. .	. .	x .	.	I*7*	
>	13	M■	.	. . .	M –	.	. .	x .	. .	.	IV*M7*	
	14	-	.	. . .	. .	.	. .	. .	. –	.	VII*m7*	
		A■	.	. A .	– .	.	. .	x .	. .	.	III*7*	
>	15	A■	.	. A .	. .	.	. .	x .	. .	.	VI*M7*	
	16	-	.	. . .	. .	.	. –	. .	. .	.	V*m7*	
		■M	–	. . .	M .	.	. .	. .	x .	–	I*7*	*(goes to bar 1)*

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	@
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.

L	I
— ↗7↗1, ↗2↗3↗p5↗7, ↘p5↘3↗7, ↘p5↘3	↗2, ↘1↘5↘p3 ↗4,
M	**D**
— ↗6↗p7, ↗1↗2↗3↗6, ↘3↘2 ↗6, ↘3↘2	↗1, ↘p7↘4↘p2↗p3,
A	**P**
— ↗5↗p6, ↗p7↗1↗2↗5, ↘2↘1 ↗5, ↘2↘1	↗p7,↘p6↘p3↘7↗p2
ML	**IP**
— — — —	— — — —

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.

```
A ⚓| A          P  |    M  | M          D   |      LD   |
  🎵| — 2↗3↘2↗3↘2|↗6* — , | — ↘5↗6↘5↗6↘5 | ↗2↘1↘7↘6, |                ...//I
                                                  1_____  2_____
  ⚓| A            | I A  |              M      |   IA | I   |
  🎵| — ↗1↘6↘4↘2 |↗3↘2,  | — ↘1↗2↗3↗5,  5↗6↘p3 |↘1 — | 1 — |

B ⚓|              |            I     |            M     |      |
  🎵|↗p2↗p3↗4↗p6*|↗p2*↘4↗p6*—↘p5 |↘4*↘p2↗p3↘1 ↘p6 | p6 — | ...altL@p2

C ⚓|        M     | A    DL        |        M    M | D   A   P   PD |
  🎵|↗p2↗p3↗3↗p6* |↗p3*↘p7↗p2*↘p6|↗7*↘p6↗p7*↘p5|↘p3↘2↘p2↗6  |
                                                                ...altM@p2
```

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.

		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	harmony (first 4 bars)
	//A.MI	@	.	x	.	x	x	.	@	x	.	x	x	@	harmony (last 4 bars)
	//I	@	.	x	.	x	x	.	$	.	x	.	x	@	melody (all)
B	//A.MI	@	.	x	.	x	x	.	@	x	.	x	x	@	harmony
	altL@p2	x	x	.	x	.	x	x	.	x	.	x	.	x	melody: Ionian of tonic p2
C	//P.DM.L	x	x	.	x	x	.	x	x	.	x	x	.	x	harmony, ending returns to A
	altM@p2	.	x	.	x	x	.	x	.	x	.	x	x	.	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.

(a) ⚓ LD
♫ 7 7↘p7↗7↘p7↘p5↗5↗6*

(b) ⚓ PM D
♫ ↘3, ↗6 6↘p6↗6↘p6↘3↗4↗5 — ,

(c) ⚓ AI I DL
♫ — ↘p3↗4 — ↘p3↗4↘p3↗4 ↗5*↘2 , ↗p3↗5↗p7↗p3*↘p6 ,

(d) ⚓ LA L AI
♫ — ↗6 ↗2 , — ↗3↘1↗2 — ,

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

(e) ⚓ AI
♫ ↗4↗5 , — ↘3↗4↗p6↗7↗2↘1↗2 ,

(f) ⚓ DL AI AI
♫ ↘7↗1 ↗p3 p3 , ↗3↘p3↘2 ↘6↗7 ↗1 ,

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 (hmm) 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.

```
⚓  |  M        D   |  L          D    |      M          D  L |    I  |
♫ 4 ||: ↗2↘1↗2↘4, — 4 |↗4↘p3↘p7↘p5↗4↘p3 | p3,  ↘2↘1↘p7↘6, ↘5↗1 | ↘6, — |
⚓ |  M          D    A    |  P          L     I     |
♫ | ↘5↗p7↗1↘p7 ↗p2↘p7↗1↘p7, | ↘4↗p7↗1↘p7 ↗p2↘p7↗1↘p7, |
⚓ |  M            D        |   L  M  D      |   M   L
♫ | ↘5↗p7↗1↘p7, ↗4 — ↘p3↘p7 | ↗2 — — — , ↘4 :|| ↗2   —   |
```

```
⚓ |  $       $     |  L      L    | $       $  $ |  L  L  |
♫ | ↘7↗1↘7↗1 ↗2↗3 | ↗p5 ↘2*,  2↘7*, | 7↘5↗6, ↗7↗1 | ↗2 —  |        ...//L
⚓ |    I          M    |  M    A    |A            |  L  M  D    |
♫ | ↘p7↗1↘p7↗1↗2 — ↗p3 | ↗p3↘1*, 1↘6*, | 6↘4↗5 ↗6↗p7  |↗1  —  — , ↘4 |
```

---

repeat bars 1-6, followed by this ending, repeated twice

```
⚓ |  D          D      |  A  D   | A   D |
♫ | ↗2↗4↗5↘4 ↗p6↘4↘p2 | ↘1  —  | 1   — |
```

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
		@	.	x	D	M	x	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
		@	.	x	D	M	x	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.

(a) ⚓ | M | I | I M | PM I I |

♫ | 3 3 3 — | — 3 3 3 | 3 — — 3 | ↗ 4 — ↘2 ↘1 ↘7 |

(b) ⚓ | M PM | I I | M M | D A |

♫ | — ↗ 5 5 5 | — 5 5 5 | 5 — — ↘3↗4↗5 | ↗p6 — ↘4↘3↘2 |

(c) ⚓ | D D | A I | D M | M |

♫ | — ↗1 1 1 | 1 ↘7 — ↘ 5 | ↗p7 — ↘3↗4↗5 | ↗6 — |

(d) ⚓ | D A | A A | L L | A I |

♫ | — ↘p6 p6 p6 | p6↘5 — ↘1↗2 | ↗p3 p3 ↘1↗p3↘2 | — — |

(e) **repeat (a)-(b)**

(f) ⚓ | $ DL A | I | M M | D A |

♫ | — ↗1 1 ↗2↘1 | 1↘7 — ↘5↗6 | ↗p7 ↘3↗6 ↘2 | ↘1 ↘7↗1↗5↘4 |

(g) ⚓ | M M | L I | M | DL AI |

♫ | ↘3 3 3 — | — ↘2 ↘1 ↘7 | ↗1 | — — |

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.

			1	p2	2	p3	3	4	p5	5	p6	6	p7	7	1	
			@		A		M	I		$	x	+	x	x	@	
(f)	$	*I*	.	.	.	.	.	.	.	$	.	.	.	.	@	
	DL	*bIII-dim7*	.	.	.	D	.	.	L	.	.	x	.	.	@	
	A	*II-m7b5*	.	.	A	.	.	.	.	.	x	.	.	.	.	
	I	*V-7*	.	.	.	.	.	I	.	–	.	.	.	x	.	
	M	*I-7*	–	.	.	.	M	.	.	.	.	.	x	.	.	
	M	*IV-M7*	.	.	.	.	M	–	.	.	.	x	.	.	.	major
	D	*IV-m7*	.	.	.	D	.	–	.	.	x	.	.	.	.	to minor
	A	*pVII-7*	.	.	A	.	.	.	.	.	x	.	–	.	.	

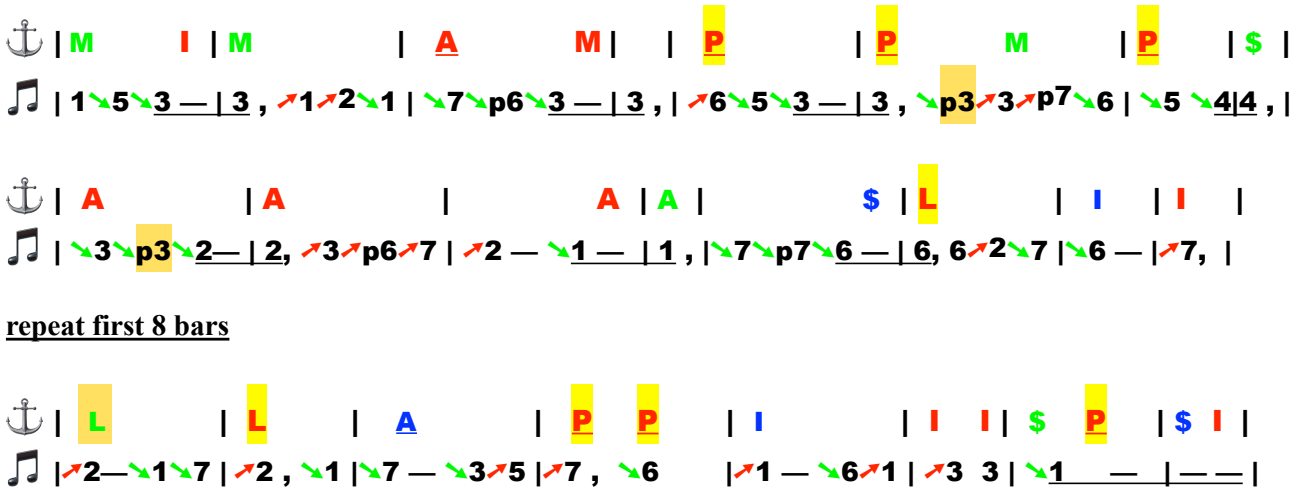
The sound of the piece is relatively insensitive to the exact placement of the harmony relative to the melody. When the melody is on a downbeat, playing the harmony on the following upbeat — and vice versa — often sounds fine. For this reason, the harmony placements shown don't necessarily align exactly 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.

		1	p2	2	p3	3	4	p5	5	p6	6	p7	7	1
	A.MI+	@	–	A	–	M	I	–	$	x	+	x	x	@
1, 17	M	–	.	.	.	M	.	.	.	.	x	.	.	–
	I	.	.	.	.	.	I	.	–	.	.	.	x	.
2, 18	M	–	.	.	.	M	.	.	.	.	x	.	.	–
3, 19	A	.	.	.	.	–	.	.	.	x	.	.	.	.
4, 20	M	.	.	.	.	M	.	.	.	.	.	x	.	.
5, 21	P	.	.	.	.	.	.	.	$	.	–	.	.	.
6, 22	P	.	.	.	.	.	.	.	$	.	–	.	.	.
	M	–	.	.	.	.	.	.	$	.	.	.	.	@
7, 23	P	.	.	.	.	.	.	.	$	.	–	.	.	.
8, 24	𝄾	.	.	.	.	.	.	.	$	.	.	.	.	.

		1	p2	2	p3	3	4	p5	5	p6	6	p7	7	1
	A.MI+	@	–	A	–	M	I	–	$	x	+	x	x	@
9	A	.	.	A	.	–	.	.	.	.	x	.	.	.
10	A	.	.	A	.	–	.	.	.	.	x	.	.	.
11	A	.	.	A	.	–	.	.	.	.	x	.	.	.
12	A	.	.	A	.	.	.	.	.	x	.	.	–	.
13	$	.	.	–	.	.	.	.	.	$	.	.	.	@
14	L	.	.	–	.	.	.	L	.	.	.	.	.	@
15	I	.	.	.	.	.	.	I	.	.	.	.	.	@
16	I	.	.	.	.	.	.	I	.	–	.	.	.	x

		1	p2	2	p3	3	4	p5	5	p6	6	p7	7	1
	A.MI+	@	–	A	–	M	I	–	$	x	+	x	x	@
25	L	.	.	.	.	.	.	L	.	.	–	.	x	.
26	L	.	.	.	.	.	.	L	.	.	–	.	.	x
27	A	.	.	.	.	–	.	.	x	.	.	.	.	.
28	P	.	.	.	.	.	.	.	x	.	–	.	.	.
	P	.	.	.	.	.	.	.	x	.	–	.	.	.
29	I	.	.	–	.	.	I	.	.	.	.	.	.	x
30	I	.	.	.	.	.	I	.	–	.	.	.	x	.
	I	.	.	.	.	.	I	.	–	.	.	.	x	.
31	$	.	.	–	.	.	.	.	$	.	.	.	.	@
	P	.	.	.	.	.	.	.	x	.	–	.	.	.
32	$	.	.	–	.	.	.	.	$	.	.	.	.	@
	I	.	.	.	.	.	I	.	–	.	.	.	x	.

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

		1	p2	2	p3	3	4	p5	5	p6	6	p7	7	1	p2	2	p3	3	4	p5	5	p6	6	p7	7	1	
	A.MI+	@	–	A	–	M	I	–	$	x	+	x	x	@	–	A	–	M	I	–	$	x	+	x	x	@	
1	M\A	.	.	.	.	M	.	.	.	.	x	.	.	–	.	A	.	.	.	.	$	.	.	.	.	.	I-6(9)
	I\M	.	.	.	.	.	I	.	–	.	.	.	x	.	.	.	.	M	.	.	.	.	x	.	.	.	V-9(13)
2	M\A	.	.	.	.	M	.	.	.	.	x	.	.	–	.	A	.	.	.	.	$	.	.	.	.	.	I-6(9)
3	L\A	.	.	.	.	–	.	L	.	.	.	.	x	.	.	A	.	.	.	.	.	x	.	.	.	.	III-9
4	M\A	.	.	.	.	M	.	.	.	.	.	x	.	.	.	A	.	.	.	.	.	x	.	.	.	.	III-9b5
5	P\L	.	.	.	.	.	.	.	x	.	–	.	.	.	P	.	.	–	.	L	.	.	.	.	x	.	VI-9(13)
6	P\I-	.	.	.	.	.	.	.	x	.	–	.	.	.	P	.	.	.	I	.	.	.	x	.	.	.	VI-7b13
7	$\M	.	.	.	.	.	.	.	$	.	.	.	.	@	.	–	.	M	.	.	.	.	x	.	.	.	II-m9
	P\I-	.	.	.	.	.	.	.	x	.	–	.	.	.	P	.	.	.	I	.	.	.	x	.	.	.	VI-7b13
8	$\M	.	.	.	.	.	.	.	$	.	.	.	.	@	.	–	.	M	.	.	.	.	x	.	.	.	II-m9

Bars 9-16

		1	p2	2	p3	3	4	p5	5	p6	6	p7	7	1	p2	2	p3	3	4	p5	5	p6	6	p7	7	1	
	A.MI+	@	–	A	–	M	I	–	$	x	+	x	x	@	–	A	–	M	I	–	$	x	+	x	x	@	
9	A\M	.	.	.	.	.	.	.	.	x	.	.	.	.	.	A	.	M	.	.	.	.	x	.	.	.	III-7
10	AI	.	.	.	.	.	.	.	.	x	.	.	.	.	.	A	.	.	I	.	.	.	.	.	x	.	III-7b9
11	$\M	.	.	.	.	.	.	.	$	.	–	.	.	@	.	.	.	M	.	.	.	.	x	.	.	.	VI-m7
	AI	.	.	.	.	.	.	.	.	x	.	.	.	.	.	A	.	.	I	.	.	.	.	.	x	.	III-7b9
12	$\M	.	.	.	.	.	.	.	$	.	–	.	.	@	.	.	.	M	.	.	.	.	x	.	.	.	VI-m7
13	$\M	.	.	.	.	.	.	.	$	.	.	.	.	@	.	–	.	M	.	.	.	.	x	.	.	.	II-9sus
14	L\M	.	.	.	.	.	.	L	.	.	.	.	.	@	.	–	.	M	.	.	.	.	x	.	.	.	II-9
15	I\M	.	.	.	.	.	I	.	.	.	.	.	.	@	.	–	.	M	.	.	.	.	x	.	.	.	II-m9
16	I\M	.	.	.	.	.	I	.	–	.	.	.	x	.	.	.	.	M	.	.	.	.	x	.	.	.	V-9
	I\D	.	.	.	.	.	I	.	–	.	.	.	x	.	.	.	D	.	.	.	.	x	.	.	.		V-7b9b13

Bar 17-24 - repeat bars 1-8

Bars 25-32

		1	p2	2	p3	3	4	p5	5	p6	6	p7	7	1	p2	2	p3	3	4	p5	5	p6	6	p7	7	1		
	A.MI+	@	–	A	–	M	I	–	$	x	+	x	x	@	–	A	–	M	I	–	$	x	+	x	x	@		
25	L\M	.	.	.	.	.	.	L	.	.	–	.	x	.	.	.	.	M	.	.	.	.	x	.	.	.		VI-6(9)
26	L\M	.	.	.	.	.	.	L	.	.	–	.	.	@	.	.	.	M	.	.	.	.	x	.	.	.		VI-m6(9)
27	A\M	.	.	.	.	.	.	.	$	.	.	.	.	.	.	A	.	M	.	.	.	.	x	.	.	.		III-m9
28	P\L	.	.	.	.	.	.	.	$	.	–	.	.	.	P	.	.	.	.	L	.	.	.	.	x	.		VI-9(13)
	P\I	.	.	.	.	.	.	.	$	.	–	.	.	.	P	.	.	.	I	.	.	.	.	x	.	.		VI-7b9b13
29	A\M	.	.	.	.	.	I	.	.	.	.	.	.	x	.	–	.	M	.	.	.	.	x	.	.	.		II-m9
30	I\M	.	.	.	.	.	I	.	–	.	.	.	x	.	.	.	.	M	.	.	.	.	x	.	.	.		V-13
	I\D	.	.	.	.	.	.	.	.	I	.	–	.	.	.	x	.	.	.	D	.	.	.	.	x	.	.	.	.	V-b9(13)
31	M\A	.	.	.	.	M	.	.	.	.	x	.	.	–	.	A	.	.	.	.	x	.	.	.	.	.		I-6(9)
	P\I	.	.	.	.	.	.	.	x	.	–	.	.	.	P	.	.	.	I	.	.	.	.	x	.	.		VI-7b9b13
32	$\M	.	.	.	.	.	.	.	$	.	.	.	.	@	.	–	.	M	.	.	.	.	x	.	.	.		II-m9(11)
	I\D	.	.	.	.	.	I	.	–	.	.	.	x	.	.	.	D	.	.	.	.	x	.	.	.	.		V-7b9b13

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.

```
♫    7↗1↗2 |
⚓ | M5          | D5                | A4          | P4          |      //A.MI+
♫ | ↘1, ↘7↘6↘3 | ↗5,      ↘p5↘4↘1 | ↗3          | 3   3↗7↘p7 |
⚓ | I5          | M5                | I5          | I5          |
♫ | ↘6          | 6      6↗3↘p3 | ↘2          | 2 ,  ↘7↗1↗2 |
repeat bars 1-4
⚓ | L4          | I4      I5  |  M5         |  D5         |      //I
♫ | ↘6,      6↘3↘2  | ↗1 — ↗2 — | ↘1 ,        | —           |
---------------------------------------------------------------
⚓ | A..I        |  $3         |  I..A       |  $3         |      //AI
♫ |↗3↗p6↗7↗2    | ↘1,         |↘p6↗7↗2↗4 | ↘3,         |
⚓ | I..A        |  $4         |        L4   | I3          |      //AI-//I
♫ |  3↗p6↗7↗2   | ↘1↘7↘6↘3    |↘2,     —    | — ↗7↗1↗2    |
---------------------------------------------------------------
repeat bars 1-4
⚓ |  L4         |  I4     I5  |  M5         |  I4     I5  |      //I
♫ | ↘6*↗3↘2     |↘1—↗2—       |↘1— ,        | —       —   |
```

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.

```
(a)//I      ⚓ $ |  I     |  I  | M       | M  |
            ♫ 1 | ↗4↘1 | ↘7* | 7↗3 ↘7 | ↘6*|
(b)altD     ⚓   | D       |   D |     |
            ♫   | 6↗p3↘6 | ↘p6 | — , |
(c) //L     ⚓   |  A  |  $   |  L   | L        | M   | P       PM    |
            ♫   | ↘5 | ↗1↘5 | ↘p5* | p5↗7↘p5 | ↘3* | 3↗p5↗5↘p5↘3|
(d)altM     ⚓   |         L        | M      | M            |  D | D  |
            ♫   |↘p3,  ↘p5↗7↗p5 | p5↘3* | —  ↘5↗p6↗3| ↘p3 | —  |
            ⚓   | M              |        |
            ♫   | — ↘p5↗7↗p3 | p3↘p2* |
(e)trans.   ⚓   | P              |  @  | A  |
            ♫   | —  ↘2↗p3↗p2 | ↘1* | — |
(f)//I      ...
```

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

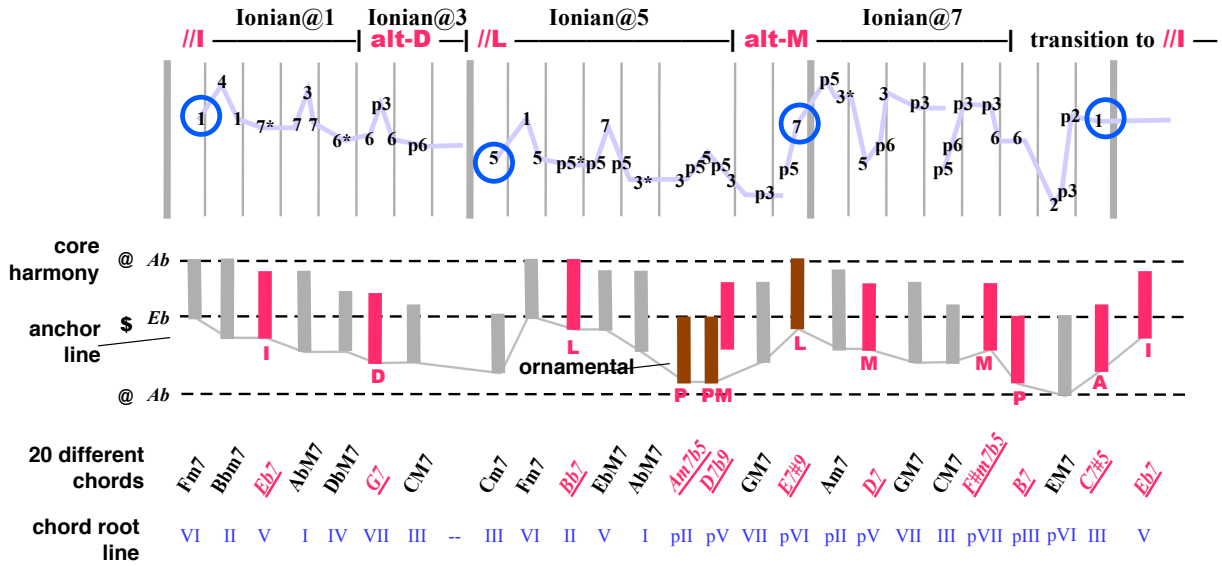
about this transition, and suggested I just memorize it. And so I did, but I kept worrying away at understanding it in more fundamental terms (described following the table).

		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	.	.	**pVII*m7b5***
(e)	P	.	x	.	–	.	.	.	x	.	.	.	.	x	**pIII*7***
	@	x	.	.	.	.	.	.	x	–	.	.	.	x	**pVI*M7***
	A	.	.	x	.	–	.	.	.	x	.	.	.	x	**III*7#5***
(f)	I	.	.	.	.	.	x	.	–	.	.	.	x	.	**V*7***

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.

1 ⚓ **ornamental** | **M D A P** | **harmony on repeat**

🎵 **//I** ||: — 6↗7, ↗1↗2, ↗3↗4↗5 |

2-5 ⚓ | **L.A** (@⁺) | **M.L** (**L⁺**) | **L.A** (@⁺) **M.L** (**L⁺**) | **P** |

🎵 **from** ⚓ | ↗p6—, ↗6↘p5 | p5, ↗5↗p6 | p6, ↗6↘p5—, ↗5↘p2 | p2 |

6-9 1 2

⚓ **//I** | **I** | **I** | **M** | **M D A** |

🎵 **from** ⚓ | ↗3 ↘1—, | ↗3↗5—, | ↘3↘1— :|| — 5↗p6 |

10-12 ⚓ **//A** | **A** | | **A** |

🎵 **//A** | ↗p7* | p7↘1↗p3↗5↗p7↗2 , ↗p3 | ↘2↘p7↗5↘p3↘1 ↘7↗p5↘2 |

13-15 ⚓ **alt-IP** | **P** | **I** **I** | |

🎵 **alt-IP** | ↘p2, — ↘p3 ↗4 | ↗5↗p6↗p3— ↘p2↘7 | ↘p7 ↗p2—, ↘7↘p7 |

16 ⚓ **from //L** | **M** |

🎵 **from //L** | ↘6, ↘p5↗6↗p2, ↘6 ↗p2 |

17 ⚓ **ornamental** | **M.L D A P** |

🎵 **//I** | ↗p5, ↘6↗7, ↗1↗2, ↗3↗4↗5 |

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.

		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	♫	@	.	x	.	x	x	.	x	.	x	.	x	@		major
bars 2-5	♫	.	.	.	.	.	.	x	x	x	x	.	.	.		// mode transitions
	⚓	x	.	x	.	x	.	x	.	x	x	.	x	x	//LA	major
	⚓	x	.	x	.	x	.	x	x	.	x	x	.	x	//ML	major
bars 6-9	⚓	@	.	x	.	x	x	.	x	.	x	.	x	@	//I	
	♫	@	.	.	.	x	.	.	x	.	.	.	.	@		exercises major triad
bars 10-12	♫	@	.	x	x	.	x		x	x	.	x	.	@	//A	minor
bars 13-15	♫	.	x	.	x	.	x	.	x	x	.	x	x	.	alt-IP	minor goes to //L major
			|										|		
bar 16	♫ + ⚓	.	x	.	.	x	.	x	.	.	x	.	x	.		//L + 1 held over note
	♫	x	.	x	.	x	.	x	x	.	x	.	x	x	//L	goes to //I via 1 altered note
								/								
bar 17	♫	@	.	x	.	x	x	.	x	.	x	.	x	@	//I	major

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.

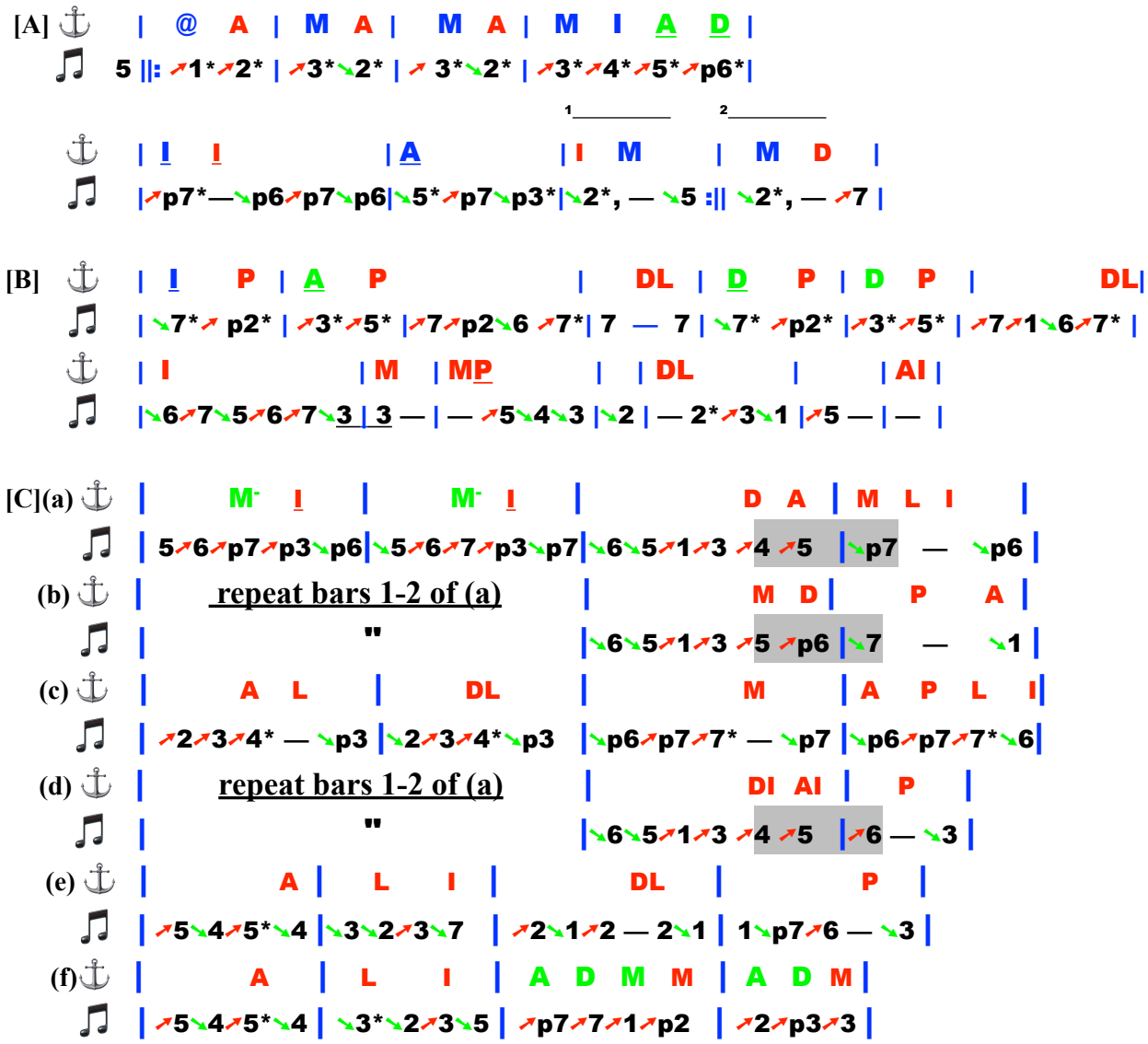
		p7	7	1	p2	2	p3	3	4	p5	5	p6	6	p7	7	1
		x	x	@	P	A	D	M	I	L	$	x	x	x	x	@
bars 2, 4	L.A	.	.	x	.	A	.	.	.	L	.	x	.	.	.	.
	@+	.	.	@	.	.	.	.	.	.	.	+	.	.	.	.
bars 3, 5	M.L	x	.	x	.	.	.	M	.	L	.	.	.	.	.	.
	L+	+	.	.	.	.	.	.	.	L	.	.	.	.	.	.

**********use notation from "faun" above 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).

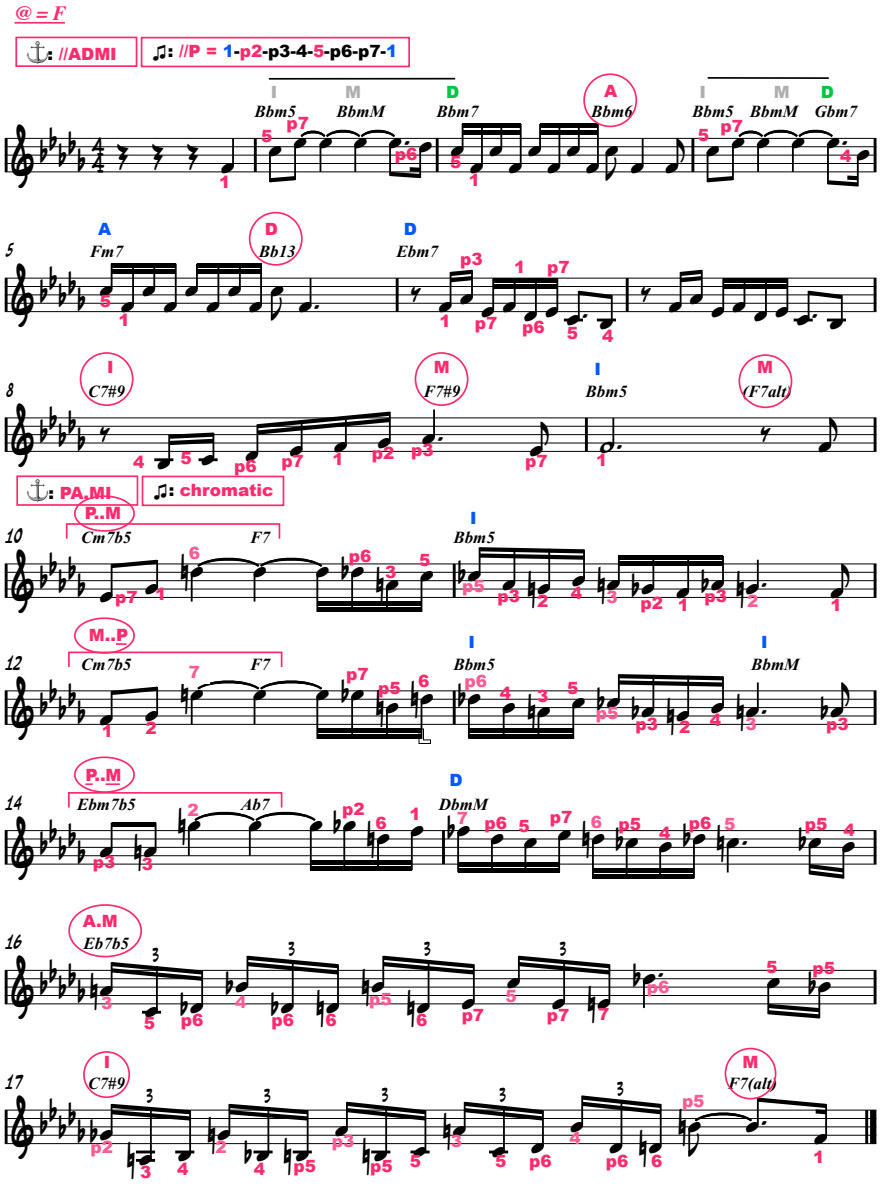
The chromatic melody-line run in the final two bars is a signature of the piece.

MIXED DOMAIN : "THE PEACOCKS"

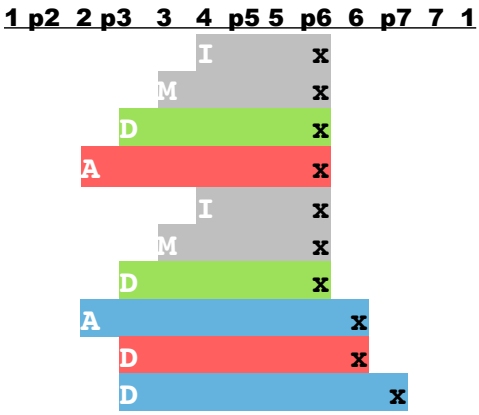
Home Tonic - F (5 flats key signature: Phrygian of F)

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. 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 material has evolved considerably since then. 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 anchors: red for tritones, blue for fifths, green for fourths).
- **chord shapes:**
  - anchor centered-octave shapes are "starter" chords, optionally id'd by anchor prefix or suffix ■
  - shapes formed of combinations of building blocks represent chords with 4 or more notes
  - triads are split building blocks identified by anchor superscripts ▼(minor), ▲(major), ● (dim)
  - chord roots are add-ons that determine chord symbols
- **chromatic scale of the home octave: 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:** set of octave shapes morphed asymmetrically by a half tone from a tritone shape
- **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 **$** of a tonic octave
- **mode signature:** word identifying a tritone cluster and implying an anchor set via the scale dictionary
- **pattern:** organized arrangement of intervals on the keyboard or over time
- **pitch center:** note identified by a fifth/fourth octave split, symbolized by **$**
- **morph:** change in the size of a building block by a half tone at one or both ends
- **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
  - **wobbly slide:** combined morph and slide
- **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
- **word:** set of alphabet letters with optional dots indicating skipped letters

ABOUT THE ALPHABET

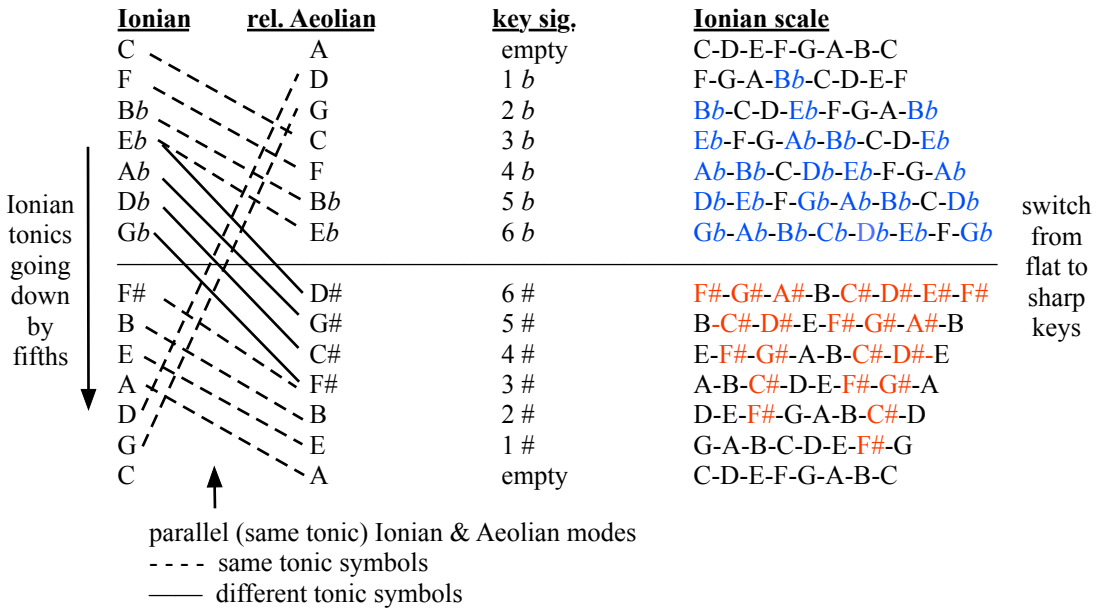
An effort must be made to avoid confusing letters of the **PADMIL** alphabet with other uses of the same letters in music theory and notation (**A**, **D** and **I** are particularly troublesome). In principle, any six letters would do for the alphabet, but the connection made to classical modes by this alphabet is too useful to discard. I thought of substituting the Greek letters epsilon (**∈**) and delta (**Δ**) for **A** and **D** and the English letter **Y** for **I**, to yield **P∈ΔMYL**, 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

SOLFEGE SCALES

The singer's solfege scale **do-re-mi-fa-so-la-ti-do** represents the pitch sequence of the standard major scale (Ionian mode) for any starting tonic **do**. All the intervals are whole tones except for half tones **mi-fa** and **ti-do**. This translates into **1-2-3-4-5-6-7-1** from the chromatic scale relative to major tonic **do** as **1**. The solfege minor scale **la-ti-do-re-mi-fa-so-la** represents the pitch sequence of the standard minor scale (Aeolian mode) for any starting tonic **la**. This translates into **1-2-p3-4-5-p6-p7-1** from the chromatic scale relative to minor tonic **la** as **1**. The problem for our purpose is solfege scales are only for classical modes and attempts to extend them are clumsy and complex (see Wikipedia).

SCALES AS INTERVAL SEQUENCES

Scales generally have only three sizes of inter-note intervals, namely half tones (**h**), whole tones (**2h**) and minor thirds (**3h**). Sometime I represent **2h** by **W** and **3h** by **W+**. Sometimes I just use the numbers. For example, the 6-note minor blues scale could be written variously as:

1-p3-4-p5-5-p7-1	**chromatic scale**
3h-2h-h-h-3h-2h	
W+WhhW+W	
321132	**half tones understood**

"Figured bass notation" (Appendix C) is different in kind. It represents chords going up from bass notes by number sequences in which the numbers count scale steps between successive notes.

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 ▌.

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

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

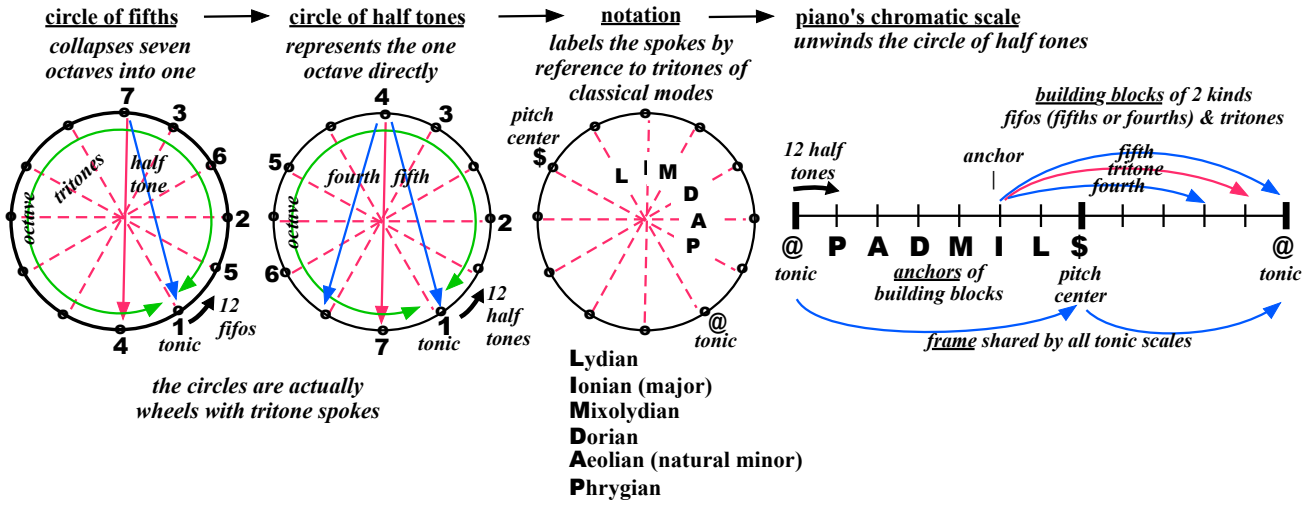
Parallel Modes of the Harmonic Major |WWhW|hW+h|

//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.

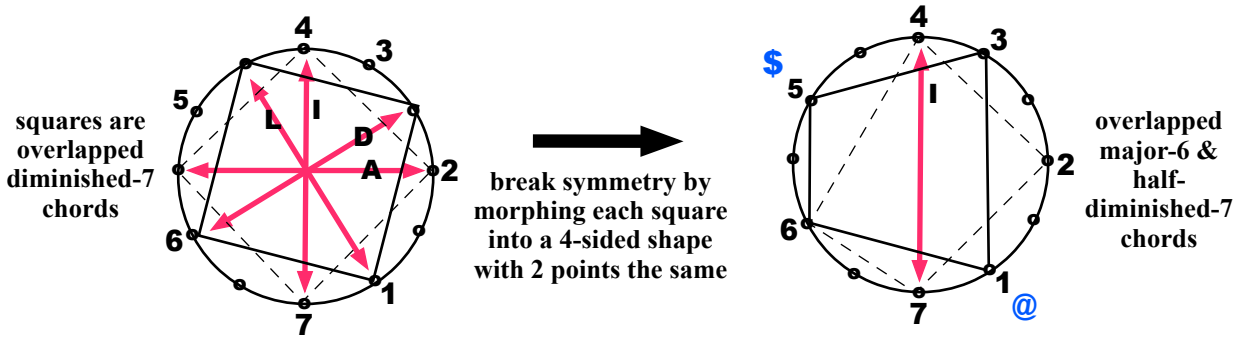
The end points of all the spokes of either circle visibly identify all the points around it, suggesting a notation that labels spokes (building blocks) instead of points (notes). This simple observation is the twist that leads to PKP's unique combination of simplicity and depth. The spoke labels, called **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.