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 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, jazz improvisation must tap into deeper musical structures that are obscured by this notation. Music notation has stood the test of time and is here to stay for piano music, even if for no more reason than the huge legacy of piano music written in it. But the piano has also stood the test of time without needing adjustable piano keys to play the nominally slightly different pitches identified for each piano key by music notation. In effect, "the emperor has no clothes" — piano music is much simpler than the "clothes" of this notation make it seem.

Trying to understand the deep structure of piano music without the obscuring clothes of music notation became an absorbing hobby that eventually led me to a simple system I call **PKP** (standing for "Picturing Keyboard Patterns"). The scope of PKP is tonal music in which a melody line is harmonized at selected points by chords formed of clusters of piano keys. Before you stop reading because of my admitted lack of musical credentials, consider the opinions of PKP of a couple of music professionals. 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."

Modes are scales defined by interval sequences that may have different realizations on the keyboard: parallel modes of different kinds have the same tonic; relative modes have the same notes and different tonics. PKP differs from music notation in putting parallel modes on notational center stage, determined by words from a 6-letter alphabet, instead of relative modes, determined by the key signatures of music notation. This enables exploiting two simple facts to yield a simple picture: any octave on the keyboard has the same shape (12 half tones), independently of the mix of black and white keys in it; and the half tones of overlapping octaves on the keyboard are aligned. The alphabet is analogous to the alphabet of biological DNA in the sense that the words identify deep structure. The identification is of Lego-like **building block** intervals determined by the letters. **Mode signatures** of 1-4 letters identify parallel modes. Sequences of letters or short words annotated above the staff represent the flow of building blocks in melody and harmony. Mode signatures are identified in this flow by the presence of their letters or words.

The alphabet represents building blocks relative to the tonic of a single conceptual home octave

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[1] What follows can only be dealt with in its own terms by experts. It's a chord progression written by Mingus for the hauntingly beautiful E♭blues *Goodbye Porkpie Hat*. This piece is a "poster child" for complex music notation. 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.

that's harmonically equivalent to a stack of home octaves on the keyboard. Many pieces of music have an easily recognizable home tonic: it's the piano key on which the melody line comes to rest at the end, or starts, or both. Secondary tonics may be visited along the way but their parallel modes are easily understood by reference to the single home tonic. The home tonic of a piece as a whole is sometimes ambiguous but it's always possible with tonal music to identify an important passage with a definite tonic that can serve as a reference for the piece as a whole.

PKP represents shapes of scales and chords in the same terms, enabling simple annotations on the written music to provide contextual cues that help in learning and remembering new pieces, knowing while playing where to go next from where you are (and how you got there), recovering from getting lost, experimenting with harmonic and melodic variations, and improvising. This turns the conventional relationship between practicing and understanding on its head: instead of practicing being required to develop understanding, understanding guides practicing.

Is this combination of simplicity and depth only a serendipitous side effect of the organization of the piano keyboard? Or is it a fundamental property of music that's obscured by music notation? Either way, it works in practice. To discover it, I had to enter uncharted territory. Nothing I read said anything about it and no expert I approached knew anything about it. The piano is not just for experts, but the conventional approach to teaching and learning it tends to make it so: understanding is expected to emerge by osmosis from the same extensive practicing that develops "chops." The idea that understanding can be had independently of this, in a form that guides practicing, is unconventional.

What qualifies me, an amateur with no formal musical training, to write about these matters? Arguably, the lack of training is itself a qualification because the absence of received wisdom about music notation makes seeing the "emperor has no clothes" easy. Add my experience as a university professor developing notations to deal with complexity in another field, computer software, that seemed to me to offer insight by analogy (computer software and piano music both use abstract notations to describe things that are performed on "hardware"). Add long-standing curiosity about how music works and why its notation is so complex. Add time to indulge my curiosity after retiring from being a professor not long after I took up the piano. Add training in math and physics that made me expect to find a "dual" representation of piano music by looking at it from a different angle.

GUIDE TO READERS

This document began as notes to myself to explain the ideas I was developing. I tried to write it so anyone with no knowledge of music theory and very little experience with the piano could read it — in other words with myself when I started out in mind. It's written to be read sitting in front of a piano keyboard on which to try out the unfamiliar concepts and notations. The potential audience includes novices at this level, pop and jazz musicians who are not pianists but want to explore harmony on the piano, music teachers interested in a different approach to teaching piano music, and "wannabe" experts interested in understanding music at a higher conceptual level than notes.

Chapter 2 develops the basic concepts and notation. Chapter 3 provides some basic examples of pieces of music represented in these terms. Chapter 4 explores the building-block world in depth. Chapter 5 provides some more advanced pieces that initially puzzled me and I suspect might puzzle anyone (the first example is the piece with the footnoted chord progression on the previous page). Chapter 6 provides observations and conclusions. References, acknowledgements and comments from some readers follow. Appendices provide helpful supplementary information.

CHAPTER 2: CONCEPTS & NOTATION

A SIMPLE CONCEPTUAL MODEL

A simple but accurate conceptual model of the home octave on the emperor-has-no-clothes piano is provided below: each possible home octave is represented by a horizontal line split into twelve equal parts representing twelve musically equal half tones. The top and bottom notes are home tonics an octave apart symbolized by **@**. Twelve overlapped home octaves are offset by half tones, thus vertically aligning all the shared notes represented by the dots. A particular piece of music has a single home octave identified by the assignment of **@** to a piano key. The piano keyboard for a piece is imagined to be formed of a stack of identical home octaves. This simple picture is the jumping off point for PKP.

```
overlapping home octaves    @ . . . . . . . . . . . @
                              @ . . . . . . . . . . . @
                                @ . . . . . . . . . . . @
                                   and so on
```

Everything in PKP is referred to a single home tonic, so keeping it fixed in the mind is essential. It's useful while learning or revisiting a piece to put a temporary label (e.g., a small stick-on circle) on the home-tonic piano key, to avoid interpreting things relative to the different home tonic of some recently played piece that's still in the mind.

The pitch sizes of the half tones increase within the octave to make the pitch of the top note double that of the bottom note. The increasing pitch sizes are represented by equal divisions of the line because they're musically equal. The fundamental difference between the piano and music notation for it is the sharing of intervals between overlapped octaves, symbolized by the vertically aligned dots. The reality is the dots cannot be exactly vertically aligned if the half tones within each octave are exactly musically equal. The piano forces alignment by providing the same piano key for all the vertical dots. Musical ears are relatively insensitive to the resulting slight errors in the pitch sizes of half tones, because they're dissonant intervals. Equal temperament tuning minimizes the effect on larger intervals formed of sums of half tones. This must be good enough because the piano has stood the test of time without adjustable piano keys to play the slightly different pitches.

Two kinds of splits of the conceptual home octave shown next bring forward fundamental elements of PKP. The letter **L** labeling the geometric center is one of six letters of PKP's mode-identifying alphabet; other letters and explanations of them are coming up.

```
                  tonic      pitch center     tonic
                    |              |            |
consonant split     @ . . . . . .  $ . . . .    @     scale frame: stacked fifth & fourth
geometric split     @ . . . . . L . . . . .     @     stacked tritones
                                |
                         geometric  center
```

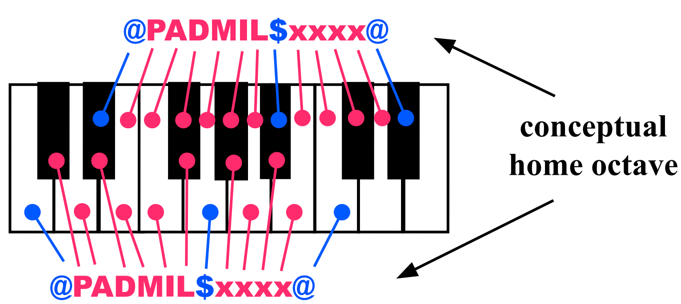
Two kinds of **building-block** intervals are determined by these splits: tritones (one of a kind, size 6 half tones) and fifths and fourths (two of a kind, size 7 and 5 half tones). Tritones are fundamentally dissonant intervals when their notes are sounded together; fifths and fourths are fundamentally consonant. This small set of building blocks is sufficient for most purposes because smaller and larger intervals emerge as inner or outer intervals of shapes of scales or chords formed from them. The smaller or larger intervals are occasionally needed as independent building-block-like quantities but the building-block notation to come covers this possibility in a simple way that doesn't require explicitly including them in the set of basic building blocks.

The sounds of tritones, fifths and fourths **sliding** to different keyboard positions and **morphing** into each other within the home octave as the music moves forward are fundamental to much music. Even with no additional information, this seems plausible because of the visibly fundamental nature of the octave splits that produce them. The notes may be spread out in the music but the essence of the sound is captured by their harmonically equivalent presence within the home octave. The tritone-tritone split morphs into the fifth-fourth split, and vice-versa by altering one note by a half tone. The bottom fifth and the bottom tritone morph into each other in the same way, as do the top fourth and the top tritone.

The **scale frame** includes the pitch center that's shared among most tonic scales (tonic scales without a pitch center exist but they're understood by reference to scales with pitch centers). Knowing the pitch center of a home-octave scale provides little scale-identifying information because almost all primary tonic scales include it. Knowing the geometric center provides more scale information because it's present in fewer scales.

THE ALPHABET

The morphing relationship between the two different kinds of building blocks is made explicit by a 6-letter alphabet that identifies them within the home octave by **anchors**, the positions of their nearest notes above the home tonic. The alphabet is **PADMIL** and its letters identify building blocks going up from the chromatic scale positions identified by them. The letters are the first letters of the names of the classical modes that determine the scales of key signatures, thus providing a strong connection to music notation. Explaining the nature of the alphabet requires a bit more information.



The concept of a fifth or fourth being morphed from a tritone warrants a new term, **fifo**, to identify the result as a building block of known type but unspecified size. The traditional terms are used when the size is known but the new term enables leaving the size to context. This provides deep notational simplification at a higher conceptual level. The default meaning of any alphabet letter **X** is understood to be a tritone anchor. Therefore **PADMIL** provides the anchors of six tritones (all the tritones with different notes that exist). Different meanings may be implied by context in explanations. Color coding identifies different meanings explicitly when this is necessary: **X** for tritones, **X** for fifos of unspecified size, **X** for fifths and **X** for fourths. For example, the tritone **M** may morph into a fifth **M** or a fourth **M** on the same anchor; or into a fifth **D** or a fourth **I** on anchors a half tone down or up. The concept of fifos morphed from tritones is independent of the presence or absence of the tritone in particular scales because the alphabet is a property of the home octave as a whole.

The terms fifth and fourth refer to the numbers of notes these intervals contain in the classical modes that define the scales of key signatures (5 and 4, respectively). The sizes would be easier to keep straight if the names were "augmented tritone" and "diminished tritone" because this would correspond to their actual keyboard sizes in half tones. As it is, the mismatch between their names and their keyboard sizes must be kept constantly in mind to avoid confusion — a fifth has 7 half tones, not 5; a fourth has 5 half tones, not 4; a major third has 4 half tones.

The surprising result of this way of understanding the conceptual home octave is that any scale with seven or more notes that can be played on the piano is identified by a **mode signature** provided by a word formed of one or more letters of **PADMIL**. A mode signature identifies a mode by its tritone content. For six primary modes, the identification implicitly includes the scale frame. The alphabet itself identifies the chromatic scale, which is formed by each tritone contributing two notes. Words formed by pruning letters from this word identify sub-scales of the chromatic scale. The meaning of pruning a letter is morphing an anchored tritone into a fifo anchored a half tone above or below it.

Pruning all but one letter leaves the single-letter mode signature of a **classical mode**. Classical modes (also sometimes called "church modes" because of their genesis in early church music) define the interval sequences of the scales of key signatures. Mode signatures with two or more letters have one or more notes outside any key signature. A word by itself identifies the tritone content of a scale. The prefix **//** standing for "parallel" identifies the parallel mode determined by the word.

The letters provide a strong connection to music notation via classical modes. The letters are the first letters of the names of the modes containing the tritones: **P**hrygian, **A**eolian, **D**orian, **M**ixolydian, **I**onian and **L**ydian/**L**ocrian. but the identification of the tritones is independent of the modes in which they find themselves. The corresponding signatures of the six primary modes are **//P**, **//A**, **//D**, **//M**, **//I** and **//L**. The seventh mode, Locrian, is an alternate mode of tritone **L** that I call **alt-L** (the optional dash is for readability).

One classical pianist with whom I discussed my ideas wondered why I bothered with "all the old church modes" because, he said, composers seldom write in modes other than the ones that define the major and natural minor modes of key signatures, namely Ionian and Aeolian. The answer is they may not write directly in all the modes but they use all of them indirectly via accidentals.

The default meaning of an anchor letter is a building block going up from it. An underlined letter over-rides the default to indicate a building block going down from it. For example, symbols **L** and <u>**L**</u> indicate tritones going up and down from the anchor to the top and bottom of the octave, which means for the latter that the home tonic is the bass note of the tritone. For tritones only, an underlined letter indicates an inversion because a tritone is the same size in either inversion. The notation is the same for fifos but the interpretation as inversions is not because opposite inversions of fifos are different sizes. For example, **X** indicates a fourth going up from an anchor and <u>**X**</u> indicates a fourth going down from it, which is an inversion of the fifth **X**, not the fourth **X**.

There are no anchors in the top fourth of the scale frame because building blocks going up from bass notes in these positions are covered by inversions. This convention makes tritone anchors unambiguous, which, in turn, makes mode signatures formed from them unambiguous.

Considering the alphabet as a circular loop (traversing it in one direction goes off one end to proceed in the same direction from the other end), it may be said that adjacent tritone anchors in the alphabet identify tritones offset by a half tone. This means for tritones **P** and **L** at opposite ends of the alphabet that the bass notes of opposite inversions are a half tone apart (the anchor of tritone **P** is a half tone above the bass note of inverted tritone **L**).

Observations on the Alphabet Symbols

The connection of the alphabet symbols to the well known modes of music notation is at once one of the most powerful features of PKP and an annoying nuisance. It's annoying because it all too easy to confuse some anchor letters with note symbols of music notation. The usefulness of the connection outweighs the annoyance, just as the usefulness of using the same numbers 1, 2, … for different things in music outweighs the annoyance of having to keep the different uses distinct in the mind (e.g., degree numbers of scale notes, different kinds of numbers in suffixes of chord symbols, sizes of intervals in terms of numbers of half tones). The special font helps, as does making a habit of mentally pronouncing the individual anchor letters and the corresponding classical mode names as "phridge" (**P**), "aeo" (**A**), "door" (**D**), "mixo" (**M**), "ion" (**I**) and "lid" or "loke" (**L**), reserving pronouncing letter names for the notes of music notation.

The alphabet order is different from the conventional order **IDPLMAL** of the first letters of the mode names. This is the order of the names of relative modes of the Ionian mode (same notes) starting on its initial note and then on successive scale notes going up from it. Anyone with even minimal exposure to the piano knows that the 7-note scales starting on successive white keys going up from note "C" yields different sounding scales. These scales determine the interval sequences not only of these relative modes but also of parallel modes of the same kind. In the conventional order, **L** appears twice because the two relative modes have different starting notes.

Parallel Mode Changes and Same-Mode Tonic Changes: Two Sides of the Same Coin

Assigning a home tonic doesn't exclude tonic changes, it only means that they are understood in terms of the home alphabet. The important result is that all possible melody scales and all possible harmony shapes of the home and secondary tonics may be understood in terms of the single alphabet of the home tonic.

Example: Transposing the tritone anchor of a classical mode up or down a minor third in the alphabet may be interpreted as either a parallel mode change, or a same-mode tonic change of a minor third in the opposite direction. The parallel mode change alters notes and the tonic change identifies a relative mode of the same kind as the original.

```
mode change   @ P A D M I L $ . . . . @
//I           @ . x . x I . $ . x . x @   Ionian
//A           @ . A x . x . $ x . x . @   the new Ionian tritone is A
                    ↑tonic of relative Ionian mode
------------------------------------------------------------------
//A           @ . A x . x . $ x . x . @   Aeolian
///I          @ . x . x I . $ . x . x @   the new Aeolian tritone is I
                                ↑tonic of relative Aeolian mode
```

Keep in mind that a substantive tonic change requires more than just using a relative mode of some selected mode as a melody scale, because this is ambiguous by itself (no notes are altered). A substantive tonic change requires note alterations such as those illustrated above. In the **//I-//A** change, the initial Ionian tritone is **I** and the final Ionian tritone is **A**. The tonic change is, unambiguously, up a minor third because tritone **A** is tritone **I** slid up a minor third.

This is a very simple way of understanding changes that can be very complex in music notation. Such changes introduce chromaticism into a piece of music, meaning scales depart from written key signatures: the more changes, the more chromaticism. Five such classical-mode changes in succession can bring in the entire chromatic scale; four tends to be a practical limit. The practical limit is lower for non-classical modes that are chromatic to begin with, for which chromaticism increases more rapidly with each successive mode because of higher tritone content.

BASIC MODES OF MUSIC

There is nothing in music notation comparable to the range of mode signatures formed from alphabet letters about to be developed. To cite just one example, the concept of "modal jazz," is to notate a piece of music by identifying modes instead of chord progressions relative to a melody line, but the written examples I have seen identify the modes by unusually sparse chord progressions, in which the chord symbols are understood to imply scales. The mode signatures coming up provide a notation.

Pentatonic Modes

Pentatonic modes, which contain neither tritones nor half tones, are the foundation scales of music in many cultures worldwide, because anyone with a musical ear can sing tunes from them, harmony is simple, and they generalize simply and directly to more general scales, including classical modes. The book *Modalogy* starts with this premise but stays with the "clothes" of music notation (sharps, flats, naturals) to develop it, thus ending up in a different and much more complex place than PKP. Understanding how more general modes follow from simple extensions of pentatonic modes is helpful in understanding how mode signatures can bypass the complexity of key-signatures-plus-accidentals to provide a much simpler view of the same things.

As illustrated next, parallel pentatonic modes follow from the scale frame by splitting the bottom fifth into unequal parts that determine major or minor tonality, and then splitting the single major third of the result into a symmetric shape formed of two whole tones (highlighted in yellow). The results are 5-note scales with inter-note intervals of whole tones (two half tones) and minor thirds (three half tones, identified by horizontal lines). The symmetric splits of the major thirds avoid adjacent minor thirds, which would form tritones. Understanding parallel modes by symmetric shapes is a fundamental feature of PKP. This is the only case where mode signatures are provided by fifo anchors (green for a fourth, blue for a fifth).

```
                              @ P A D M I L $ . . . . @
scale frame split             x . . . x . . x . . . . x
pentatonic major mode //M     x . x . M-----x . x-----x
-------------------------------------------------------
scale frame split             x . . x . . . x . . . . x
pentatonic minor mode //D     x-----D . x . x-----x . x
```

Pentatonic major and minor modes formed of all five black piano keys are easiest to see on the keyboard. The tonic of the all-black-key pentatonic major mode is the black key at the geometric center of the C octave. The tonic of the all-black-key, relative, pentatonic minor mode is the next black key down. A lot of fun can be had, and insight gained, by improvising pentatonic melody and harmony on the black keys. This leads directly to a music-notation-independent understanding of the blues because, as will be shown later, basic 6-note blues modes add one note these modes.

Parallel Classical Modes from Parallel Pentatonic Modes

Classical modes follow from pentatonic modes by splitting their minor-third intervals into a half tone and a whole tone in a way that creates symmetric shapes formed of a tritone with inner or outer half tones. The results for the Ionian and Aeolian modes that are the default major and natural minor modes of key signatures are shown next. The added notes in red text are the single tritones of the classical modes. The symmetric shapes are highlighted in yellow.

```
                             @ P A D M I L $ . . . . @
pentatonic major mode //M    @ . x . M-----$ . x-----@
Ionian major mode //I        @ . x . x I . $ . x . x @
------------------------------------------------------
pentatonic minor mode //D    @-----D . x . $-----x . @
natural minor mode  //A      @ . A x . x . $ x . x . @
```

The complete set of parallel classical modes constructed this way is summarized next. The six primary modes on the left, identified by mode signatures of the form **//X**, determine the rest of the table.

```
                         @ P A D M I L $ . . . . @
pentatonic major         @ . x . M-----$ . x-----@
Lydian       //L         @ . x . x . L $ . x . x @     major tonality
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 .     minor-major

pentatonic minor         @-----D . x . $-----x . @
Dorian       //D         @ . x D . x . $ . x x . @     minor
             alt-D       . x . D x . x . x x . x .     minor-major

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
```

The seventh parallel mode, Locrian, is a “tritone substitute mode” of the primary Lydian mode (same tritone, all non-tritone notes different). This simple way of remembering the Locrian mode follows from it being a relative mode of the Lydian mode of the inverted tritone **L**. Inverting a tritone transposes it by a tritone, so the Lydian mode of **L** is transposed by a tritone. The parallel Locrian mode is its relative mode starting from the home tonic, which is in the tritone. The six **alt-X** modes are all “tritone-substitute modes” of the primary modes (the optional dash is only for readability) but the others are not parallel modes of the home tonic because the tritones don’t contain it (think of them as pseudo-parallel modes). The ***//X*** and **alt-X** modes are shown one above the other to show that knowing one means knowing the other.

The highlighted symmetric shapes determine the modes. The shapes follow from the symmetric arrangement of half tones relative to the mode tritone (both inside it or both outside it). Symmetric shapes formed by and around tritones are a fundamental feature of the PKP way of knowing scales. Symmetry is well known in math and physics to be a cornerstone for understanding complexity, so it’s logical that it might do so for music, which is complex by any measure. The only hurdle to overcome is the unfamiliar notation. The notation is symbolic but there’s no math here. Everyone has an intuitive understanding of circular and mirror symmetry from everyday life. For a start, the home-octave split into a 2-tritone stack is a symmetric shape with circular symmetry (the inter-note intervals are all the same, just as the radii of a circle are all the same). It’s an easy step from there to the yellow-highlighted symmetric shapes in the scales, which have mirror symmetry (the interval sequence going down from the top is the mirror image of the one going up from the bottom).

A Lego-like View of Building Blocks

The building blocks identified by the anchors of the master Ionian mode are summarized next in Lego-like terms. The white entries inside the colored blocks highlight the anchors. This is only one classical mode but the concepts are the same for all parallel modes. This summary provides several deep insights in a simple way. It provides a menu of available building blocks for constructing chords. It brings forward core harmonic sequences to the eye. It illustrates in a graphic way the reason for introducing the concept of a fifo.

```
                                 @ . A . M I . $ . x . x @
                                 @ . x . x X . $ . x . x @
frame                 $=@        . . . . . . . $ . . . . @
core          |       I          . . . . . I . . . . . . x
              |       I          . . . . . I . . . . . x .
              |       M          . . . . M . . . . . . x .
secondary     |       M          . . . . M . . . . x . . .
              |       A          . . A . . . . . . x . . .
              |       A=$        . . A . . . . $ . . . . .
frame                 @=$        @ . . . . . . $ . . . . .
```

The core harmonic sequence is **I-I-M** because the tritone is core by definition and the two fifths are morphed from it, putting them a half tone apart, which makes them mutually dissonant and therefore functionally different. The fifth **M** is a resolution fifth because it establishes major tonality, automatically making the fifth **I** a non-resolution fifth. The sequence **I-I** anticipates resolution in the mode of the tritone and the sequence **I-M** provides the resolution.

The lightweight fifo concept exploits the actual flexibility of fifths and fourths in harmony. Aspects of this flexibility are as follows. All of the above fifos except the fifth **I** are both harmonically ambiguous and mutually substitutable. They're harmonically ambiguous because they're consonant with both core fifos. They're mutually substitutable because they're consonant with each other. Fifos are a source of both harmonic richness in music and notational complexity in music notation. The lightweight notation keeps the former and avoids the latter.

Anchor Sets

The simplicity of notating fifos enables modes to be understood in terms of **anchor sets**. Every primary classical mode has a 3-part anchor set within the lower fifth of the scale frame that distinguishes it from the other primary classical modes. Examples are **A.MI** for the Ionian mode and **A.MI** for the Aeolian mode (dots indicate skipped alphabet letters; grey text leaves the fifo sizes open because the scales provides both sizes). The tritone anchor determines the anchor set which determines the scale. The tritone anchor also provides a fifo anchor that's not listed in the anchor set because it's understood. The fifo that shares its note with the mode tritone alternates between a fourth and a fifth for successive modes in dictionary order (**I** for the Ionian mode, **A** for the Aeolian mode).

Classical modes are constrained by a rule of no adjacent half tones, so a tritone anchor can have only one fifo anchor adjacent to it (**M** for the Ionian mode), which leaves only one other alphabet letter available as a fifo anchor (**A** for the Ionian mode) because any other choice would yield adjacent half tones (**L**, **D** and **P** are excluded from the Ionian mode for this reason). This makes knowing the anchor set of a classical mode very simple.

Parallel Mode Changes

Successive parallel modes bring chromaticism into the domain of classical modes. One alphabet step up or down in a mode signature alters one note, two steps alters two notes and three steps alters three notes. In each step, one altered note is provided by the tritone (the other tritone note is in both modes). Here are some example mode changes and corresponding note alterations:

- the single step change **//I-//M** alters one note;
- the two-step change **//I-//D** alters two notes;
- the 3-step change **//I-//A** alters three notes;
- the cascaded 2-step changes **//L-//M-//A** alter two notes at each step (the three tritones define a whole tone scale that provides a kind of scaffolding for the changes);
- analogous sequences down or up follow from any starting mode (when changes go off one end of the alphabet, they wrap around to other end, bringing in **alt** modes).

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

"How strange the change from major to minor" — these words from the song *Every Time We Say Goodby* (covered in Chapter 5) express, incidentally, the complex nature of a simple parallel mode change such as **//I-//A** in music notation. Suppose the home tonic is the first black key above C, which is either C# or Db in music notation, depending on context. Then this change is from 5 flats for Db major to 4 sharps for C# minor. The change naturalizes 5 notes and then sharps 4 notes — 9 symbol changes to alter 3 notes! A particularly confusing feature of this change is the different symbols for the minor tonic (C#) and the major tonic (Db) that seem to imply slightly different pitches for the same tonic. They don't — what they actually imply is different pitches for the notes C and D, when used as references for sharps or flats, from the pitches they have as independent notes. The pitch differences are real independently of the piano but not real for the piano, and so overcomplicate written piano music. The piano has stood the test of time without variable pitch piano keys that would enable pianists to play the slight pitch differences. The PKP way of understanding parallel modes does an end run around this misleading complexity.

NON-CLASSICAL MODES FROM MASHUPS OF BASIC MODES

More general modes are **mashups** of basic parallel modes. A mashup, as the term is used in the music business, means combining different musical things to make a new musical thing that's different in kind. The different things here are parallel modes. A mashup of the parallel pentatonic modes provides a blues mode that's different in kind not only from the pentatonic modes but also from classical modes. A mashup of the parallel Aeolian and Ionian classical modes provides minor and major modes that are different in kind from classical modes. The mode signatures of the mashups help to make sense of things that can be overwhelmingly complex in music notation for all but experts.

Non-classical modes are common in music (melodic minor, harmonic minor and harmonic major modes, and more) but nothing equivalent to the mode signatures coming up exists in music notation. The mode signatures enable knowing scales by implied keyboard patterns, without thinking in terms of note symbols of any kind. Menus of building blocks follow directly from the scales in the simple Lego-like terms illustrated earlier for the Ionian classical mode, but details are left for examples in later chapters because there's nothing new in the concept.

Non-Classical Modes: Blues

Blues scales follow simply and directly from a mashup of major and minor pentatonic scales. The scales are different in kind from classical modes, which is why blues pieces often appear complex and arbitrary in music notation. The basic mashup may be understood to emerge from singers of simple pentatonic tunes "bending" the tonality defining notes by a half tone to give a sad twist to the major mode or a happy twist to the minor mode. The effect is to switch to the opposite pentatonic mode, which amounts to singing from a combined scale that bends the 3rd and 7th notes of the parallel Ionian mode downward. Also bending the 5th Ionian note downward (the famous "flatted fifth") creates a 9-note blues family mode. The result is different in kind from classical modes — 9 notes, 6 half tones (5 of which are adjacent) and 3 tritones.

//M	@ . x . M———$. x———@	**pentatonic major**
//D	@———D . x . $———x . @	**pentatonic minor**
//DM	@ . x D M x . $. x x . @	**8-note pentatonic mashup**
//DM.L	@ . x D M x L $. x x . @	**9-note blues family mode**

The family mode signature implies the anchor set **ADMIL** because of its origin in pentatonic modes. This is a family scale because it includes all the usual blues scales as sub-scales, as summarized below. The melodic and harmonic minor modes in the middle are from the next section on minor and major family modes. The bottom two sub-modes are are commonly taught to beginners as "the" blues scales. These scales seem somewhat arbitrary, presented cold, but they follow logically from the master mode by splitting its highlighted half-tone sequence into two parts that determine one-note additions to the pentatonic modes. In passing, it can be useful to know that the family scale is a mashup of these two scales.

//DM.L	`@ . x D M x L $ . x x . @`	**family**
//DM	`@ . x D M x . $ . x x . @`	**penta mashup**
//M.L	`@ . x . M . L $ . x x . @`	**// major mode of melodic minor**
//D..L	`@ . ~~x~~ ~~D~~———~~L~~ ~~$~~ . x x . @`	**// minor mode of harmonic minor**
//D..L	`@———D . x L $———x . @`	**penta minor blues**
//DM	`@ . x D M———$ . x———@`	**penta major blues (actually minor-major)**

Additional sub-modes are the classical modes **//D** and **//M**. The **//L** mode is not itself a sub-mode but it's a closely related mode that morphs into the **//ML** mode.

The family of blues modes illustrates the confusing variety of key signatures that may appear for pieces that use non-classical modes of any kind. Key signatures for the Mixolydian or Dorian classical modes provide scales that differ by only two notes from the master blues scale, but these are far from the only key signatures seen for blues pieces. A blues key signature may be almost anything, leaving possibly many scale notes to be determined by accidentals. Accidentals don't identify the functions of notes. Many low-level details must be sorted out to get a mode-level view. Mode signatures determined by tritone content sort these details out at a high conceptual level.

Non-Classical Modes: Major & Minor Family Scales

A particularly useful class of family scales follows from a mashup of the **//A** and **//I** classical modes. The mode signatures are not color coded because all the letters are tritone anchors. The immediate result of the mashup is a 4-tritone, 10-note scale with mode signature **//ADMI**. The mixed minor-major tonality of this scale provides a solid basis for sub-scales of one or the other tonality. These sub-scales follow from morphing either the **D** or **M** tritone into a scale fifo with the same top note. The result is pair of 3-tritone, 9-note modes of minor or major tonality identified by **//AD.I$^+$** or **//A.MI$^+$**, where the plus superscripts indicate the inclusion of the top note of the missing tritone identified by the dot in the signature. The only difference between these modes is the tonality in the bottom fifth (highlighted). The modes are two notes short of the chromatic scale but their simple forms makes them easy to know on the keyboard. The forms say something important about tonality: it's determined in the bottom fifth of the home octave, leaving the top fourth to context.

	`@ P A D M I L $ . . . . @`	
//ADMI	`@ . A D M I . $ x x x x @`	**//I + //A**
//AD.I$^+$	`@ . X X . X . $ x x + x @`	**minor family**
//A.MI$^+$	`@ . X . X X . $ x + x x @`	**major family**

Tritones **P** and **L** and the corresponding classical modes are excluded from this picture but often appear ornamentally in music from these scales as functional substitutes for **A** and **I**. They're ornamental because they're excluded. They're excluded because it's simpler to know the scales this way.

There are many widely used sub-scales, summarized next.

Minor-family sub-scales: The **//D.I** mode is noteworthy for being almost the whole-tone scale determined by **P.D.I** (it's 4-whole tone sequence is highlighted). The **A..I** double tritone is circularly symmetric (all its intervals are minor thirds) and therefore ambiguous by itself. However the mode signature **//A..I** is unambiguously minor in a minor context. The scale is determined by its empty minor third because the other minor thirds are filled from context. The interpretations in parentheses here and later are helpful in understanding the unfamiliar mode signatures in the conventional terms of altered degree numbers.

//AD.I	@ . A D . I . $ x x . x @	**"bebop" melodic minor**
//D.I	@ . x D . I . $. x . x @	**melodic minor (Ionian b3)**
//A..I	@ . A x . I . $ x———x @	**harmonic minor (melodic minor b6)**
//D, //A	...	**classical sub-modes**

Major family sub-scales: The **//A.M** mode is a parallel mode of **//D.I** with a corresponding property of being almost a whole tone scale, **A.M.L** in this case. The **//A..I** mode is determined by context in the same way as above. I have been told that bebop major variation was popularized in jazz by Charlie Parker.

//A.MI	@ . A . M I . $ x . x x @	**no-name major mode like //AD.I**
//A.M	@ . A . M x . $ x . x . @	**parallel mode of //D.I (Mixo b6)**
//A..I	@ . A . x I . $ x———x @	**harmonic major**
//A.MI	@ . A . M I . $ x x . x @	**"bebop" major**
//M, //I	...	**classical sub-modes**

The "melodic" and "harmonic" minor and major modes are like classical modes in having seven notes and no adjacent half tones. They're the only non-classical modes that have been formally developed in music notation into a set of seven parallel modes that are analogous to the seven parallel classical modes.. The book *Modalogy* develops these modes in conventional terms, with complex results that were part of my motivation for developing PKP.

Other Mashups

Mashups of classical modes are not restricted to **//I+//A** in principle but I've not come across others that seem worth adding to the menu. That said, adding others is easily done.

CHROMATIC SCALE

We have come a long way without needing an actual 12-symbol chromatic scale but one is needed for melody lines and for designating secondary tonics in parallel modes. This has been postponed until now to develop a view of music based on intervals as musical objects that may be understood independently of the pairs of notes of which they're formed. Developing the same concepts terms of note symbols bogs down in combinatorial complexity. That said, it's time for note symbols to enter the picture.

Music notation does not provide a 12-symbol chromatic scale, so I had to find one. I found one in a chord root notation used in Mehegan's jazz piano instruction book, which I adapted as shown below.

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**	**@**

Mehegan's notation uses Roman Numerals **I-VII** for the seven roots from the master Ionian mode of a tonic, and flatted Roman Numerals for the five chromatic roots in the five whole tone intervals. This adaption replaces the Roman Numerals by numbers **1..7** and the flat symbol by prefix **p** standing for "phlat" and meaning "next piano key down." The replacement of the flat symbol avoids the confusion that arises with sharp or mixed sharp-flat scales in music notation. The prefix **p** is not a conventional flat symbol, but a position indicator. It only applies to five numbers (**p1** and **p4** are *not* alternate symbols for **7** and **3**), and there are no symbols corresponding to sharps. From now on, these two lines of symbols will head every representation of mode signatures and harmony shapes, enabling symbols in either line to be understood in terms of the other in a direct and simple way (e.g., the tritone anchored by **M** is **3-p7**).

The anchor notes of **PADMIL** are **p2-2-p3-3-4-p5**, so why not avoid the additional alphabet notation by identifying anchors by 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. The alphabet symbols are PKP's way of doing this.

The beauty of this chromatic scale notation is it mirrors the look of the C-octave on the piano: the un-prefixed symbols are the white keys and the prefixed ones are the black keys, giving visibility to the musical functions of the notes in any octave by mental reference to the C octave. The notation is simple enough to annotate on the staff next to note symbols of a written melody line.

Skeleton Melody Lines

The chromatic scale will be used to represent **skeleton melody lines** of pieces of music as single textual lines of note symbols interspersed with up and down arrows (↗ and ↘) to show up down melody zig-zags. Such lines represent the way people with musical ears hear and remember melody lines as pitch movements, independently of detail-loaded representations in music notation.

Secondary Tonics

A secondary tonic is identified in a mode signature by a suffix of the form **@t**, where **t** is the chromatic-scale symbol for the tonic. For example, **//I-//A@p3** represents an Ionian-mode tonic change up a minor third. There's no direct representation of a new Ionian tritone "**I**" because this would require a separate alphabet for the new tonic. The new Ionian anchor is a fourth above the new tonic **p3**, which makes it **p6**, the other end of the **A** tritone. In other words, change is from a home Ionian mode with tritone **I** to a secondary Ionian mode with tritone $\underline{\mathbf{A}}$, the inversion of **A**. This is understood without spelling out the scale (spelling it out as **p3-4-5-p6-p7-1-2-p3** verifies it).

Chords

The chromatic scale can be used for chord roots by replacing the numbers by RN symbols. Chord symbols are results not starting points in PKP. A chord in PKP is a combination of building blocks. Chord roots are add-ons (either identified within a shape, or as an added note)

CHAPTER 3: SELECTED EXAMPLES

We now have sufficient concepts and notation to represent the essence of the melody and harmony of pieces of music, paving the way for looking at some example pieces in these terms to give a sense of how all this fits together in actual music.

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

It's useful to think of music as divided into domains identified as basic classical (inherently not chromatic), chromatic classical 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 people already expert in playing from music notation, because of the ten thousand or so hours at the keyboard required to get there. These hours are needed to become an expert pianist at some level, but not everyone has this ambition. For those who don't, PKP provides access to pieces that would otherwise be inaccessible. For those who do, PKP can provide a helpful "leg up."

BASIC CLASSICAL DOMAIN : “HAPPY BIRTHDAY”

Home Tonic - F

A skeleton melody line for this familiar piece is presented next. Colored arrows show melody zig-zags up and down within a bar structure. Asterisks indicate repeated notes, leaving the number of repetitions open (one here). Commas mark ends of phrases. Not here but later, dashes indicate melody gaps of undefined duration that may have accompanying harmony. Timing is left open (note and space durations, time signatures).

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

Cross-references to letter notes for home tonic F are shown next (Appendix B provides a table of cross references for all possible home tonics). The cross reference is needed to extract PKP elements from written music. Think of the skeleton melody line as a transcription into a text line of annotations on the staff of the written piece. The idea is to avoid thinking in terms of the note symbols of music notation to the greatest extent possible, to minimize the possibility of confusion between letter notes and alphabet symbols.

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	@

At a glance, the scale is Ionian, but recognizing a scale in general requires condensing the melody line into the home-octave, as shown next. The melody line uses all seven scale notes, so there’s no ambiguity. The two header lines enable cross referencing by eye between notes and building blocks identified by alphabet letters. The Lego-like view of the selected building blocks used in the upcoming harmony self identifies fundamental harmonic sequences. .

		1	p2	2	p3	3	4	p5	5	p6	6	p7	7	1
		@	P	A	D	M	I	L	$	x	x	x	x	@
scale	//I	x	.	x	.	x	x	.	x	.	x	.	x	x
selected building blocks	I	.	.	.	.	.	I	.	.	.	.	.	.	x
	I	.	.	.	.	.	I	.	.	.	.	.	x	.
	M	.	.	.	.	M	.	.	.	.	.	.	x	.
	M	.	.	.	.	M	.	.	.	.	x	.	.	.

Integrated Melody and Harmony

Core harmony provided by selected building blocks from the melody scale is represented by adding an anchor line, above the melody line to conform with the way chords are shown above the staff in written music.

⚓ | I | 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 anchor line and skeleton melody line are identified on the left by the symbols ⚓ and ♫ (this is not needed for this simple piece, but is helpful when melody lines are represented by multiple text lines going down the page). From now on, all examples will be presented in this form.

The mode tritone is placed in positions relative to the melody line that anticipate resolution in the mode. The resolution is postponed in the first and third melody phrases, signified by the tritone harmonizing the final melody note of the phrase. The resolution is immediate in the second and fourth melody phrases, signified by the tritone harmonizing the pre-resolution melody note of the phrase. 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 played in the next octave up. The lightweight notation enables substitutions to be made easily (e.g., **A** or **A** for **I**).

Most transitions in this core harmony are **slides** or **morphs** (recall that a slide moves a building block to a different keyboard position while holding its size, and 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 wobbling the fingers 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). This is a 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 is startling to the uninitiated. Chord roots are only references for specifying notes, and not actually fundamental to the sound of a chord progression. In contrast, the core building blocks are fundamental to the sound.

The combination of small harmony steps within the home octave and large melody jumps that go outside it sounds fine. The harmony would be played in the octave below the melody octave to keep it separate. This is only one way of playing harmony, but it has the attractive feature of being easy for anyone to play, thus setting the stage for other ways.

Voice Leading

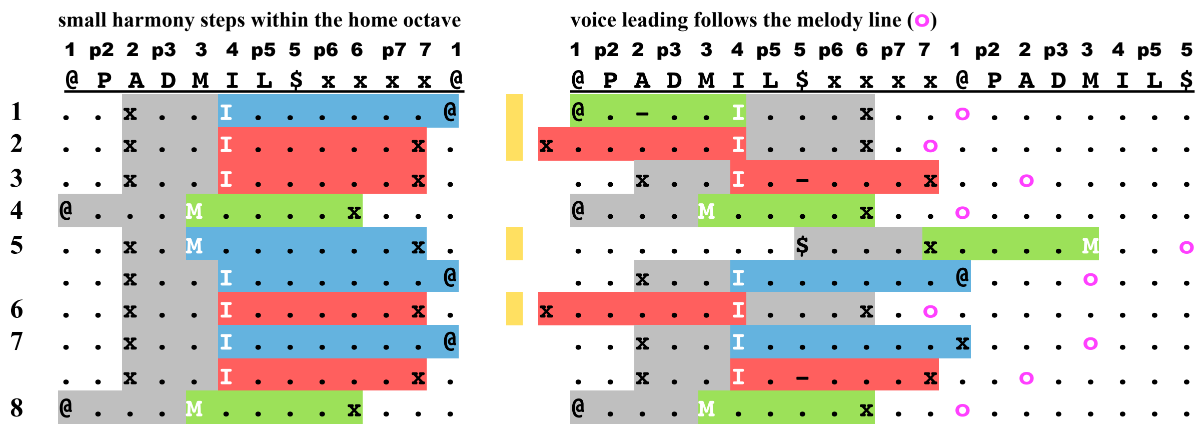
Another way of playing the harmony, illustrated next, is known as "voice leading" because the harmony follows closely below the melody. The upper anchor line is the original. The lower anchor line makes the highlighted changes, which consist of inverting the building blocks plus moving the **M** fourth into the next octave up to place its top note (the anchor) close to the melody line. No extra notation is needed for this placement because the melody line cues it.

⚓ | **I** | **I** | **I** | **M** | **M** **I** | **I** | **I** **I** | ~~**M**~~

⚓ | **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 two versions of the core harmony are shown next with added voicing notes a major or minor third below the core for the original, and above or below the core as required for voice leading. Major or minor thirds are not the only possibilities, but they're suggested by fact that they're the intervals of basic seventh chords that are the workhorse chords of much harmony. The voice leading pattern is jumpy and therefore difficult to play — the hand must jump around while adjusting the fingers for the different interval sizes. That said, it's made easier to play by this: it follows in a simple way from inverting four of the ten building blocks of the original, and it's cued by the melody line.



Chord Progressions

Chords are not the main subject in this chapter but it's easy to know the basic chord progression voiced by these shapes. The sequence on the left voices the following progression. These are all seventh chords in the sense that I6 is an inversion of VIm7. The voicing of the V7 chord is rootless but that's not a problem because the root is the ubiquitous pitch center of the home octave.

| IIm7 | V7 | V7 | VIm7 | IIIm7 IIm7 | V7 | IIm7 V7 | I6 |

The sequence on the right voices essentially the same chord progression on the same root line, except the rootless V chord in bars 2 and 6 is V9 instead of V7.

The default way of playing any chord progression is with the notes in order going up from the roots. This is jumpy like the voice-leading example but without the benefit of the jumpiness being tied to the melody line. A better choice for harmony that doesn't track the melody line is the small-step harmony within home octave because it's easy to play, and is easily transformed into a voice leading pattern.

Chord roots are literally no more than references for specifying chord notes, not essential elements of the music. The proof of this is the common use of inversions of chords that bury the roots in the middle of the chord, and of rootless voicings that omit the roots entirely. The musical fundamental elements are the melody notes and the core building blocks.

NON-CLASSICAL DOMAIN: BACKWATER BLUES

Home Tonic - 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.

⚓	| M | D | M | M |
♫	| 5↘4↘p3 ↘1, | ↗5↘4↘p3↘<u>1 | 1</u> , | — | — |
⚓	| M | D | M | M |
♫	| ↗5↘4↘p3↘1, | ↗5↘4↘p3↘<u>1 | 1</u> , | — ↗5↗p7↘5|
⚓	| I | D | M | M |
♫	| ↗p7*, ↘5 | ↗ 1 ↘p7↘5↘p5↘4↘p3↘ <u>1 | 1</u> , | — |

Although the home tonic is the same as the previous example, there are more notes to cross-reference.

F		G	Ab	A	Bb	B	C		D	Eb	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	@

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 than these but these are sufficient for many purposes.

.

	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	x	@	**//DMI**
melody	@	.	.	D	.	x	L	$	.	.	x	.	@	**//DL** (6-note minor blues)
blues family	@	.	x	x	x	x	x	$	.	x	x	.	@	**//DM.L**
selected building blocks	.	.	.	.	.	.	X	.	.	.	.	.	@	**L**
	.	.	.	.	.	X	.	.	.	.	.	x	.	**I** - ornamental
	.	.	.	.	X	.	.	.	.	.	x	.	.	**M**
	.	.	.	X	.	.	.	.	.	x	.	.	.	**D**

There always several ways of understanding the same thing. The harmony scale may be understood as a **//DMI** scale. However, I find it more helpful to focus on a single master mode signature and to regard this variation of it as substitution of **I** for **L**. Either way, the single appearance of the tritone provides turnaround marker in the melody (an indicator of the beginning of the final four bars). The substitution is useful when working with chord symbols because it makes the usual chords on roots I, IV and V all dominant seventh chords — simple for anyone. The V chord based on **L** is different, but the difference is unimportant in PKP.

Un-inverted and inverted harmonic cores are shown next, to give a sense of the range of possibilities, with simple simple voicing lines added that satisfy the chord symbols shown (such lines only need to add depth because the tritones provide ample variety). Omitted chord roots are identified by dashes.

```
1 p2 2 p3 3 4 p5 5 p6 6 p7 7 1
@  .  A  D  M  I  L  $  .  x  x  .  @
@  .  .  .  M  .  .  .  .  .  x  .  .    I7
@  .  .  D  .  -  .  .  .  x  .  .  .    IV7
@  .  .  .  M  .  .  .  .  .  x  .  .    I7
@  .  .  .  M  .  .  .  .  .  x  .  .    I7

@  .  .  D  .  -  .  .  .  x  .  .  .    IV7
@  .  .  D  .  -  .  .  .  x  .  .  .    IV7
@  .  .  .  M  .  .  .  .  .  x  .  .    I7
@  .  .  .  M  .  .  .  .  .  x  .  .    I7

.  .  x  .  .  I  .  -  .  .  .  +  .    V7
@  .  .  D  .  -  .  .  .  x  .  .  .    IV7
@  .  .  .  M  .  .  .  .  .  x  .  .    I7
@  .  .  .  M  .  .  .  .  .  x  .  .    I7
```

```
5 p6 6 p7 7 1 p2 2 p3 3 4 p5 5
$  .  x  x  .  @  .  A  D  M  I  L  $
.  .  .  x  .  -  .  .  .  M  .  .  $    I7
.  .  x  .  .  .  .  .  D  .  -  .  $    IV9
.  .  .  x  .  -  .  .  .  M  .  .  $    I7
.  .  .  x  .  -  .  .  .  M  .  .  $    I7

.  .  x  .  .  .  .  .  D  .  -  .  $    IV9
.  .  x  .  .  .  .  .  D  .  -  .  $    IV9
.  .  .  x  .  -  .  .  .  M  .  .  $    I7
.  .  .  x  .  -  .  .  .  M  .  .  $    I7

.  .  .  .  +  .  .  .  .  .  I  .  $    V7
.  .  x  .  .  .  .  .  D  .  -  .  $    IV9
.  .  .  x  .  -  .  .  .  M  .  .  $    I7
.  .  .  x  .  -  .  .  .  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. Ignoring repetitions, and assuming the governing scale is **//DM.L**, the core tritone sequence of this piece is **M-D-M-D-M-L-D-M**. This is a very definite blues sequence. The order is not as important as the presence of these tritones in some order that fits the melody line. That said, blues cores often include fifos. The higher the ratio of core fifos to core tritones, the weaker the blues sound because fifos are less definite musical elements than tritones (there are twice as many of them, and they're widely shared).

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. In PKP terms, the basic form of chord substitution boils down to holding the core and changing other notes. For example, raising the bass note a whole tone for the last four bars on the left above voices the chord sequence **V7-IV7b13-I9-I9** (among other possibilities). Altering the treble line for the sequence at bottom right above to a minor third above the inverted core yields a voicing of "tritone substitute" chords on a root line a tritone away from the original, namely **bII7-VII7-bV7-bV7** (among other possibilities). A tritone substitute chord is a tritone chord with its root a tritone away, containing the same tritones in opposite inversions. Other possibilities have different chord root lines for different types of chords. Make enough substitutions and symbolic chord progressions can quickly become difficult to comprehend for all but experts (e.g., the footnoted example in the opening chapter).

Walking Bass Lines

Walking bass lines, ubiquitous in blues, provide an alternative to chordal harmony. The same anchor symbol identifies a line underneath the melody line as a walking bass line. There's no place to annotate both anchor line and walking bass lines on most written music, but they can be recorded in a separate notebook, which has has the benefit of making them shareable among different pieces.

The following walking bass line for this piece is borrowed from Monk's *Straight No Chaser*. (coming up). The bass line is on downbeats and the melody notes in blue text are on upbeats. This enables the lines to cue each other, and avoids a few direct dissonances. Arrows are not needed for bass lines because they're not sensitive to the direction of the next note, unlike melody lines (this line is assumed to go to the nearest instance of the next note, but that's an assumption not a constraint).

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

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

NON-CLASSICAL DOMAIN : TWO BLUES BY MONK

The walking bass line of the previous example comes from the first piece. I learned it and the next piece from my first piano teacher by following her fingers on the keyboard. I developed this way of representing walking bass lines on my own and was encouraged by another piano teacher to keep doing it because of its novelty and usefulness. The only reference I have for these versions of these pieces are my own notes. They're very easy to play. The only trick is the relative timing.

Straight No Chaser (Home Tonic F)

♫ 5 |1-2-p3-3—↘5-1-2 |p3-3-4-p3——— ↘5 |1-2-p3-3— ↘5-1-2 | p3-4-p3↘5-1-2-p3-3 |

⚓ 1 2 p3 3 4 p3 2 p2 1 3 5 6 p7 6 5 3

♫ |—↘5-1-2-p3-3-4-p3 | ———————— | —↘5-1-2-p3-3— ↘5 | 1-2-p3-3— ↘5-1-2 |

⚓ 4 p3 2 p2 4 p3 2 p2 1 3 5 6 3 p7 6 p3

♫ |p3-3–4↘5-p6-6-p7-7 |↘1-p6-6-p7-7— | 1-p2-2-p3-3— ↘5 | 1-p2-2-p3-3 |

⚓ 2 3 4 p5 5 6 p7 7 1 2 p3 3 1 2 p3 3

Blue Monk (Home Tonic Bb)

♫ |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 5 4 p3 1 2 p3 3

♫ |6-p7-7-1 |p5-5-p6-6 |5-6-5-p5-4—p7-3 | ————— 5-5-5

⚓ 4 5 p6 6 p5 5 p6 6 1 5 4 p3 1 p7 6 p6

♫ |5↘5 |5-6-5-p5-4-p3-p2 |5-6-5-p5-4-p3 | 3 —————

⚓ 5 6 p7 7 1 p7 6 p6 1 p7 6 p6 1 2 p3 3

MIXED DOMAINS : “SUMMERTIME”

Home Tonic - D

I learned this piece in D-minor (1 flat) 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 **//AD.I⁺**. The sub-modes are shown above the anchor line, providing an example of how modal harmony may be notated.

| ——————— //DI ——————— | —— //DM —— | ———— //A ———— | //AI |

⚓| | D | I | D | M | D | A | AI |

♫ | — 5↘p3 |↗5 |5, ↘4↘p3↘4↗5↘p3|↘1↘5 |5, ↗5↘p3 |↗4-4 | 4,↘p3↘1↗p3↘1↗p3 |↘2, |

| | ——— //A ——— | —— //AI ———— |

⚓| | A | A AI | $ |

♫ | ——————repeat above—————— | 5↗p7↘5↗p7↗1↗p3, |↗5↘4↘p3 — |↘1, |

The cross reference between music notation and PKP notation for this home tonic is as follows. The key signature is one flat (Bb because D is the relative minor tonic of Bb major). This is a simple key but the many non-classical modes of the harmony bring in a mix of sharps and flats that can be endlessly confusing.

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

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

	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	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	.	@	↑

Shown next is an example set of harmony shapes for the anchor line of bars 1-8 plus the resolution bar 16, formed by adding voicing notes from the scale to the core. 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.

Numeric suffixes and one numeric prefix on the left show the numbers of half tones the voicing notes are above or below the core (they're not shown in the anchor line to keep the initial presentation simple, but could be). This simple notation has 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 on 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.

bar	shape	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	D2	.	.	.	D	.	–	.	.	.	x	.	.	.	.	x	.	IV-13	
3	I4	.	.	.	.	.	I	.	–	.	.	.	x	.	.	.	x	V-7#5	
4	D5	.	.	.	D	.	–	.	.	.	x	.	.	.	.	x	.	IV-13	
5	M5	–	.	.	.	M	.	.	.	.	.	x	.	–	.	.	x	I-7#9	ornamental
6	D5	–	.	.	D	.	.	.	.	.	x	.	.	–	.	x	.	I-m6(9)	
7	A4	.	.	A	.	.	.	.	.	x	.	.	.	x	.	.	.	II-m7b5	
8	AI	.	.	A	.	.	I	.	–	x	.	.	x	.	.	.	.	V-7b9	
16	4$	–	.	.	x	.	.	.	$	.	.	.	.	x	.	.	–	I-m	triad resolution

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

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 cross reference between music notation and PKP notation for this home tonic is as follows. The key signature is two flats (Bb, Eb) but the classical mode changes imply key-signatures with one flat (Bb) no sharps or flats, and one sharp (F#). Mixtures of sharps and flats are always difficult to deal with for all but experts, often much more difficult than this.

A#			C#		D#			F#		G#		A#
Bb	B	C	Db	D	Eb	E	F	Gb	G	Ab	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	@

The parallel mode changes are summarized next. I was taught to understand the changes as Ionian tonic changes going down by fifths to the home tonic. This tonic sequence is **6-2-5-1**, (highlighted in grey). This requires thinking in terms of whole scales that move by large intervals. It’s simpler to think in terms of parallel modes within the home octave that alter one note for each change (highlighted in yellow). The modes are easy to figure out going backwards from the end. **//L** (Lydian) to **//I** (Ionian) alters one note. **//P** (Phrygian) to **//L** (Lydian) alters more notes, so the **P** mode can only be **alt-P**. This in turn requires the **A** mode to be **alt-A**.

		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	@
bars 9-10	**altA**	.	x	A	.	x	.	x	.	x	x	.	x	.
bars 11-12	**altP**	.	P	x	.	x	.	x	$	.	x	.	x	.
bars 13-14	**//L**	@	.	x	.	x	.	L	$	.	x	.	x	@
bar 15-16	**//I**	@	.	x	.	x	I	.	$	.	x	.	x	@

There’s nothing new in bars 1-8, but it’s worth taking a quick look at the core flow in bars 4-8 to get a sense of the simplicity. The **M-D-A** tritone sequence is visibly ornamental. The fifos are from the **//I** mode. The chords follow from the root line (omitted roots in the building blocks are identified by dashes).

```
     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
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. A treble note is held for the first two bars while one other note changes at each step. The pattern is repeated for the second two bars. Except for one note of each of the tritones **A**, **P** and **L**, all the notes are the home Ionian mode. The only departure from this mode is in one of the implied chords: the chord note inside the fifth in bar 9 is the melody note **p5** in bar 10. Considering only the 3-note shapes, the tritones are as ornamental here as they are in bars 1-8. The difference is in the implication of the pattern.

```
           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 harmonic sequence speaks to the difference between parallel mode changes and same-mode tonic changes that are two sides of the same coin. The tonic-change side is only worth thinking about when melody lines in secondary modes are more extended than this.

ORNAMENTED BASIC CLASSICAL : “OVER THE RAINBOW”

Home Tonic - Eb

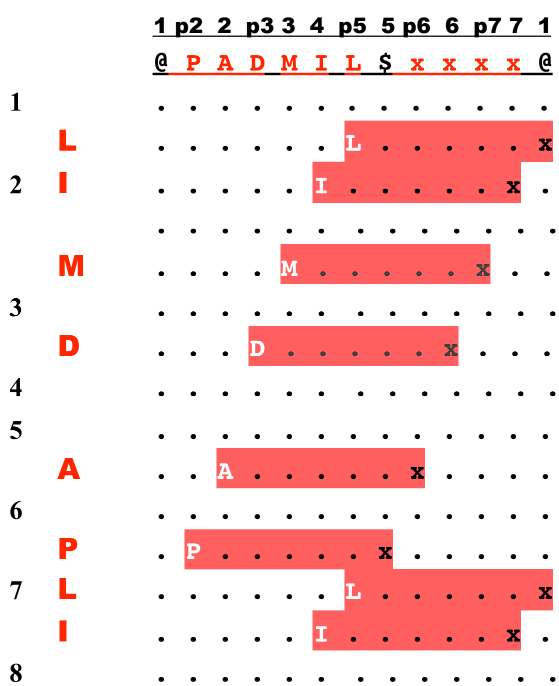
This is an exercise in creating strongly chromatic harmony from scratch, illustrating the extent to which chromatic harmony can be purely ornamental. The first eight bars of the piece are sufficient for the purpose, which are so well known to everyone that there’s no need for a reference. The melody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

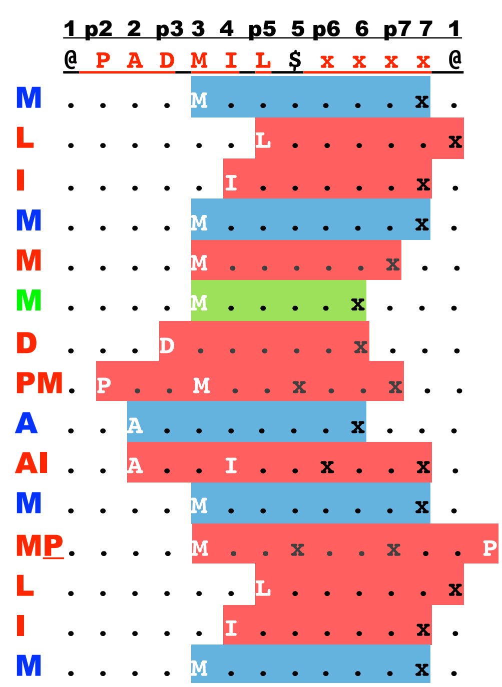
As shown next, the downward trending melody line is given a downward trending tritone anchor line consisting of the alphabet in reverse order starting on **L** and wrapping around: **L-I-M-D-A-P-L-I**. The tritones are spread out over the melody line and positioned for consonance with it.

⚓ | **L** | **I** **M** | **D** | | **A** | **P** | **L** **I** | |

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

The tritone “seed” on the left below provides a framework for adding core fifos and some tritone 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)





The result is representative of many pieces with simple melody lines from classical modes with rich ornamental harmony that has no tonic scale implications.

⚓ | **M** **L** | **I** **M** **M** | **M** **D** | **PM** | **A** **AI** | **M** **MP** | **L** **I** | **M** |

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

MIXED : “TRAUMERAI” (SCHUMANN)

Home Tonic - F

The reference for this beautiful 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 parallel classical modes, or as a single, extended non-classical mode — the 9-note major family scale **//A.MI+**. The latter is simpler 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** substitutions for tritones **A** and **I**.

The cross reference between music notation and PKP notation for home tonic F was given for an earlier piece. The segments highlighted in grey provide insight into the subject of relative vs. parallel modes that will be visited after exploring this chart.

⚓ | $ | M | $ I M | $ A |)…//I

♫ 5 ||:↗1—↘7↗1↗3|↗5↗1 1— ↘7↘6 |↘5↗1↘2↗3↗4↗6↘1↗2|↗3↗5↘2, ↘5 |)

⚓ | $ | A | PM | L I $)…//A.MI+

♫ | ↗1, ↘7↗1↗3 |↗5↗3 3—↘2↘1↘7|↗1↗3↘6↗1↘7— ↘p7 |↘6↗7↘5, ↘5 :||)

⚓ | $ | I M | PM M | P M |)

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

⚓ | | I M | AI I | M I |)

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

repeat bars 1-8 ————————————————————————

⚓ | $ | L | I | I $ |)…//I

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

The melody scales and the building blocks from the family scale used in the harmony are summarized next. The scale provides more building blocks than this but the others aren’t used. Given this picture, reading the above anchor line is straightforward.

	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	@	**minor 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	.	.	.	.	$	.	.	.	.	.	

Tonic Changes

The melody segments highlighted in grey cast light on one of the most confusing areas of music, namely relative tonic changes that alter no notes, versus parallel-mode changes that imply note-altering tonic changes identified by relative modes of them.

The melody line of the second segment highlighted in grey is that of the first segment transposed up a fourth, misleadingly suggesting an Ionian tonic change up a fourth. It's not, because of one note in the following bar. As shown next, the transposition is actually a parallel mode change down a half tone in the alphabet (**//I-//M**) followed by a relative mode change of a tritone minus a half tone up (a fourth). The transposition of tritone **M** up a tritone inverts it. The scales differ by one note (highlighted in yellow). The melody in the bar after the second grey segment does not follow this transposition because it includes note **7** instead of **p7**. There's no substantive tonic change, only a reprise of the opening **//I** mode in a different order.

	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	I	.	$	.	x	.	x	@
same, up fourth= //M	x	.	x	.	M	@	.	x	.	x	x	.	x

The bundling of the intermediate changes of this piece into a single non-classical mode of the home tonic pushes aside the need to think in terms of tonic changes. The melody line is the same to the ear, independently of how anyone thinks about. In either case, its unambiguous interpretation requires a mode context. A mode context that minimizes the number of tonic changes to think about tends to be simplest. A relative mode change in a melody line has no specific meaning in tonic-change terms, independently of a mode context.

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 it's possible to skim the chapter 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 mode signatures for tonic scales summarizes in half a page all the scales and more in scale dictionaries such as *The Source*. The mode signatures on the left identify scales by tritone content.

signature	1 p2 2 p3 3 4 p5 5 p6 6 p7 7 1	scale type
PADMIL	x P A D M I L x x x x x x	chromatic (12 notes)
//P.DM.L	x P . D M . L x . x x . x	diminished (8-notes, min-maj)
//AD.IL	x . A D . I L . x x . x x	diminished (8 notes, min)
PA.MI	. P A . M I . x x . x x .	diminished (8 notes, maj)
ADMI	. . A D M I———x x x x .	no name (8 notes, min-maj)
//A.M.L	x . A . M . L . x . x . x	whole tone (6 notes, maj)
P.D.I	. P . D . I . x . x . x .	whole tone (6 notes, min)
//DM.L	@ . A D M I L $. x x . @	min-maj blues family (9 notes)
//DMI	@ . A D M I . $. x x x @	variation
//ADM	@ . A D M I . $ x x x . @	variation
//P.DM	@ P A D M I . $. x x . @	variation
//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), a basic blues scale
//A..I	@ . A D M I . $ x———x @	harmonic minor-major (8 notes) (master of //PM,AI,DL,MP,IA,LD)
//D.I	@ . A D . I . $. x . x @	melodic minor (7 notes) (master of //PD,AM,DI,ML,IP,LA)
//I	@ . A . M I . $. x . x @	Ionian (7 notes) (master of //P,A,D,M,I,L)
//M	@ . A . M———$. x———@	pentatonic major
//D	@———D . I . $———x . @	pentatonic minor

The scales above double line are atonal, with symmetric shapes (same interval sequence going up and down). The scales below it are tonal, with asymmetric shapes. These scales are completed by populating the anchor sets in the lower fifth of the scale frame with fifo-only anchors. The letters **ADMI** are fundamental to these anchor sets, with different omissions of letters or different identifications of them as fifo-only anchors determining different scales. Minor-third intervals of scales are shown as solid lines to make them stand out to the eye. These are by no means the only possible scales but the dictionary is easily extended if anyone sees a need.

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

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

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

TONIC CHANGES

Tonic changes are misleadingly complex in key-signature-based music notation. For the classical modes that define the scales of key signatures, they boil down to the following simple table. The changes in the left column are from an established mode (parallel or alt), identified by a tritone anchor position in the alphabet, to a parallel mode identified by a different position a given number of steps up (+) or down (-) in the alphabet as a circular loop (steps off one end wrap around to the other end). Steps in the opposite direction add up to a tritone. The yellow highlights identify changes that alter the fewest notes. This is sufficient to identify the mode signature of a result because changes between primary modes and alt modes alter the most notes.

SAME-MODE CHANGES TO TONICS A TRITONE APART

anchor change	tonic change	altered notes	tonic change	altered notes
+3	-3	3	+3	3
+2	-4	4	+2	2
+1	-5	1	+1	5
0	0	0	± 6	5
-1	+5	1	-1	5
-2	+4	4	-2	2
-3	+3	3	-3	3

The table generalizes simply and directly to non-classical modes, but is also less important for them because they're already so chromatic that extra chromaticism provided by tonic changes tends to be undesirable.

<u>SCALE FAMILIES</u>

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. These scales were shown earlier to be easily understood as built up from a foundation of parallel pentatonic minor and major modes, the scales of simple "folk music" in many cultures worldwide. The classical modes that provide the alphabet follow from these modes by splitting their minor-third intervals. Beyond these, family scales follow from forming unions of parallel modes of opposite tonalities.

<u>Blues Family</u>

The blues hierarchy of family scales 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 ▯ are the scales but the associated are 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.

<u>Minor and Major Families</u>

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 (they're sub-scales of **AD.I⁺** and **A.MI⁺**).

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**	

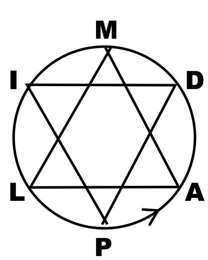
The **ADMI** scale reduces to 9-note minor or major family scales by morphing the **M** or **D** tritone into a fifo with the same top note. The morphed scales are identified by the augmented words **AD.I⁺** or **A.MI⁺** where the plus superscript indicates the top note of the missing tritone is retained. 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.

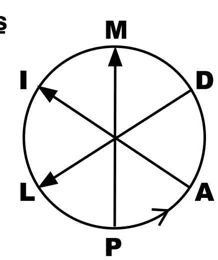
PARALLEL "MELODIC" AND "HARMONIC" MODES

The systematic development of the concept of parallel modes in music notation is restricted to single- and double-tritone modes identified by the terms "melodic" and "harmonic" that share with classical modes the properties of seven notes and no adjacent half tones.

melodic minor modes	
PD	~~**alt PD**~~
AM	~~**alt AM**~~
DI	~~**alt DI**~~
~~**IP**~~	~~**alt IP**~~
ML	**alt ML**
LA	**alt LA**



harmonic minor-major modes	
PM	~~**alt PM**~~
AI	~~**alt AI**~~
DL	**alt DL**
MP	~~**alt MP**~~
IA	~~**alt IA**~~
LD	**alt LD**



→ indicates letter order for primary modes (secondary modes are opposite)

crossed-out modes don't contain the home tonic but may be used ornamentally

The melodic and harmonic modes are different in kind because each of the words is unique for the former and half of the words are repetitions of the other half in the opposite order for the latter. This is because the double tritones of the latter are circularly symmetric (all inter-note intervals are minor thirds in any inversion). The harmonic modes can be dauntingly complex in conventional terms

(Appendix D) because the irregularity of the master mode makes rotated transpositions doubly irregular. The irregularity can be finessed by making the master mode mixed minor-major, leaving the choice of its tonality in a particular parallel mode to context.

The three words **A.M**, **D.I** and **M.L** that fall out of the earlier scale hierarchies determine four parallel modes of the melodic minor mode identified by **D.I**. The three words determine four modes because any word containing **L** determines a primary parallel mode and an **alt** mode with all non-tritone notes different.

The two words **A..I** and **D..L** that also fall out of the foregoing scale hierarchies determine eight possible parallel modes of a harmonic minor-major master mode.

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

Parallel "Melodic" Modes

These modes are summarized below in the same format as for parallel classical modes to enable easy comparison. As for classical modes, there are seven parallel modes (checked, with the master mode double checked). The unchecked modes are pseudo modes that don't contain the home tonic. Neither **IP** mode contains the home tonic but the major mode is designated **//IP** because of its place in the mode table. The twelve modes are so close to whole-tone scales that they are easy to know on the keyboard. A whole-tone scale is formed of five stacked whole tones, and these scales contain four stacked whole tones highlighted in yellow for the six primary modes. The notes highlighted in blue that provide references for the whole tone stacks are the tonics going down by fifths (**6-2-5-1-4-p7**) of the relative master mode.

		1	p2	2	p3	3	4	p5	5	p6	6	p7	7	1	tonality notes highlighted
		@	P	A	D	M	I	L	$	x	x	x	x	@	
✔	**//LA**	x	.	x	.	x	.	x	.	x	x	.	x	x	major (lydian sharp 5)
✔	**alt-LA**	x	.	x	x	.	x	x	.	x	.	x	.	x	minor
	//IP	.	x	x	.	x	x	.	x	.	x	.	x	.	major (ionian sharp 1)
	alt-IP	.	x	.	x	.	x	.	x	x	.	x	x	.	minor
✔	**//ML**	x	.	x	.	x	.	x	x	.	x	x	.	x	major (lydian flat 7)
✔	**alt-ML**	x	x	.	x	x	.	x	.	x	.	x	.	x	minor-major
✔✔	**//DI**	@	.	x	x	.	x	.	x	.	x	.	x	x	minor (ionian flat 3)
	alt-DI	.	x	.	x	.	x	x	.	x	x	.	x	.	minor
✔	**//AM**	x	.	x	.	x	@	.	x	x	.	x	.	x	major (mixo flat 6)
	alt-AM	.	x	x	.	x	.	x	.	x	.	x	x	.	major
✔	**//PD**	x	x	.	x	.	x	.	x	.	x	x	.	x	minor (dorian flat 2)
	alt-PD	.	x	.	x	x	.	x	x	.	x	.	x	.	

As for classical modes, the **alt** modes are tritone substitutes with all non-tritones notes different, and the ones containing **L** are parallel modes because the **L** tritone contains the home tonic (the difference here is there are two of these modes). Some useful relationships to classical modes are shown on the right, but keep in mind that the best way of understanding how the modes emerge in music is as sub-modes of higher level family modes in the scale hierarchy. It's also useful to remember that these scales are morphed from the whole tone scales identified by **A.M.L** or **P.D.I** by splitting one scale note into two notes a half tone above and below it (the lower note is the one highlighted in blue above).

Parallel "Harmonic" Modes

Making the minor-major mode the master reduces fourteen parallel modes that are often intricate and difficult to comprehend or remember, into the eight simple parallel modes summarized below.

	@	P	A	D	M	I	L	$	x	x	x	x	@	
	1	p2	2	p3	3	4	p5	5	p6	6	p7	7	1	
✔ //DL	x	.	x	D	—	—	L	$	.	x	o	o	x	**alt-DL:** all non-tritone notes different
//LD	x	—	—	D	x	.	L	o	o	x	.	x	x	**alt-LD:** all non-tritone notes different
✔✔ //AI	@	.	A	o	o	I	.	$	x	—	—	x	@	
//IA	@	x	A	.	x	I	—	—	x	x	.	x	@	
✔ //PM	@	P	—	—	M	x	.	x	o	o	x	.	@	
//MP	@	P	.	x	M	—	—	x	x	.	x	o	@	

There's a simple pattern to this table that makes understanding it easy. The check-marked modes establish the pattern (the master mode has a double check mark). The letters in the mode signatures of the check-marked modes above and below the master mode are in order within the alphabet. This puts their relative master tonics (highlighted in blue) a fifth up from the bottom and down from the top of the home octave. These relative tonics establish the next minor third down as empty (horizontal line) and the next minor third up as full (yellow highlighting). The opposite order of the letters in the unchecked modes indicates everything shifts by a minor third: down for **//LD**, up for **//MP**. The choice between the master mode being major or minor (yellow highlighting) is a detail best determined by the family context in which a mode appears (there's no choice in the two cases where the yellow highlighting includes the tonic — the non-tonic highlighted note must be omitted).

Examples of **//DL** from the blues family and an **alt-DL** variation are shown next (each example of a conventional name is one among several possibilities from Appendix D).

	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	"Romanian"
alt-DL	x	x	.	D	o	o	L	.	x	x	.	x	x	
choose	x	x	.	D	x	.	L	.	x	x	.	x	x	"Leading Tone Minor Diminished"

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. After many years of trying to find good voicings for chord progressions in lead sheets and fake books, I have concluded that chord symbols cannot be trusted to give good information about voicings. The specify a set of notes precisely but over specify them relative to context that often supplies their notes in the flow, carried over from previous chords or supplied by the melody line. Chord roots are references for vertical structure but are often misleading for horizontal flow.

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 seventh chords from the Ionian mode shown next provide the basic symbols of chord notation. Their core building blocks, shown in color, are analogous to "guide intervals" used in standard chord voicing practice. In this 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 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 the anchor points (the fifos are all fifths for basic seventh chords going up from these roots, but these are not the only possibilities).

		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	@	.	.	.	M	.	.	o	.	.	.	x	.	.	.	.	.	.	.	.	.	.
II-m7	— 343	.	.	x	.	.	I	.	.	.	o	.	.	x	.	.	.	.	.	.	.	.	.
III-m7	— 343	.	.	.	.	M	.	.	o	.	.	.	x	.	.	x	.	.	.	.	.	.	.
IV-M7	434 —	.	.	.	.	.	I	.	.	.	o	.	.	x	.	.	.	x	.	.	.	.	.
V-7	— — 433	.	.	.	.	.	.	.	@	.	.	.	x	.	.	o	.	.	I	.	.	.	.
VI-m7	— 343	.	.	.	.	.	.	.	.	.	x	.	.	o	.	.	.	M	.	.	x	.	.
VII-m7b5	— — — 334	.	.	.	.	.	.	.	.	.	.	.	x	.	.	o	.	.	I	.	.	.	x

The interval stacks in the "shape" column include only minor thirds (symbolized by **3** , standing for three half tones, as before) and major thirds (symbolized by **4**). For chords, this is a variation of a standard notation called "figured bass notation" (Appendix B), in which different numbers represent counts of scale steps between chord notes).

Omitting the inner notes of the core building blocks reduces the chords to a core building block with a major or minor third above or below it, with their sizes determined by scale position (for example, for the first chord, the “third” below the core fifth can only be major). The resulting 3-note shapes are thin voicings of the chords that are often sufficient in the context of a piece of music. The missing inner notes are likely to be implied by most contexts because they’re the tonic or pitch center of the home octave, or notes a whole tone above them.

This yields at one stroke a way of voicing seventh chords of classical modes starting from core building blocks (add a major or minor third from the scale above or below a core building block), and a way of notating the voicings (add the size number as a suffix or prefix to the anchor).

Chords From Core Building Blocks

Putting all the core building blocks of the chords in the bottom octave, and rearranging the root order, provides the following revealing picture within the home octave.

	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	.	.	.	M	.	.	.	*IV-M7*
I3	.	.	.	.	.	I	.	.	.	o	.	x	.	.	A	.	.	.	.	.	*VII-m7b5*
M3	.	.	.	.	M	.	.	$	.	.	.	x	.	.	A	.	.	.	.	.	*III-m7*
~~M~~3	.	.	.	.	M	.	.	$	.	x	.	.	@	.	.	.	.	.	.	.	*VI-m7*
3I	.	.	A	.	.	I	.	.	.	o	.	.	@	.	.	.	.	.	.	.	*II-m7*
3I	.	.	A	.	.	I	.	$	.	.	.	x	.	.	.	.	.	.	.	.	*V-7*
4M	@	.	.	.	M	.	.	$	.	.	.	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 all the fingers must be lifted and moved by large jumps, while also

	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	.	.	.	x	.	.	.	.	.	*IV-M7*
I4	.	.	.	.	.	.	.	.	.	.	.	x	.	.	o	.	.	I	.	.	.	x	*VII-m7b5*
M3	.	.	.	.	M	.	.	o	.	.	.	x	.	.	x	.	.	.	.	.	.	.	*III-m7*
M3	.	.	.	.	.	.	.	.	.	x	.	.	o	.	.	.	M	.	.	x	.	.	*VI-m7*
3I	.	.	x	.	.	I	.	.	.	o	.	.	o	.	.	.	.	.	.	.	.	.	*II-m7*
4I	.	.	.	.	.	.	.	x	.	.	.	x	.	.	o	.	.	I	.	.	.	.	*V-7*
4M	@	.	.	.	M	.	.	o	.	.	.	x	.	.	.	.	.	.	.	.	.	.	*I-M7*

adjusting them for “wobbles.”

Such shape progressions may be understood as sliding a “scale shape” to different positions in the same scale. The scale shape of a seventh chord from a classical mode has two scale steps between successive notes, but many other scale shapes are possible. Scale shapes are conceptually simple but have the disadvantage of requiring independent knowledge of the scale. Keyboard shapes determine scales. What’s more, they enable starting out as one must continue, by working in terms of wobbly slides with different inter-note intervals on the keyboard (two scale steps in a classical mode may be a major or a minor third).

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

Open Voicings

The following 4-note open voicings of the original chords follow from putting the different building blocks in different adjacent home octaves. These shapes can be represented by pairs of anchors that are equivalent to the anchor-with-numeric-offsets notation.

Example (a) is basic. 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 shapes they don't quite fit. See Appendix C for more on chords.

Example (c) is particularly simple: move the middle 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.

```
                        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
    shape               @ .  A .  M I .  $ .  x .  x @ .  A .  M I .  $ .  x .  x @
(a) I\A   (I27)         . .  . .  . I .  . .  . .  . @ .  A .  . . .  . .  x .  . .   IIm7
    I\A   (I37)         . .  . .  . I .  . .  . .  x . .  A .  . . .  . .  x .  . .   V7
    M\@   (M17)         . .  . .  M . .  . .  . .  x @ .  . .  . . .  $ .  . .  . .   I-M7
    ------------------------------------------------------------------------
(b) I\M   (I45)         . .  . .  . I .  . .  . .  . @ .  . .  M . .  . .  x .  . .   IIm9, IV-M7
    I\M   (I55)         . .  . .  . I .  . .  . .  x . .  . .  M . .  . .  x .  . .   V7(13), VII-m7b5
    M\A   (M35)         . .  . .  M . .  . .  . .  x . .  A .  . . .  $ .  . .  . .   I-M9, III-m7
    ------------------------------------------------------------------------
(c) I\M   (I45)         . .  . .  . I .  . .  . .  . @ .  . .  M . .  . .  x .  . .   IIm9, IV-M7
    I\M   (I55)         . .  . .  . I .  . .  . .  x . .  . .  M . .  . .  x .  . .   V7(13), VII-m7b5
    M\A   (M55)         . .  . .  M . .  . .  x .  . . .  A .  . . .  $ .  . .  . .   I-M6(9), III-m7(11)
```

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 satisfactory.

Octave Shapes

Octave shapes illustrated next provide a simple starting point for transforming thin core harmony into 3-note shapes with all notes different. Asterisks mark the limited choices of voicing notes above the **I-I-M** core. Playing octave shapes of this kind is a standard keyboard exercise for beginners but the ability to write them down in this simple way as shapes that voice chords, without using chord or note symbols, is novel. Voicings of a wide variety of chord progressions with the same core are easily created this way.

	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
shape	@	.	A	.	M	I	.	$	.	x	.	x	@	.	A	.	M	I	.	$	.	x	.	x	@
I\I	.	.	.	.	.	I	.	.	.	.	.	.	@	.	*	.	*	I	.	.	.	.	.	.	.
I\I	.	.	.	.	.	I	.	*	.	.	.	x	.	.	*	.	*	I	.	.	.	.	.	.	.
M\M	.	.	.	.	M	.	.	.	.	.	.	x	.	*	.	*	M	.	.	.	.	.	.	.	.

CHROMATIC CHORDS FROM NON-CLASSICAL MODES

The family modes described earlier provide many chords, a sampling of which is provided next.

	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	@c	
AD	.	.	A	D	.	.	.	.	x	x	.	.	.	no simple conventional symbol
D.I	.	.	.	D	.	I	.	.	.	x	.	.	x	. 7b5 on roots IV or VII
A..I	.	.	A	.	.	I	.	.	x	.	.	x	.	dim7 on 4 roots, 7b9 on other roots
A3 or 3A	.	.	A	.	.	x	.	.	x	.	.	.	.	dim on same 4 roots (spread out)
D+	.	.	.	D	.	.	.	.	.	.	.	x	.	augmented fifth
3D+	x	.	.	D	.	.	.	.	.	.	.	x	.	ImM7 ("M" doesn't mean M)
4$	.	.	.	x	.	.	.	$	.	.	.	.	@	Im (minor triad, spread out)
major family	@	.	x	.	x	x	.	$	x	x	x	x	@	
MI	.	.	.	.	M	I	.	.	.	.	x	x	.	no simple conventional symbol
A.M	.	.	A	.	M	.	.	.	x	.	x	.	.	7b5 on roots III or pVII
A..I	.	.	A	.	.	I	.	.	x	.	.	x	.	same dim7, dim & 7b9
3$	.	.	.	.	x	.	.	$	.	.	.	.	@	I (major triad, spread out)
blues family	@	.	x	x	x	x	x	$	.	x	x	.	@	
DM	.	.	.	D	M	.	.	.	.	x	x	.	.	no simple conventional symbol
ML	.	.	.	.	M	.	L	.	.	.	x	.	x	7b5 on roots pV or I
DL	.	.	.	D	.	.	L	.	.	x	.	.	x	dim7, dim & 7b9 chords

OBSERVATIONS ON CHORD SYMBOLS

Chord symbols in tonal music 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 set of notes. The choices for them seen in fake books sometimes seem arbitrary. 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 an essential 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.

OBSERVATIONS ON WAYS OF PLAYING CHORD PROGRESSIONS

Early in my musical adventure, I learned about simple "open" voicings of complex chords 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 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 creating voicings based on representing chords as "scale shapes" determined by counts of scale steps between adjacent chord notes. This resonated with my developing ideas about building blocks, so I contacted him to learn about his method. He recommends, to beginning jazz piano students, a practicing regime of moving scale shapes of chords to different positions in and between classical modes, without reference to chord symbols. The objective is developing the instinctive moves required of jazz pianists. Although the scale shapes are fixed, the keyboard shapes are "wobbly," requiring adjustment of the fingers to play. This combined with lifting all the fingers off the keyboard and moving them by often largish intervals to other keyboard positions makes this style of playing difficult. The method has no notation and is learned from exercises.

I decided to find for myself a simple way of notating such different ways of playing chord progressions. PKP is what I found.

CHAPTER 5: ADVANCED EXAMPLES

This chapter explores a smorgasbord of example pieces that I found difficult when I first encountered them in music notation: not necessarily difficult to play by rote but definitely difficult to understand. The idea of a smorgasbord is to offer something for everyone. Digging into one or two of these pieces is sufficient to internalize the concepts; the remaining pieces are available for interest. The first example is the blues by Mingus with the footnoted complex chord progression presented in the opening chapter. The second example is a classical piece by Debussy that uses the same blues scale in a different way. All the examples are independent of each other and so may be approached in any order.

A takeaway is confirmation that only six alphabet symbols, alone or in combination, are actually sufficient to cover any voicing of any chord progression of a piece in any key signature. Figuring out voicings from music notation is difficult. Figuring out voicings in PKP terms is much simpler because of the guidance provided by two useful structural properties of tritones, namely determining tonic scales and determining the flow of harmony within the home octave. The harmony isn't itself novel, the only novelty is in the unconventional use of tritones to provide structural guidance.

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.

NON-CLASSICAL DOMAIN : “GOODBYE PORKPIE HAT”

Home Tonic - Eb

This blues in Eb is a poster child for chromatic music that’s difficult on the page for all but experts (perhaps even for them) and yet is very simple on the piano. 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 origin of the chord complexity (footnote in Chapter 1) has several parts: an imaginative chord root line by a creative bassist; many chord substitutions; and the addition of blues melody notes to chord symbols that don’t contain the notes.

The simple melody line is mostly in either the all-black-key pentatonic minor mode of the home tonic (**1=**Eb) or its 6-note minor blues extension that adds one white key (**p5=**A); the deviations from these scales in bars 6-7 are highlighted in yellow (the **7.p2** notation means the first note is “crushed” into the second note on the same beat).

⚓ | *M L* | I\I LM | I\I L * | I\I *M |

♫ 5|↗1↗p3↘1↗p3↗4↘p3, ↘1↘p7|↗1↗p3↘1↘p7↗1, ↘5|↗1↗p3↘1↗p3↗p5↘p3, ↘1↘p7|↗1↗p3↘1↘p7↗1, 1|

A

⚓ | I\I L\L | AI | PD | L\L I\I |

♫ |↗5↗p7↘1↗p3↗4↘p3, ↘p7↗p3|↗5↗1↘1↗p3↗p7↘5↘p7↘p6, |↗p3↗p5↘7.p2↘7↗p5↘3|↗p3 ↘1, ↗p5↘4|

⚓ | *M *D | *I L* | *M L* | P* LM |

♫ |↘p3↘1, |↗4↘p3↘1↘p7↗p5↘4↘p3↘1|↘p3↘1, |5↘4↘p3↘1↘p7↘5|

The scales, and associated building blocks used in the harmony, are summarized next.

		1	p2	2	p3	3	4	p5	5	p6	6	p7	7	1	
		@	P	A	D	M	I	L	$	x	x	x	x	@	
scales	//DM.L	x	+	x	x	x	x	x	$	+	x	x	+	x	harmony
		x	.	.	x	.	x	x	$	.	.	x	.	x	melody sub-scale
from the scale	M	.	.	.	.	M	.	.	.	.	.	x	.	.	
	L	x	.	.	.	.	.	L	.	.	.	.	.	.	
	D	.	.	.	D	.	.	.	.	.	x	.	.	.	
	LM	x	.	.	.	M	.	L	.	.	.	x	.	.	
	L\L	x	.	.	.	.	.	L	.	.	.	.	.	x	
	I\I	x	.	.	.	.	I	.	.	.	.	x	.	.	
ornamental	I	.	.	.	.	.	I	.	.	.	.	.	x	.	
	AI	.	.	A	.	.	I	.	.	x	.	.	x	.	
	PD	.	P	.	D	.	.	.	$	.	x	.	.	.	
	P	.	P	.	.	.	.	.	$	.	.	.	.	.	

The following view of the complete harmony using these building blocks is worth a glance for the strong contrast it demonstrates between the simplicity on the keyboard and the complexity of the chord progression being voiced (omitted roots are shown by dashes). Any omitted chord notes are picked up in the flow. The chord root line can provide a bass line underneath if desired, but the melody line with this harmony conveys the haunting sound of the piece very effectively.

		1	p2	2	p3	3	4	p5	5	p6	6	p7	7	1		
		@	.	A	D	M	I	L	$	.	x	x	.	@		
1	*M	@	.	.	.	M	.	.	o	.	.	x	.	.		*I-7#9*
	L*	@	.	.	.	.	.	L	.	–	.	x	.	.		*pVI-9(13)*
2	I\I	@	–	.	.	.	I	.	.	.	.	x	.	.		*pII-M9*
	LM	@	.	.	.	M	.	L	.	.	.	x	.	.		*pV-7#11*
3	I\I	@	.	–	.	.	I	.	.	.	.	x	.	.	.	*II-9sus*
	L*	@	.	.	.	.	.	L	.	–	.	x	.	.		*pVI-9(13)*
4	I\I	@	.	–	.	.	I	.	.	.	.	x	.	.		*II-7sus*
	*M	@	.	.	.	M	.	.	.	.	.	x	.	.		*I-7*
5	I\I	@	.	.	.	.	I	.	.	.	.	x	.	.		*IV-m11*
	L\L	@	.	.	.	.	.	L	.	–	.	.	.	x		*pVI-7(13)*
6	AI	.	.	A	.	.	I	.	.	x	.	.	x	.		*II-m7b5 + V-7#5#9*
7	PD	.	P	.	D	.	.	.	$	.	x	.	.	.		*VI-13#11 + II-7(13)*
8	L\L	@	.	.	.	.	.	L	.	–	.	.	.	x		*pVI-7*
	I\I	@	–	.	.	.	I	.	.	.	.	x	.	.		*pII-M7*
9	*M	@	.	.	.	M	.	–	.	.	.	x	.	.		*pV-7(13)*
	*D	@	.	.	D	.	–	.	.	.	x	.	.	.		*IV-7*
10	*I	@	.	.	.	.	I	.	–	.	.	.	x	.		*V-7*
	L*	@	.	–	.	.	.	L	.	.	.	x	.	.		*II-7*
11	*M	@	.	.	.	M	.	.	.	.	.	x	.	.		*I-7#9*
	L*	@	.	.	.	.	.	L	.	–	.	x	.	.		*bVI-7*
12	P*	.	P	.	.	.	.	.	$	.	.	.	x	.		*pII-M7#11*
	LM	@	.	.	.	M	.	L	.	.	.	x	.	.		*bV-7#11*

NON-CLASSICAL DOMAIN : “PRELUDE TO AN AFTERNOON OF A FAUN”

Home Tonic - C#

This and the previous piece make strange bedfellows. I was motivated to investigate this piece by things said about its violation of music convention in the article *Beauty in the Void,* Alex Ross, The New Yorker, Oct. 29, 2018. I was curious about the non-classical modes it might use. My source for the written music is the *Classical Fake Book*, 2nd Edition, Hal Leonard (2013), page 222. The key signature is 4 sharps and the home tonic is C#, identified by the closing note of the melody line.

The only unusual notational feature in the skeleton melody line below is the double arrow at the end of [A] indicating a jump to the pitch center two octaves up. The way to read the anchor line is this: add the building block size and the voicing interval size to get the overall size (e.g., **3P** is size 3+5=8 half tones, an augmented fifth); locate the bass and treble notes and then add the note in between.

[A] ♫ |1 —↘p7↘6↘p6↘5↘p5↗5↗6↗p7↗7|↗1 —↘p7↘6↘p6↘5↘p5↗5↗6↗p7↗7|

♫ |↗1↗2↗5↘p3↘5↘p7|p7-p7↗1↘6↗↗5|

[B] ⚓ |3P M3 | 3P M3 |

♫ |1 —↘p7↘6↘p6↘5↘p5↗5↗6↗p7↗7|↗1 —↘p7↘6↘p6↘5↘p5↗5↗6↗p7↗7|

⚓ | 3A 3A 3D | I3 |

♫ |↗1↗2↗5↘p3↘5↗p7| — p7↗1↘6|

[C] ⚓ | 4A 2$ I2 | $⁺ LM | M4 I4 | M4 MP |

♫ | — ↗1↗2↘7 —↘6↗3|↘5↗6 |↗p7 —↘p6↘3↗5↗p7↗1|↘6↘5↘3↗5↗p7↗1|

[D] ⚓ | | | $3 |

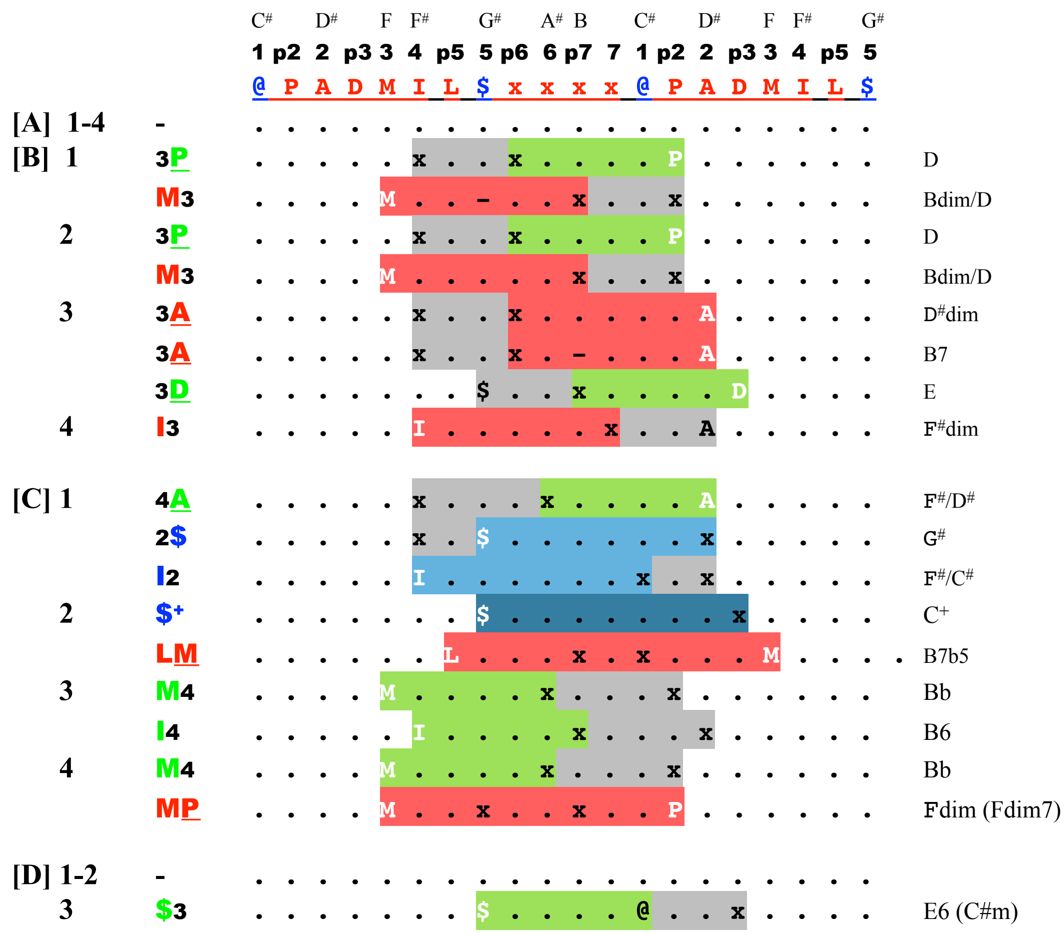
♫ |↘5↗p7↗1↘5↗p7↗1↘5↗p7↗1|↘5↗p7↗1↘5↗p7↗7|↗1 — |

Moving all the melody notes except the ornamental passing notes into corresponding positions in the home octave (below) reveals the blues family mode. The passing notes are identified as such because they fill in scale sequences going in the same direction, and can be skipped without materially affecting the sound (if skipped, hold the previous note or anticipate the next one to preserve the timing); also because they’re never harmonized. Thinking in terms of the blues scale provides a structural handle on the piece that’s missing if you think in terms of a scale that’s one note short of the chromatic scale. The repetitive, sparse melody line at the end of [C] is from the parallel pentatonic minor mode that’s a sub-scale of the blues family scale. The building blocks from this scale that were used in the previous example are also used here.

	1	p2	2	p3	3	4	p5	5	p6	6	p7	7	1	
	@	P	A	D	M	I	L	$	x	x	x	x	@	
//DM.L	x	.	x	x	x	x	x	$	.	x	x	.	x	blues family mode
//D	@	.	.	x	.	x	.	$	.	.	x	.	@	pentatonic minor sub-mode

The voiced anchor line is self sufficient for playing purposes but taking a look at the following Lego-like view of it gives a sense of its simplicity on the keyboard. Blues tritones **M** and **L** have a strong presence overall, and a particularly strong presence in melody section [C] that precedes the pentatonic minor closing. Blues tritone **D** is missing from the harmony but its anchor note **p3** is present in the melody and in a couple of places in the harmony, implying the tritone in combination with scale note **6**. Tritones **P**, **A** and **I** are ornamental passing tritones analogous to ornamental passing notes in melody.

The 3-note shapes that voice diminished chords (symmetrically split tritones) or major or minor triads (asymmetrically split fifths) are mostly spread out by moving the inner notes outside to fit in with 3-note voicings of 4-note chords. The result is smoothly flowing harmony within the range of the **M-M** octave that straddles the pitch center of the home octave.



CHROMATIC CLASSICAL DOMAIN: “LAURA”

Home Tonic - C

My source for this piece in C is *The Jazz Book*, John Brimell, CPP/Belwin, 1989, p24. The book is sub-titled *Today's Easy Adult Piano*, but the piece is easy in music notation only in the sense that the page is not black with notes. The changes involve multiple implicit key signatures. Some of the melody lines are ambiguous, requiring some creative guessing to interpret.

(a) ⚓ | | LD | | |
♫ | 7* | — ↘p7↗7↘p7↘p5↗5 | ↗6*↘3 — | — | ...//L
(b) ⚓ | | PM | | D |
♫ | ↗6*| — ↘p6↗6↘p6↘3↗4 | ↗5 — | — | ...//M
(c) ⚓ | AI | I | | | D DL |
♫ | — ↘p3↗4 | — ↘p3↗4↘p3↗4 | ↗5*↘2 — | — ↗p3↗5↗p7 |↗p3*↘p6 — | ...//A
(d) ⚓ | LA | L | AI |
♫ | — ↗6 | ↗2 — | — ↗3↘1↗2 — | ... //𝕄
(e) ⚓ | | AI | L | |
♫ | — ↗4↗5 | — ↘3↗4↗p6↗7 | ↗2↘1↗2 — | — ↘7↗1| ...//AI
(f) ⚓ | DL AI | AI | | |
♫ | ↗p3 p3 | — ↗3↘p3↘2↘6↗7 | ↗1 — | — | ...//I

When I first approached this piece, I struggled with trying to understand how the harmony implied the melody and finally realized I had it backwards. The melody comes first and the harmony is an add-on. The melody interpretation is shown next. Segments highlighted in grey suggest successive transpositions of tritones down by whole tones (**L-M-A**) that identify corresponding classical modes. The first two segments include adjacent half tones that are part of no classical mode, but assuming the middle note is a passing note yields the interpretation shown below: relative Ionian tonics going down in the sequence **5-4-p3-1** (two whole tones followed by a minor third).

	1	p2	2	p3	3	4	p5	5	p6	6	p7	7	1	
	@	P	A	D	M	I	L	$	x	x	x	x	@	
(a) ambiguous melody	.	.	.	.	x	.	x	x	.	x	x	x	.	
scale interpreted as **//L**	@	.	x	.	x	.	x	$	.	x	+	x	@	**//L@5** is home-tonic **//I** up a fifth
(b) ambiguous melody	.	.	.	.	x	x	.	x	x	x	.	.	.	
scale interpreted as **//M**	@	.	x	.	x	x	.	$	+	x	x	.	@	**//M@4** is **//I** up a fourth
(c) melody is **//A**	@	.	x	x	.	x	.	$	x	.	x	.	@	**//A@p3** is **//I** up a min. third
(d) ambiguous melody	x	.	x	.	x	.	.	.	.	x	.	.	x	
scale interpreted as //𝕄	@	.	x	.	x	.	.	$	.	x	.	.	@	pentatonic major goes to (a) or (e)
(e) melody is major **//AI**	@	.	x	.	x	x	.	$	x	.	.	x	@	harmonic major
(f) ambiguous melody	@	.	x	x	x	.	.	.	.	x	.	x	@	
scale interpreted as **//I**	@	.	x	+	x	x	.	$	.	x	.	x	@	**//I**

The home-tonic mode of (c) is unambiguously Aeolian **//A**, suggesting **//L-//M-//A** for (a)-(b)-(c), with tritone anchors going down by whole tones. The highlighted passing notes are beautifully consistent: they're a minor third up from relative Ionian tonics; in the case of (a) and (b), they're borrowed from the next mode in the succession. Understanding these Ionian tonic changes is conceptually useful, but the parallel mode changes provide all the notes.

The harmony sounds good but is only loosely related to the melody modes in which it appears. The harmony is dominated by nine instances of the three double tritones **DL**, **PM** and **AI**. These are the only three diminished seventh chords that exist: the four possible inversions select different notes as roots but the mirror symmetry of the shapes gives them the same form in any inversion (a stack of three minor thirds), and context decides the inversion. I read somewhere that these are chords of last resort — when you're unsure about an appropriate chord, use one of them.

The double tritones may be understood as cueing the melody modes as follows.

(a) **L** of **DL** cues **//L**

(b) **M** of **ML** cues **//M**

(c) **A** of **AI** cues **//A**

(d) the mixed harmony is purely ornamental

(e) **AI** cues major **//AI**

(f) **I** of **AI** cues **//I**

CHROMATIC CLASSICAL DOMAIN : “BODY AND SOUL”

Home Tonic 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 natural 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 the fact that every note of [B] is 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, |

1______ 2______

⚓| A | I A | M | IA | I |

♫| — ↗1↘6↘4↘6|↗3↘2, | — ↘1↗2↗3↗5 5↗6↘p3 |↘1 — |↘1 — | ...//I

[B] ⚓| | I | M | |

♫|↗p2↗p3↗4↗p6*|↗p2*↘4↗p6*—↘p5 |↘4*↘p2↗p3↘1↘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

Scales

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.

		1 @	p2 P	2 A	p3 D	3 M	4 I	p5 L	5 $	p6 x	6 x	p7 x	7 x	1 @	
[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**

CHROMATIC CLASSICAL DOMAIN : “GIANT STEPS”

Home Tonic - F#

My source for Coltrane’s jazz classic is *The Real Book*, 6th Edition, Hal-Leonard. It cycles rapidly through 3 Ionian modes of tonics G, Eb and B that are a major third apart and differ by 4 notes. The F# melody line is a sequence of short segments from these modes that combine into 9-note scale that’s very far from a classical mode and too special to be of general use. That said, the piece is easily understood in terms of classical modes relative to the F# home tonic, as shown next. All the notes identified by this view are as written. The highlighted melody segments identify two parallel classical modes that determine the melody line. The only tritone of the three that’s actually present in the melody line is **M** (tritones **D** and **I** are also present incidentally, not as elements of a generally useful mode signature).

⚓ | M L | I A | P | L L | I A | P M | M |
🎵 | 1↘p6 | ↘4↘p2↗3 | 3, | ↘4↘p3, | ↗p6↘3 | ↘p2↘6↗1 | 1, |
⚓ | A | P | L | I | M | M | A | P | M |
🎵 | ↗p2↘7↗3 | 3, | ↗4↘p3↗p6 | p6, | ↗6*↗1 | 1, | ↗p2*↗3 | 3, | ↘1* |

Playing the melody requires tracking 2 modes, identified by highlighting, through 6 relatively infrequent changes.

	1	p2	2	p3	3	4	p5	5	p6	6	p7	7	1	
	@	P	A	D	M	I	L	$	x	x	x	x	@	
alt-L	x	x	.	x	.	x	x	.	x	.	x	.	x	provides melody segments
alt-A	.	x	x	.	x	.	x	.	x	x	.	x	.	provides melody segments
//M	x	.	x	.	x	x	.	x	.	x	x	.	x	provides tonic & major tonality
melody scale	x	x	.	x	x	x	.	.	x	x	x	x	x	composite of melody segments

In the following view of the harmony, arrows on the left mark the tritones that identify the highlighted melody modes.

			1	p2	2	p3	3	4	p5	5	p6	6	p7	7	1		
			@	P	A	D	M	I	L	$	x	x	x	x	@		
	1	M	.	.	.	.	M	–	.	.	.	x	.	.	.	*BM7*	*(IV)*
–>		L	.	.	.	.	.	.	L	.	–	.	.	.	x	*D7*	*(pVI)*
	2	I	.	–	.	.	.	I	.	.	.	.	.	.	x	*GM7*	*(pII)*
		A	.	.	A	.	–	.	.	.	x	.	.	.	.	*Bb7*	*(III)*
	3	P	.	P	.	.	.	.	.	.	x	–	.	.	.	*EbM7*	*(VI)*
	4	L	.	x	.	–	.	.	L	.	.	.	.	.	.	*Am7*	*(pIII)*
–>		L	x	.	.	.	.	.	L	.	–	.	.	.	.	*D7*	*(pVI)*
	5	I	x	–	.	.	.	I	.	.	.	.	.	.	.	*GM7*	*(pII)*
–>		A	.	.	A	.	–	.	.	.	x	.	.	.	.	*Bb7*	*(III)*
	6	P	.	P	.	.	.	.	.	.	x	–	.	.	.	*EbM7*	*(VI)*
		M	–	.	.	.	M	.	.	.	.	.	x	.	.	*F#7*	*(I)*
	7	M	.	.	.	.	M	–	.	.	.	x	.	.	.	*BM7*	*(IV)*

NON-CLASSICAL DOMAIN: WHEN SUNNY GETS BLUE

Home Tonic - G

My source for this piece is sheet music by Jack Segal and Marvin Fisher from Hal-Leonard (1956), numbered 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. Ornamental touches are highlighted in yellow — the ones in the melody line are from the written music and the ones in the harmony are part of the reharmonization.

```
⚓  | 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 | ↗3↘1*, 1↘6*, | 6↘4↗5 ↗6↗p7 | ↗1 —  —, ↘4 |
```

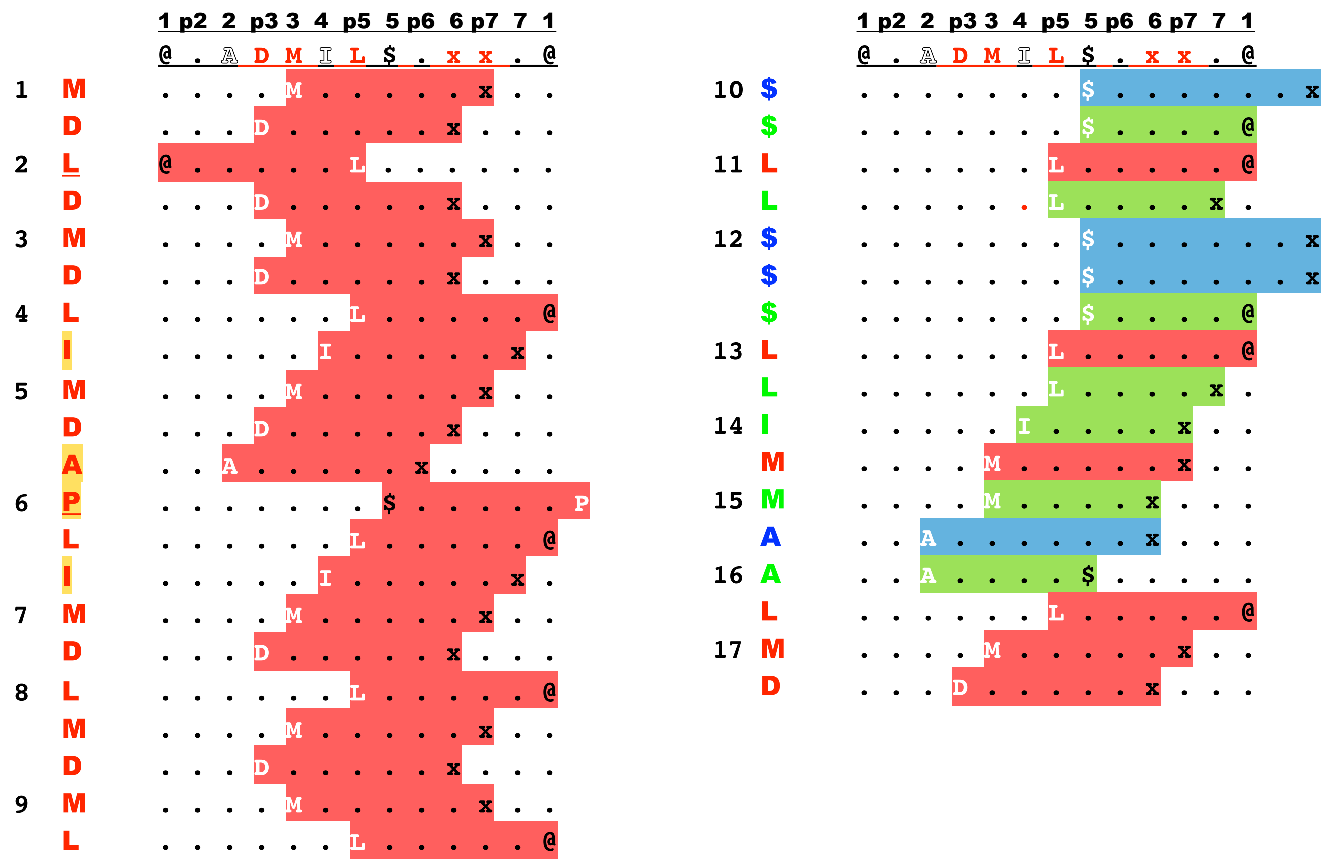
---

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. 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.


1 p2 2 p3 3 4 p5 5 p6 6 p7 7 1
@ . A D M I L $. x x . @
1 M D 2 L D 3 M D 4 L I 5 M D A 6 P L I 7 M D 8 L M D 9 M L
10 $ $ 11 L L 12 $ $ $ 13 L L 14 I M 15 M A 16 A L 17 M D

NON-CLASSICAL DOMAIN : “ALL OF ME”

Home Tonic - 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.

⚓ | **M** **I** | **M** | **A** **M** | | **P** | **P** **M** | **P** | **$** |

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

⚓ | **A** | **A** | **A** | **A** | **$** | **L** | **I** | **I** |

♫ | **↘3↘p3↘2— | 2, ↗3↗p6↗7 | ↗2 — ↘1 — | 1 , |↘7↘p7↘6 — | 6, 6↗2↘7 |↘6 — |↗7, |**

repeat first 8 bars and then finish with this

⚓ | **L** | **L** | **A** | **P** **P** | **I** | **I** **I** | **$** **P** | **$** **I** |

♫ **|↗2—↘1↘7 | ↗2 , ↘1 |↘7 — ↘3↗5 |↗7 , ↘6 |↗1 — ↘6↗1 | ↗3 3 | ↘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⁺	@	.	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)

Core Harmony

The tritone core provides a framework for fairing in core fifos without reference to anything else. 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  . .  . . . A
4, 20    M        . .  . .  M . .  . .  . x  . .
5, 21    P        . .  . .  . . .  $ .  - .  . . P
6, 22    P        . .  . .  . . .  $ .  - .  . . P
         M        - .  . .  . . .  $ .  . .  . @
```

```
              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 .  . .  . . . A
28    P       . .  . .  . . .  x .  - .  . . P
      P       . .  . .  . . .  x .  - .  . . P
29    I       . .  - .  . I .  . .  . .  . x
30    I       . .  . .  . I .  - .  . .  x .
      I       . .  . .  . I .  - .  . .  x .
31    $       . .  - .  . . .  $ .  . .  . @
      P       . .  . .  . . .  x .  - .  . . P
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

		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	
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 chords 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.

<u>**NON-CLASSICAL DOMAIN : “NO GREATER LOVE”**</u>

<u>**Home Tonic - Bb**</u>

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 |)

<u>repeat bars 1-4</u>

⚓ | 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 |)

<u>repeat bars 1-4</u>

⚓ | L4 | I4 I5 | M5 | I4 I5 |) ... //I
♫ | ↘6*↗3↘2 | ↘1—↗2— | ↘1— , | — — |)

<u>**Scales**</u>

	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 (major context)	@	.	x	.	x	x	.	@	x	.	.	x	@
//I (Ionian major)	@	.	x	.	x	x	.	@	.	x	.	x	@
P,D,L		+		+			+						

ornamental subs for **A,I**

A walking-bass-line version presented in class is translated here into chromatic scale notation. Highlighted out-of-context notes at the ends of bars are passing notes to in-context notes in the next bar. Directional arrows are not needed in the bass line because vertical positioning of the notes is determined by the melody line. The bass line rhythm is steady 4/4.

♫ 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

CHROMATIC CLASSICAL DOMAIN : “ALL THE THINGS YOU ARE”

Home Tonic - Ab

I learned this strikingly beautiful piece early in my musical adventure, and found it easy to play but difficult to understand. The source is *The Ultimate Jazz Fakebook*, Wong, Hal Leonard (1988). The key signature is 4 flats and the home tonic is Ab, which identifies classical mode **//I** (Ionian major). The piece starts and ends in this mode but, in between, moves back and forth between major and minor of the home tonic in ways I initially found puzzling.

The skeleton melody line and and associated core harmony for bars 1-26 where all the changes occur are shown below.

(a) ⚓ | $ | I | I | M | M |
♫ | 1 | ↗4↘1 | ↘7* | 7↗3 ↘7 | ↘6*| ... **//I** : Ionian

(b) ⚓ | D | D | |
♫ | 6↗p3↘6 | ↘p6 | — , | ... **altD@p6** : Phrygian

(c) ⚓ | A | $ | L | L | M | P PM |
♫ | ↘5 | ↗1↘5 | ↘p5* | p5↗7↘p5 | ↘3* | 3↗p5↗5↘p5↘3 | ... **//L@5** : Ionian

---

(d) ⚓ | L | M | M | D | D |
♫ |↘p3, ↘p5↗7↗p5 | p5↘3* | — ↘5↗p6↗3| ↘p3 | — |
⚓ | M | |
♫ | — ↘p5↗7↗p3 | p3↘p2* | ... **altM@p3** : Phrygian

(e) ⚓ | P | @ | A |
♫ | — ↘2↗p3↗p2 | ↘1* | — | ... transition

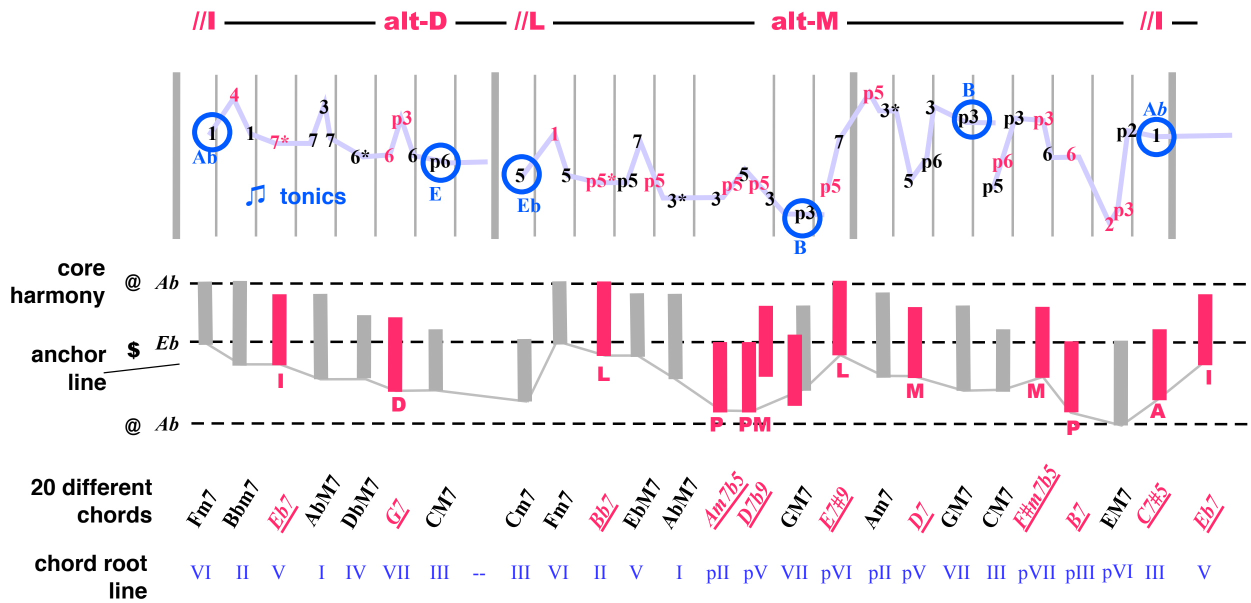
(f) ⚓ | | I | ...
♫ | 1 | ↗4↘1 |↘7* ... ... **//I** : Ionian

The melody notes transposed into the home octave provide the home-tonic modes.

	1	p2	2	p3	3	4	p5	5	p6	6	p7	7	1	
	@	P	A	D	M	I	L	$	x	x	x	x	@	
(a) **//I**	x	.	x	.	x	x	.	x	.	x	.	x	x	Ionian of tonic **1**
(b) **altD@p6**	.	x	.	x	x	.	x	.	x	x	.	x	.	Phrygian of tonic **p6**
(c) **//L@5**	x	.	x	.	x	.	x	x	.	x	.	x	x	Ionian of tonic **5**
(d) **altM@p3**	.	x	.	x	x	.	x	.	x	.	x	x	.	Phrygian of tonic **p3**
(e)	x	x	x	x	.	.	.	.	.	.	.	.	x	transition
(f) **//I**	x	.	x	.	x	x	.	x	.	x	.	x	x	Ionian of tonic **1**

The melody line alternates between relative Ionian and Phrygian modes of the tonic sequence **1↘p6↘5↘p3↘1** highlighted in blue (in letter notes this is Ab-E-Eb-B-Ab). The tritone change **I↗L** and the tonic change **1↘5** identify an Ionian-Ionian change. The tritone change **D↗M** and the tonic change **p6↘p3** identify a Phrygian-Phrygian change. The parallel and alt modes of the home tonic are relative modes of these (the alt modes follow from the absence of the home tonic from the two Phrygian modes). The strong presence of the Phrygian mode may seem strange but is not unusual in strongly chromatic music.

The following overview sketch contrasts the conceptual and actual simplicity of the piece with the complexity of the written music. The chord progression begins with a simple Ionian root line that starts to be misleading at bar 7 and continues to be so until bar 13. Being misleading stops after that but complexity continues. The transition back to the home tonic is particularly complex.



NON-CLASSICAL DOMAIN : "CHELSEA BRIDGE"
Home Tonic - C#/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: a key signature of 5 flats and tonic Db identify the opening Ionian mode; a key signature of 4 sharps and tonic C# identify a following parallel Aeolian mode. The same black key is the home tonic of both (Db/C#). The notational complexity that follows from this has been discussed elsewhere in these pages. This piece multiplies the complexity by returning to the original Ionian mode at the end via naturals relative to the 4-sharps key signature. Between the 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 so 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, and 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.

⚓ | M D A P | ... ornamental
♫ ||: — 6↗7, ↗1↗2, ↗3↗4↗5 | ... //I

⚓ | L.A | M.L | L.A M.L | P | ... determines // modes
♫ | ↗p6—, ↗6↘p5 | p5, ↗5↗p6 | p6, ↗6↘p5—, ↗5↘p2 | p2 | ... moves between modes

1 2

⚓| I | I | M | M D A | ... determines //I
♫ | ↗3 ↘1—, | ↗3↗5—, | ↘3↘1— :|| — 5↗p6 | ... moves in //I

⚓| A | | A | ... //A
♫ | ↗p7* | p7↘1↗p3↗5↗p7↗2 , ↗p3 | ↘2↘p7↗5↘p3↘1 ↘7↗p5↘2 | ... //A

⚓ | P | I I | |) ... altIP
♫ | ↘p2, — ↘p3 ↗4 | ↗5↗p6↗p3— ↘p2↘7 | ↘p7 ↗p2—, ↘7↘p7 |)
⚓ M
♫ | ↘6, ↘p5↗6↗p2, ↘6 ↗p2 | ... ornamental

⚓ M.L D A P ... ornamental
♫ | ↗p5, ↘6↗7, ↗1↗2, ↗3↗4↗5 | ... //I

The only complicated part from a playing perspective is bars 2-5. In these bars, the harmony double tritones may be implied by playing their outer notes as augmented fifths moving down and up by whole tones, as suggested by the following picture. 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	.	.	.	x	.	x	.	.	.	.
bars 3, 5	**M.L**	x	.	@	.	.	.	x	.	x	.	.	.	.	.	.

Here are the melody scales. In bars 2-9, the various parallel modes, all with major tonality, are determined jointly by the melody and harmony. In bars 2-5, the melody line sequences **p6-6-p5-5** and **p5-5-p6-6** move back and forth between the **LA** and **ML** modes. In bars 6-9, the sparse melody line exercises the major triad of the **//I** mode identified by the harmony. In bars 13-15, the **IP** minor mode follows the **//A** minor mode like the several major modes follow the opening **//I** major mode.

	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	.	x	x	**//I**
bars 2, 4	x	.	x	.	x	.	x	.	x	x	.	x	x	**//LA**) **differences highlighted**
bars 3, 5	x	.	x	.	x	.	x	x	.	x	x	.	x	**//ML**)
bars 6-9	x	.	x	.	x	x	.	x	.	x	.	x	x	**//I**
bars 10-12	x	.	x	x	.	x		x	x	.	x	.	x	**//A**
bars 13-15	.	x	.	x	.	x	.	x	x	.	x	x	.	**altIP (Phrygian b1)**
bars 16	.	x	.	.	.	.	x	.	.	x	.	.	.	**ornamental transition**
bar 17	x	.	x	.	x	x	.	x	.	x	.	x	x	**//I**

The melody and harmony have an elegant simplicity in these terms that is not difficult to understand, remember or play.

NON-CLASSICAL DOMAIN : "LUSH LIFE"

Home Tonic - 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].

[A] ⚓ | @ A | M A | M A | M I A D |

♫ 5 ||: ↗1*↗2* | ↗3*↘2* | ↗ 3*↘2* | ↗3*↗4*↗5*↗p6*|

1________ 2________

⚓ | I I | A | I M | M D |

♫ |↗p7*—↘p6↗p7↘p6|↘5*↗p7↘p3*|↘2*, — ↘5 :|| ↘2*, — ↗7 |

[B] ⚓ | I P | A P | DL | D P | D P | DL|

♫ | ↘7*↗ p2* | ↗3*↗5* |↗7↗p2↘6 ↗7*| 7 — 7 | ↘7* ↗p2* |↗3*↗5* | ↗7↗1↘6↗7* |

⚓ | I | M | MP | | DL | | AI |

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

[C](a) ⚓ | M- I | M- I | D A | M L I |

♫ | 5↗6↗p7↗p3↘p6|↘5↗6↗7↗p3↘p7|↘6↘5↗1↗3 ↗4 ↗5 |↘p7 — ↘p6 |

(b) ⚓ | repeat bars 1-2 of (a) | M D| P A |

♫ | " |↘6↘5↗1↗3 ↗5 ↗p6 |↘7 — ↘1 |

(c) ⚓ | A L | DL | M | A P L I|

♫ | ↗2↗3↗4* — ↘p3 |↘2↗3↗4*↘p3 |↘p6↗p7↗7* — ↘p7 |↘p6↗p7↗7*↘6|

(d) ⚓ | repeat bars 1-2 of (a) | DI AI | P |

♫ | " |↘6↘5↗1↗3 ↗4 ↗5 |↗6 — ↘3 |

(e) ⚓ | A | L I | DL | P |

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

(f) ⚓ | A | L I | A D M M | A D M |

♫ | ↗5↘4↗5*↘4 | ↘3*↘2↗3↘5 | ↗p7↗7↗1↗p2 | ↗2↗p3↗3 |

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 includes **P** and **L** as substitutes for **A** and **I**, but thinking of these as ornamental relative to the tonal scale **//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].

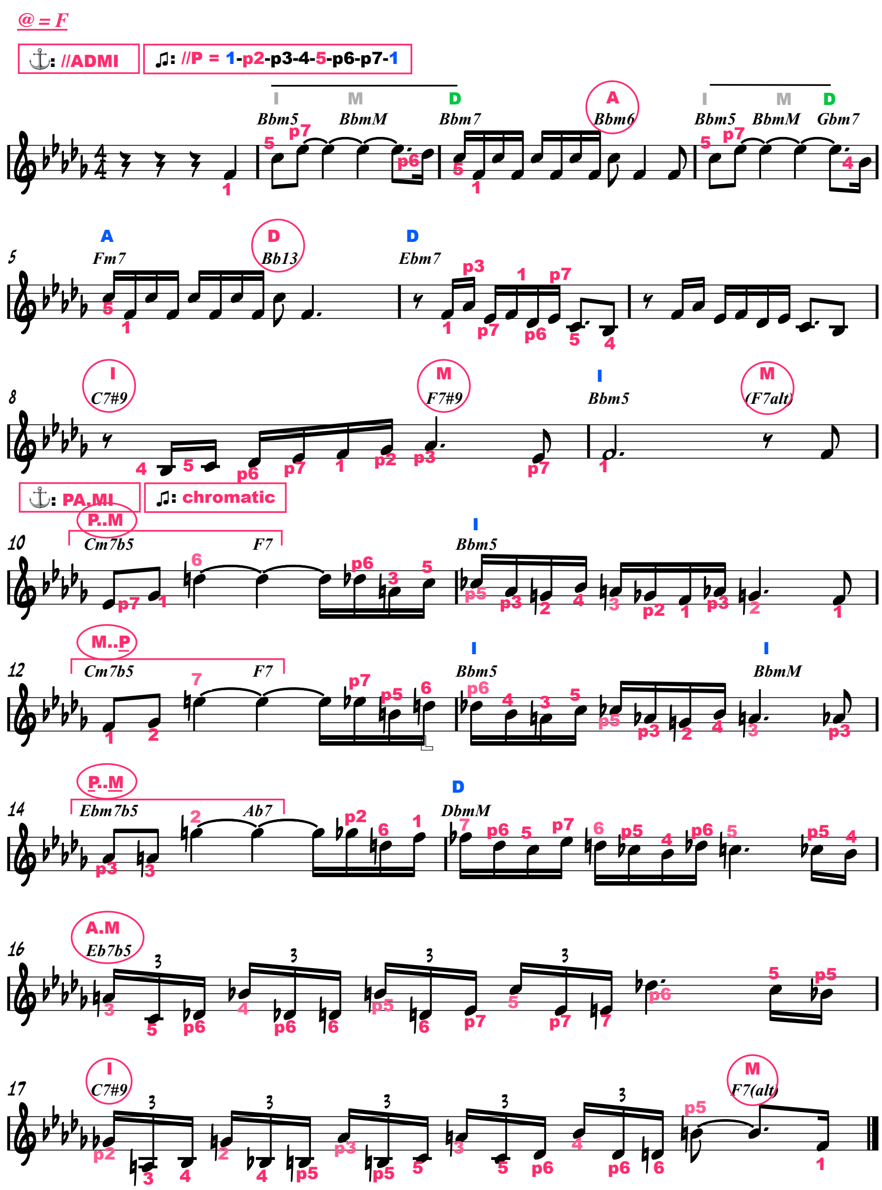
The double tritones **PM**, **AI** and **DL** that appear in many places in the harmony are diminished seventh chords, commonly used ornamentally in any context in which they sound good. The double tritones have circular symmetry (all intervals are minor thirds), so only three of them with different 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).

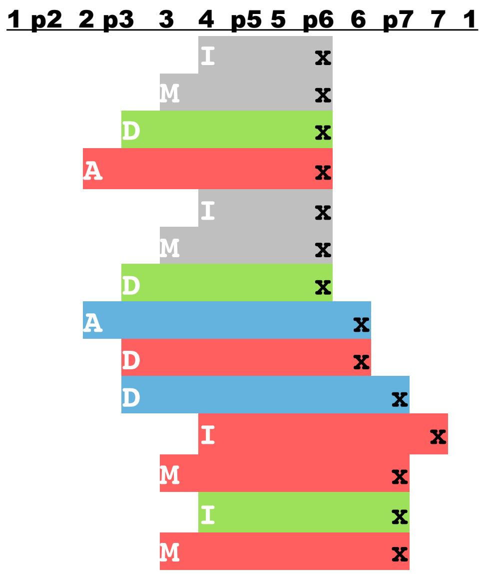
The chromatic melody-line run in the final two bars is a signature of the piece.

MIXED DOMAIN : “THE PEACOCKS”

Home Tonic - F

This wraps up the chapter with an example in annotated music notation. 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 (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 from the non-classical domain. The over-lines in bars 2 and 4 indicate held treble notes. All the annotations can be handwritten except for the fifo anchors in outline text form, which can be written in plain text outlined by boxes.

Harmony in bars 2-9 contrasts strongly with the melody. The core harmony in these bars, shown next, is visibly from the atonal **ADMI** scale (which is minor-major relative to the home tonic). The anchors of the grey-shaded minor and major thirds are specified by angle brackets because these intervals are not in the building-block set, but the choices shown are obvious ones from context, sound exactly right to ear, and voice the written chords in context (their sizes could be indicated by numeric suffixes 3 and 4, but these sizes are obvious from context).



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

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 useful size tools 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.

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 these kinds of music than the ability to sight-read melody lines in music notation. Anyone with eyes to see intervals on the keyboard can infer harmonic cores from anchor lines annotated above the staff.

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 using them 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.

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

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

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

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

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

Thanks to friends Marva Black, Mike Budde, Peter Marchant and Selinda Spugies for helpful insights on aspects of this material that helped me to understand how to get the ideas across better. Thanks to singer extraordinaire and friend Lorna Kollmeyer for helping me figure out how to organize piano accompaniment in guitar-strumming style.

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

SOME COMMENTS FROM READERS

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

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

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

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

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

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

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

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

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

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

APPENDIX A: UNCONVENTIONAL ELEMENTS

TERMINOLOGY & NOTATION

- **anchor:** identifies a building block by the position of its bottom end relative to the home tonic
- **anchor set:** set of tritone and fifo anchors that define a scale by construction
- **anchor line:** anchor sequence written above the staff (outlined by circles for tritones & boxes for fifos)
- **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
    - tritone or fifo anchors identified, respectively, by **PADMIL** or PADMIL
    - default direction is up from anchor; underline indicates down
    - tritone is same size either way; default fifo size is fifth, strikethrough indicates fourth
    - uncommitted fifo anchors are represented by fifo anchors in angle brackets
- **chromatic scale: 1-p2-2-p3-3-4-p5-5-p6-6-p7-7-1**
- **context:** provided by mode signatures for melody and harmony plus flow of both
- **core:** sequence of building blocks of harmony identified by an anchor line
- **family:** a set of sub-scales of a family scale defined by a single mode signature
- **fifo:** fifth or fourth that are opposite inversions (add up to an octave)
- **flow:** formed by morphs and slides of building blocks
- **frame:** defined by the tonic **@** and pitch center **$** of a tonic octave (plus sometimes by tonality)
- **mode signature:** word identifying a tritone cluster and implying an anchor set via the scale dictionary
- **pattern:** organized arrangement of intervals on the keyboard or over time
- **pitch center:** note identified by a fifth/fourth octave split, symbolized by **$**
- **morph:** small change in the size of a building block while holding one end fixed
- **outside:** not in a given tonic scale (as distinct from "chromatic" meaning not in a key-signature scale)
- **shape:** combination of building blocks
- **slide:** size-preserving movement of a building block
    - **wobbly slide:** combined morph and slide
- **symmetry:** same keyboard-interval sequence going up and down a shape
- **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 reference tonic
- **word:** set of alphabet letters with optional dots indicating skipped letters

ABOUT THE ALPHABET

A special, boldfaced font for the **PADMIL** alphabet distinguishes these uses of the letters from other uses in music (note symbols "A" and "D", RN symbol "I"). Letters **A** and **D** cannot be confused with letter notes because they identify adjacent piano keys; the different letters are never mixed together in the use of PKP. That said, when the music includes letter notes "A" or "D" avoiding confusion requires effort. I have found the effort worthwhile. I thought of substituting the Greek letters epsilon (**Є**) and delta (**Δ**) for **A** and **D** and the English letter **Y** for **I**, to yield **PЄΔMYL**, 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 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).

Ionian	rel. Aeolian	key sig.	Ionian scale
C	A	empty	C-D-E-F-G-A-B-C
F	D	1 *b*	F-G-A-B*b*-C-D-E-F
B*b*	G	2 *b*	B*b*-C-D-E*b*-F-G-A-B*b*
E*b*	C	3 *b*	E*b*-F-G-A*b*-B*b*-C-D-E*b*
A*b*	F	4 *b*	A*b*-B*b*-C-D*b*-E*b*-F-G-A*b*
D*b*	B*b*	5 *b*	D*b*-E*b*-F-G*b*-A*b*-B*b*-C-D*b*
G*b*	E*b*	6 *b*	G*b*-A*b*-B*b*-C*b*-D*b*-E*b*-F-G*b*
F#	D#	6 #	F#-G#-A#-B-C#-D#-E#-F#
B	G#	5 #	B-C#-D#-E-F#-G#-A#-B
E	C#	4 #	E-F#-G#-A-B-C#-D#-E
A	F#	3 #	A-B-C#-D-E-F#-G#-A
D	B	2 #	D-E-F#-G-A-B-C#-D
G	E	1 #	G-A-B-C-D-E-F#-G
C	A	empty	C-D-E-F-G-A-B-C

Ionian tonics going down by fifths

switch from flat to sharp keys

parallel (same tonic) Ionian & Aeolian modes
- - - - same tonic symbols
—— different tonic symbols

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.

CHROMATIC SCALE

The chromatic scale represents an octave on the piano keyboard as notes determined by twelve half tones, and overlapped octaves as sharing the same notes. The fundamental two modes of music notation, namely Ionian and Aeolian, are represented as follows (tonics underlined).

//A	**Aeolian**	**1-2-p3-4-5-p6-p7**
//A@p3	**relative Ionian**	**1-2-p3-4-5-p6-p7 —> p3-4-5-p6-p7-1-2**
//I	**Ionian**	**1-2-3-4-5-6-7**
//I@6	**relative Aeolian**	**1-2-3-4-5-6-7 —> 6-7-1-2-3-4-5**

Experts develop rules of thumb about sharps and flats as indicators of what comes next and see this way of representing scales as omitting these clues. The clues are present in a different way in the positions of the scale notes relative to a home tonic and to each other.

CROSS REFERENCES

The following table summarizes the relationship between PKP notation and the note symbols of music notation. This is the simplest case. More generally, naturals may enter the note-symbol picture, and white pianos may be represented by sharps or flats (e.g., B=Cb, C=B#, F=E#, E=Fb).

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

SCALES AS INTERVAL STACKS

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

APPENDIX C: ABOUT CHORDS

Chords identified by chord symbols of any kind 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, 11th 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. The exceptions prove the rule. An augmented fifth (8 half tones or two major thirds) that are "building blocks" of minor-major-7 chords are combinations of scale fifos or tritones with their inner notes omitted). Simpler triad chords are, structurally, truncated combinations of combinations of two building blocks.

ANCHOR LETTERS FROM TRITONE CHORDS

As described in the body, tritones are the agents of context change. They are directly visible in melody lines if you see them in terms of keyboard intervals between successive notes. They may be extracted from chord progressions using the following table of tritone chords. In either case, they're represented by anchor letters from the **PADMIL** alphabet that identify the position of their nearest notes above the home tonic.

The following table of tritone chords summarizes the simplest examples of chords with tritones in different positions. Only 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 (dim7) 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. Major and minor triads and diminished chords are, structurally, seventh chords of the same kind with the top note omitted.

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

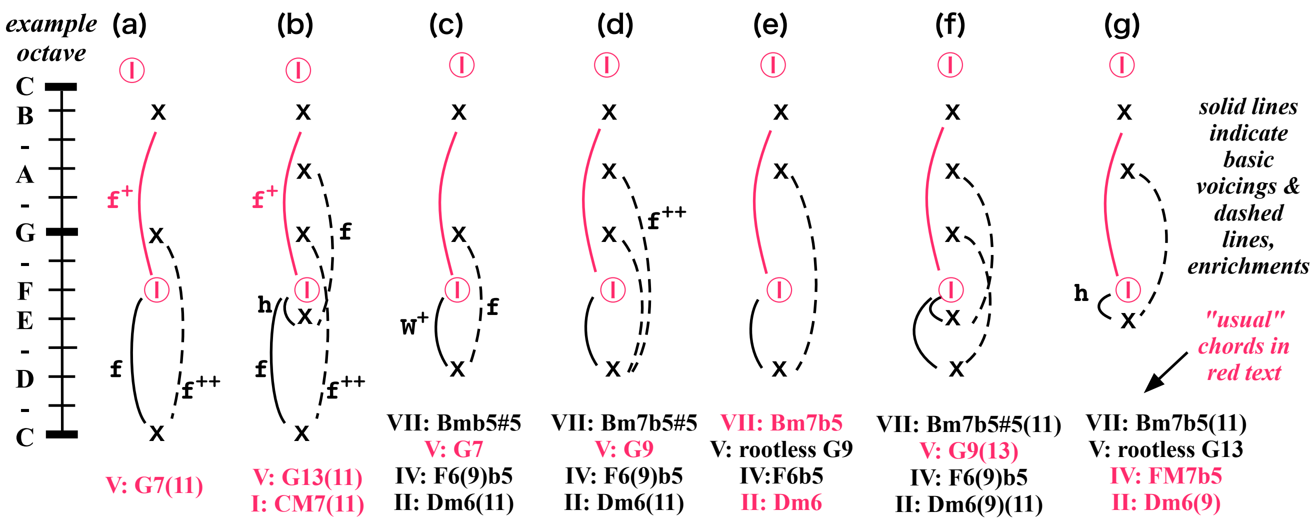
Inverting the tritone of a chord into the home octave (if it isn't already there) determines its PKP anchor. For example, The tritone of a V-7 chord is partially outside the home octave but its inversion is within it. The bass note of its inversion is a fourth above the home tonic which makes its anchor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

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

MISLEADINGLY COMPLEX CHORD SYMBOLS

Misleadingly complex chord symbols follow from “banging square pegs into round holes” (fitting basic chord symbols into places in scales where they don’t quite fit). This is illustrated next by the startling variety of single-tritone chords from the Ionian mode that may be voiced by the single tritone plus a carefully selected scale note below or above the tritone (or both). The symbols **f**, **f**$^{+}$ and **f**$^{++}$ stand for fourth, tritone (augmented fourth) and fifth (this was prior to my decision to use numeric suffixes or prefixes for these intervals of keyboard shapes).

Enrichments by overlapped fifos are important when the chords are played by themselves but the notes they add are visibly fundamental scale notes (the pitch center and a whole tone above it) in the context of the flow of a chord progression, which the ear tends to hear even if the notes aren’t sounded. A bass note a half tone below the tritone is equivalent to a fourth above it (same note), yielding the interval stack **f-f**$^{+}$. The result is an “all fourths” shape. Seventh or sixth chords voiced by all fourths shapes have extended or altered chord symbols. This is in contrast to the “all thirds” shapes of seventh chords identified by basic chord symbols.



The figure and these examples are specific but the concepts are general. Different voicings of different tritone chords may created in a very simple way by specifying a bass or treble note that implies visibly obvious enrichment fifos from the tonic scale. The tonic scale is understood from tritone content. The enrichments are without reference to chord symbols; they’re usually so obvious that no extra notation is needed.

Well formed voicings of chord progressions follow from morphing tritones into fifos. For example, for tonic C, the fifo-tritone sequences in (a) and (c) voice chords as follows:

- (a) **f-f**$^{+}$ identifies a 3-note voicing of Dm7(11)-G7 or G7♯3-G7, both equivalent in the flow to Dm7-G7.

- (c) a different **f-f⁺** is a different 3-note voicing of Dm7(11)-G7 or G7♯3-G7, also equivalent in the flow to Dm7-G7.

FIGURED BASS NOTATION; EXTENDED CHORDS

Figured bass notation provides a simple representation of chords from the the highly regular scales of classical modes (7 notes, 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. Extension suffixes altered by sharps or flats are needed to represent chords from scales that are not classical modes.

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 as 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 and flats used in *Modalogy*. Corresponding PKP mode signatures are shown on the left.

The purpose is twofold. One is to verify the PKP view of modes relative to *Modalogy*. The other is to illustrate the complexity of the conventional representations. 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 these terms. This impossibility is demonstrated by a discussion in *Modalogy* of defining and non-defining notes of the many and various modes that never mentions tritones.

The simple, unique mode signatures of PKP are novel.

Parallel Modes of the Melodic Minor |WhWW|WWh|

alt-LA	**1-2-p3-4-p5-p6-p7-1**	**Aeolian Diminished (Aeolian- ♭5)**
LA	**1-2-3-p5-p6-6-7-1**	**Lydian Augmented (Lydian-♯5)**

alt-ML	**1-p2-p3-3-p5-p6-p7-1**	**Jazz Altered (Locrian- ♭4)**
ML	**1-2-3-p5-5-6-p7-1**	**Lydian Dominant (Lydian- ♭7)**

DI	**1-2-p3 -4-5-6-7-1**	**Melodic, or Jazz, Minor (Ionian- ♭3)**
AM	**1-2-3-4-5-p6-p7-1**	**Jazz Mixolydian (Mixolydian- ♭6)**
PD	**1-p2-p3-4-5-6-p7-1**	**Jazz Phrygian (Phrygian-♯6)**

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**

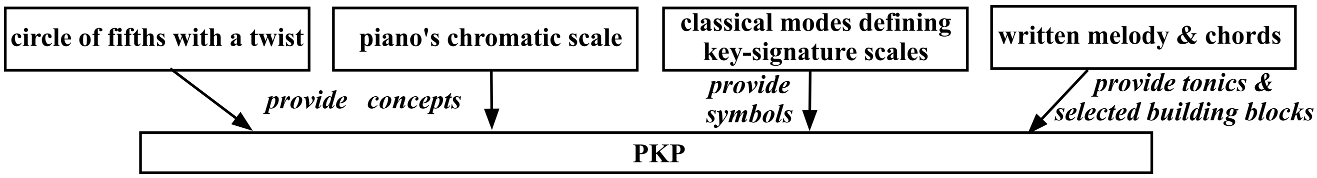
LD	**1-2-p3-p5-5-6-7-1**	**Lydian Melodic Minor, Lydian ♭3**
alt-LD	**1-p2-p3-4-p5-p6-6-1**	**Leading Tone Major Diminished, Locrian 𝄫7, Locrian Diminished-7**

AI	**1-2-3-4-5-p6-7-1**	**Harmonic Major**

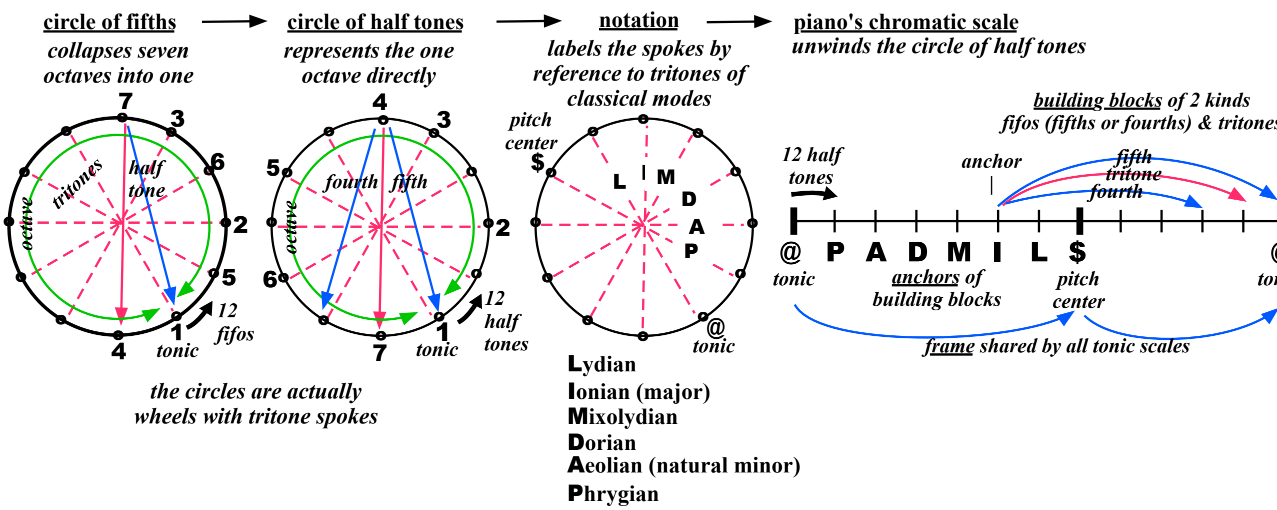
PM	**1-p2-3-4-5-6-p7-1**	**Jazz Phrygian Dominant, Mixolydian ♭2**
MP	**1-p2-p3-3-5-p6-p7-1**	**Altered Phrygian Dominant, Phrygian ♭4, Superlocrian ♮5, Superphrygian**

APPENDIX E: ABOUT SYMMETRY & SYMMETRY-BREAKING

The elements of PKP are summarized below in a way that provides a link between the concept of symmetry breaking in these pages and in the book *The Jazz of Physics*.



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.

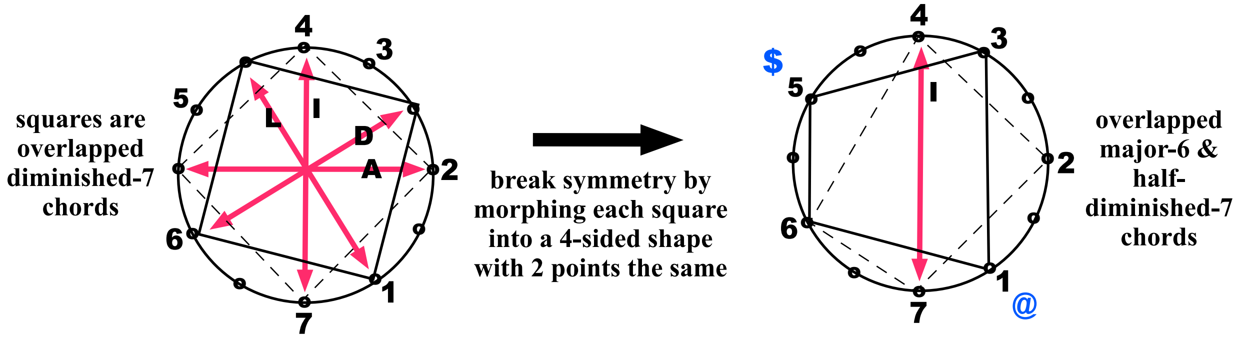
The circle of half tones rearranges the spokes of the circle to put the labeled points around it in scale order. The result is an intuitively natural **@1** between pictorial geometry and musical geometry. Around the circle remains an octave and across any spoke remains a tritone. The half tones across 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, and outlining them differently in annotations above the staff distinguishes the different kinds of building blocks (circles for tritones and squares for fifos, e.g., Ⓘ and $\boxed{\text{I}}$). 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). This kind of thing is fascinating to anyone with a mathematical bent but probably not anyone else.



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