

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.”

PKP differs from music notation in putting parallel modes with the same tonic on notational center stage, determined by words from a 6-letter alphabet, instead of relative modes with the same notes, 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 blocks** 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 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 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

¹ The following chord progression written by Mingus for the hauntingly beautiful E ♭ blues *Goodbye Porkpie Hat* is a “poster child” for music notation that's too complex for all but experts: 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.

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 above the staff of a piece of 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? The lack of training is itself a qualification because the absence of received wisdom about music notation enables seeing that the emperor has no clothes. Add 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," notations that put a large conceptual distance between what's on the page and what happens on the hardware). Add long-standing curiosity about the complexity of music notation. Add time to indulge my curiosity, after retiring as a university professor not long after I took up the piano. Add the instincts of a professor to write about it. The earlier opinions of a couple of musical experts indicate that the results may be worth looking at.

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 concepts sufficiently to understand many of the examples in Chapters 4 and 5. Chapter 3 develops details independently of examples. Chapter 4 and 5 develop the details via examples, independently of music notation in Chapter 4, in terms of annotated music notation in Chapter 5 (the final example in Chapter 5 is the piece with the footnoted chord progression on the previous page). Chapter 6 provides observations and conclusions. References, acknowledgements, comments from some readers, and appendices follow. Appendix A summarizes unconventional terminology. Appendices B-D are about scales, chords and parallel modes in music notation vs. PKP. Appendix E is about the role of symmetries in keyboard shapes.

CHAPTER 2: CONCEPTS & NOTATION

A CONCEPTUAL MODEL OF THE PIANO AS IT ACTUALLY IS

A simple but accurate conceptual model of any home octave of the emperor-has-no-clothes piano is a horizontal line split into twelve equal parts representing twelve musically equal half tones. They're musically equal because, although their pitch sizes increase within the octave to make the pitch of the top note double that of the bottom note, their musical sizes sound equal to the ear. The top and bottom notes are home tonics an octave apart symbolized by @. The fundamental difference between the piano and music notation for it is the sharing of intervals between overlapping 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 musically equal. The piano forces alignment by providing the same piano key for all the vertical dots and compensates for the slight pitch errors by equal temperament tuning. This simple picture is the jumping off point for PKP.

overlapping octaves @ @
 @ @
 @ @
 and so on

Everything in PKP is referred to the single home tonic of a piece, 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 piano key that is the home tonic, to avoid interpreting things relative to the different home tonic of some recently played piece that's still in the mind.

Octave Splits

Profoundly simple relationships are revealed by two different kinds of splits of the conceptual home octave into equal halves: a geometric split that yields a stack of two harmonically equivalent tritones (6 half tones); and a musical split that yields a fifth (7 half tones) with a harmonically equivalent fourth stacked on top (5 half tones) that are of equal pitch sizes because of the increasing pitch sizes of half tones going up within an octave. The musical split defines a **scale frame** formed of the octave notes with the pitch center of the octave in between. This scale frame is the starting point for forming tonic scales (tonic scales without pitch centers exist but the references for understanding them are scales with pitch centers). The geometric center is the starting point for identifying scale positions a half tone apart within the scale frame.

	tonic		geometric center		tonic	
octave	|		|		|	
	@	@
geometric split	x	.	.	.	.	x
musical split	@	.	.	.	.	@
			\$			
			pitch center			

12 half tones
tritone-tritone
fifth-fourth scale frame

Tritones, fifths and fourths are the Lego-like **building blocks** of PKP. Fifths and fourths are the same kind of building block (consonant when their notes are sounded together, different keyboard sizes that invert into each other). Tritones are, different in kind (dissonant when their notes are sounded

together, same keyboard size in either inversion). The fact that fifths and fourths are the same kind of building block warrants a special term that covers both: **fifo**, standing for “fifth or fourth.” This term is more than just a textual shorthand. It identifies a fundamental structural property that contributes to PKP’s combination of simplicity and depth: fifos are viewed as morphed tritones (hold one note and move the other by a half tone). This is directly visible within the home octave for the particular cases shown above — the lower tritone morphs into the lower fifth, the upper tritone morphs into the upper fourth — but it pervades harmony viewed in terms of the home octave. Morphing the tritone stack into the fifth/fourth stack by altering one note by a half tone captures the essence of this sound in a more muted way — the tritone dissonance is moderated by the octave notes — giving a sense of how chords containing tritones do the job. The sound of tritone dissonance morphing into fifo consonance in harmony, whether overt or muted, is fundamental to much music. The PKP notation for this can be very simple: fixed-size tritones frame the flow; over-specifying fifos is avoided by leaving details that can be implied by the flow to be determined by the flow.

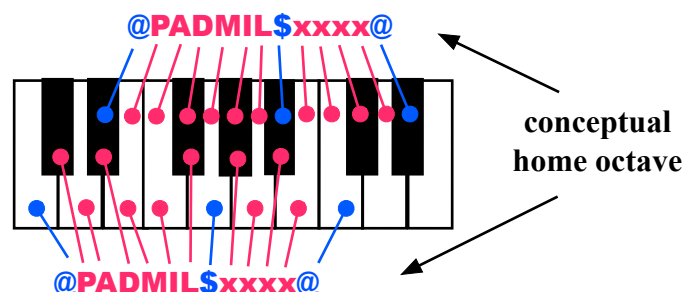
This small set of basic building blocks is sufficient for most purposes because smaller and larger intervals emerge as inner or outer intervals of shapes of scales or chords formed from them. The smaller or larger intervals are occasionally needed as independent building-block-like quantities but the building-block notation to come covers this possibility in a simple way that doesn’t require explicitly increasing the size of the basic set to include them.

Expert pianists with whom I have spoken about these ideas tend to object to the term “fifo.” It seems to them to add complexity by adding new terminology when none is needed. What’s the matter with sticking with the familiar terms? The answer is, nothing is wrong when a fifth or fourth is specifically meant — the new term contributes simplicity at a higher conceptual level.

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). It would be better for our purpose if these terms 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 Anchor Concept

The PKP alphabet identifies building blocks by **anchor** positions within the conceptual home octave identified by the letters **PADMIL** (in a distinctive font, Arial Black to avoid confusion with other uses of the same letters in music notation and theory). An anchor of a building block is its nearest end above the identified home tonic; the other end is a known number of half tones above the anchor (“end” not “note” to emphasize that this view is independent of note symbols of any kind).



The concept is every piece of music has the same conceptual home octave determined by the same alphabet. The difference for different home tonics of different pieces is only in the assignment of the symbol @ to a particular piano key (two example assignments are illustrated above, of a total of twelve possible ones). Piano keys in the home octave of a piece and in the overlapping parts of octaves of any secondary tonics are determined by reference to the single alphabet.

The letters **PADMIL** provide a direct connection to music notation via the classical modes that define the scales of key signatures. They are the first letters of the mode names arranged in the following unconventional order going up the keyboard from a half tone above the tonic to the geometric center of the octave: **P**hyrgian, **A**eolian, **D**orian, **M**ixolydian, **I**onian and **L**ydian/**L**ocrian. It's a fortuitous accident that same starting letter **L** of the latter two modes provides a single anchor symbol that covers both. Classical modes are unique among tonic scales with seven or more notes in containing only one tritone. The alphabet order is the order of the anchors of the single tritones of the parallel classical modes going up the keyboard. The letter **L** covers two modes because they contain the same tritone (in opposite inversions, but the anchor is the same). Knowing one mode means knowing the other.

A tritone has only one anchor but may have two possible bass notes in music: one is the anchor and the other is the bass note of its inversion. Inversions are indicated by underlining (e.g., the bass note of the tritone anchored by **L** is the anchor itself, and of tritone **L** is the home tonic a tritone down). There are no anchors in the top fourth of the scale frame because tritones 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. This includes multi-letter mode signatures of multi-tritone scales that are not classical modes.

Anyone with even minimal acquaintance with the piano knows that the intervals of the classical modes are determined by playing the seven white keys of the piano starting from different positions. The modes so identified are relative (same notes) but the intervals are the same for parallel modes (same tonic). The list of the first letters of the *relative* modes in the conventional order is **IDPLMAL**, in which **L** appears twice because relative Lydian and Locrian modes have different starting notes. The **PADMIL** order identifies *parallel* modes with different tritones that share the same tonic. The letter **L** appears only once because the same tritone appears in opposite inversions in the Lydian and Locrian modes.

The alphabet provides anchors for both tritones and fifos, with the difference indicated in text by solid letters for the former and letters in outline form for the latter, as shown below. Red text highlights tritone anchors where this is useful for explanation purposes, but the meaning is in the letters not in the color. This use of variations of a special font is simple and concise for text but cannot be used for handwritten annotations on the music page. However the same effect can be achieved for them with colored pencils or different outlines for letters (circles for tritones, boxes for fifos).

tritone anchor alphabet:	PADMIL
fifo anchor alphabet:	PADMIL

A fifo may be morphed from a tritone with the same anchor (e.g., tritone **M** may be morphed into a

fifth or fourth anchored by **M**) or from a tritone anchored a half tone up or down (e.g., tritone **D** may be morphed into a fourth anchored by **M**, and tritone **I** may be morphed into a fifth anchored by **M**). This multiplicity of possibilities is, in computer speak, a feature of PKP not a bug. It enables the flow of harmony to be understood as sequences of morphs and slides of building blocks (a slide moves a building block while holding its size fixed), in which the sizes of fifos are determined by context.

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**).

FIRST TONIC SCALES

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. They're simple and all other scales follow from them in a simple way. The book *Modality* starts with this premise but stays with the “clothes” of music notation to develop it, thus ending up in a different and more complex place.

As illustrated next, parallel pentatonic modes follow from splitting the bottom fifth of the scale frame into unequal parts that determine major or minor tonality, and then splitting the results again to yield 5-note scales with inter-note intervals of whole tones (two half tones, symbolized by **2**, below right) and minor thirds (three half tones, symbolized by **3**). The splits avoid adjacent minor thirds, which would form tritones. The scale frame and fifo anchors within the lower fifth provide symbols for the scale positions that are not note symbols in any notation (the symbols in this and subsequent tables of this form are in the fixed width Courier font instead of the more distinctive Arial Black font, to provide vertical alignment). The interval stacks on the right provide a textual shorthand that's useful for comparing scales. The vertical bars mark the positions of the shared scale frame of the parallel modes.

The mode signatures **//M** and **//D** are precursors for the mode signatures to come. The prefix stands for “parallel” and the fifo anchors are unambiguous mode identifiers in the context of the scale frame.

	@ P A D M I L \$ @	
scale frame split	@ . . . x . . \$ @	
pentatonic major mode //M	@ . x . M ——— \$. x ——— @	| 223 | 23 |
scale frame split	@ . . . x . . \$ @	
pentatonic minor mode //D	@ ——— D . x . \$ ——— x . @	| 322 | 32 |

The use of fifo anchors relative to the home tonic instead of note symbols provides direct access to building blocks of harmony. Fifo anchors **M** and **D** are **core** because they're unambiguous (**M** is only in the major scale, where it anchors only a fourth, and **D** is only in the minor scale, where it anchors only a fifth). Fifo anchors **A** and **I** are secondary in these scales because they're ambiguous (each anchors both a fourth and a fifth). Each scale is formed of the scale frame shared by all tonic scales with pitch centers, plus a core fifth or fourth, plus one extra note provided by a secondary fifo anchor.

Interval stacks are independent of whether modes are parallel or relative; the difference is in the

Classical Modes

The six **alt-X** modes follow by construction from the primary modes: they're "tritone substitute modes" (same tritone, all five non-tritone notes different). The **alt-L** mode provides a seventh parallel mode because the **L** tritone includes the home tonic, but it's not included with the primary modes because it's determined by the primary mode **//L**.

<p>//M</p> <p>@ P A D M I L \$ x x x x @</p> <p>@ . x . M — \$. x — @</p>	<p>pentatonic major</p> <p>| 223 | 23 |</p>
<p>//L</p> <p>x . x . x . L @ . x . x x</p> <p>alt-L x ∞ . x . x L . x . x . x</p>	<p>Lydian (maj)</p> <p>| 2221 | 221 |</p> <p>Locrian (min)</p> <p>ditto, offset a tritone</p>
<p>//I</p> <p>@ . x . x I . \$. x . x @</p> <p>alt-I . x . x . I x . x . x x .</p>	<p>Ionian (maj)</p> <p>| 2212 | 221 |</p> <p>tritone subst. (min)</p> <p>ditto, offset a tritone</p>
<p>//M</p> <p>@ . x . M x . \$. x x . @</p> <p>alt-M . x . x M . x . x . x x .</p>	<p>Mixolydian (maj)</p> <p>| 2212 | 212 |</p> <p>tritone subst. (min-maj)</p> <p>ditto, offset a tritone</p>
<hr/>	
<p>//D</p> <p>@ P A D M I L \$ x x x x @</p> <p>@ — D . x . \$ — x . @</p>	<p>pentatonic minor</p> <p>| 322 | 32 |</p>
<p>//D</p> <p>@ . x D . x . \$. x x . @</p> <p>alt-D . x . D x . x . x x . x .</p>	<p>Dorian (minor)</p> <p>| 2122 | 212 |</p> <p>tritone subst. (min-maj)</p> <p>ditto, offset a tritone</p>
<p>//A</p> <p>@ . A x . x . \$ x . x . @</p> <p>alt-A . x A . x . x . x x . x .</p>	<p>Aeolian (minor)</p> <p>| 2122 | 122 |</p> <p>tritone subst. (maj)</p> <p>ditto, offset a tritone</p>
<p>//P</p> <p>@ P . x . x . x x . x . @</p> <p>alt-P . P x . x . x x . x . x .</p>	<p>Phrygian</p> <p>| 1222 | 122 |</p> <p>tritone subst. (maj)</p> <p>ditto, offset a tritone</p>

The **//X** and **alt-X** modes are displayed one above the other to show the simplicity of the difference, which is provided by symmetric shapes (**1221** and **12221** highlighted in yellow) formed around the tritone. The scales are completed by filling in the scale frame with whole tones.

Symmetric shapes formed by and around tritones are a fundamental feature of this 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 no math is needed to understand it, only an intuitive understanding of symmetry from everyday life. For a start, the home-octave split into a 2-tritone stack is itself a symmetric shape, with circular symmetry because 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 relative to their end notes (not circular symmetry because the inter-note intervals are not all the same). Circular symmetry and mirror symmetry are intuitively familiar to everyone.

Pause for a moment think about the simplicity of knowing these scales this way. Knowing a parallel mode requires only positioning a tritone anchor anywhere within the lower fifth of the home octave and forming one of two possible symmetric shapes around the tritone. Knowing a mode change boils down to transposing the tritone to another position and doing the same with it. Positioning and repositioning the tritone, and forming symmetric shapes around it, is done by eye on the keyboard, without reference to symbols of any kind. Identifying the mode requires only identifying the bottom tritone note by an alphabet letter. Thinking of the whole scale in terms of note symbols is never required.

Building Blocks

The building blocks identified by the anchors are shown next in Lego-like terms for the Ionian mode. Accumulating the anchors and their opposite ends from all the building blocks yields the scale. This is not to suggest actually constructing a scale this way, only to show that the building blocks fall out of this way of representing scales.

		@	P	A	D	M	I	L	\$	x	x	x	x	@
frame fifth & fourth	@	@	.	.	.	.	.	.	\$	.	.	.	.	.
	\$	\$	@
core fifth	I	.	.	.	.	.	I	.	.	.	.	.	.	x
core tritone	I	.	.	.	.	.	I	.	.	.	.	.	x	.
core fifth	M	.	.	.	.	M	.	.	.	.	.	.	x	.
secondary fourth	M	.	.	.	M	.	.	.	.	x	.	.	.	.
secondary fifth	A	.	.	A	.	.	.	.	.	.	.	x	.	.
secondary fourth	A	.	.	A	.	.	.	.	x	.	.	.	.	.

A new notational element is introduced here: the default interpretation of a fifo anchor letter is a fifth; a letter with a strikethrough indicates a fourth (think of the strikethrough as cutting down the size). Strikethroughs are optional but useful; if they're not used, fifo size is left entirely to context (which is useful when getting started on a new piece).

Intervals smaller and larger than building blocks are implicit in keyboard shapes formed of combinations of building blocks: they're inner or outer intervals of the combinations. However, it's

occasionally useful to bring them in as explicit fifo-like objects in the flow of harmony. This is indicated by putting a fifo anchor symbol in triangular brackets that cancel the normal size interpretation, leaving the interpretation to context (e.g., $\langle \mathbb{M} \rangle$ and $\langle \mathbb{M} \rangle$ are anchors of intervals of unspecified size, smaller than a fourth for the former, larger than a fifth for the latter). This is sufficient because it's rarely required and the sizes to choose are generally obvious from context.

Properties of Classical Modes

Altered Notes. 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).

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 (e.g., $\mathbb{A}\mathbb{M}\mathbb{I}$ for the Ionian mode and $\mathbb{A}\mathbb{M}\mathbb{I}$ for the Aeolian mode, where the optional dot indicates a skipped alphabet letter). The tritone anchor also provides a fifo anchor that's not listed in the anchor set because it's understood (e.g., \mathbb{I} for the Ionian mode, \mathbb{A} for the Aeolian mode). Classical modes are constrained by a rule of no adjacent half tones: the tritone anchor can have only one fifo anchor adjacent to it (e.g., \mathbb{M} for the Ionian mode), which leaves only one other alphabet letter available as a fifo anchor (e.g., \mathbb{A} for the Ionian mode) because any other choice would yield adjacent scale half tones (e.g., \mathbb{L} , \mathbb{D} and \mathbb{P} are excluded from the Ionian mode because they would yield adjacent half tones $\mathbb{M}\mathbb{I}\mathbb{L}$, $\mathbb{D}\mathbb{M}\mathbb{I}$ and $\mathbb{x}\mathbb{A}\mathbb{P}$, where \mathbb{x} is the upper note of the \mathbb{I} tritone).

Harmonic Roles of Fifos. The fifo that shares its note with the mode tritone (e.g., \mathbb{I} of the Ionian mode) alternates between a fourth and a fifth for successive modes in dictionary order. The other scale fifos may be either fifths or fourths. The core fifo anchors identify opposite harmonic roles (e.g., for the Ionian mode, \mathbb{M} establishes tonality as major and so may be characterized as a **resolution anchor**; \mathbb{I} is offset a half tone away from it and so is automatically a **non-resolution anchor** because of the relative dissonance).

Simplicity from Tritones. Beyond classical modes, the more tritones in the tonic scales, the simpler the core harmony. Tritones are inherently simpler than fifos because of their fixed size and their lack of mutual substitutability (different tritones are neither harmonically equivalent nor mutually consonant). Ornamental tritones sometimes act as ornamental surrogates for mode tritones in the flow of harmony (e.g., tritone \mathbb{L} sometimes acts as a surrogate for \mathbb{I} , or tritone \mathbb{P} for \mathbb{A}), but that's different in kind from fifo substitution.

Avoiding Complexity from Fifos. Most of the fifos of classical modes are substitutable for each other in harmony because of either harmonic equivalence (e.g., the frame fifth and fourth) or mutual consonance (e.g., all but the mutually dissonant core fifos). This opens the possibility of different combinations of building blocks and different permutations of their notes (following from inversions) being used for essentially the same harmonic function in different places in the same piece. This substitutability makes for harmonic richness but also for notational complexity in music notation, because of the large number and wide variety of different chord symbols that may result. PKP keeps the possibility of harmonic richness but does an end run around the notational complexity.

A small amount of notational complexity is unavoidable with fifo-intensive classical modes (7:1 ratio of fifos to tritones) because decisions must be made about sizes of anchored fifos but this is small potatoes compared to music notation. The PKP anchor concept eliminates most of the complexity at

one stroke. It permits dividing harmony into **core** and **enrichment** parts, in which the core parts are determined by anchor sequences and the enrichment parts by context provided by mode signatures determined by the melody line and the core harmony.

TWO SIDES OF THE SAME COIN

The subject of this section — mode changes and corresponding tonic changes — is one of the most complex in music notation. It's simple in PKP because the conceptual home octave is all you need. This avoids the nonlinear increase in conceptual complexity that follows from using, as music notation does, different symbols for the scales of different tonics (nonlinear because the number of relationships between symbols increases much faster than the increases in the number of symbols).

Mode changes and tonic changes are two sides of the coin, as illustrated by the following representative examples.

		<u>source of notes</u>	<u>@ P A D M I L \$ x x x x @</u>
(a)	Home Ionian	//I	x . x . x x . x . x . x x
	Home Aeolian	//A	x . x x . x . x x . x . x
(b)	Ionian up a minor third	//A	x . x x . x . x x . x . x
	Ionian down a minor third	alt-A	. x x . x . x . x x . x .
(c)	Ionian up a fourth	//M	x . x . x x . x . x x . x
	Ionian down a half tone	alt-M	. x . x x . x . x . x x .

A home-mode change is identified as a tonic change by designating a note of the new mode as a secondary tonic of a relative mode. A symbolic notation for secondary tonics is provided by a symbolic chromatic scale introduced later, but the concepts are easily understood without it. The relative mode has the same notes going up from the secondary tonic, but this is understood without writing it out. In the examples, the home and secondary tonics are highlighted in blue. The examples are simple in these terms, but are often overwhelmingly complex in music notation for all but experts.

Example (a). This sets the stage. A major-minor tonality change for the same tonic is one of the simplest and most recognizable changes in music. The notation **//I-//A** visibly expresses this simplicity. A tritone anchor change **I-A** down three alphabet steps identifies a parallel mode change that alters three notes. This is the default interpretation unless a melody line indicates a tonic change, in which case the interpretation goes to (b).

Music notation obscures the simplicity of (a) behind a fog of complexity that's particularly thick for mode changes that switch between sharp scales and flat scales. Suppose the home tonic is the first black key above C, which is either C# or Db in music notation, depending on context. Then the parallel mode change **//I-//A** 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 alter only 3 notes on the keyboard).

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 difference is manifested in the ability of singers, for example, to voice “perfect” fifths (or

fourths) of slightly different pitch sizes from other intervals with the same number of half tones. The piano has stood the test of time without variable pitch piano keys that would enable pianists to do this. The wide acceptance of the piano demonstrates that the difference is so subtle that equal temperament tuning finesses it (see *How Equal Temperament Tuning Ruined Music* for a negative opinion).

Examples (b)-(c). These are same-mode tonic changes for a starting Ionian mode, but the logic is general for any starting mode. Example (b) follows directly from example (a). The symmetric tonic changes up and down of this example each alter the same number of notes (3). The asymmetric tonic changes up and down of (c) alter different numbers of notes (1 and 5).

Mode changes and tonic changes alter 1-6 notes. The 5-note alteration of (c) follows from transposing the Ionian mode by a half tone. A transposition of a classical mode by a half tone moves all its notes by a half tone but only alters 5 of them because 2 notes are shared (the fifth anchored by \mathbb{M} is in both scales).

The General Case. The following table summarizes all possible same-mode tonic changes in a notation-free way. 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 mode identified by a different position a given number of alphabet 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 least notes. This is sufficient to identify the mode signature of a result because changes between primary modes and alt modes alter the most notes.

The table is for classical modes but the concepts are general. In the general case, mode signatures are words instead of single letters, and the anchor changes are of the first letter (numbers of altered notes are different). In all cases, different-mode changes are covered by relative modes of the results.

SAME-MODE CHANGES TO TONICS A TRITONE APART					
anchor	change altered		change altered		
change	(i)	notes	(ii)	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	example (c)
-2	+4	4	-2	2	
-3	+3	3	-3	3	example (b)

SCALE FAMILIES

Accepting that tritone content is in any way fundamental to music is a big conceptual leap but only a small notational step from here. Tritones don't seem fundamental in music notation because the presence of any tritone beyond the one in the tonic scale of the written key signature introduces notational complexity — other tritones come from other key signatures. The emperor-has-no-clothes view of the piano brings tritones forward to the eye as structurally fundamental. Skeptics should glance through the examples of Chapter 4-5.

The small notational step is illustrated by scale families, details of which are deferred until later, but concepts of which are easy to understand now. Parallel classical modes have already been seen as a family of scales developed from parallel pentatonic modes by splitting their minor thirds in a systematic way.

A Blues Family

A very different family scale follows from the union of the pentatonic modes identified by **//DM**. This with an added twist yields a 3-tritone scale determined by tritone anchor set **DM.L** (a dot indicates a skipped alphabet letter). The **DM** pair of anchors provides the mixed minor-major tonality that gives blues its characteristic sad-happy sound. The **L** anchor adds the characteristic blues “flatted 5th” (which is the flatted 5th note of any 7-note classical mode, not of the 9-note blues scale). Notice that unions don’t double the number of notes if notes are shared (e.g., adding tritone **L** to a scale that includes the tonic adds only one note, namely the anchor. The family scale is very different from classical modes (9 notes, 3 tritones, 5 adjacent half tones), so different that inherently simple blues is a misleadingly complex genre in music notation. The two main sub-scales used for melody are the 6-note scales shown (“minor” and “major” refer to the tonalities of the pentatonic scales that provide the five basic notes; the “major” scale is actually minor-major); the highlighted half-tone sequences provide a simple way of remembering them.

	@ P A D M I L \$ x x x x @	
//M	@ . x . x — \$. x — @	pentatonic major
//D	@ — x . x . \$ — x . @	pentatonic minor
//DM = //M + //D	@ . x x x x . \$. x x . @	8-note blues
//DM.L = //DM + L	x . x x x x x x \$. x x . x	9-note blues
//M + D	@ . x x x — \$. x — @	6-note major blues
//D + L	x — x . x x \$ — x . x	6-note minor blues
and more (next chapter)		

Minor and Major Scale Families

In an analogous manner, the union of classical modes **//A** and **//I** (that are themselves developments of the foundation pentatonic scales) yields a 4-tritone, 10-note scale determined by **ADMI** that reduces, by morphing the **M** or **D** tritone into fifos, to a pair of 3-tritone, 9-note scales of minor or major tonality identified by the mode signatures **AD.I+** or **A.MI+**. These scales are very easy to remember because the only difference (highlighted) is in the tonality in the bottom fifth.

	@ P A D M I L \$ x x x x @	
//I	@ . x . x x . \$. x . x @	
//A	@ . x x . x . \$ x . x . @	
//ADMI = //I + //A	@ . x x x x . \$ x x x x @	
//A.MI+	@ . x . x x . \$ x + x x @	
//AD.I+	@ . x x . x . \$ x x + x @	
and more (next chapter)		

Relationship to Key Signatures

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. That said, key signatures must be lived with.

Blues pieces illustrate the confusing variety of choices of key signatures displayed by pieces that go

outside classical modes. Shown next are the differences (highlighted in yellow) between the blues family scale and different parallel classical modes on the left determined by different key signatures.

The Mixolydian and Dorian modes are the closest of the parallel classical modes to the blues family scale, suggesting a key signature for one of them might be a good choice. However, given a melody line in one of the 6-note blues scales, any key signature that provides the corresponding pentatonic scale as a sub-scale can also be a good choice, which broadens the scope to include the Ionian and Aeolian modes. All of these possibilities, and others not shown, are displayed by different blues pieces. The effect is to make blues seem, misleadingly, an entirely ad hoc musical genre.

//DM.L	x . A D M I L \$. x x . x	differences from modes on the left
Lydian mode (//L)	x . x . x . x \$. x . x x	3 omissions, 1 addition
Ionian mode (//I)	@ . x . x x . \$. x . x @	3 omissions, 1 addition
Mixolydian mode (//M)	@ . x . x x . \$. x x . @	2 omissions
Dorian mode (//D)	@ . x x . x . \$. x x . @	2 omissions
Aeolian mode (//A)	@ . x x . x . \$ x . x . @	3 omissions, 1 addition
Phrygian mode (//P)	@ x . x . x . x x . x . @	3 omissions, 2 additions
Locrian mode (alt-L)	x x . x . x x . x . x	4 omissions, 2 additions

In music notation, accidentals (sharps, flats, naturals) identify differences from key signatures. Accidentals don't distinguish between notes that determine a scale and ornamental passing notes that have no scale implications. Many low-level details must be sorted out to get a higher level conceptual view. The complexity over all possible tonics and key signatures can be mind boggling. Mode signatures determined by tritone content sort things out at a high conceptual level.

SYMBOLIC CHROMATIC SCALE

As has just been illustrated, a lot of musical ground can be covered without using note symbols of any kind. Harmony shapes and their scales of origin can be understood solely in terms of two kinds of building blocks. Melody *scales* can be understood in terms of the same building blocks but melody *lines* need a 12-symbol scale that covers any home octave. Music notation provides no such scale because overlapping home octaves require different key signatures (explicit or implicit). In principle, any set of twelve different symbols could represent the chromatic scale (o-p-q-r-s-t-u-v-w-x-y-z-o, for example) but symbols that are more easily related to music notation are helpful.

A suitable notation begins with the convention of music notation that the Ionian mode is the default reference scale of a key signature, relative to which all other scales are understood. Labeling the piano keys of the Ionian mode of the home octave **1-2-3-4-5-6-7-1** provides a set of symbols for seven of the twelve piano keys. The intervals are whole tones except for the two half tones **3-4** and **7-1**. Completing the chromatic scale requires five symbols for the five piano keys in the five whole-tone intervals. A sufficient notation for them is provided by attaching prefix **p** to the five numbers above the whole tone intervals. The prefix stands for “phlat” and means next piano key down. The result is shown next, aligned with the conceptual home octave.

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 @

These are the only symbols: **p1** and **p4** are not in this scale, so **7** is never **p1** and **3** is never **p4**; there are no symbols corresponding to sharps. The beauty of this notation is it mirrors the look of the C-octave on the piano (the five prefixed symbols are the black keys), giving visibility to the musical functions of the notes in any octave. The notation is simple enough to annotate on the staff next to note symbols of a written melody line.

From now on, all explanations of harmony in the tabular form that shows Lego-like building blocks will include both representation along the top, to enable easy cross reference (for example a tritone anchored by **M** is understood to be **3-p7** in the chromatic scale without spelling it out as such).

Chord Roots

This scale with the numbers replaced by RN symbols provides a set of twelve symbols for the twelve possible chord roots of the home octave: *I, pII, II, pIII, III, IV, pV, V, pVI, VI, pVII, VII*. Mehegan's jazz piano instruction book uses exactly this notation for chord roots relative to a tonic, except with actual flat symbols of music notation as prefixes, which causes endless confusion when the written roots are sharped or flatted letter notes, or suffixes of the written chord symbols contain sharped or flatted letter notes that alter notes of the chord scale. The "phlat" prefixes avoid the confusion.

Melody Scales

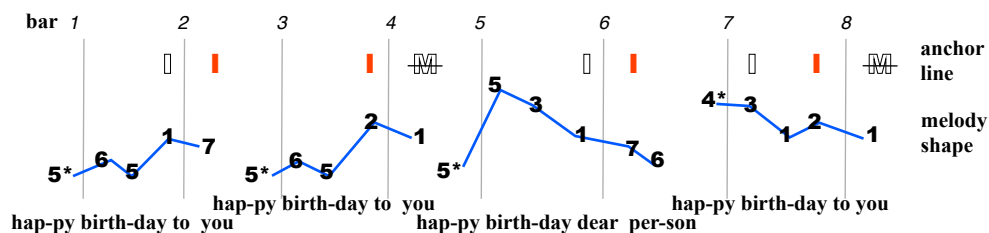
The chromatic scale is useful for annotating melody lines on a staff (or writing them out separately) to assist in identifying their tonic scales of origin. Recognizing tonic scales in annotations on the staff is helped by showing the symbols of tritone notes in red (e.g., *II* is **1-2-3-4-5-6-7-1** and *IIA* is **1-2-p3-4-5-p6-p7-1**, in both of which the notes in red text identify the mode tritone).

Two Sides of the Same Coin




The chromatic scale enables identifying secondary tonics by scale symbols. In a written-out scale or melody line, this is accomplished by highlighting a selected note. In mode signatures, it's accomplished by adding suffixes of the form **@t**, where **t** is chromatic scale symbol identifying a secondary tonic in the mode identified by the signature. Either way, this alters no notes.

INTEGRATED MELODY PLUS HARMONY

The chromatic scale notation enables a shorthand representation of integrated melody and core harmony by two simple lines, as shown next for a familiar piece in which melody and harmony are both in the Ionian mode (having both melody and harmony in the same scale is not the general case, but serves to introduce the concepts).




















The ziz-zag melody line symbolizes chromatic scale symbols annotated on the staff next to selected note symbols. Asterisks indicate repeated notes, leaving the number to be determined by context (e.g., **5*** means **5-5** here). The intervals of the zig-zags represent the essence of how people with musical ears remember melody shapes as sequences of pitch intervals going up or down, independently of rhythm, timing and duration of notes and rests. The anchor line that defines core harmony is shown

above the melody line to symbolize annotating it above the staff in the written music. Its building blocks are easily correlated with note symbols of the melody (e.g.,  is the fifth **4-1**,  is the tritone **4-7**,  is the fourth **3-6**).





For concreteness, cross references for a particular tonic (F) are provided next (the chord roots are for later reference). Such cross references are always required for any piece. The idea is to think only in terms of the symbols below the horizontal line to avoid potential confusion between letter notes and anchor symbols (e.g., letter notes “A” and “D” are **3** and **6** relative to tonic F, and anchors **A** and **D** are **2** and **p3** in the home chromatic scale).






<i>F</i>	-	<i>G</i>	-	<i>A</i>	<i>Bb</i>	-	<i>C</i>	-	<i>D</i>	-	<i>E</i>
<i>I</i>	<i>pII</i>	<i>II</i>	<i>pIII</i>	<i>III</i>	<i>IV</i>	<i>pV</i>	<i>V</i>	<i>pVI</i>	<i>VI</i>	<i>pVII</i>	<i>VII</i>
1	p2	2	p3	3	4	p5	5	p6	6	p7	7
@	P	A	D	M	I	L	\$	.	.	.	.


As shown next, the melody and harmony may be represented by two textual lines. The melody shape is condensed into a single line interspersed with diagonal up and down arrows. The anchor line is identified on the left by  and the melody line by  (the annotation , : **///** indicates harmony and melody use the same Ionian mode). In the melody line, commas indicate ends of phrases. Dashes not shown may be used to mark melody gaps where harmony may appear. The melody zig-zags are less graphic but the textual representation is more compact, providing a useful shorthand summary of the melodic and harmonic essence of the piece that’s independent of music notation and of the choice of home tonic.

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

The core harmony established by this anchor line is shown next in Lego-like terms, starting from tritone content as the “seed.” This is useful because tritones are both fixed size and unique to the mode, and fifos are neither. A table of tritone chords is provided in Appendix C.

	1	p2	2	p3	3	4	p5	5	p6	6	p7	7	1
<i>bar</i>	@	.	A	.	M	I	.	\$	.	x	.	x	@
1
2		I	.	.	.	.	.	x	.
3		I	.	.	.	.	.	x	.
4
5
6		I	.	.	.	.	.	x	.
7
8		I	.	.	.	.	.	x	.

	1	p2	2	p3	3	4	p5	5	p6	6	p7	7	1
	@	.	A	.	M	I	.	\$	.	x	.	x	@
	I	.	.	.	.	.	x	↓morph
	I	.	.	.	.	.	x	.
	I	.	.	.	.	.	x	↓ wobbly slide
	M	.	.	.	x	.	.	.	↓ wobbly slide
	I	.	.	.	.	.	x	↓morph
	I	.	.	.	.	.	x	.
	I	.	.	.	.	.	x	↓morph
	I	.	.	.	.	.	x	↓ wobbly slide
	M	.	.	.	x	.	.	.	.

The fifos fill in the gaps in visibly obvious ways. For a start, there’s only one fifo anchored by  in

this mode, a fifth. An appearance of this fifth precedes each appearance of the mode tritone, forming a characteristic pre-resolution sequence of major harmony in which a fifth **morphs** downward into a tritone. For resolution in bars 4 and 8, the tritone could **morph** downward into a fifth anchored by \mathbb{M} but doesn't here, to avoid putting a dissonant half tone below the melody tonic (assuming the melody is played in the next octave up). Instead it morphs into a fourth anchored by \mathbb{M} . This isn't a simple morph, but a combination of a **slide** (the tritone slides down a half tone) and a **morph** (the tritone morphs into a fourth) that I have come to call a **wobbly slide**. This odd term accurately represents how the fingers must move, namely lift them and move them as one (the slide), while spreading them apart or squeezing them together to make size changes (the wobble).

Chords in general will be dealt with later but the usual chords implied by this core harmony are easily understood now. They're determined by assigning roots to building blocks as follows (these are the usual roots but far from the only possible ones): root *V* for the tritones in bars 2, 3, 6 and 7 voices dominant seventh chord *V-7*; root *II* for the fifths in bars 1, 5 and 7 voices minor seventh chord *II-m7*; root *VI* for the fourth in bar 4 voices minor seventh chord *VI-m7* (in this context); and root *I* for the fourth in bar 8 voices major sixth chord *I-6*, of which *VI-m7* is an inversion. The chord progression is | *II-m7* | *V7* | *V7* | *VI-m7* | *II-m7* | *V7* | *II-m7* | *V7* | *I6* |.

As shown later, a large number and wide variety of chords with very different chord symbols can be implied by adding different roots to the same core. Straight dominant seventh chords such as *V7* are but one example of single-tritone chords (see Appendix C for a table of tritone chords). Chord symbols are not nearly as important for understanding harmony as they look.

Beyond This Example

Wobbly slides may be understood as literal sequences of a **slide** and a **morph**. For example, $\mathbf{I-M}$ is a contraction of $\mathbf{I-M-M}$ (a tritone slides down a half tone and then shrinks into a fourth); and $\mathbf{M-I}$ is contraction of $\mathbf{M-M-I}$ (a fourth expands into a fifth which slides up a half tone). This is a useful way of thinking in any case because it represents multi-step anchor lines that may identify mode changes (e.g., $\mathbf{I-M}$ or $\mathbf{M-M-I}$ stays in the Ionian mode, and $\mathbf{I-M-M}$ goes to the parallel Mixolydian mode).

Slides that move off one end of the alphabet wrap around to the other end. For example $\mathbf{I-A}$ slides a tritone down a minor third, and $\mathbf{I-A}$ slides a tritone up a minor third, which amounts to wrapping around to **A** and sliding the result up a tritone (in other words, inverting it). Such simple movements may imply mode or tonic changes that can be complex in music notation.

Fifo-only anchors \mathbb{C} , \mathbb{S} and \mathbb{A} don't appear in this example but may appear in general in core harmony. A good way of thinking of the appearance of these anchors in core harmony is as fifo substitutions to provide more variety. For example, the \mathbb{A} fifth might be substituted for the \mathbb{M} fourth in bar 1 of the example.

FROM CORE HARMONY TO CHORD PROGRESSIONS

When piano music is fully written out on the grand staff, the flow of the music is directly visible. The problem is the amount of complex detail is overwhelming for all but experts. When music is separated into melody on a staff and harmony represented by chord symbols above the staff, only the flow of melody is visible because chords may be voiced in different ways to give different harmonic flows that complement the melody line in different ways.

A piano teacher once told me to learn chords by picturing the chord symbols on the keyboard. I

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

Chords of Classical Modes

The seventh chords from the Ionian mode shown next provide the basic chord symbols for chords in general. 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 ♮ 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>I-M7</i>	434	@	.	.	.	M	.	.	O	.	.	.	x	.	.	.	.	.	.	.	.	.	.
<i>II-m7</i>	— 343	.	.	x	.	.	I	.	.	.	O	.	.	x	.	.	.	.	.	.	.	.	.
<i>III-m7</i>	— 343	.	.	.	.	M	.	.	O	.	.	.	x	.	.	x	.	.	.	.	.	.	.
<i>IV-M7</i>	434 —	.	.	.	.	.	I	.	.	.	O	.	.	x	.	.	.	.	x	.	.	.	.
<i>V-7</i>	— — 433	.	.	.	.	.	.	.	.	@	.	.	x	.	.	O	.	.	I	.	.	.	.
<i>VI-m7</i>	— 343	.	.	.	.	.	.	.	.	.	x	.	.	O	.	.	M	.	.	x	.	.	.
<i>VII-m7b5</i>	— — — 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	
<u>shape</u>	@	.	A	.	M	I	.	\$	.	x	.	x	@	.	A	.	M	I	.	\$	<u>chord</u>
4	.	.	.	.	.	I	.	.	.	O	.	.	x	.	.	.	x	.	.	.	<i>IV-M7</i>
3	.	.	.	.	.	I	.	.	.	O	.	.	x	.	.	x	.	.	.	.	<i>VII-m7b5</i>
3	.	.	.	.	M	.	.	O	.	.	.	.	x	.	.	x	.	.	.	.	<i>III-m7</i>
3	.	.	.	.	x	.	.	O	.	.	x	.	.	.	.	.	.	.	.	.	<i>VI-m7</i>
3	.	.	x	.	.	I	.	.	.	O	.	.	.	.	.	.	.	.	.	.	<i>II-m7</i>
3	.	.	x	.	.	I	.	.	.	O	.	.	.	.	.	.	.	.	.	.	<i>V-7</i>
4	x	.	.	.	M	.	.	O	.	.	.	.	.	.	.	.	.	.	.	.	<i>I-M7</i>

This is a voicing of the famous “diatonic cycle” in which chord roots go down by fifths (conceptually) starting from *VII* (*IV* is at the end in the down-by-fifths sequence but is put at the beginning here to put *I* at the end). The core is the same -- for the first three steps and the last three steps. The building blocks and the 3-note shapes symbolized on the left morph from one to the next. The 3-note shapes identify an enriched core that’s sufficient to imply the chord in context. Playing these shapes is very easy: two fingers are held and two lowered at each step.

Transforming this so the chords go up from the roots yields the difficult-to-play result shown next.

	1	p2	2	p3	3	4	p5	5	p6	6	p7	7	1	p2	2	p3	3	4	p5	5	p6	6	
<u>shape</u>	@	.	A	.	M	I	.	\$	.	x	.	x	@	.	A	.	M	I	.	\$	.	x	<u>chord</u>
4	I	.	.	.	O	.	.	x	.	.	.	x	.	.	.	.	.	<i>IV-M7</i>
4	x	.	.	O	.	.	I	.	.	x	<i>VII-m7b5</i>
3	M	.	.	O	.	.	.	.	x	.	.	x	.	.	.	.	.	.	<i>III-m7</i>
3	x	.	O	.	.	M	.	.	.	x	<i>VI-m7</i>
3	.	.	x	.	.	I	.	.	.	O	.	.	.	.	.	.	.	.	.	.	.	.	<i>II-m7</i>
4	x	.	.	.	.	.	.	.	.	.	<i>V-7</i>
4	@	.	.	.	M	.	.	O	.	.	.	.	x	.	.	.	.	.	.	.	.	.	<i>I-M7</i>

The zig-zags of the shapes up a fourth and down a fifth are harmonically equivalent to down by fifths. This is difficult to play because all the fingers must be lifted and moved by large jumps, while also 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).

The morphed version within the home octave and the zig-zag slide version that goes outside it are harmonically equivalent. There’s obvious benefit in learning the easier-to-play morphed version first and then switching to the other version, if desired, by inverting selected building blocks (which is

always easy when building blocks are known by their anchors).

Open Voicings

As shown next, open voicings separate the overlapped building blocks of chords within the home octave, putting them one above the other in adjacent home octaves.

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

These shapes can be represented by pairs of anchors that are equivalent to the anchor-with-numeric-offsets notation. The figure 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 (a) is directly from the earlier diatonic cycle. Examples (b) and (c) are simple variations in building block terms that provide voicings of a variety of complex-looking chord symbols. Example (c) is particularly simple: first the middle note moves down a scale step and then all notes move down a scale step. The shapes in the last two steps are "all fourths" (counting the tritone as an augmented fourth). These are far from the only possible variations but they give a good sense of the often deceptively complex nature of chord progressions.

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

Octave Shapes

Octave shapes provide a simple way transforming thin core harmony into 3-note shapes with all notes different. There are four different ways of forming octave shapes from a core. Start with the core un-inverted (a, b) or inverted (c, d) and add a voicing note to complete an octave, on the side indicated by the asterisk prefix or suffix. Then move the voicing note to a selected scale note closer to the core (the likeliest choices are marked by x in the grey-shaded areas) to form a 3-note shape that goes well with the melody line. The octave shapes of (a) and (d) or of (b) and (c) have the same notes an octave apart and so are harmonically equivalent. The difference is in the final, less-than-octave shapes. The asterisks could be replaced by numeric offsets as illustrated earlier (e.g., I* of (a) could become I3 or I5) but this is often overly precise because choices are few and tend to be obvious from context.

Playing shapes of this kind is a standard keyboard exercise for beginners but the ability to write

	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	.	S	.	x	.	x	@	.	A	.	M	I	.	S	.	x	.	x	@
(a)  *	I	.	.	.	.	.	.	@	.	x	.	x	.	.	.	.	.	.	.	.
 *	I	.	.	.	.	.	.	x	.	x	.	x	.	.	.	.	.	.	.	.
 *	M	.	.	.	.	.	.	x	.	x	.	.	.	.	.	.	.	.	.	.	.
(b)  *	.	.	x	.	.	I	.	.	.	.	.	.	@	.	.	.	.	.	.	.	.	.	.	.	.
 *	.	x	.	x	.	I	.	.	.	.	.	.	x	.	.	.	.	.	.	.	.	.	.	.	.
 *	.	x	.	x	.	M	.	.	.	.	.	x	.	.	.	.	.	.	.	.	.	.	.	.	.
(c)  *	@	.	.	.	I	.	x	.	x	.	x	.	.
 *	x	.	.	.	I	.	x	.	x	.	.	.	.
 *	x	.	.	.	M	.	x	.	x	.	.	.	.
(d)  *	x	.	x	.	.	@	.	.	.	I	.	.	.	.	.	.	.	.
 *	x	.	x	.	.	x	.	.	.	I	.	.	.	.	.	.	.	.
 *	x	.	x	.	.	x	.	.	.	M	.	.	.	.	.	.	.	.

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.

This picture is for single-tritone classical modes but the concept is the same for multi-tritone modes. The details are different because multiple tritones provide a more definite core that requires fewer core fifos to complete (sometimes none). The tritones overlap, which suggests, going forward, voicing them on opposite sides for smooth flow.

DIFFERENT WAYS OF PLAYING HARMONY

Chords that seem very different from their chord symbols may be hardly different at all in the flow of harmony on the keyboard. A dominant seventh chord such as *V-7* and a half-diminished seventh chord such as *V-m7b5* (or a *II-m6* chord with the same notes) differ only in one note that amounts to using an overlapped fifth or fourth to complete the chord. The alteration of the chord symbol is like banging a square peg into a round hole — the result is messy. This example is from the same classical mode. Things only get messier with more general scales.

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. I learned that 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 only from exercises.

I thought there must be a simple way of notating these approaches in common terms. After much experimentation, I found the way just described.

The big difference from what I learned from Susan Muscarella is core-based representations of chords that are independent of chord symbols (apart from identifying tritones from the chord table in Appendix C); Chapter 4 presents examples from her comping course in full.

The big difference from Taylor Eigsti's method is a notation for wobbly slides on the keyboard that covers all kinds of shapes from all kinds of scales. Given that wobbly slides in keyboard terms are the general case, it seems useful to start out thinking in their terms, using a notation that represents them.

The examples so far have all been from the Ionian mode but the concepts are general. The general case is actually simpler because more tritones identify more scale notes.

HARMONY WORKSHEETS

The Lego-like views of harmony provided in many figures illustrate how *given* anchor lines may be interpreted on the keyboard. The figures are only for explanation of the notation, and are helpful for forming mental models.

That said, they suggest **worksheets** for *figuring out* anchor lines to provide desired harmonic sequences. All that's needed for this is pages marked off with vertical and horizontal grid lines. The columns created by the vertical grid lines identify the half tones of the home octave. The rows identified by the horizontal grid lines identify successive bars and positions within bars. Entries penciled into the columns are sufficient for identifying building blocks. The colored shading in the illustrative views is not needed for this. Translating such worksheets into music notation can be useful in particular cases and is so straightforward that it could easily be automated. Exploring this further is outside the scope of this document.

CHAPTER 3: DETAILS DEVELOPED FROM BASIC PRINCIPLES

This chapter fills in notational details independently of specific pieces of music. The next two chapters fill them in by exploring example pieces. The concepts needed to understand the examples are sufficiently well explained in the previous chapter that proceeding to the next chapters with only a quick skim of this one to see what's in it should be possible, returning here if and when needed.

DICTIONARY OF MODE SIGNATURES

The following short dictionary of tonic scales identified by mode signatures covers in half a page all the scales and more in scale dictionaries such as *The Source*. 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.

Parallel mode changes and tonic changes are two sides of the same coin; the difference is generally indicated by the melody line. These are by no means the only possible scales but the dictionary is easily extended if anyone sees a need.

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	. P . D M . L x . x x . x	diminished (8-notes, min-maj)
//AD.IL	. . 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	. . 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)
//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 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).

The prefix “//” that distinguishes parallel modes determined by words from the tritones determined by the same words is only really needed for words of one or two letters because two tritones is the practical limit for chords containing tritones. Beyond that, no confusion of meaning is possible. That said, it’s useful to use the prefix for clarity.

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.

SCALE FAMILIES

Scale families provide a simple, unified view of a very large number of scales of music notation of different kinds in different key signatures that are, in aggregate, overwhelmingly complex for all but experts. These scales are 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 were developed in the previous chapter from these modes by splitting their minor-third intervals. Scales beyond these follow from forming unions of parallel modes of opposite tonalities.

Blues Family

The union of the pentatonic major and minor modes with an added note that splits the octave into geometric halves yields a 9-note blues family scale.

	1	p2	2	p3	3	4	p5	5	p6	6	p7	7	1
//M pentatonic major	@	.	A	.	M	—	\$	.	x	—	@		
//D pentatonic minor	@	—	D	.	I	.	\$	—	x	.	@		
<hr/>													
//DM = //M + //D	@	.	A	D	M	I	.	\$	.	x	x	.	@
//DM + L adds geometric octave split	x	.	.	.	.	.	x	.	.	.	.	.	x
//DM.L blues family scale	x	.	A	D	M	I	L	\$	.	x	x	.	x

The 8-note union is a natural consequence of “bending” the tonality-establishing notes of simple pentatonic music downwards to give a major piece a sad twist, or upwards to give minor piece a happy twist. The bent notes in the lower fifth join with pentatonic notes in the upper fourth to form two tritones. Also bending the pitch center adds the center note of the geometric octave split seen earlier, which forms a tritone with the tonic. The result is a 9-note scale with three tritones and five adjacent

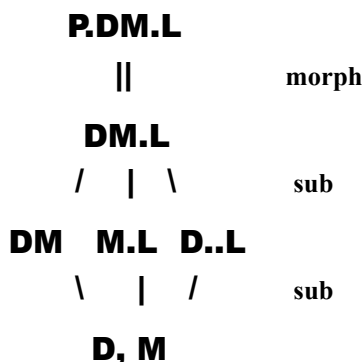
half tones that differs markedly from the classical modes that are the scales of key signatures, which have seven notes, one tritone and no adjacent half tones. This explains why blues pieces are often complex in music notation (e.g., the footnoted chord progression in the opening chapter).

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.

The three tritones of **DM.L** determine six notes, the scale frame adds one note (the **L** tritone already includes the tonic), and the other two non-tritone notes are from the foundation pentatonic scales. This 9-note scale provides many sub-scales that are stalwarts of blues pieces, shown next listed in order of decreasing tritone content.

	1	p2	2	p3	3	4	p5	5	p6	6	p7	7	1	
sub-scales of //DM.L	x	.	A	D	M	I	L	\$	.	x	x	.	x	
//DM (8 notes)	@	.	A	D	M	I	.	\$	.	x	x	.	@	//M + //D
//D..L (7 notes)	@	.	A	D	.	I	L	\$	.	x	x	.	@	// mode of harmonic minor
//M.L (7 notes)	x	.	A	.	M	I	L	\$	.	x	x	.	x	// mode of melodic minor
//D (7 notes)	@	.	A	D	.	I	.	\$	.	x	x	.	@	Dorian
//M (7 notes)	@	.	A	.	M	I	.	\$	.	x	x	.	@	Mixolydian
//M + D (6 notes)	@	-----	D	.	I	L	\$	-----	x	.	x	.	@	major blues
//D + L (6 notes)	@	.	A	D	M	-----	\$	.	x	-----	@	.	@	minor blues
//M (5 notes)	@	.	A	.	M	-----	\$	.	x	-----	@	.	@	pentatonic major
//D (5 notes)	@	-----	D	.	I	.	\$	-----	x	.	@	.	@	pentatonic minor

A contrasting top-down view to this bottom-up view is provided by the following hierarchy of scales and sub-scales starting from parent scale **P.DM.L** (an atonal scale called “diminished”). This scale morphs into the **DM.L** scale (the **P** tritone morphs into a fifa 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 notes.



The words **M.L** and **D..L** determine parallel “melodic” and “harmonic” modes, (described later) that share with classical modes the properties of seven notes and no adjacent half tones.

Conspicuously missing are tritones **A** and **I** from the classical modes conventionally regarded as the default minor and major modes of key signatures. Fifo anchors **A** and **I** identify in-scale fifos but tritones anchored by **A** and **I** 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 (see *When Sunny Gets Blue* in Chapter 4 for an example).

Minor and Major Families

The union of the parallel Aeolian and Ionian modes forms a 10-note scale of mixed minor-major tonality determined by the word **ADMI** that is a master scale of family scales of major and minor tonality. This 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.

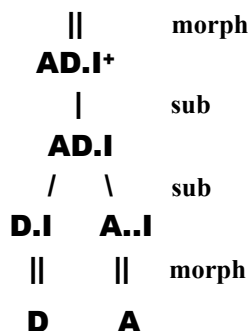
		1	p2	2	p3	3	4	p5	5	p6	6	p7	7	1	
Ionian mode	// A	@	.	A	.	M	I	.	\$	.	o	.	x	@	foundation scales
Aeolian mode	// I	@	.	A	D	.	I	.	\$	x	.	o	.	@	
10-note union	// ADMI	@	.	A	D	M	I	.	\$	x	x	x	x	@	morph major tritone morph minor tritone
minor family scale	// AD.I⁺	@	.	A	D	.	I	.	\$	x	x	+	x	@	
major family scale	// A.MI⁺	@	.	A	.	M	I	.	\$	x	+	x	x	@	

As for the blues, the 9-note scales provide sub-scales shown next that are stalwarts of minor and major music.

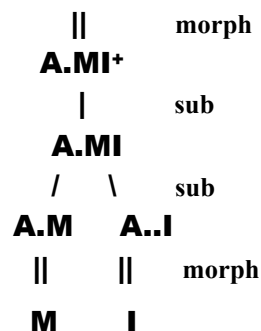
		1	p2	2	p3	3	4	p5	5	p6	6	p7	7	
sub-scales of AD.I⁺		@	.	A	D	.	I	.	\$	x	x	+	x	@
AD.I	bebop melodic minor	@	.	A	D	.	I	.	\$	x	x	.	x	@
// A..I	harmonic minor	@	.	A	D	.	I	.	\$	x	.	.	x	@
// D.I	melodic minor	@	.	A	D	.	I	.	\$	.	x	.	x	@
// D	Dorian	@	.	A	D	.	I	.	\$	.	x	+	.	@
// A	Aeolian	@	.	A	D	.	I	.	\$	x	.	+	.	@
sub-scales of A.MI⁺		@	.	A	.	M	I	.	\$	x	+	x	x	@
A.MI	no specific name	@	.	A	.	M	I	.	\$	x	.	x	x	@
// A..I⁺	bebop major	@	.	A	.	M	I	.	\$	x	+	.	x	@
// A..I	harmonic major	@	.	A	.	M	I	.	\$	x	.	.	x	@
// A.M	// mode of melodic minor	@	.	A	.	M	I	.	\$	x	.	x	.	@
// M	Mixolydian	@	.	A	.	M	I	.	\$	.	+	x	.	@
// I	Ionian	@	.	A	.	M	I	.	\$	.	+	.	x	@

The minor and major hierarchies are slightly more complex than the blues hierarchy because **ADMI** is not the only 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 (or AD.IL)



ADMI (or PA.MI)



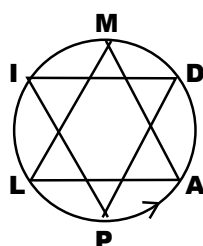
The double tritones **D.I** and **A..I** on the left, and **A.M** and **A..I** on the right, determine parallel “melodic” and “harmonic” modes that share with classical modes the properties of seven notes and no adjacent half tones.

PARALLEL “MELODIC” AND “HARMONIC” MODES

The concept of parallel modes applies to any scale — they're rotated transpositions of a master scale — but its systematic development 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. In PKP, the parallel modes are determined by transpositions of a master word within within the alphabet as a circular loop (meaning wrapping the letters around to the other end of the alphabet). The transpositions may be understood graphically as shown next (spacer dots are omitted for brevity).

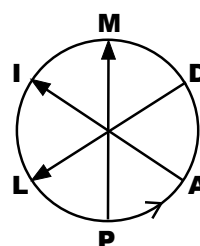
melodic minor modes

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 a minor or major master to context. The choice is a minor detail, except for the master mode

itself.

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 six possible parallel modes of a harmonic minor-major master scale (two modes for the former and modes for the latter).

Details follow for information, but most of the modes fall directly out of blues, minor or major family scales.

Parallel “Melodic” Modes

The master mode is conventionally understood to be the melodic minor identified here by **D.I** but but **A.M** is logically just as valid. In any case, a simple way of knowing them is as morphed whole tone scales. Whole tone scales are determined by **A.M.L** and **P.D.I** are the simplest keyboard shapes possible (5 stacked whole tones). The **A.M**, **M.L** and **L.A** modes are morphed from the **A.M.L** scale; the **P.D**, **D.I** and **I.P** modes are morphed from to **P.D.I** scale. The morphs split one of the whole tones into two half tones. Here follows a summary of the parallel modes that highlights the splits. The bottom note of the split is the starting note of a transposed melodic minor scale.

mode	source	1	p2	2	p3	3	4	p5	5	p6	6	p7	7	1	tonality determiners highlighted
alt-LA	AML	x	.	A	D	.	I	L	.	x	.	x	.	x	
//LA	AML	x	.	A	.	M	.	L	.	x	x	.	x	x	
✗ alt-IP	PDI	.	P	.	D	.	I	.	x	x	.	x	.	.	pseudo-parallel mode (Phrygian- <i>b1</i>)
✗ //IP	PDI	.	P	A	.	M	I	.	x	.	x	.	x	.	pseudo-parallel mode (Ionian- <i>#1</i>)
alt-ML	AML	x	P	.	D	M	.	L	.	x	.	x	.	x	
//ML	AML	x	.	A	.	M	.	L	x	.	x	.	x	.	
//DI	PDI	@	.	A	D	.	I	.	\$	.	x	.	x	@	
//AM	AML	@	.	A	.	M	I	.	\$	x	.	x	.	@	
//PD	PDI	@	P	.	D	M	.	L	x	.	x	.	x	@	

The **//IP** mode marked by **✗** isn't a proper parallel mode because it doesn't include the tonic but it's included as a pseudo-parallel mode because it's so close to being one (it's the Ionian mode with the tonic raised a half tone). The **//IP** pseudo mode has major tonality and is partnered by an **alt-IP** mode of minor tonality with all non-tritone notes different.

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 next.

The circular symmetry of the double tritones of these modes makes them remarkably simple on the keyboard — a stack of three minor thirds. One of the minor thirds is empty in the scale and the one a minor third away from it is, for a minor-major master, filled with two notes a half tone apart. Choosing a minor or major or minor master boils down to omitting one of these notes (candidates for omission are highlighted in yellow — sometimes there's only one possible choice). Except for the master mode

itself, the choices don't affect the tonality of the result. This simplifies thinking because the difference between a major or minor master mode is a detail that can be left to context. An example from the blues follows.

	1	p2	2	p3	3	4	p5	5	p6	6	p7	7	1		1	p2	2	p3	3	4	p5	5	p6	6	p7	7	1	
//DL	x	.	A	D	—	L	\$	.	x	o	o	x		//LD	x	—	D	M	.	L	o	o	x	.	o	x		
alt-DL	x	P	.	D	M	o	L	.	o	x	—	x		alt-LD	x	P	A	D	.	I	L	—	x	o	.	x		
<hr/>															<hr/>													
//AI	@	.	A	D	M	I	.	\$	x	—	x	@		//IA	@	P	A	.	M	I	—	x	o	.	x	@		
<hr/>															<hr/>													
//PM	@	P	—	M	o	.	x	o	o	x	.	@		//MP	@	P	.	D	M	—	x	o	.	x	o	@		

Examples of **//DL** and **alt-DL** modes from the blues are shown next (the examples of conventional names for them are from Appendix D).

	1	p2	2	p3	3	4	p5	5	p6	6	p7	7	1		1	p2	2	p3	3	4	p5	5	p6	6	p7	7	1		
DM.L	x	.	A	D	M	I	L	\$	.	x	x	.	x		DM.L	x	.	A	D	M	I	L	\$	.	x	x	.	x	
//DL	x	.	A	D	————	L	\$	.	x	o	.	x		alt-DL	x	P	.	D	M	.	L	.	o	x	————	x			
(e.g., “Romanian”)															(e.g., “Leading Tone Minor Diminished”)														

CHAPTER 4: DETAILS DEVELOPED VIA EXAMPLE PIECES

This chapter develops the details via a smorgasbord of example pieces, avoiding the use of music notation to keep things simple and independent of specific tonics. The smorgasbord offers a choice of pieces to focus on initially, with the idea that anyone will find at least one or two pieces that are either familiar or of interest. Digging into one or two selected pieces in depth should be sufficient to internalize the concepts; the remaining pieces are available for interest. Chapter 5 provides a few example pieces in annotated music notation, culminating in the piece with the footnoted chord progression in the opening chapter — anyone still puzzled by this material should look at this chapter.

The examples are intended to be understood by playing them, not just looking at pages, and so should be studied 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 fifa shapes. The simplicity of finding flow “bottom up” from core harmony is in stark contrast to the complexity of finding it “top down” from chord symbols.

My hope for the examples is that the visible simplicity and depth that PKP provides for each of many different kinds of pieces will accumulate a weight of evidence to convince skeptics that the approach is both correct and practically useful. Practicality is demonstrated by the simplicity and depth of the annotations needed on the written music. The annotations are independent of the actual home tonic of a piece, enabling lessons and patterns learned from one piece to be applied to other pieces with the same or different home tonics. The meaning of the annotations in keyboard terms is demonstrated by tabular representations of Lego-like harmony shapes on the keyboard. The resulting harmony isn’t itself novel, the only novelty is in the unconventional representation.

The examples are independent of each other and so may be approached in any order. That said, they get progressively more sophisticated as the chapter proceeds. I worked them out at different times, sometimes years apart, so they sometimes present things in slightly different ways, but the ways are always consistent.

Understanding a piece begins with the melody line, which requires annotating the notes on the staff with chromatic scale symbols relative to the home tonic to enable inferring mode signatures from tritone content and any secondary tonics. The two-sides-of-the-same-coin property of home-mode changes and same-mode tonic changes offers many different interpretations for highly chromatic pieces, requiring some experimentation to know which fits best. The opposite ends of the range of interpretations are usually relatively obvious: classical modes with possibly different tonics at one end; blues pieces with the same tonic at the other. The difficult ones to interpret are in between.

A large range of different combinations of melody and harmony scales are possible. Many pieces can be understood in terms of specific mode scales with ornamentation. PKP visually distinguishes the types in a direct and simple manner. For example: melody and harmony use the same scale; melody and harmony use different scales; melody and harmony share a scale family but use different elements of it in different ways; melody is in a definite scale and harmony is ambiguous; harmony is in a definite scale and melody is ambiguous, in which case harmony may imply a melody scale; neither melody nor harmony seem to be in definite scales.

The examples explore a range of pieces and interpretations, with the aim only of providing insight into the wide range of possibilities.

BACKWATER BLUES

The simple piece called *Backwater Blues* provides surprisingly deep insight into a number of things that are complex in music notation. It's a 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." A summary of the melody and core harmony is shown next. The melody is in the pentatonic minor scale except for bar 9 that adds note **p5** (tritone anchor **L**) to form the 6-note, minor blues scale visited in reverse in bar 9. Opposite tonalities in melody and harmony illustrated by the opening **M** bar (and implied for improvisations in all **M** bars) are a common feature of the blues. The opposite tonalities may also be the other way round (improvised major melody in the **D** bars). Another common feature of the blues is all-tritone core harmony.

⚓, ♪: //DM.L

⚓	M	D	M	M
♪	| 5↘4↘p3↘1,	| ↗5↘4↘p3↘1_____ | 1 ,	| —	|
⚓	D	D	M	M
♪	| ↗5↘4↘p3↘1,	| ↗5↘4↘p3↘1_____ | 1 ,	| — ↗5↗p7↘5 |	
⚓	I	D	M	M
♪	| ↗p7*, —	↘5 | ↗1↘p7↘5↘p5↘4↘p3↘ 1_____ | 1 ,	| —	|

CROSS REFERENCES

<i>F</i>	<i>Gb</i>	<i>G</i>	<i>Ab</i>	<i>A</i>	<i>Bb</i>	<i>B</i>	<i>C</i>	<i>Db</i>	<i>D</i>	<i>Eb</i>	<i>E</i>
<i>I</i>	<i>pII</i>	<i>II</i>	<i>pIII</i>	<i>III</i>	<i>IV</i>	<i>pV</i>	<i>V</i>	<i>pVI</i>	<i>VI</i>	<i>pVII</i>	<i>VII</i>
1	p2	2	p3	3	4	p5	5	p6	6	p7	7
@	P	A	D	M	I	L	\$	.	.	.	.

Enriched un-inverted and inverted cores are shown next. The simple voicing lines shown satisfy the chords shown. This simplicity works because there's so much harmonic variety in the tritones that the voicing lines only have to add depth. Omitted chord notes are identified by dashes. The anchor symbols in the shorthand summary could have prefixes or suffixes to identify the bass or treble lines, but the lines are so simple it's hardly worth it. Keep in mind that chord root **I** and anchor symbol **I** (shown as **I** in the Lego views) mean different things.

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	

DM.L is the mode signature of general 9-note blues scale that's represented in chromatic scale notation as **1-2-p3-3-4-p5-5-6-p7-1** (tritone notes in red, pitch center in blue, completion notes in black): think of it as the chromatic scale without notes **p2**, **p6** and **7**. This is not a new scale introduced by PKP, only a novel way of representing a known scale by a mode signature. The same blues workshop that taught me this piece also taught me this general blues scale in conventional terms; mode signatures came later.

The melody scale of this piece is visibly a sub-scale of the **DM.L** scale. Harmony tritone **I** stands out like sore thumb as not in this scale. The single appearance of this tritone in bar 9 provides a harmonic “turnaround” marker indicating the start of the last four bars (useful for improvisors). The in-scale tritone **L** could provide this marker but tritone **I** forms a familiar dominant seventh chord on root **V**, providing a simple progression of familiar dominant-seventh chords.

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 voices the chord sequence **V7-IV7b13-I9-I9** (among other possible interpretations). Altering the treble line for the sequence at bottom right 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 **bIII7-VII7-bV7-bV7** (among other possible interpretations). 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.

A more advanced kind of chord substitution alters the core. An example is substituting tritone **I** for blues tritone **L** in bar 9. The V-chord with tritone **L** is **V-M7(II)** which is different in kind from the other chords. The substitution turns it into **V-7**. The substitution is different in kind from that achieved

by substituting harmonically equivalent or mutually consonant fifos: tritone **I** is made **functionally equivalent** to tritone **L** by its position in the core sequence.

Make enough substitutions and symbolic chord progressions can quickly become difficult to comprehend for all but experts. Chord progressions become complex, but thinking and working in terms of Lego-like building blocks instead of chord symbols and chord scales is child's play in comparison.

The “swing feel” with which such pieces should be played is a performance property not represented by the notation (e.g., bounce downbeats off delayed upbeats). The general scale has many sub-scales that may be used for improvisation beyond the two used in this example.

Context

An all-tritone core containing the tritones of the **DM.L** mode signature establishes a solid blues context. That said, blues pieces often include fifos in core harmony (for which the scale provides four anchors). The problem is fifos don't establish a definite context because there are twice as many of them as tritones and they're widely shared between different kinds of tonic scales. Too many of them in core harmony weakens the definitive look and sound of a blues, and indeed of any music from a multi-tritone scale. Combine this kind of harmony with an ambiguous melody line and the piece as a whole becomes musically ambiguous. This may be a desired musical effect but it makes learning and remembering such pieces difficult because of the lack of definite guiding context.




More tritones in core harmony make it not only simpler on the keyboard but also more definite, musically. Ignoring repetitions and replacing **I** by **L**, for reasons just explained, the core tritone sequence of this piece is **M-D-M-D-M-L-D-M**. The order is not as important for the blues sound as is the presence of the tritones in some order. The melody line determines an appropriate order.

BLUES WALKING BASS LINES

Walking bass lines provide an alternative to chordal harmony. They're ubiquitous in blues. The following simple walking bass line (indicated by ▼) is from Monk's *Straight No Chaser* (coming up). The line is very easy to learn and remember and may be used for many blues pieces. The notes are all on downbeats. No up or down arrows to mark zig-zags are needed because the next note is always the nearest one up or down. The notes of the tritones from the **DM.L** mode signature are highlighted in red to bring forward their strong presence in this harmony in a distributed fashion over time.

▼ | 1-2- p3-3	| 4- p3-2-p2	| 1- 3-5-6	| p7-6-5-3
▼ | 1-2- p3-3	| 4- p3-2-p2	| 1- 3-5-6	| 3-p7-6-3
▼ | 2-3-4-p5	| 5-6-p7-7	| 1-2- p3-3	| 1-2- p3-3

The use of this line with *Backwater Blues* is shown next. Interleaving the bass and melody lines in the way suggested by long and short dashes enables the lines to cue each other, and avoids a few direct dissonances. The bass line is on down beats, melody notes in blue text are on upbeats. This is very easy and satisfying to play.

| 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




Walking bass lines are replacements for PKP anchor lines, not additions to them. Annotating both above the staff is not practical for most written music because there isn't enough space. Anchor lines are basic so where do walking bass lines go? One answer is to put them in a separate notebook of walking bass lines cross-referenced to different pieces.

BLUE MONK & STRAIGHT NO CHASER

Presented here are two Monk blues pieces with walking-bass harmony. The lines have few direction change arrows because few are needed. The lines mostly move steadily in one direction or the other.




Straight No Chaser

A walking bass line for *Backwater Blues* was borrowed earlier from Monk's blues in F called *Straight No Chaser*. The original is shown next (melody notes on upbeats highlighted in blue to bring the simple pattern forward to the eye). A very simple melody line is combined with a very simple walking bass line, dovetailed such that the whole sounds more than the sum of the parts: the melody and harmony notes cue each other. The passing dissonances on a few downbeats are typical of the blues and sound right because they anticipate notes to come (and repeat earlier notes).

	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

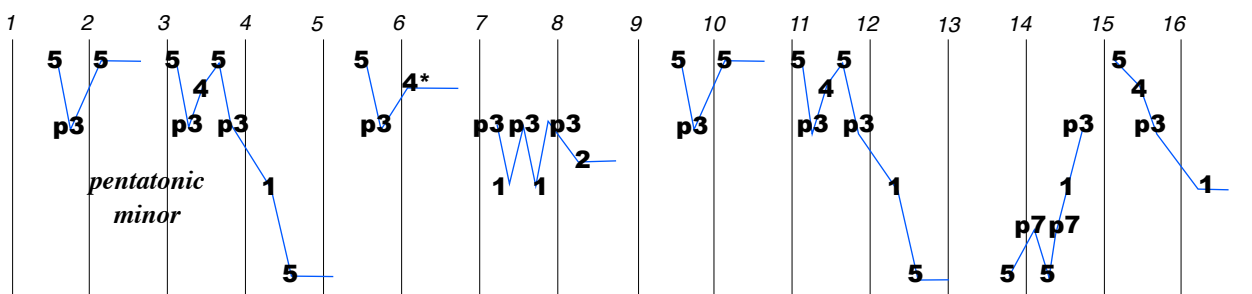
Other Monk blues pieces are useful sources of model walking bass lines, to say nothing of providing much playing pleasure. *Blue Monk* in Bb an example (same format as above).

	|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

In the written piece, another harmony line tracks the melody line just shown so closely that the effect is of a double melody line. The lower line uses bass-line note sequences shifted to melody-line beats. The result is a mix of minor and major thirds between the lines that don't have to be held in mind because the easy-to-remember lines deliver them.

SUMMERTIME

I learned *Summertime* in D-minor (one flat) with associated interesting harmony some years ago in Susan Muscarella's Piano Comping course at the then Jazz School in Berkeley. The melody scale is plain pentatonic minor.



Shown next is a summary of the melody and harmony. The governing harmony scale is the minor family scale with mode signature **AD.I⁺**, which is a 9-note extension of the **AD.I** scale (the latter is known to jazz musicians as “bebop melodic minor”). This scale has many sub-scales identified by sub-words: from double-tritone intermediate modes identified by **//D.I** (melodic minor) and **//A..I** (harmonic minor) down to classical modes **//A** (Aeolian) and **//D** (Dorian). The melody scale is sub-scale of **//A**. The only departure from these scales is in bar 5, where an 8-note minor-major scale identified by **DM** comes into play briefly (recall that this scale is formed of the union of the pentatonic major and minor scales); this scale provides an ornamental transition from melodic minor to natural minor (Aeolian). Annotating **AD.I⁺** at the beginning as the governing mode is sufficient, but for illustrative purposes, the individual scales are annotated above the applicable segments. The chord root line is the one I learned in the course but many others are possible for the same core.

	IV		V		IV	I		I	II		V
	//DI				//DM			//AI			
Anchor	D		I		D	M		D	A		A..I
Musical staff	| - 5\p3 | ↗5 | 5, \4\p3↗4↗5\p3 | \1\5 | 5, ↗5\p3 | ↗4 - 4 | 4,\ p3\1↗p3\1↗p3 | \2, |										
					II			pVII		V	I
					//A			//AI			
Anchor					A			A	AI		*♫
Musical staff	| ————— repeat bars 1-4 ————— | 5↗p7\5↗p7\1↗p3 , | ↗5\4\p3 - | \1 |										


Cross references shown next include both sharp and flat letter notes because both come into play in the written music.

CROSS REFERENCES

<i>D</i>	<i>D#/Eb</i>	<i>E</i>	<i>F</i>	<i>F#/Gb</i>	<i>G</i>	<i>G#/Ab</i>	<i>A</i>	<i>A#/Bb</i>	<i>B</i>	<i>C</i>	<i>C#/Db</i>
<i>I</i>	<i>pII</i>	<i>II</i>	<i>pIII</i>	<i>III</i>	<i>IV</i>	<i>pV</i>	<i>V</i>	<i>pVI</i>	<i>VI</i>	<i>pVII</i>	<i>VII</i>
1	p2	2	p3	3	4	p5	5	p6	6	p7	7
@	P	A	D	M	I	L	\$	.	.	.	.

Shown next is a 3-part voicing of the tritone core of bars 1-8 that voices chords on the assigned roots shown in blue (double tritones are voiced here by three notes because the other note is provided in the flow). All the voicings but one are rootless (the missing roots are identified by dashes). The simplicity of the building block view stands out in contrast to the complexity of the implied chords. Creating these shapes is no more complex than what a child does when it snaps plastic building blocks together. The harmony is only 3-part but the chords are satisfied partly in place and partly in the flow. The voicings are all rootless except for the II chord just before the end but this is no problem because the roots are implied by the joint flow of melody and harmony. Counting tritones as augmented fourths, four of the seven shapes may be said to be “all-fourths.” The other three tritones have either a major third on top (it and its inversion, an augmented fifth, count as a fifos) or a minor third on top (one case) that completes the double tritone of the **AI** mode.

The ornamental insertion of **M** provides a transition from melodic minor to natural minor via a wavelike movement up and down by a half tone. This amounts to using the 8-note **DM** mode as an ornamental scale.

mode	shape	1	p2	2	p3	3	4	p5	5	p6	6	p7	7	1	p2	2	p3	a voicing of
//ADI		@	.	A	D	.	I	.	\$	x	x	.	x	@	.	A	D	
//D.I	D5	.	.	.	D	.	-	.	.	.	x	.	.	.	.	x	.	IV-7b5
	I4	.	.	.	.	I	.	-	.	.	.	x	.	.	.	x	.	V-7#5
	D5	.	.	.	D	.	-	.	.	.	x	.	.	.	.	x	.	IV-13
//DM	M5	.	.	.	M	.	.	.	.	.	.	x	.	-	.	.	x	I-7#9 ornamental
	D5	.	.	.	D	.	-	.	.	.	x	.	.	-	.	.	x	I-m6(9)
		
//AI	A4	.	.	A	.	.	.	.	.	.	x	.	.	x	.	.	.	II-m7b5
	AI	.	.	A	.	.	I	.	-	x	.	x	.	.	.	x	.	V-7b9
<hr/>																		
	* 	.	.	.	x	.	.	.	.	\$	.	.	.	.	x	.	.	I-m final resolution

Nothing could better illustrate that taking chord symbols from classical modes and adjusting them for non-classical modes is like “banging square pegs into round holes.”

chord scale notes




root of *I-m6(9)*, “5” of *IV-13*, “7” of *II-m7*
 root of *II-m7b5*, “9” of *I-m6(9)*, “13” of *IV-13*
 “7” of *IV-7*, “#5” of *V*, “#9” of *I-7#9*
 “b5” of *II*, “b9” of *V-7b9*
 root of *pVII-7* (not in bars 1-8)
 “b5” of *IV-7b5*










piano keys

1
2
p3
p6
p7
7

I GOT RHYTHM

The piece *I Got Rhythm* by Gershwin is the source of widely used chord changes in jazz, popularly known as “Rhythm Changes.” The original is in Bb major with variations. The melody line of the first eight bars is straight Ionian mode. So is the harmony except for ornamental tritones anchored by **M**, **D** and **A**. The second eight bars are different in kind because the music in each of four 2-bar segments goes to classical modes that are identified by the tritones. These modes preserve the major tonality of the home tonic, which means that tritones **A** and **P** identify modes **alt-A=//A** and **alt-P=//P** that are of opposite tonality (major) to the primary minor Aeolian and Phrygian modes, and don’t include the home tonic. The rhythmic nuances are left to music notation or memory: the purpose here is only to correlate melody and harmony

 : //I + MDA,  : //I
 ||: — 5 ↗6 | 1 ↗2 | 2↘1 | 6↘5, | 5↗6 | 1↗2, ↗4↘2 | ↗3*↘2↗3↘2 | 1, — |

  : alt-A   : alt-P   : //L   : //I
 | — 3* | 3↗p5, | — 3* | 3↘6, | 2* | 2↗3, | ↘2* | ↘5, :||

As shown next starting from bar 4, completing the all-tritone core by fairing in fifos is simple.

	1	p2	2	p3	3	4	p5	5	p6	6	p7	7	1	
	@	P	A	D	M	I	L	\$	x	x	x	x	@	
4 ?	
I	I	.	.	.	.	.	x	.	
5 ?	
M	-	.	.	M	.	.	.	.	.	.	.	x	.	
6 D	.	.	.	D	.	.	.	.	.	.	.	x	.	
A	.	.	A	.	.	.	.	.	.	.	.	x	.	
7 ?	
I	I	.	.	.	.	.	x	.	
8 ?	
I	I	.	.	.	.	.	x	.	

	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	.	.	.	.	.	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

	9	?		10	?		11	?		12	?	
A	.	.	A	.	.	.	.	.	.	.	.	.
A	.	.	A	.	.	.	.	.	.	.	.	.
P	.	.	P	.	.	.	.	.	.	.	.	.
L	L	.	.	.	.	.	x
I	I	.	.	.	.	.	x

	A		9	?		10	?		11	?		12	?	
A	.	.	A	.	.	.	.	.	.	.	.	.	.	VII-m7
A	.	.	A	.	.	.	.	.	.	.	.	.	.	III-7
A	.	.	A	.	.	.	.	.	.	.	.	.	.	III-m7
P	.	.	P	.	.	.	.	.	.	.	.	.	.	VI-7
\$	VI-m7
L	L	.	.	.	.	.	.	x	II-7
I	I	.	.	.	.	.	.	x	II-m7
I	I	.	.	.	.	.	.	x	V-7

CROSS REFERENCES

<i>Bb</i>	<i>B</i>	<i>C</i>	<i>Db</i>	<i>D</i>	<i>Eb</i>	<i>E</i>	<i>F</i>	<i>Gb</i>	<i>G</i>	<i>Ab</i>	<i>A</i>
<i>I</i>	<i>pII</i>	<i>II</i>	<i>pIII</i>	<i>III</i>	<i>IV</i>	<i>pV</i>	<i>V</i>	<i>pVI</i>	<i>VI</i>	<i>pVII</i>	<i>VII</i>
1	p2	2	p3	3	4	p5	5	p6	6	p7	7
@	P	A	D	M	I	L	\$	.	.	.	.

Dashes indicate the positions of the roots of the chords shown, most of which may be omitted in 3-note shapes that are sufficient voicings of the chords in context.

In the first eight bars, the tritones anchored by **M**, **D** and **A** are purely ornamental. They contain notes **p7**, **p3** and **p6** that are outside the home Ionian mode. The outside note of the first chord of this trio is the root of the third chord. Otherwise, all notes of shapes to provide voicing notes for core elements are from the home Ionian mode.

In the final eight bars, the piece visits four different modes that bring in the following notes (working backwards from the end): **p5** replaces **4**, **p2** replaces **1** and **p6** replaces **5**. This leaves notes **5**, **1** and **4** unavailable as voicing notes for bar 9, **4** and **1** for bar 10 and **4** for bar 11.

This is very simple seen this way, but rather complex if you think in terms of degree numbers in chord scales relative to the different key signatures of seven different parallel modes. The piece includes all six tritones identified by the alphabet, each of which is compatible with parallel modes of two tonics a tritone apart. Tritone **A** appearing twice in different places, implies a different parallel mode with a different key signature for each appearance. The other five tritones imply one key signature each, for a total of seven. Thinking in terms of chord scales relative to seven different key signatures, all implied by accidentals relative to one of them, is complex by any measure.

OVER THE RAINBOW

This is an exercise in creating ornamental harmony from scratch without even thinking about harmony scales or chords. The example is the melody line of *Over the Rainbow*. The original is in Eb major (3 flats). The Ionian melody line trending downwards is given core harmony defined by a reverse-alphabet tritone slide going downward by half tones. This harmony uses the full chromatic scale and yet is visibly simple. The only creative parts are positioning the tritones for consonance with the melody notes and adding enrichments.

The core harmony is visibly a variation of “Rhythm Changes.” The variation uses the full reversed alphabet **L-I-M-D-A-P** with a tag **-L-I** at the end to bring it to resolution in the home scale. The **//I** annotation identifies all harmony except **I** as ornamental.

⚓ : **PADMIL**, 🎵 : **//I**

🎵 | **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, |

	1	p2	2	p3	3	4	p5	5	p6	6	p7	7	1
@	P	A	D	M	I	L	\$	x	x	x	x	x	@
1 ?
L
2 I
? M
3 ?
D
4 ?
5 ?
A
6 ?
P
7 L
I
8 ?


	1	p2	2	p3	3	4	p5	5	p6	6	p7	7	1
@	P	A	D	M	I	L	\$	x	x	x	x	x	@
M
L
I
M
M
M
D
PM
A
AI
M
MP
L
I
M

CROSS REFERENCES

<i>Eb</i>	<i>E</i>	<i>F</i>	<i>Gb</i>	<i>G</i>	<i>Ab</i>	<i>A</i>	<i>Bb</i>	<i>B</i>	<i>C</i>	<i>Db</i>	<i>D</i>
<i>I</i>	<i>pII</i>	<i>II</i>	<i>pIII</i>	<i>III</i>	<i>IV</i>	<i>pV</i>	<i>V</i>	<i>pVI</i>	<i>VI</i>	<i>pVII</i>	<i>VII</i>
1	p2	2	p3	3	4	p5	5	p6	6	p7	7
@	P	A	D	M	I	L	\$	.	.	.	.

The core on the left is completed with interspersed fifos plus a few double tritones just because they sound good. Identifying implied chords is unnecessary but straightforward. Some of the simple symmetries between successive shapes are striking (e.g., **PM** - **A** shrinks the outer notes of the double

tritone inwards a half tone).

 : **PADMIL**,  : **///**



M

L

I

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, |

This is representative of many pieces with simple melody lines from classical modes and rich harmony that is just that, not an indicator of any specific harmony mode. As a general rule, harmony can't be trusted to indicate melody modes: sometimes it does, sometimes it doesn't.

WHEN SUNNY GETS BLUE

This is my personal interpretation of the hauntingly beautiful ballad *When Sunny Gets Blue*. I see it as a blues in G: it's key signature of one flat is consistent with the blues-compatible Dorian mode of G; it's melody line is almost straight from the **//DM.L** blues scale of G; a 4-bar segment of the bridge visits the **//L** mode (Lydian) of G which goes nicely with the blues scale. However, the bar structure is idiosyncratic and the written chords are all over the map and don't strongly assert the blues, making the harmony difficult to remember. Here follows a re-harmonization that provides a stronger sense of the blues, is much easier to remember, and sounds fine.

The melody line is as written (within the limits of the summary notation) but the harmony shown is altered. 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. The original harmony is shown later, for comparison.

//DM.L

Anchor 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, — |

Anchor M D A P L I

5 | ↘5↗p7↗1↘p7, ↗p2↘p7↗1↘p7, | ↘4↗p7↗1↘p7, ↗p2↘p7↗1↘p7, |

Anchor M D L M D M L

5 | ↘5↗p7↗1↘p7, ↗4 — ↘p3↘p7 | ↗2 — — —, ↘4:|| ↗2 — |

=====bridge=====

//L

Anchor \$ \$ L L \$ \$ L L

7 | ↗7↗1↘7↗1, ↗2↗3 | ↗p5 ↘2*, 2 ↘7*, | 7↘5↗6, ↗7↗1 | ↗2 — |

//DM.L

Anchor + M A A L M D

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

=====

repeat bars 1-6 (first two lines) here, followed by this ending, repeated twice

Anchor D D A D A D

7 | ↗2↗4↗5↘4, ↗p6 ↘4↘p2 | ↘1 — | 1 — |

CROSS REFERENCES

G	Ab	A	Bb	B	C	Db	D	Eb	E	F	Gb
I	pII	II	pIII	III	IV	pV	V	pVI	VI	pVII	VII
1	p2	2	p3	3	4	p5	5	p6	6	p7	7
@	P	A	D	M	I	L	\$	.	.	.	.

The new core harmony is based entirely on mode signatures **//DM.L** and **//L**, without reference to chord symbols. The big difference in the reharmonization is a coherence of the whole to the eye and ear. 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, to provide a mixed core of the kind shown on the right, that remains more definite and easier to remember than the original. The harmony in these bars is so chromatic to begin with that the difference to the sound is almost too subtle to notice.



Melody and harmony of the first four bars of the bridge are in the **//L** mode (Lydian). The final four bars of the bridge return to the original blues scale. Unlike the original, all the harmony for these modes is from the two scales. As in the original, the transition between bars 13-14 is marked by the distinctive sound of a fourth sliding down a half tone ($\text{♭} - \text{♮}$).

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

This completes the re-harmonization. The original from which I learned this piece is shown next in the same terms, for comparison.

Bars 1-8 from the Written Chords

For comparison, the original written chords and associated core harmony are shown next for these bars, and coming up for the remaining bars. Ornamental elements of the core are highlighted in yellow on the left. The notes identified by circles are 9, 13 and b13 chord extensions/alterations that are not fundamental to the sound of the chords in this context.

		1	p2	2	p3	3	4	p5	5	p6	6	p7	7	1	
		@	.	A	D	M	I	L	\$	.	x	x	.	@	
1	D	-	.	.	D	.	.	.	.	.	.	x	.	-	<i>I-m7</i>
	D	.	.	.	D	.	-	.	.	.	.	x	.	.	<i>IV-7sus</i>
	D	.	.	.	D	.	-	.	.	.	x	.	.	.	<i>IV-7</i>
2	 D	.	.	.	D	.	-	.	.	x	.	.	.	.	<i>IV-m7</i>
	L	x	.	.	.	.	L	.	-	.	.	.	.	.	<i>pVI-9</i>
3	A	.	.	A	.	.	.	.	.	.	x	-	.	.	<i>pVII-M7</i>
	D	-	.	.	D	.	.	.	.	.	x	.	-	.	<i>I-m7</i>
4	I	.	.	-	.	.	I	.	.	.	.	.	.	@	<i>II-m7</i>
	I	.	.	.	.	.	I	.	-	.	.	.	x	.	<i>V-7</i>
5	ML	.	.	.	M	.	L	.	.	.	x	.	.	@	<i>III-m7b5</i>
	D	.	.	.	D	.	.	.	.	.	x	.	.	.	<i>pIII-m7</i>
	L	.	.	.	.	.	L	.	-	.	.	.	.	@	<i>pVI-7</i>
6	I	.	.	-	.	.	I	.	.	.	.	.	.	@	<i>II-m7</i>
	M	.	-	.	M	.	.	.	.	.	.	x	.	.	<i>pII-m7</i>
	M	.	.	.	M	.	-	.	.	.	.	x	.	.	<i>pV-9</i>
7	D	-	.	.	D	.	.	.	.	.	x	.	-	.	<i>I-m7</i>
	I	.	.	.	.	.	I	.	-	.	.	.	x	.	<i>V-13</i>
	I	.	.	.	.	.	I	.	-	.	.	.	x	.	<i>V-b13</i>
8	L	.	.	-	.	.	.	L	.	.	.	.	.	@	<i>II-13</i>
	L	.	.	-	.	.	.	L	.	.	.	.	.	@	<i>II-7b13</i>
9	 D	.	.	.	.	.	.	.	\$	.	-	.	.	@	<i>VI-m7</i>
	I	.	.	.	.	.	I	.	.	x	.	.	x	.	<i>II-7b9</i>

Remaining Bars from the Written Chords

The ornamental elements highlighted in yellow in bars 10-13 are at odds with the Lydian mode of the melody line in these bars, making for a confusing transition to and from these bars.

Everything in the blues bars 14-17 is from the family blues scale but the flow is irregular and difficult to remember, especially following the unclear nature of the first four bars.

The final ending also provides a harmonic introduction to the piece. The #5 and #9 notes of the **IV-7** chords are the out-of-scale melody notes **p2** and **p6** repeated in the chord symbols. The practice of sometimes including melody notes in chord symbols is not only redundant, it overcomplicates chord notation.

		1	p2	2	p3	3	4	p5	5	p6	6	p7	7	1	
		@	.	A	D	M	I	L	\$	.	x	x	.	@	
10		.	.	.	.	.	I	.	-	.	.	x	.	.	V-m7
		.	.	.	.	.	.	.	\$	.	-	.	.	@	VI-m7
11		.	.	.	.	.	.	.	.	x	.	-	.	P	bVII-m7
	IA	.	.	.	.	-	I	.	.	x	.	.	x	.	III-7b9
12		.	.	.	.	.	.	.	\$	.	-	.	.	@	VI-m7
	ML	.	.	-	.	M	.	L	.	.	.	x	.	@	II-9b13
	DL	.	.	-	.	D	.	L	.	.	.	x	.	@	II-7b9
13		.	.	.	.	.	.	L	-	.	.	.	x	.	V-M7
14		.	.	.	.	.	I	.	-	.	.	x	.	.	V-m7
	M	-	.	.	.	M	.	.	.	.	.	x	.	-	I-13
	M	-	.	.	.	M	.	.	.	.	.	x	.	-	I-7b13
15		.	.	.	.	M	-	.	.	.	x	.	.	.	IV-M7
		.	.	-	.	.	I	.	.	.	.	x	.	.	II-m7
16		.	.	.	.	.	I	.	.	.	.	x	.	.	pVII
		.	.	.	.	.	I	.	-	.	.	x	.	.	V-m7
	ML	-	.	.	.	M	.	L	.	.	.	.	.	x	I-7b5
17		-	.	.	.	D	.	.	.	.	.	x	.	-	I-m7
	DL	.	.	.	.	D	.	-	L	.	.	.	x	.	IV-13b9
	D	.	.	.	.	D	.	-	.	.	.	.	.	.	IV-7b13

repeat bars 1-6 and then repeat the following 3 bars twice






	-	.	.	D	.	.	.	.	.	.	x	.	-		I-m7
D	.	.	.	D	.	-	.	.	.	.	x	.	.		IV-7#5
	.	.	A	.	.	.	.	.	\$	.	.	-	.	@	bVII-6/9
D	.	.	.	D	.	-	.	.	.	.	x	.	.	.	IV-7#5#9
	.	.	A	.	.	.	.	.	\$	.	.	-	.	@	bVII-6/9
D	.	.	.	D	.	-	.	.	.	.	.	.	.	.	IV-7#5#9


ALL OF ME





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 voicings rearrange the chord notes. As presented in the course, the rearrangements are identified by rearranged degree numbers in which the same notes from adjacent chords have different degree numbers relative to different roots that are often omitted from the shapes. The representations are indirect relative to the keyboard and difficult to comprehend as a whole, or remember. The complexity goes away when the shapes are understood in terms of core building blocks directly on the keyboard.


The melody and core harmony are summarized next. The piece consists of four 8-bar sections in the form ABAC. The melody line overall is in the 9-note major mode identified by **A.MI⁺**. The core harmony goes outside this mode via ornamental tritones **P** and **L** and fifos morphed from them. This core harmony puts its own spin on "Rhythm Changes."

//A.MI⁺

  **I**  **A** **M** **P** **P**  **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**   **L**  **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**  **P** **P**  **I** **I**  **P**  **I**

 | ↗2 — ↘1↘7 | ↗2, ↘1 | ↘7 — ↘3↗5 | ↗7, ↘6 | ↗1 — ↘6↗1 | ↗3 3 | ↘1 — | — — |

CROSS REFERENCES

C	C#/Db	D	D#/Eb	E	F	F#/Gb	G	G#/Ab	A	A#/Bb	B
I	pII	II	pIII	III	IV	pV	V	pVI	VI	pVII	VII
1	p2	2	p3	3	4	p5	5	p6	6	p7	7
@	P	A	D	M	I	L	\$	.	.	.	.

As usual, the tritone core provides a framework for fairing in core fifos without reference to anything else. 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	-	.	.	.	.	.	.	\$	.	.	.	.	@
7, 23	P	.	.	.	.	.	.	.	\$	.	-	.	.	P
8, 24	\$	.	.	.	.	.	.	.	\$	.	.	.	.	@

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

		1	p2	2	p3	3	4	p5	5	p6	6	p7	7	1
	A.MI⁺	@	-	A	-	M	I	-	\$	x	+	x	x	@
25	L	.	.	.	.	.	.	L	.	.	-	.	x	.
26	L	.	.	.	.	.	.	L	.	.	-	.	x	.
27	A	.	.	.	.	-	.	.	x	.	.	.	.	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	.

4-Note Open Voicings

The 4-note “open” voicings developed from this core are shown next. These are voicings of the chords 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.

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	MA	.	.	.	.	M	.	.	.	.	x	.	.	-	.	A	.	.	.	.	\$	.	.	.	.	.	I-6(9)
	IM	.	.	.	.	I	.	-	.	.	.	x	.	.	.	M	.	.	.	.	.	x	.	.	.	V-9(13)	
2	MA	.	.	.	.	M	.	.	.	.	x	.	.	-	.	A	.	.	.	.	\$	.	.	.	.	.	I-6(9)
3	LA	.	.	.	.	-	.	L	.	.	.	x	.	.	.	A	.	.	.	.	.	.	x	.	.	.	III-9
4	MA	.	.	.	.	M	.	.	.	.	.	x	.	.	.	A	.	.	.	.	.	.	x	.	.	.	III-9b5
<hr/>																											
5	PL	.	.	.	.	.	.	.	.	x	.	-	.	.	.	P	.	.	-	.	L	.	.	.	.	x	VI-9(13)
6	P _H	.	.	.	.	.	.	.	.	x	.	-	.	.	.	P	.	.	.	I	.	.	.	.	x	.	VI-7b13
7	\$M	.	.	.	.	.	.	.	.	\$	.	.	.	.	@	.	-	.	M	.	.	.	.	x	.	.	II-m9
	P _H	.	.	.	.	.	.	.	.	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	AM	.	.	.	.	.	.	.	.	x	.	.	.	.	A	.	M	.	.	.	.	x	.	.	.	.	III-7
10	AI	.	.	.	.	.	.	.	.	x	.	.	.	.	A	.	.	I	.	.	.	.	.	x	.	.	III-7b9
11	\$M	.	.	.	.	.	.	.	.	\$	.	-	.	.	@	.	.	M	.	.	.	.	x	.	.	.	VI-m7
	AI	.	.	.	.	.	.	.	.	x	.	.	.	.	A	.	.	I	.	.	.	.	.	x	.	.	III-7b9
12	\$M	.	.	.	.	.	.	.	.	\$	.	-	.	.	@	.	.	M	.	.	.	.	x	.	.	.	VI-m7
13	\$M	.	.	.	.	.	.	.	.	\$	.	.	.	.	@	.	-	.	M	.	.	.	.	x	.	.	II-9sus
14	LM	.	.	.	.	.	.	.	.	L	.	.	.	.	@	.	-	.	M	.	.	.	.	x	.	.	II-9
15	IM	.	.	.	.	.	.	.	.	I	.	.	.	.	@	.	-	.	M	.	.	.	.	x	.	.	II-m9
16	IM	.	.	.	.	.	.	.	.	I	.	-	.	.	x	.	.	M	.	.	.	.	.	x	.	.	V-9
	ID	.	.	.	.	.	.	.	.	I	.	-	.	.	x	.	.	D	.	.	.	.	.	x	.	.	V-7b9b13

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	LM	.	.	.	.	.	.	L	.	.	-	.	x	.	.	.	.	M	.	.	.	.	x	.	.	.	VI-6(9)
26	LM	.	.	.	.	.	.	L	.	.	-	.	.	@	.	.	.	M	.	.	.	.	x	.	.	.	VI-m6(9)
27	AM	.	.	.	.	.	.	.	.	.	.	.	.	.	A	.	.	M	.	.	.	.	x	.	.	.	III-m9
28	PL	.	.	.	.	.	.	.	.	.	.	.	.	P	.	.	.	.	.	.	.	.	.	.	.	.	VI-9(13)
	P!	.	.	.	.	.	.	.	.	.	.	.	.	P	.	.	.	I	.	.	.	.	x	.	.	.	VI-7b9b13
29	IM	.	.	.	.	.	.	I	.	.	.	.	.	x	.	-	.	M	.	.	.	.	x	.	.	.	II-m9
30	IM	.	.	.	.	.	.	I	.	.	-	.	.	x	.	.	.	M	.	.	.	.	x	.	.	.	V-13
	ID	.	.	.	.	.	.	I	.	.	-	.	.	x	.	.	.	D	.	.	.	.	x	.	.	.	V-b9(13)
31	MA	.	.	.	.	M	.	.	.	.	.	.	.	-	A	.	.	.	.	.	.	x	.	.	.	.	I-6(9)
	P!	.	.	.	.	.	.	.	.	.	.	.	.	P	.	.	.	I	.	.	.	.	x	.	.	.	VI-7b9b13
32	\$M	.	.	.	.	.	.	.	.	.	.	.	.	@	.	-	.	M	.	.	.	.	x	.	.	.	II-m9(11)
	ID	.	.	.	.	.	.	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 along the top. 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.

NO GREATER LOVE

The version of *No Greater Love* (original in Bb major) has strongly chromatic harmony, complex in music notation, that runs through the entire **PADMIL** alphabet. The chords (not shown) are many and various. The chromaticism could mean tonic changes, except the melody mode is visibly major-family **//A.MI+** throughout (**1-2-3-4-5-p6-6-p7-7-1**), with only the two exceptions highlighted in yellow. A single-tonic interpretation is always simpler if it's in an easily understandable mode. The harmony departs from this mode to bring in tritones **P**, **M** and **L** for transitions that are ornamental because they don't change the melody mode (this includes the altered harmony pattern in the bridge).





//A.MI+


 7↗1↗2 |




  **D5** **A4** **P4**
 | ↘1↘7↘6↘3 | ↗5↘p5↘4↘1 | ↗3 | 3—3↗7↘p7 |

 **I5**   **I5**
 | ↘6 | 6 6↗3↘p3 | ↘2 | 2, ↘7↗1↗2 |






repeat bars 1-4

 **L4**  **I5**  **D5**
 | ↘6, 6↗3↘2 | ↘1 — ↗2 — | ↘1, | — |

 **AI**  **IA** 
 | 3↗p6↗7↗2 | ↘1, | ↘p6↗7↗2↗4 | ↘3, |

 **IA**  **L4** **I3**
 | ↘3↗p6↗7↗2 | 1↘7↘6↘3 | ↘2—, | — ↗7↗1↗2 |












repeat bars 1-4 here, followed by

 **L4**  **I5**   **I5**
 | ↘6*↗3↘2 | ↘1—↗2— | ↘1—, | — — |

CROSS REFERENCES



<i>Bb</i>	<i>B</i>	<i>C</i>	<i>Db</i>	<i>D</i>	<i>Eb</i>	<i>E</i>	<i>F</i>	<i>Gb</i>	<i>G</i>	<i>Ab</i>	<i>A</i>
<i>I</i>	<i>pII</i>	<i>II</i>	<i>pIII</i>	<i>III</i>	<i>IV</i>	<i>pV</i>	<i>V</i>	<i>pVI</i>	<i>VI</i>	<i>pVII</i>	<i>VII</i>
1	p2	2	p3	3	4	p5	5	p6	6	p7	7
@	P	A	D	M	I	L	\$	.	.	.	.

Here's how to picture the keyboard pattern identified by the anchor notation. Turning this around, it shows how to work out core-based shapes on the keyboard that may then be identified by the anchor notation.

		1	p2	2	p3	3	4	p5	5	p6	6	p7	7	1	p2	2	p3	3
	A.MI⁺	@	.	A	.	M	I	.	\$	x	+	x	x	@	.	A	.	M
1	 ₅	.	.	.	.	M	.	.	.	.	x	.	.	.	.	x	.	.
2	D ₅	.	.	.	D	.	.	.	.	.	x	.	.	.	.	x	.	.
3	A ₄	.	.	A	.	.	.	.	.	.	x	.	.	x	.	.	.	.
4	P ₄	.	P	.	.	.	.	.	.	x	.	.	x	.	.	.	.	.
<hr/>																		
5	I ₅	.	.	.	.	.	I	.	.	.	.	.	x	.	.	.	.	x
6	 ₅	.	.	.	.	M	.	.	.	.	.	.	x	.	.	.	.	x
7	 ₅	.	.	.	.	.	I	.	.	.	.	.	.	x	.	.	.	x
8	I ₅	.	.	.	.	.	I	.	-	.	.	.	x	.	.	.	.	x
<hr/>																		
9-12 <u>repeat 1-4</u>																		
13	L ₄	.	.	.	.	.	.	L	.	.	.	.	.	x	.	.	.	x
14	 ₄	.	.	.	.	.	.	I	.	.	.	.	.	x	.	.	.	x
	I ₅	.	.	.	.	.	.	I	.	-	.	.	.	x	.	.	.	x
15	 ₅	.	.	.	.	M	.	.	.	.	.	.	.	.	.	.	.	.
16	D ₅	.	.	.	D	.	.	.	.	.	.	.	.	.	.	.	.	.
<hr/>																		
17	AI	.	.	A	.	.	I	.	.	.	.	.	.	.	.	.	.	.
18	 ₃	.	.	.	.	.	.	.	\$	.	.	.	.	.	.	.	.	x
19	IA	.	.	.	.	.	I	.	.	.	.	.	.	.	.	A	.	.
20	 ₃	.	.	.	.	.	.	.	\$	.	.	.	.	.	.	.	.	x
<hr/>																		
21	AI	.	.	A	.	.	I	.	.	.	.	.	.	.	.	.	.	.
22	 ₄	.	.	.	.	.	.	.	\$	.	.	.	.	.	.	.	.	x
23	L ₄	.	.	.	.	.	.	L	.	.	.	.	.	.	.	.	.	x
24	I ₅	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	x
<hr/>																		
25-28 <u>repeat 1-4</u>																		
29	L ₄	.	.	.	.	.	.	L	.	.	.	.	.	.	.	.	.	x
30	 ₄	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	x
	I ₅	.	.	.	.	.	.	I	.	-	.	.	.	.	.	.	.	x
31	 ₅	.	.	.	.	M	.	.	.	.	.	.	.	.	.	.	.	.
32	 ₄	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	x
	I ₅	.	.	.	.	.	.	I	.	-	.	.	.	.	.	.	.	x

A walking-bass version presented in class is translated here into chromatic scale notation. The bass line doesn't attempt to capture the sequence of the chordal harmony, only to walk through the governing scale in a way that complements the melody. Some out-of-scale notes at the ends of bars provide transitions to in-scale notes in the next bar. The 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			

ALL THE THINGS YOU ARE

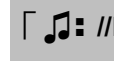

The example is *All The Things You Are* (original in 4 flats). I learned this strikingly beautiful piece early in my musical adventure and found its simple keyboard patterns easy to play, but the relationship between its melodic and harmonic changes difficult to understand from a fake-book chart with an often-puzzling chromatic chord progression (presented at the end of this section). I wanted to try improvising but found it impossible in the absence of a clear understanding. A piano teacher told me to forget the puzzling chord progression, just memorize simple voicing patterns for the changes, which I did.

Later, I prepared the following PKP summary of what I had learned to play. This covers only the first 24 bars because this is where the tricky parts reside. The simple voicing patterns are octave shapes based on the harmony core. The annotated melody modes that make sense of the chords came even later and are explained following the summary. They follow from observing that the initial melody line of [A] transposes down a fourth to form the initial melody line of [B]. The rest follows naturally. The piece is easily played as below without thinking about the mode changes but they're required for experimenting with improvising, unless you're a piano wizard.

[A]  

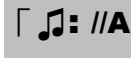
Anchor: \$ I M M D D

1 | ↗4↘1 | ↘7* | 7↗3↘7 | ↘6* | 6↗p3↘6 | ↘p6 | — , |

[B]  

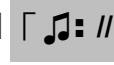
Anchor: A \$ L L M P PM D L

1 | ↘5 | ↗1↘5 | ↘p5* | p5↗7↘p5 | ↘3* | 3↗p5↗5↘p5↘3 | ↘p3 , | — ↘p5↗7↗p5 |

[C] continued 

Anchor: M M D D M P @ A

1 | p5↘3* | — ↘5↗p6↗3 | ↘p3 | — , ↘p5↗7↗p3 | p3↘p2* | — ↘2↗p3↗p2 | ↘1* | — |

[D] 

Anchor: I

1 | ↗4↘1 | ↘7* | —

Cross References for Tonic Ab

<i>G#/Ab</i>	<i>A</i>	<i>A#/Bb</i>	<i>B</i>	<i>C</i>	<i>C#/Db</i>	<i>D</i>	<i>D#/Eb</i>	<i>E</i>	<i>F</i>	<i>F#/Gb</i>	<i>G</i>
<i>I</i>	<i>pII</i>	<i>II</i>	<i>pIII</i>	<i>III</i>	<i>IV</i>	<i>pV</i>	<i>V</i>	<i>pVI</i>	<i>VI</i>	<i>pVII</i>	<i>VII</i>
1	p2	2	p3	3	4	p5	5	p6	6	p7	7
@	P	A	D	M	I	L	\$	.	.	.	.

Explanation

Understanding always begins with the melody line. Shown next are the home classical modes that provide the melody notes. The basic structure is very simple: **A-B** is **//I-//L**, which is major to major and alters one note; **B-C** is **///L-//A**, which is major to minor and alters two notes. So, the minor-major return from **C-A** must alter three notes. This is very easy to play, knowing only the highlighted symmetric shapes based on the tritones. There only two shapes, namely **12221** and **1221**, with the tritone either inside, namely **1(222)1**, or outside, namely **(1221)**.

Knowing the tritones means knowing the shapes which means knowing the scales, all without reference to note symbols. The alt modes provide alternating major and minor tonality. Tritone **D** is in both the melody and harmony of **A**. Tritone **M** is not fully in the melody of **B** (only its anchor is) but there are good reasons for seeing it as the mode-defining tritone here: it has the most appearances in the harmony, and it repeats a pattern from **A**: **L-M** goes down a whole tone just as **I-D** does. The two alt modes have both minor major tonality, so it's easy to form melody lines with one or the other or both tonalities. The short melody segment from **alt-M** that's harmonized by **L** is also visibly from **//L** but there's no point in thinking of a mode change: harmony **L** is ornamental relative to **alt-M**. The final **alt-M** melody segment borrows the pitch-center note **5** from context as a lead-in to **C**. The **C** melody borrows note **p2** from **B** as a passing note.

The harmony tritones are the five melody-mode tritones plus **P**, which is to say all the tritones there are. The melody and the flow of the core harmony cues them. Core fifos are faired into the inter-tritone gaps.

	1	p2	2	p3	3	4	p5	5	p6	6	p7	7	1
melody modes	@	P	A	D	M	I	L	\$	x	x	x	x	@
A													
//I	x	.	x	.	x	x	.	x	.	x	.	x	x
(//D	x	.	x	x	.	x	.	x	.	x	x	.	x
alt-D@p6	.	x	.	x	x	.	x	.	x	x	.	x	.
B													
//L	x	.	x	.	x	.	x	x	.	x	.	x	x
(//M	x	.	x	.	x	x	.	x	.	x	x	.	x
alt-M@p3	.	x	.	x	x	.	x	.	x	.	x	x	.
C													
//A	x	.	x	x	.	x	.	x	x	.	x	.	x
//I	x	.	x	.	x	x	.	x	.	x	.	x	x

1-4-1-7*-7-3-7-6*-

for reference)

6-p3-6-p6,

5-1-5-p5*-p5-7-5-3*-3-p5-5-p5-3-

for reference)

p3, p5-7-p5-p5-3*,

5-p6-3-p3,

p5-7-p3-p3-p2*,

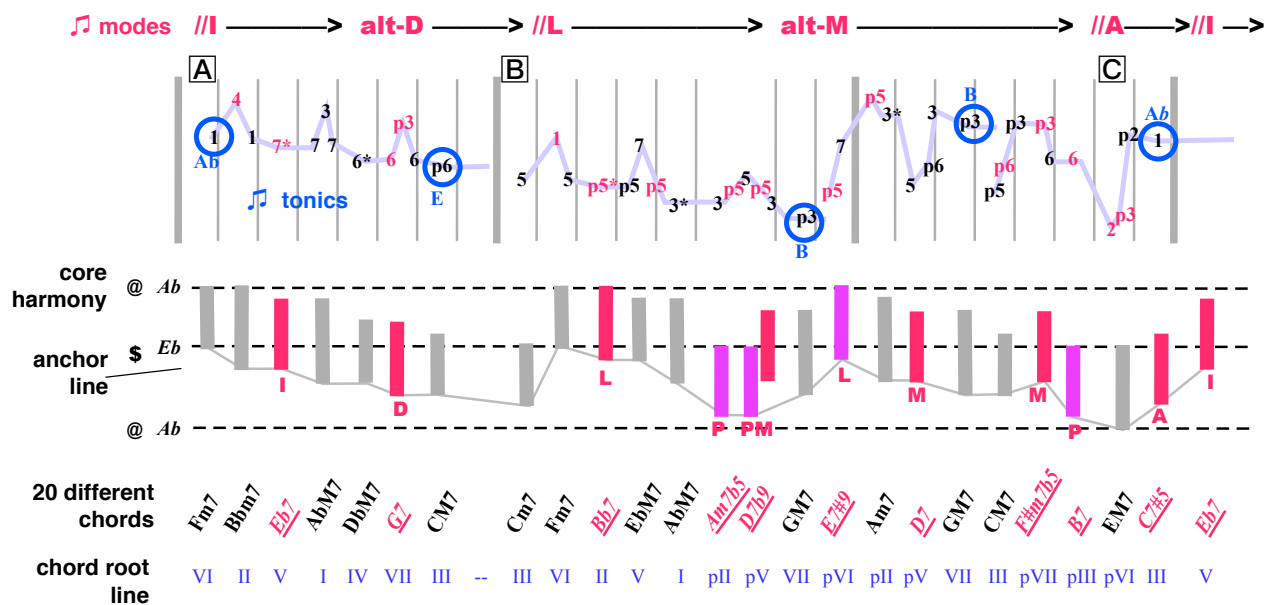
2-p3-p2-1,

1-4-1-7*...

The secondary tonics for the alt modes are determined by the melody lines, but showing them as suffixes on the mode signatures tells you what to play without thinking in terms of whole melody scales. **//I→alt-D** alters five notes, but the melody line only uses the tritone and the secondary tonic

from the highlighted symmetric shape. **alt-D**→**//L** alters 3 notes but the melody line uses only the symmetric tritone shape and the defining note of major tonality, namely **3**. **//L**→**alt-M** alters four notes but the melody line follows easily from the symmetric shape and the note a whole tone below it. **alt-M**→**//A** alters four notes and **//A**→**//I** alters three notes but the melody lines follow easily from the highlighted symmetric shapes. Improvising melody changes based on the scales known this way is straightforward.

The overview sketch below contrasts the simplicity of the piece understood as just described with the complexity of the written chord progression. There are two problems with the chord symbols, one general one specific to this piece. Chord symbols in general refer to whole scales, and the many note changes between the whole scales described above yield complex, tricky chord changes. The specific chord symbols of this piece follow easily recognizable that go with the melody line but necessarily depart from these patterns in the latter part of [B], thereby creating misleadingly complex chord sequences. The tritones shown in a contrasting color are ornamental in the context of the specified melody segment in which they appear. Optionally, the chord roots may be added to the core harmony to get voicings of the written chords without reference to chord symbols (except for the original extraction of the tritones) but there's nothing much to be gained from this in the way of playing or listening pleasure.



EVERY TIME WE SAY GOODBYE

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

(a) M I M **PM** I

| 3 - 3 - 3 , | — , 3 - 3 - 3 | 3 — — 3 | ↗ 3 — ↘ 2 ↘ 1 ↗ 7 , |

(b) M **PM** I I M M **D** **A**

| — , ↗ 5 - 5 - 5 , | — 5 - 5 - 5 | 5 — , ↘ 3 ↗ 4 ↗ 5 | ↗ **p6** — ↘ 4 ↘ 3 ↘ 2 |

(c) **D** **D** **A** I **D** M M

| — , ↗ 1 - 1 - 1 | 1 ↘ 7 — ↘ 5 | ↗ **p7** — ↘ 3 ↗ 4 ↗ 5 | ↗ 6 — |

(d) **D** **A** **A** **A** L L **A** I

| — , ↘ **p6**-**p6**-**p6** | **p6**↘ 5 — ↘ 1 ↗ 2 | ↗ **p3**-**p3** ↘ 1 ↗ **p3**↘ 2 | — — |

(e) repeat (a)-(b)

(f) *\$ **DL** **A*** *I M **D** **A**

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

(g) M M L I **DL** **AI**




| ↘ 3 - 3 - 3 — | — ↘ 2 ↘ 1 ↘ 7 | ↗ **1** , | — — |

CROSS REFERENCES

<i>Eb</i>	<i>E</i>	<i>F</i>	<i>Gb</i>	<i>G</i>	<i>Ab</i>	<i>A</i>	<i>Bb</i>	<i>B</i>	<i>C</i>	<i>Db</i>	<i>D</i>
<i>I</i>	<i>pII</i>	<i>II</i>	<i>pIII</i>	<i>III</i>	<i>IV</i>	<i>pV</i>	<i>V</i>	<i>pVI</i>	<i>VI</i>	<i>pVII</i>	<i>VII</i>
1	p2	2	p3	3	4	p5	5	p6	6	p7	7
@	P	A	D	M	I	L	\$	.	.	.	.

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


In phrase (f) shown next, the two melody bars with the famous words “how strange the change from major to minor” stay resolutely in major for the melody, while the highlighted harmony, in these bars only, goes from major to minor. The harmony of the first two bars is intricate in chord terms but simple on the keyboard. The asterisk prefixes and suffixes help, by indicating the side of the core on which to place obvious voicing notes. The final voicing for the second bar implies the double tritone **AI** that's a half tone down from **DL** in the first bar. In effect, the core sequence is **DL-AI** down a half tone. Octave voicings for the remaining bars are sufficient.


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


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


LAURA


The piece *Laura* (original has home tonic C) sounds simple to the ear and is correspondingly simple on the keyboard, as shown next. Figuring out this simplicity requires a bit of thought because some of the individual parts are not obvious at first glance. Explanations follow.


(a)  **//L@5** ... Ionian of tonic **5**


 **DL**


 | 7* | — \p7↗7\p7\p5↗5 | ↗6* \3 — | — | ... **p7** from **//AML**


(b)  **//M@2** ... Ionian of tonic **4**


 **PM** **D**

 | ↗6* | — \p6↗6\p6\3↗4 | ↗5 , | — | ... **p6** from **//AML**

(c)  **//A@p3** ... Ionian of tonic **p3**

 **I** **D** **DL**


 | — \p3↗4 | — \p3↗4\p3↗4 | ↗5*\2 — | — ↗p3↗5↗p7 | ↗p3*\p6 — |


(d)  **//L@5** ... Ionian of tonic **5**


LA **L** **AI**


| — ↗6 | ↗2 — | — ↗3\1↗2 — |


repeat (a)-(b) and then continue from here


(e)  **//AI** ... harmonic minor-major

 **AI** **L** **DL** **AI**

 | — ↗4↗5 | — \3↗4↗p6↗7 | ↗2\1↗2 — | — \7↗1 | ↗p3-p3 — |

(e)  **//I**

 **I** **AI**

 | — ↗3\p3\2\6↗7 | ↗1 — | — |

Notational cross references for tonic C of the original are as follows.

<i>C</i>	<i>C#/Db</i>	<i>D</i>	<i>D#/Eb</i>	<i>E</i>	<i>F</i>	<i>F#/Gb</i>	<i>G</i>	<i>G#/Ab</i>	<i>A</i>	<i>A#/Bb</i>	<i>B</i>
<i>I</i>	<i>pII</i>	<i>II</i>	<i>pIII</i>	<i>III</i>	<i>IV</i>	<i>pV</i>	<i>V</i>	<i>pVI</i>	<i>VI</i>	<i>pVII</i>	<i>VII</i>
1	p2	2	p3	3	4	p5	5	p6	6	p7	7
@	P	A	D	M	I	L	\$	.	.	.	.

Here follows a summary of the melody scales and the melody lines from them. Only sections (a)-(d) require explanation. Sections (e)-(f) are straightforward and unambiguous.

melody mode	1	p2	2	p3	3	4	p5	5	p6	6	p7	7	1	
// AML	x	x	x	x	x	x	x	x	x	x	x	x	x	background whole tone scale of (a)-(d)
(a) // L	x	x	x	x	x	x	x	x	x	x	x	x	x	7*-p7-7-p7-p5-5-6*-3,
(b) // M	x	x	x	x	x	x	x	x	x	x	x	x	x	6*-p6-6-p6-3-4-5,
(c) // A	x	x	x	x	x	x	x	x	x	x	x	x	x	p3-4-p3-4-p3-4-5*-2, p3-5-p7-p3*-p6,
(d) // L	x	x	x	x	x	x	x	x	x	x	x	x	x	6-2, 3-1-2
(e) // AI	x	x	x	x	x	x	x	x	x	x	x	x	x	4-5-3-4-p6-7-2, 7-1-p3*, 3-p3
(f) // I	x	x	x	x	x	x	x	x	x	x	x	x	x	2-6-7-1

The //**L** and //**M** modes of (a) and (b) can be bit difficult to see at first glance, for a couple of reasons: 1) the defining tritones of the modes don't appear in the melody lines; 2) the half-tone runs **6-p7-7** and **5-p6-6** in the melody scales are not from any classical mode. The question is, if the scales are not classical modes, what are they? The melody notes, put in scale order, form no commonly used scale. Standing back from the details provides a bigger picture that determines the modes.

The first seven notes of (a) and (b) go down by whole tones from one to the other, which suggests melody modes of the same kind going down by whole tones. The mode of (c) is visibly the classical mode //**A**. These two observations suggest the (a)-(b)-(c) scales are classical modes defined by the tritone sequence **L-M-A** going down by whole tones. The mode signature //**AML** defines a whole tone scale that provides the passing notes **p7** and **p6** of (a) and (b). Conclusion: The mode sequence of (a)-(b)-(c) is //**L-//M-//A** with passing notes in the first two modes provided by the whole tone scale.

The melody lines going down by whole tones in the first parts of (a) and (b) are provided by relative Ionian modes //**L@5** and //**M@4**. The full melody lines are ambiguous by themselves but context resolves the ambiguity. Continuing the down-by-whole-tones pattern, the melody scale of (c) is the relative Ionian scale //**A@p3**.

Everything above the horizontal line boils down to Ionian tonic changes **5-4-p3** (G-F-Eb for home tonic C). None of it requires thinking in terms of note symbols. The mode changes boil down to transposing the tritones by eye on the keyboard, and the yellow-highlighted symmetric shapes along with them. The rest of the shared scale frame is completed by whole tones as needed.

The highlighted passing notes in //**L** and //**M** add tritone **M** to //**L** and tritone **A** to //**M** thus anticipating these tritones in the next mode. The double tritones are **ML** and **AM** but the result is not the 7-note "melodic" modes //**ML** and //**AM**. The passing notes are ornaments added to 7-note modes.

Additional confirmation of this pattern is provided by the harmony. The double tritones **DL**, **PM** and **AI** are the only three diminished seventh chords that exist: **AI** ends (d) and (f), both of which go to **DL** of (a) on a repeat and then to **PM** of (b), thus introducing the melody tritones **L** of (a) and **M** of (b).

GIANT STEPS





























Coltrane's famous jazz classic *Giant Steps* cycles rapidly and repeatedly through three Ionian modes of tonics G (one sharp), Eb (3 flats) and B (4 sharps) that are a major third apart and differ by four notes. The harmony for each tonic is Ionian II-V-I (often with II omitted). The melody line is a sequence of short fragments from these scales that combine into an unusual major scale of tonic F# with ten notes and no pitch center. The piece is complex by any measure in these terms.

The written home tonic is F# (5 sharps for the Ionian mode) but could just as well be Gb (6-flats for the Ionian mode). Given that Eb is one of the original Ionian tonics, it seems more natural to me to represent the home tonic by Gb than F#. This means five keys are competing for attention in the mind: 1 sharp, 4 sharps, 5 sharps, 3 flats and 6 flats. The only way music notation can represent the differences, namely by accidentals, is at a very low conceptual level, providing no sense of scales as coherent musical entities. The piece is only approachable in these terms by expert pianists.

Yet the piece is essentially simple seen in terms of a whole-tone scale of tonic F# with mode signature **AML** where the letters are the anchors relative to F#=1 of the tritones of V-chords D7, F#7 and Bb7 of the respective Ionian tonics. The parallel modes of the home tonic identified by the tritones are **alt-A**, **//M** and **alt-L**.

	x	A	M	L	x	x	x
	1	-2	-3	-p5	-p6	-p7	-1
Ionian tonics	p2	4	6				
	G	B	Eb				

The result of the piecing together is a melody line in the whole tone scale, with inserted passing notes that briefly include the Ionian tonics.

			
	 L  A  P  L  A  P  M 		
	 A  P  L  M  A  P  M		
	 p2  7  3 | 3, | 4  p3  p6 | 3 | p2  6 1 | 1, | p2 7 3 | 3, | 4 p3 p6 | p6, | 6 1 | 1, | p2 7 3 | 3, | 1 1 1 1		

CROSS REFERENCES

<i>F#/Gb</i>	<i>G</i>	<i>G#/Ab</i>	<i>A</i>	<i>A#/Bb</i>	<i>B</i>	<i>C</i>	<i>C#/Db</i>	<i>D</i>	<i>D#/Eb</i>	<i>E</i>	<i>F</i>
<i>I</i>	<i>pII</i>	<i>II</i>	<i>pIII</i>	<i>III</i>	<i>IV</i>	<i>pV</i>	<i>V</i>	<i>pVI</i>	<i>VI</i>	<i>pVII</i>	<i>VII</i>
1	p2	2	p3	3	4	p5	5	p6	6	p7	7
@	P	A	D	M	I	L	\$	.	.	.	.

The melody sequences **1~p6~4~p2** and **p6~3~p2~6** go down by the thirds of classical modes (major-minor-major) but resolve by jumping up a minor third to notes not in the modes. The resolutions establish the home tonic (bars 7 and 13) and major tonality of it (bars 3 and 9). The final three bars set up a repeat. The three tritones provide the basic harmony, with transitions between them provided by fifos that fit the very simple flow, without reference to classical modes or chord symbols.

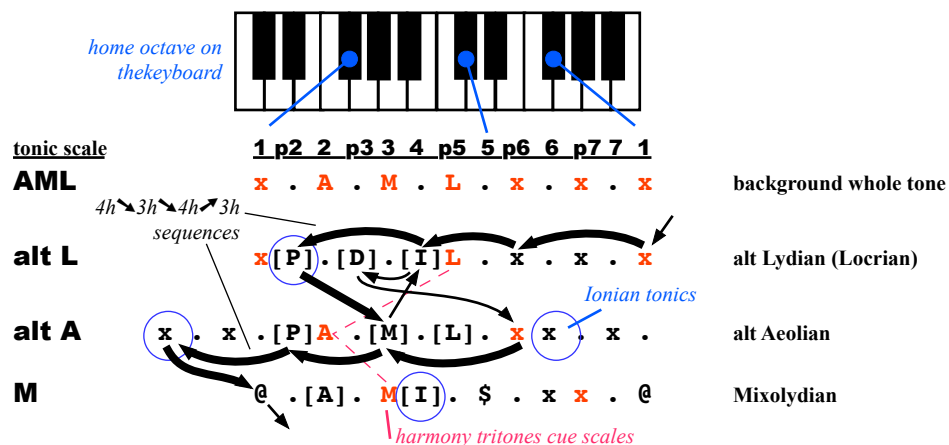
Playing this with octave shapes for the core harmony (double the treble notes an octave down) mutes tritone dissonance and adds depth. The harmony is so varied that this provides the essence of the sound of the piece.

On one hand, the rapid changes of the Ionian modes makes playing the harmony as sliding shapes following chord root lines a job only for expert pianists. On the other hand, anyone can play this simple core flow in which building blocks morph and slide by small intervals into each other. Shapes that voice the written chords are easily obtained, if desired, without reference to the details of the chord symbols, by inverting selected building blocks and adding the root line underneath.

		1 p2 2 p3 3 4 p5 5 p6 6 p7 7 1			
		x A M L x x x			
1		. . . . M - . . . x . . .	<i>BM7</i>	<i>(IV)</i>	
	L	. . . . . L . - . . . x	<i>D7</i>	<i>(pVI)</i>	alt-L
2		. - I x	<i>GM7</i>	<i>(pII)</i>	
	A	. . A . - . . . x	<i>Bb7</i>	<i>(III)</i>	alt-A
3		. P x -	<i>EbM7</i>	<i>(VI)</i>	
	L	. x . - . . . L	<i>Am7</i>	<i>(pIII)</i>	alt-L
4		x L . -	<i>D7</i>	<i>(pVI)</i>	
5		x - I	<i>GM7</i>	<i>(pII)</i>	
	A	. . A . - . . . x	<i>Bb7</i>	<i>(III)</i>	alt-A
6		. P x -	<i>EbM7</i>	<i>(VI)</i>	
	M	- M x . . .	<i>F#7</i>	<i>(I)</i>	//M
7		. . . . . M - x . . .	<i>BM7</i>	<i>(IV)</i>	

Parallel Classical Modes

The next figure traces the melody line through the modes of the home tonic.



The tritone-fifo sequences in the anchor line are transpositions of Ionian **I-M** resolution sequences. As the melody cycles through these parallel modes, it creates the 10-note melody scale. The square brackets are an earlier notation for fifo anchors.



Variations

Improvisations can use double-tritone modes of the melodic minor mode, derived from the **AML** whole tone scale by replacing any note by the pair of notes a half tone up and down from it. One of these double-tritone modes can replace two consecutive single-tritone modes, thus slowing the rapid pace of context changes and providing a simpler base for variations. Playing the original in these or other parallel modes requires some out-of-scale passing notes, but these are easy to find by ear once you've learned the piece. The **ML** variation suggests the possibility of a blues variation.



CHELSEA BRIDGE

The hauntingly beautiful piece *Chelsea Bridge* by Billy Strayhorn is, to me, an example of “frozen improvisation.” I once heard a classical musician say that all written music is frozen improvisation, and the transitions of this piece seem to me to speak to that. It’s basic structure is parallel Ionian-Aeolian-Ionian (yellow highlighting) with chromatic transitions in between. The piece is complex in music notation even without the chromatic transitions because it moves between written Db major (5 flats) and written C# minor (4 sharps). The complexity is multiplied by making a change of written key-signature from 5 flats to 4 sharps in the middle and then returning to 5 flats at the end via accidentals relative to 4 sharps. Add the chromatic transitions and 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 the sophistication is much simpler to understand and remember in the following terms. Explanations follow.



(a) (harmony on repeat)

 **M D A P**
 ||: — **6↗7, ↗1↗2, ↗3↗4↗5** |



(b) transition

 **LA ML LA ML P**
 | ↗p6—, ↗6↘p5 | p5, ↗5↗p6 | p6, ↗6↘p5—, ↗5↘p2 | p2 |

(c) IP

 **I M M D A**
 | ↗3 ↘1—, | ↗3↗5—, | ↗3↗1— :|| — **5↗p6** |

(d) //A



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

(e) transition

(f) alt-IP

P I
 | ↘p2, — ↘p3 ↗4 | ↗5↗p6↗p3— ↘p2↘7 | ↘p7 ↗p2—, ↘7↘p7 |

(g) transition

 **M**
 | ↘6, ↘p5↗6↗p2, ↘6 ↗p2 |



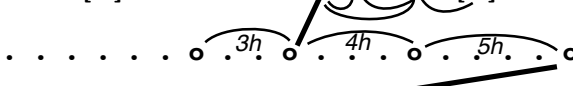
(h) I

 **ML D A P**
 | ↗p5, **↘6↗7, ↗1↗2, ↗3↗4↗5** |

CROSS REFERENCES											
<i>C#/Db</i>	<i>D</i>	<i>D#/Eb</i>	<i>E</i>	<i>F</i>	<i>F#/Gb</i>	<i>G</i>	<i>G#/Ab</i>	<i>A</i>	<i>A#/Bb</i>	<i>B</i>	<i>C</i>
<i>I</i>	<i>pII</i>	<i>II</i>	<i>pIII</i>	<i>III</i>	<i>IV</i>	<i>pV</i>	<i>V</i>	<i>pVI</i>	<i>VI</i>	<i>pVII</i>	<i>VII</i>
1	p2	2	p3	3	4	p5	5	p6	6	p7	7
@	P	A	D	M	I	L	\$	.	.	.	.

The following figure traces the melody line through the different modes, skipping the details of segments (a), (d) and (h) because their melody lines are all straight Ionian or Aeolian. The square brackets are an earlier notation for fifa anchors.

Ionian-Aeolian-Ionian melody transitions

	1 p2 2 p3 3 4 p5 5 p6 6 p7 7 1 p2 2 p3 3 4 p5 5	parallel modes
(a)	@ . [A] . [M] I . \$. o . x @ . [A] . [M] I . \$	—//I
(b)	. . . . . . . . . .	} ornamentation ending where started
(c)	. P [A] . [M] I . x . o . x . P [A] . [M] I . x	
(d)	@ . A [D] . [I] . \$ x . o . @ . A [D] . [I] . \$	—//A
(e)	. . . . . . . . . .	} ornamentation ending a 1/2 tone up
(f)	. P . [D] . I . x o . x . P . [D] . I . x	
(g)	. . . . . . . . . .	} ornamentation ending a 1/2 tone down
(h)	@ . [A] . [M] I . \$. o . x @ . [A] . [M] I . \$	

Segments (b), (e) and (g) seem like improvised ornamentation that performs transitions between well-defined scales, namely the two classical modes **//I** and **//A** and the non-classical modes **//IP** and **alt-IP** (recall that the former is a pseudo mode consisting of the Ionian mode with the tonic raised a half tone, and the latter is a minor mode with all non-tritone notes different).

Segment (b) has a simple, thin and ambiguous melody line. It fits the bitonal interpretation provided by the written chords, in which parallel modes of the melodic minor identified by **LA** and **ML** alternate (the corresponding transposed master tonics are, respectively, up a minor third and up a half tone). However, the full scales are not used by the melody line. The **AML** whole tone scale provides a shared background.

Segment (e) and (g) are transitions that set up and execute a return to Ionian of tonic **1** (Db) via Aeolian of tonic **7** (C). Keep this in mind and some confusing details of these bars in the written music become obvious on the keyboard.

LUSH LIFE

The beautiful Strayhorn piece *Lush Life* 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 integrated melody and harmony are summarized in PKP terms next. Explanations follow.

[A] Verse, //A.MI

@ 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 A D

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

[B] Bridge, //IP melody (major), then //I; transitional harmony

I P A P DL I P A 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] Chorus, //ADMI

(MI) I (MI) I D A M L I

(a) | 5↗6↗p7↗p3↘p6 | ↘5↗6↗7↗p3↘p7 | ↘6↘5↗1↗3 ↗4 ↗5 | ↘p7 — ↘p6 |

M D P A

(b) | repeat bars 1-2 of (a) | ↘6↘5↗1↗3 ↗5 ↗p6 | ↘7 — 1 |

A L DL M A P L I

(c) | ↗2↗3↗4* — ↘p3 | ↘2↗3↗4*↘p3 | ↘p6↗p7↗7* — ↘p7 | ↘p6↗p7↗7*↘6 |

DI AI P

(d) | repeat bars 1-2 of (a) | ↘6↘5↗1↗3 ↗4 ↗5 | ↗6 — ↘3 |

A L I DL P

(e) | ↗5↘4↗5*↘4 | ↘3↘2↗3↘7 | ↗2↘1↗2 — 2↘1 | 1↘p7↗6 — ↘3 |

A L I A D MI M A D M

(f) | ↗5↘4↗5*↘4 | ↘3*↘2↗3↘5 | ↗p7↗7↗1↗p2 | ↗2↗p3↗3 |

CROSS REFERENCES

<i>C#/Db</i>	<i>D</i>	<i>D#/Eb</i>	<i>E</i>	<i>F</i>	<i>F#/Gb</i>	<i>G</i>	<i>G#/Ab</i>	<i>A</i>	<i>A#/Bb</i>	<i>B</i>	<i>C</i>
<i>I</i>	<i>pII</i>	<i>II</i>	<i>pIII</i>	<i>III</i>	<i>IV</i>	<i>pV</i>	<i>V</i>	<i>pVI</i>	<i>VI</i>	<i>pVII</i>	<i>VII</i>
1	p2	2	p3	3	4	p5	5	p6	6	p7	7
@	P	A	D	M	I	L	\$	.	.	.	.

This sees the piece as being in parallel modes of the Db home tonic of the written 5-flats key signature, with no secondary tonics. There are no voicing extensions of the building blocks because the intent is to play octave shapes, which provide depth without adding different 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 the verse and in the ending bars of the chorus. The piece can be seen as daisy-chained, short segments of different secondary tonics, but this is unhelpful because there are no solid melodic resolutions to any tonic. Resolutions to the home tonic are mostly implied by the harmony.

Verse [A]

The joint melody/harmony scale up to the second ending is the major family scale with mode signature **A.MI**. The harmony provides the **A** and **I** tritones and the melody provides the **A** and **M** tritones. The melody is in the **A.M** parallel major mode of the melodic minor (**1-2-3-4-5-p6-p7**), with one out-of-scale passing note (**p3**). The first and second endings of the written piece are each three bars long but the difference is a tiny variation in the melody line not recorded here. The melody starts on tonic **1** and comes to rest on note **2**, in the first ending as a return to the tonic, and in the second ending as a move towards **p2** of the bridge's **//IP** mode.

Bridge [B]

The melody line is in the **//IP** non-classical mode in the first six bars (**p2-2-3-4-5-6-7**) and in the **//I** classical mode in the next eight bars (**1-2-3-4-5-6-7**). The **//IP** mode is, visibly, a relative mode of a melodic minor mode with tonic a whole tone up from the home tonic, but there's no point in viewing it this way because the melody line in the first six bars doesn't resolve to it. The harmony is ornamental relative to these melody lines but anticipates what's to come. It's main thread is **I-M-D-A** going down by half tones (omitting the second tritone of the double tritones) thus introducing the highly chromatic **//ADMI** scale that dominates the chorus.

Chorus [C]

There are six 4-bar segments. The master scale for the entire segment is **//ADMI** (**1-2-p3-3-4-5-p6-6-p7-7**). The **P** and **L** tritones are ornamental.

(a),(b),(d) These three segments use the full **//ADMI** scale for both melody and harmony. The melody lines are identical up to the middle of the third bar, where they change to provide different transitions (a)-(b), (b)-(c) and (d)-(e).

(c) A variation.

(d) Returns to the pattern of (a) and (b) except for the ending.

(e) The melody line is straight Ionian. The harmony is contrasting minor in the **AD.I** scale with **P** and **L** ornamentation.

(f) The melody and harmony are solidly major, in the **A.MI** scale with which the piece began. The chromatic run of the melody line in the final two bars is a signature of the piece.

CHAPTER 5: ANNOTATED MUSIC NOTATION

As I said in the opening chapter, my motivation was trying to understand the deep structure of piano music independently of the obscuring effects of music notation. These pieces provide concrete examples of difficult pieces in music notation, annotated to reveal underlying simplicity.

BODY AND SOUL

Body and Soul is an often-played jazz standard with a beautiful melody line and interesting harmony. It's tricky in music notation for all but experts because of the three very different key signatures that provide a mixed blend of sharps and flats. Here follows an annotated chart for it.

home tonic @=D

highlighted notes are "outside" indicated melody scales

A $\text{♩} \text{: alt-M@7}$

Ebm7 Bbm7 Ebm7 Ab7 DbM7 Gbm7 Fm7 A..I Edim7

p2 p3 p6 p5 p6 p2 7 p7 p6

L **M** **A** **A..I**

5 Ebm7 Ebm7/Db Cm7b5 F7 Bbm7 Ebm9 Ab7#5 Db6 Bbm7b9 Fm7 Db6 Em7 A7

p6 3 7 p3 p2 7 p2 p3 p5 p6 2 7

P..M **M** **A..I** **L**

tonic a half tone down

B $\text{♩} \text{: //I}$

10 D Em7 D/F# Gm7 C7 F#m7 Bm7 Em7 A7 D

home tonic 1 2 3 5 1 3 5 4 3 1 2 7 5

C $\text{♩} \text{: //D}$

14 Dm7 G9 CM7 Ebdim7 Dm7 G7 G7#5 C9 B9 Bbm7 E9#11

1 2 p3 5 2 6 1 5 p7 5 6 4 2 p2 1 p6

D **P..M** **D** **D** **A** **P** **L** **L..A**

	1	p2	2	p3	3	4	p5	5	p6	6	p7	7	1
A	x	x	x	x	x	x	x	x	x	x	x	x	x
B	x	x	x	x	x	x	x	x	x	x	x	x	x
C	x	x	x	x	x	x	x	x	x	x	x	x	x

mode altM@7

//I all notes up 1/2 tone

//D 2 altered notes

Melody

The annotated chart identifies the piano keys and intervals relative to a single home tonic D. The designation of this home tonic is an arbitrary choice among two possibilities (D or Db/C#) made because the result seems intuitively simplest to me. Either choice works. Relating everything to a single home tonic enables the melody and harmony to be understood in terms of parallel modes of it, which is useful because parallel mode changes and tonic changes are two sides of the same coin: knowing the former means knowing the latter.

The melody scale of [B] is //I, so the melody scale of [A], determined by anchor **M** a half tone down from **I**, is a relative mode of the **alt-M** parallel mode defined by secondary tonic **7**, namely **alt-M@7** (Ionian a half tone down). Every note of the [B] scale is a half tone up from the [A] scale, but the number of altered notes is only

5 because 2 notes are shared (**3** and **7**).

The rest is straightforward: //I of [B] goes to //D of [C] by altering 2 notes. The return to [A] alters 5 notes, the same number as initial [A]-[B] transition, but not the same notes.

Harmony

The harmony of [A] is mostly from the **A.M.L** whole tone scale centered on the melody-mode tritone **M**. The exceptions are double tritones **P.M** (a combination of tritones from two adjacent chords) and **A..I**. Each double tritone includes one of the **A.M.L** tritones. The two double tritones are easy to remember because they're a half tone apart. All of the tritones are easy to remember because they're cued by the melody.

The harmony of [B] is from the 8-note bebop-major mode that extends the 7-note harmonic major mode of **A..I** by one note (**6**).

The harmony of [C] is from the Dorian mode of the melody line, except for a single ornamental double tritone that's a harbinger of things to come, and a concluding tritone sequence **D-A-P-L** that moves down by half tones to transition back to the harmony of [A].

Play this first with octave shapes for all single tritones. Knowing the scales from core tritone content makes fifos easy to fill in later.

The harmony scales suggest melodic improvisations.

THE PEACOCKS

The Peacocks, an annotated chart for which is shown below, is one of the most haunting jazz pieces I have heard or learned to play. It sounds so “right” that jazz improvisations rarely stray far from what’s written here.

@ = F

⌨: //ADMI ♪: //P = 1-p2-p3-4-5-p6-p7-1

⌨: PA.MI ♪: chromatic

⌨: P..M

⌨: M..P

⌨: P..M

⌨: A.M

⌨: I

⌨: M

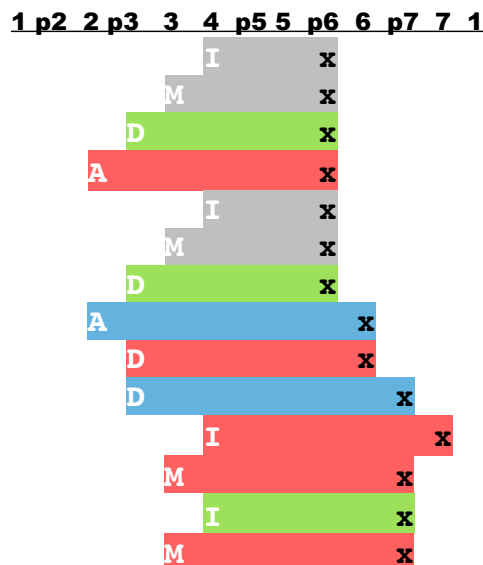
CROSS REFERENCES

F	F#/Gb	G	G#/Ab	A	A#/Bb	B	C	C#/Db	D	D#/Eb	E
I	pII	II	pIII	III	IV	pV	V	pVI	VI	pVII	VII
1	p2	2	p3	3	4	p5	5	p6	6	p7	7
@	P	A	D	M	I	L	\$	.	.	.	.

A piece that looks forbiddingly complex in music notation is extraordinarily simple on the keyboard.

The home tonic is determined to be F by the final notes of bars 9 and 17 (these are actually bars 8 and 16, not counting the lead-in bar). 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.

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.

GOODBYE PORK PIE HAT

The piece *Goodbye Pork Pie Hat* is a haunting Eb blues written by Mingus in memory of Lester Young. Its complex chord progression was footnoted in the opening chapter. The annotated chart below is shown in a format that puts building blocks in insets below the staff, aligned vertically with melody. This is helpful to the eye but impractical for annotating written music. The same thing in the separate tabular format used in the rest of this document is shown at the end.

The annotations above the staff are in a style that can be handwritten: circles outlining tritone anchors, boxes outlining fifo anchors (green for fourths, blue for fifths of which there are none here).

bars 1-4

M Eb7#9 L B9(13) <I> EM9 ML A7#11 <I> Db9sus L* B9(13) <I> Db7sus *M Eb7

bars 5-8

<I> Abm11 L* B7(13) AI Fm7b5 Bb7#5#9 PD C13#11 F7(13) L* B7 <I> EM7

bars 9-12

*M A7(13) *D Ab7 *I Bb7 L* Db7 *M Eb7#9 L* B7 P* EM7#11 ML A7#11

CROSS REFERENCES

<i>Eb</i>	<i>E</i>	<i>F</i>	<i>Gb</i>	<i>G</i>	<i>Ab</i>	<i>A</i>	<i>Bb</i>	<i>B</i>	<i>C</i>	<i>Db</i>	<i>D</i>
<i>I</i>	<i>pII</i>	<i>II</i>	<i>pIII</i>	<i>III</i>	<i>IV</i>	<i>pV</i>	<i>V</i>	<i>pVI</i>	<i>VI</i>	<i>pVII</i>	<i>VII</i>
1	p2	2	p3	3	4	p5	5	p6	6	p7	7
@	P	A	D	M	I	L	\$	.	.	.	.

The melody line is very simple — all in the 6-note minor blues scale except for the “outside” notes outlined in bars 6-7. The telling tritone content of the anchor line simple harmonic patterns that are difficult to see in the written music because they’re obscured by a combination of multiple different chord types on a creative root line by bassist Mingus, and also by sometimes including melody notes in chord symbols (#9, 13, 9, #5 are from melody or nearby harmony). The core harmony is easily understood, and sounds fine played independently of the creative root line, which may be added later as a bass line, if desired. The roots internal to the harmony shapes shown are omitted here (dashes show where).

All tritones are un-inverted in the core harmony except **L**, which is always inverted. Fixed voicing lines a minor seventh apart in many bars are determined by the double tritone **ML** in bars 2 and 12. Bars 6-7 are an ornamental departure from **DM.L** blues, announced and terminated by octave shapes based on **L**. The double tritones within the ornamental segment, which are each extracted from a pair of complex chords, cue the melody lines in these bars. Continuation of the tritone octave shapes in bars 8-10 seems natural. The five fifos chords are all non-resolution chords from the minor Aeolian or Phrygian modes of the home tonic (which differ by one note). Only the Ionian anchor is specified for the core fifos, leaving the shape to be completed in a visibly obvious way as stacked fourths. The Phrygian mode appears explicitly in the chord root of bars 2 and 8 (which is omitted from the shapes) and in the tritone of bar 12 (which is included).

The harmony is summarized next in the tabular form used in the rest of this document. The simplicity of the keyboard patterns stands out in strong contrast with the complexity of the chord progression.

		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>I-7#9</i>
	L*	@	.	.	.	.	.	L	.	-	.	x	.	.	<i>pVI-9(13)</i>
2	<□>	@	-	.	.	.	I	.	.	.	.	x	.	.	<i>pII-M9</i>
	ML	@	.	.	.	M	.	L	.	.	.	x	.	.	<i>pV-7#11</i>
3	<□>	@	.	-	.	.	I	.	.	.	.	x	.	.	<i>II-9sus</i>
	L*	@	.	.	.	.	.	L	.	-	.	x	.	.	<i>pVI-9(13)</i>
4	<□>	@	.	-	.	.	I	.	.	.	.	x	.	.	<i>II-7sus</i>
	*M	@	.	.	.	M	.	.	.	.	.	x	.	.	<i>I-7</i>
5	<□>	@	.	.	.	.	I	.	.	.	.	x	.	.	<i>IV-m11</i>
	L*	@	.	.	.	.	.	L	.	.	.	.	.	@	<i>pVI-7(13)</i>
6	AI	.	.	A	.	.	I	.	.	x	.	.	x	.	<i>II-m7b5, V-7#5#9</i>
7	PD	.	P	.	D	.	.	.	\$	.	x	.	.	.	<i>VI-13#11, II-7(13)</i>
8	L*	@	.	.	.	.	.	L	.	.	.	.	.	@	<i>pVI-7</i>
	<□>	@	-	.	.	.	I	.	.	.	.	x	.	.	<i>pII-M7</i>
9	*M	x	.	.	.	.	M	.	-	.	.	x	.	.	<i>pV-7(13)</i>
	*D	x	.	.	.	.	D	.	-	.	.	x	.	.	<i>IV-7</i>
10	*I	x	.	.	.	.	I	.	-	.	.	x	.	.	<i>V-7</i>
	L	@	.	-	.	.	.	L	.	.	.	x	.	.	<i>II-7</i>
11	*M	@	.	.	.	M	.	.	.	.	.	x	.	.	<i>I-7#9</i>
	L*	@	.	.	.	.	.	L	.	-	.	x	.	.	<i>bVI-7</i>
12	P*	.	P	.	.	.	.	.	\$	.	.	.	x	.	<i>pII-M7#11</i>
	ML	@	.	.	.	M	.	L	.	.	.	x	.	.	<i>bV-7#11</i>

CHAPTER 6: OBSERVATIONS & CONCLUSIONS

Music notation is here to stay and must be lived with, but 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 *Modality*, 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. They 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 $12 \times 39 = 468$ 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 $4 \times 7 = 28$ 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.

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7. 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.
8. Dmitri Tymoczko, *A Geometry of Music* (2011) for stimulating discussions of how to think about music from different angles.
9. 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.
10. 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.
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12. Jeff Brent with Schell Barkley, *Modality — 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.
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14. 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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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.

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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.

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 (**Ε**) and delta (**Δ**) for **A** and **D** and the English letter **Y** for **I**, to yield **PEΔMYL**, 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**.

QUESTIONS AND ANSWERS LEADING TO THE ALPHABET

Why does every piano key require many different note symbols (the note itself, a sharpened lower note, a flatted higher note, cancellation by a natural of a sharp or flat on the note itself)?
The fundamental principles of the physics of sound determine that the pitches of the notes of overlapped octaves of different tonics cannot all be exactly aligned. The piano ignores the principles by

aligning them. This is technically incorrect but works because the pitch differences are tiny and half tones are dissonant intervals that sound much the same to human ears when slight errors are made in their pitch sizes. Equal temperament tuning gives the same scales of different tonics the same shape to human ears. This is not to say everyone likes equal temperament tuning (see *Lies My Music Teacher Told Me* for observations on how it can affect singers accompanied by the piano, and *How Equal Temperament Tuning Ruined Music* for a thoroughly negative view).

Why is there no simple representation of scales relative to any tonic “do” analogous to the singer’s scale do-re-mi-fa-so-la-ti-do? A key signature identifies relative modes with the same notes and different tonics, so it inherently cannot identify a single tonic, it can only offer a choice of multiple possible tonics that use the same notes. Not only that, a tonic is sometimes assigned different note symbols for a major or minor scale, leading to misleadingly complex representations of simple major/minor transitions (for example, Db for a major tonic and C# for a minor tonic, both of which are the same black piano key).

Why do chord symbols have to specify all the notes of a chord when some of them are determined by context in tonal music? It’s the nature of chord symbols — they identify full chords independently of context. There’s a weak concept of core harmony in the common use of “guide intervals” as starting points for voicing chords, but the guide intervals are known by degree numbers (e.g., 3rd-7th) that only identify relative positions of notes going up from chord roots, which change from chord to chord. The same note has different degree numbers in different chord scales and in the tonic scales of origin of the chords. The relationship between a written chord progression and the piano keys to play different voicings of it is indirect, intricate and complex in these terms.

Why are many chord progressions dauntingly complex for all but wizards? Part of the answer was just given. Here’s the other part. Chord symbols are borrowed from classical modes and adjusted to fit elsewhere by various tweaks, the most common of which is adding suffixes that identify offsets from the standard note positions. This is like “banging square pegs into round wholes” — the results tend to be messy.

Why not use the chromatic scale to identify anchors of building blocks, thus dispensing with the alphabet? The answer has several parts: the double meaning as notes sometimes and anchors of building blocks at other times would be hopelessly confusing; the scale provides twelve possible anchors, which is double the number needed; and the alphabet provides readable words.

KEY-SIGNATURE SCALES

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 sharp minor scales, which have the same black-key tonic on the piano, have different note symbols for it).

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

CHROMATIC SCALE

The Emperor Has No Clothes v10/13/18 — p81 — ©copyright R.J.A. Buhr

the same thing in music notation, except more simply (e.g., this sequence could be F-G \flat -G or F-F \sharp -G of a C blues). 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.

SCALES AS INTERVAL STACKS

The simplest possible spelling out of a piano scale is as a sequence of inter-piano-key intervals. For classical modes, the intervals are either half tones or whole tones (two half tones). Other scales include intervals of minor thirds (3 half tones). The numbers **1**, **2** and **3** identify these intervals. 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.

The Ionian and Aeolian modes are visibly determined by symmetric shapes (same interval sequence going up or down) highlighted next: **|2122|122|** and **|2122|122|**. The highlighted shapes are formed of a tritone with attached half tones outside or inside it. Symmetric shapes that reveal underlying simplicity are lurking everywhere in music, obscured by music notation. They become important for multi-tritone scales. The importance of symmetry should not be surprising — music is complex and symmetric shapes are well known to be helpful in dealing with many kinds of complexity in other fields than music.

This useful notation is an adaption of a standard 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.

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 fivo and one tritone form dominant-7, half-diminished-7 (a.k.a. minor-7- \flat 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- \flat 5 chords. Two tritones and one fivo (that may share a note with a tritone) form variations of other chord types such as dominant-7 \flat 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.

offset of tritone bass note above root R	suffixes on root symbol R										
	7	7#9(13)	9 \flat 13 (or #5)	7 \flat 9	7 \flat 5 (or #4 or #11)	dim7 (or o7)	m7 \flat 5	m6	M7(11)	\flat 9	M7#11 (or \flat 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.

example octave

(a) **V: G7(11)**

(b) **V: G13(11)**
I: CM7(11)

(c) **VII: Bmb5#5**
V: G7
IV: F6(9)b5
II: Dm6(11)

(d) **VII: Bm7b5#5**
V: G9
IV: F6(9)b5
II: Dm6(11)

(e) **VII: Bm7b5**
V: rootless G9
IV: F6b5
II: Dm6

(f) **VII: Bm7b5#5(11)**
V: G9(13)
IV: F6(9)b5
II: Dm6(9)(11)

(g) **VII: Bm7b5(11)**
V: rootless G13
IV: FM7b5
II: Dm6(9)

solid lines indicate basic voicings & dashed lines, enrichments

"usual" chords in red text

The figure and these examples are specific but the concepts are general. Different voicings of different tritone chords may be 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. Translating interval stacks into figured bass notation (and vice versa) for classical modes is easy because **W**⁺ and **W**⁺⁺ are always two scale steps and **W** 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.

<u>chord type</u>	<u>(2) = split</u>	<u>in place</u>	<u>extended</u>
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 *Modality* 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 *Modality*. Corresponding PKP mode signatures are shown on the left.

The purpose is twofold. One is to verify the PKP view of modes relative to *Modality*. 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 *Modality*, tritone anchor **p3** is \flat III or \sharp II and tritone anchor **6** is VI or \flat 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 *Modality* 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. Green highlighting brings forward to the eye that some modes are of opposite tonality to the master mode, or of mixed tonality.

Parallel Modes of the Melodic Minor | whWW | whh |

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 |

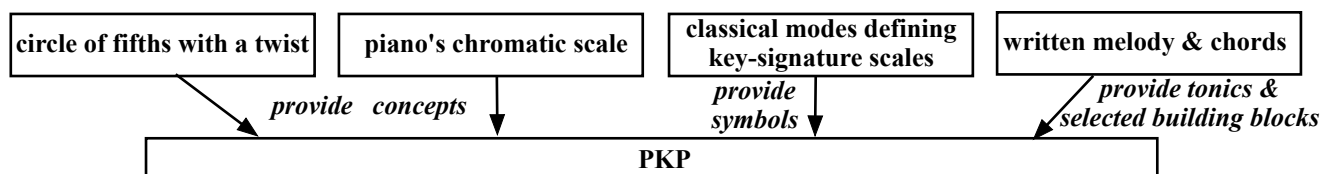
DL	1-2-p3-p5-5-6-p7-1	Romanian, Dorian #4, Mishebarakh
alt-DL	1-p2-p3-3-p5-p6-6-1	Leading Tone Minor Diminished, Super Locrian ♭7
LD	1-p3-3-p5-5-6-7-1	Lydian Blues Major, Lydian #2
alt-LD	1-p2-p3-4-p5-6-p7-1	Jazz Phrygian Diminished
AI	1-2-p3-4-5-p6-7-1	Harmonic Minor, Aeolian ♮ 7, Jazz Minor ♭ 6, Mohammedan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

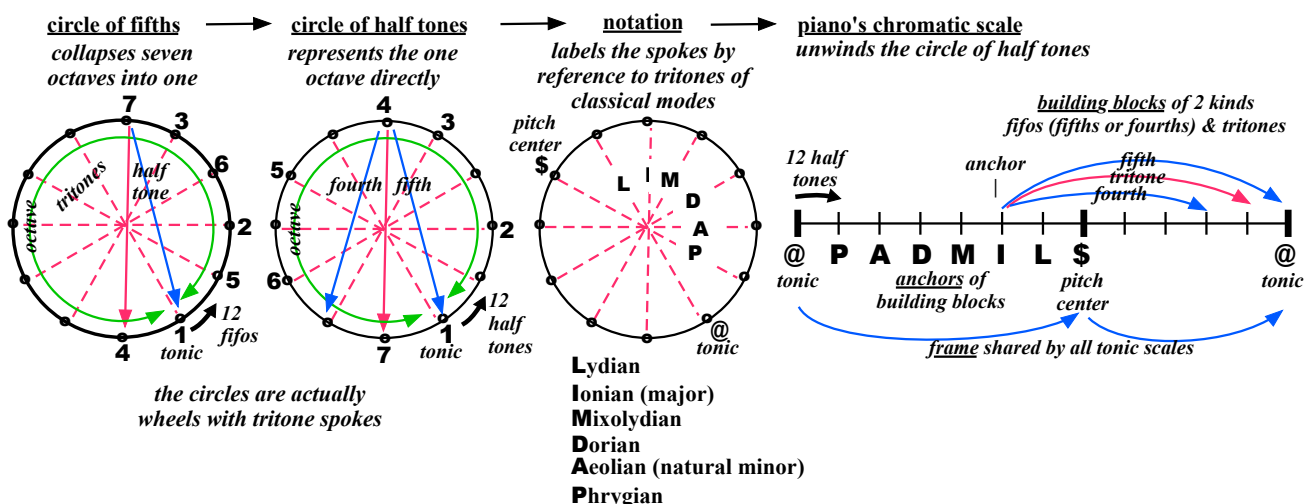
DL	1-p3-3-p5-p6-6-7-1	Lydian Blues Augmented, Lydian Augmented #2
alt-DL	1-2-p3-4-p5-6-p7-1	Jazz Minor #4, Lydian Diminished
LD	1-2-p3-p5-5-6-7-1	Lydian Melodic Minor, Lydian ♭ 3
alt-LD	1-p2-p3-4-p5-p6-6-1	Leading Tone Major Diminished, Locrian ♭7, Locrian Diminished-7
AI	1-2-3-4-5-p6-7-1	Harmonic Major
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 ($3\frac{1}{2}$ octaves) or five fourths ($2\frac{1}{2}$ 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.

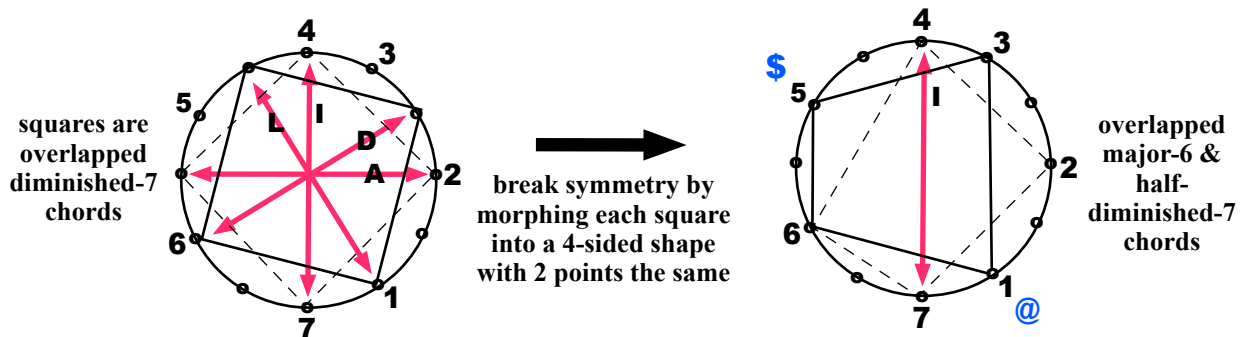
The circle of half tones rearranges the spokes of the circle to put the labeled points around it in scale order. The result is an intuitively natural @1 between pictorial geometry and musical geometry. Around the circle remains an octave and across any spoke remains a tritone. The half tones across the 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., ① and [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.

