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Pat Martino's *The Nature of the Guitar:*
An Intersection of Jazz Theory and Neo-Riemannian Theory

KEYWORDS: Pat Martino, Jazz Theory, Neo-Riemannian Theory, Guitar, Parsimonious Voice-Leading, John Coltrane, Giant Steps

ABSTRACT: This paper studies a set of instructional materials by the renowned jazz guitarist and pedagogue Pat Martino, winner of *Downbeat* Magazine's 2004 reader's poll for jazz guitarist of the year. The materials, titled *The Nature of the Guitar*, represent an ongoing project of Martino's begun in 1972. *The Nature of Guitar* is remarkable in its degree of overlap with Neo-Riemannian ideas. After discussing excerpts from *The Nature of Guitar* that engage parsimonious voice-leading, I compare Martino's analysis of John Coltrane's "Giant Steps" to that of Matthew Santa.

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An Intersection of Jazz Theory and Neo-Riemannian Theory
GUY CAPUZZO

I: INITIAL CONSIDERATIONS

[1.1] This paper studies a set of instructional materials by the renowned jazz guitarist Pat Martino, winner of *Downbeat* magazine's 2004 readers poll for jazz guitarist of the year.[1] The materials, titled *The Nature of the Guitar*, represent an ongoing project of Martino's begun in 1972. *The Nature of the Guitar* is remarkable in its degree of overlap with neo-Riemannian ideas; much of it may be viewed online at www.patmartino.com.[2] While I shall support my arguments with quotes from interviews with Martino (two of which I conducted), the aim of this paper is to survey the relations between Martino's work and present-day neo-Riemannian theory, not to reconstruct the development of his theories.

[1.2] Applications of neo-Riemannian theory to jazz harmony all extend the theory to accommodate the "tall" tertian sonorities characteristic of jazz. Callender (2004) employs contextual transformations and altered *Tonnetze* in an analysis of Ligeti's "Arc-en-ciel," a work that Ligeti (1996, 11) describes as "almost a jazz piece." Santa (2004) adapts Cohn's (1996) hexatonic systems to analyze John Coltrane's "Giant Steps." Strunk (2003) develops contextual operations to analyze seventh-chord progressions in post-bebop jazz. And Waters (2004) probes the interaction of the hexatonic, diatonic, acoustic, and octatonic collections with Cohn's (1996) hyper-hexatonic system. Martino's work, while sharing many features with the foregoing research, derives from the idiosyncratic organization of the guitar fretboard.[3]

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[1]A version of this paper was presented to the Dublin International Conference on Music Analysis on June 24, 2005. I am grateful to the *MTO* readers for their valuable suggestions (particularly on §2.1, §2.5, and §3.5), and also to Pat Martino, Paul Capuzzo, Adam Ricci, Matthew Santa, Theresa Vaughan, and Keith Waters for their input.

[2]Examples 1, 3, 4, 9, and 10 are available on patmartino.com. Examples 6, 7, and 8 were given to me by Martino. All of these examples are reproduced with the kind permission of Pat Martino.

[3]Capuzzo (2004, 182-184) also discusses neo-Riemannian theory from the perspective of the guitar fretboard, albeit in a pop-rock context.

II: THE GUITAR FRETBOARD AND PARSIMONIOUS VOICE-LEADING

[2.1] Example 1 reproduces two of Martino's diagrams. Here Martino grounds his conception of the guitar fretboard through a comparison with the piano. Two aspects of the piano diagram are noteworthy. First, Martino observes that the arrangement of white and black keys partitions the keyboard into seven white keys, representing the diatonic scale, and five black keys, representing the pentatonic scale. Second, he notes that the union of these two scales forms the total chromatic through the addition of seven and five. By contrast, Martino considers the fretboard to be generated by multiplication. He parses the first octave of the fretboard into two equal divisions—three major thirds and four minor thirds. The major thirds brackets above the fretboard indicate that each of the enclosed frets belongs to a different augmented (aug) triad.[4] Likewise, the minor thirds brackets indicate that each of the enclosed frets belongs to a different ^{o7} chord (Martino uses the term "diminished" to indicate ^{o7}). To the right of the fretboard diagram, Martino writes "augmented 4 frets × 3." Here he multiplies the interval in semitones by which the aug triad symmetrically divides the octave (4) by the cardinality of the aug triad (3). To the right of the fretboard diagram also appears "diminished 3 frets × 4." Here Martino multiplies the interval by which the ^{o7} chord symmetrically divides the octave (3) by the cardinality of the ^{o7} chord (4). This yields $4 \times 3 = 12$ and $3 \times 4 = 12$, demonstrating how the chromatic scale emerges as the cross product of the aug and ^{o7} chords.[5] Martino summarizes Example 1 as follows: "Unlike the piano, which uses a seven plus five system of addition, the guitar uses multiplication. With [the aug triads and ^{o7} chords] we cover all twelve notes of the chromatic scale by multiplying three times four" (quoted in Gold 2004, 92).
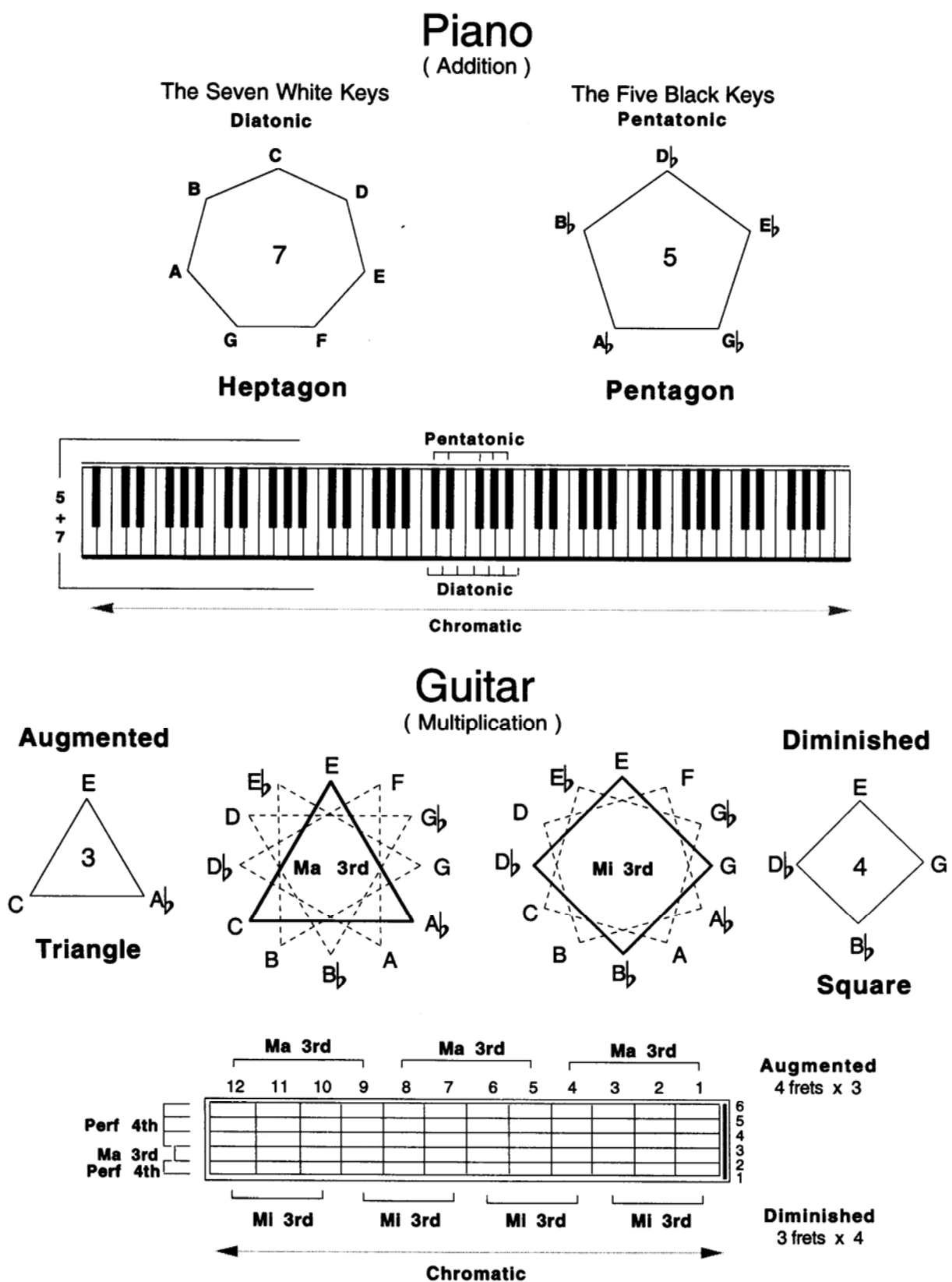
[2.2] As a point of departure for a comparison of Martino's concepts with those of neo-Riemannian theory, Example 2 reproduces a diagram from Weitzmann (1853) discussed by Cohn (2000, 90-91).

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[4]I adopt the following abbreviations and symbols: + (major), - (minor), ° (diminished), aug (augmented), ma^7 (major-major seventh), mi^7 (minor-minor seventh), ^{7} or dom^7 (major-minor seventh), ^{ø7} (half-diminished seventh), ^{o7} (fully-diminished seventh). For reasons given in §3.5, I use a mod 4 labeling system for hexatonic, whole-tone, and nonatonic collections. For example, {3478B0} is labeled as Hex03 since every pc in {3478B0} is congruent to 0 or 3 mod 4. The remaining labels are thus Hex01, 12, and 23; WT02 and 13; and Non012, 123, 023, and 013.

[5]Balzano (1980, 72-74) studies essentially the same phenomenon: the isomorphism between the cyclic group C12 and the cross product of C3 and C4.

Example 1. Martino, The keyboard is based on addition (7+5; diatonic plus pentatonic); the fretboard is based on multiplication (4 × 3; diminished "multiplied by" augmented)

Piano
(Addition)

The Seven White Keys
Diatonic

The Five Black Keys
Pentatonic

Heptagon

Pentagon

Pentatonic

Diatonic

Chromatic

Guitar
(Multiplication)

Augmented

Triangle

Ma 3rd

Mi 3rd

Diminished

Square

Ma 3rd   Ma 3rd   Ma 3rd

Augmented
4 frets x 3

Perf 4th
Ma 3rd
Perf 4th

Mi 3rd   Mi 3rd   Mi 3rd   Mi 3rd

Diminished
3 frets x 4

Chromatic

Example 2. Weitzmann, The total chromatic is the cross product of diminished-seventh chords and augmented triads (after Weitzmann 1853, 22 and Cohn 2000, 91)

E$\sharp^{\sharp\circ7}$	E$\sharp$	G$\sharp$	B	D
C$\sharp^{\sharp\circ7}$	C$\sharp$	E	G	B$\flat$
A$^{\circ7}$	A	C	E$\flat$	G$\flat$
	Aaug	Caug	E$\flat$aug	G$\flat$aug

Martino and Weitzmann both view the total chromatic as the cross product of $^{\circ7}$ chords and aug triads and show that each aug triad contains one note from each $^{\circ7}$ chord, and conversely that each $^{\circ7}$ chord contains one note from each aug triad. For instance, following Weitzmann's diagram from south to north starting on the note C shows that Caug contains the note C from A$^{\circ7}$, E from C$\sharp^{\sharp\circ7}$, and G$\sharp$ from E$\sharp^{\sharp\circ7}$. Likewise, following the diagram from west to east starting on the note C$\sharp$ shows that C$\sharp^{\sharp\circ7}$ contains the note C$\sharp$ from Aaug, E from Caug, G from E$\flat$aug, and B$\flat$ from G$\flat$aug.

[2.3] Martino views the aug triad and $^{\circ7}$ chord as symmetrical collections that act as reference points for generating asymmetrical collections. Examples 3 and 4 (on pages 6 and 7) present two diagrams from *The Nature of the Guitar* that portray semitonal relations between symmetrical and asymmetrical harmonies.[6] Example 3 presents "The Augmented Formula," indicating the "movement of any single tone [by] half-step." Starting with the Caug triad denoted by the boldface triangle, the augmented formula yields six triads, which form two major thirds cycles (hereafter *T4 cycles*) of relative major/minor triads (F-/A$\flat$+, A-/C+, D$\flat$-/E+). The right side of Example 3, labeled "Transformation," indicates these semitonal displacements. A similar process obtains with the "Diminished Formula" in Example 4. Each boldface square indicates a $^{\circ7}$ chord, and the notation "V7ths" indicates the four dom^7 chords that obtain by moving one note by semitone from E$^{\circ7}$.[7] An exact parallel between Martino's Example 3 and neo-Riemannian theory appears in Example 5. The four Weitzmann regions (Cohn 2000, 94) are identical to Martino's diagrams in Example 3.

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[6]Enharmonic equivalence holds for all of Martino's examples.

[7]It is curious that Martino does not generate the four possible $^{\varnothing7}$ chords in like fashion. In conversation, he acknowledged this point (interview, July 11, 2005) but did not explain the omission. Cohn (2000, 102) observes the same omission in Weitzmann (1853).

Example 3. Martino, Half-step relations among minor, augmented, and major triads

Example 4. Martino, Half-step relations between diminished 7th and dominant 7th chords

Example 5. Four Weitzmann regions (after Cohn 2000, 94)

$$\{C, E, A\flat\} \rightarrow C+, A\flat+, E+, A-, F-, C\sharp-$$

$$\{E\flat, G, B\} \rightarrow E\flat+, B+, G+, C-, A\flat-, E- \qquad \{C\sharp, F, A\} \rightarrow C\sharp+, A+, F+, B\flat-, F\sharp-, D-$$

$$\{D, F\sharp, B\flat\} \rightarrow D+, B\flat+, G\flat+, B-, G-, E\flat-$$

For instance, the Caug diagram in both examples shows the six triads formed by holding two notes of Caug and moving the remaining note by half-step. The remaining diagrams work analogously.

[2.4] In Example 6, Martino uses the semitonal relationship between $^{\circ 7}$ and dom^7 chords from Example 4 to form slash chords.[8] On the fretboard diagrams, the vertical lines represent the six strings of the guitar (ordered from left to right as ⟨E, A, D, G, B, E⟩) while the horizontal lines represent the frets. Dots on the fretboard indicate the placement of left-hand fingers, while the dot above the A string indicates an open string. With the fretboard labeled "diminished/V^7 polychords," Martino refers to E$^{\circ 7}$, G$^{\circ 7}$, B$\flat^{\circ 7}$, and D$\flat^{\circ 7}$ over an A bass note. The union of the five notes at hand, {A, C$\sharp$, E, G, B$\flat$}, forms an A7$\flat$9 chord, which is another name for E$^{\circ 7}$/A. The words "vertical and horizontal" indicate that the chords can be moved horizontally up and down the fretboard on the same strings, or vertically across the fingerboard on different strings.[9] However, changing strings eliminates the A pedal. On the fretboard labeled "horizontal, 4 inversions/4 positions," Martino lowers one note from each $^{\circ 7}$ chord to form a dom^7 chord. By doing this, he creates E$\flat^7$/A, which is an appropriate slash chord for an altered dominant harmony such as A7$\flat$5$\flat$9.

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[8]Some musicians use the term "polychord" to indicate a chord over a separate bass note, as does Martino in Example 6. Others (e.g. Levine 1995, 103-110) prefer the term "slash chord," which is the term I use. Depending on context, "polychord" can suggest the amalgam of two triads.

[9]"Vertical" and "horizontal" indicate motion on the fingerboard as it is held, not as depicted in Example 6. With a vertical motion from the ⟨D, G, B, E⟩ strings to the ⟨A, D, G, B⟩ strings, the fingering must be altered by one note to maintain chord quality (and likewise from ⟨A, D, G, B⟩ to ⟨E, A, D, G⟩).

The word "horizontal" indicates that the E♭^{7} chord labeled I is followed by a horizontal motion up the fretboard to the E♭$^6_5$ chord labeled II, and likewise from II to III, and III to IV. Example 6 nicely illustrates Martino's view of semitonal relations and symmetry, which he summarizes as follows: "[The aug triads and °^{7} chords] are great for generating chord progressions. By lowering one note here, raising another there, you have a very efficient way of generating complex harmonies—and with the smoothest of voice-leading" (quoted in Gold 2004, 92).

**Example 6**. Martino, Harmonic substitution based on Example 4

Strings: E A D G B E   E A D G B E
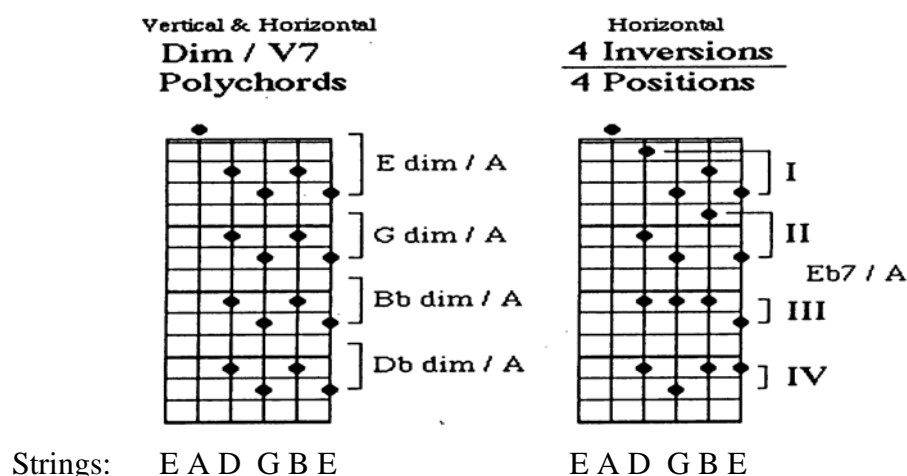
[2.5] Martino also treats the remaining method of generating the number 12 by multiplying two integers, namely 6 × 2. Example 7 displays Martino's tritone diagram, consisting of two clockfaces, one with C at 12:00 and the other with G♭ at 12:00. The diagram also represents two tritone-related circles of fifths. A triangle encloses each tritone, while the vertices of the three smallest squares at the center indicate the three °^{7} chords (e.g. the union of {C, G♭}, {E♭, A}, {G♭, C}, and {A, E♭}). In Example 8, Martino displays the ability of the tritone (ic 6) to generate perfect fourths and fifths (ic 5) via semitonal displacement. The diagram in Example 8 duplicates that of Example 7 and superimposes upon it two dodecagrams, each in boldface font.[10] Clockwise motion along either dodecagram yields ascending perfect fifths while counterclockwise motion yields descending perfect fifths. Holding one note of an ic 6 and moving the other note one place to the right or to the left along a clockface yields an ic 5, e.g. {C, G♭} to {C, G} or {C, F} or {G♭, B} or {G♭ ,D♭}.

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[10]The irregularities in the dodecagrams are not of consequence.

Example 7. Martino's tritone diagram
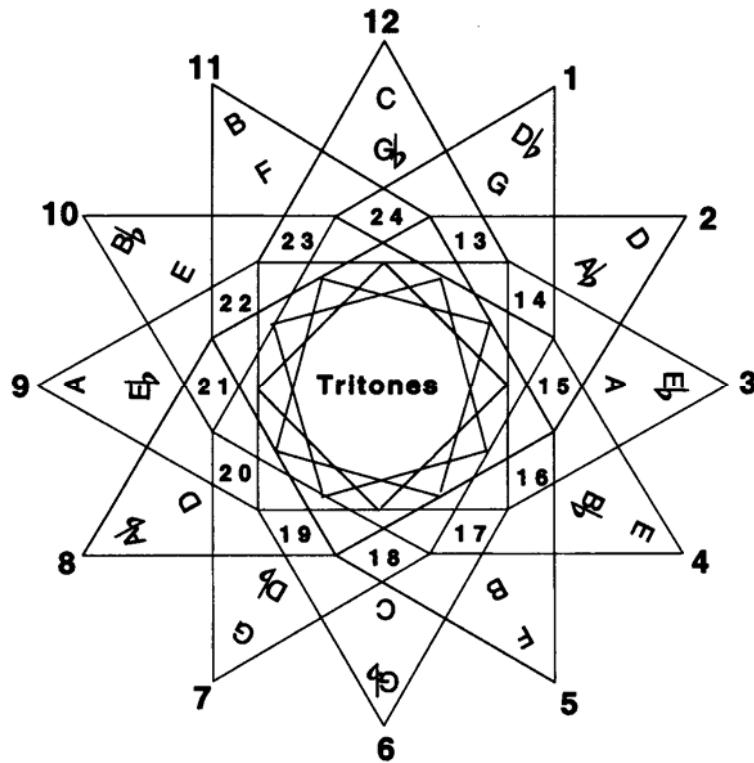
Example 8. Martino, Tritones yield perfect fifths and fourths via semitonal displacement
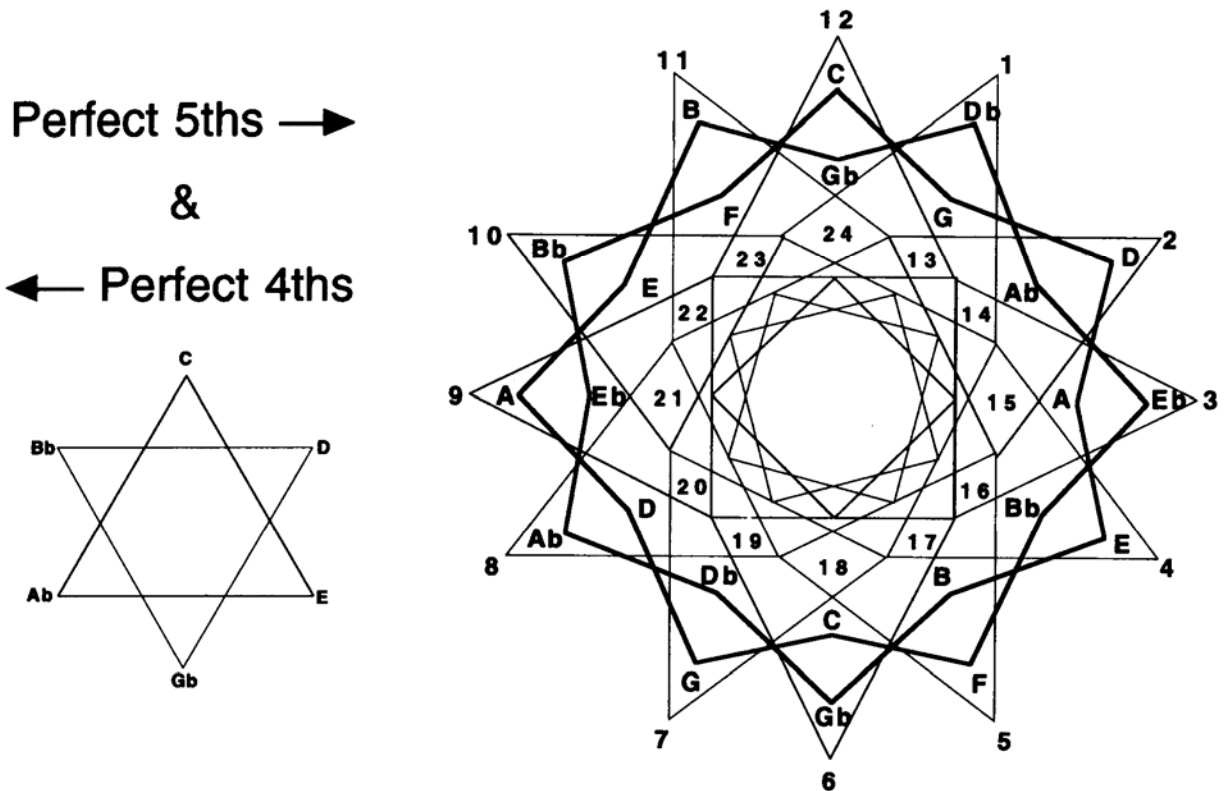
III: MARTINO'S ANALYSIS OF "GIANT STEPS"

[3.1] Analysts have taken disparate approaches to the striking harmonic structure of "Giant Steps," a lead sheet for which appears in Example 9. Many of these approaches do not overlap with neo-Riemannian work. For instance, Martin's (1988, 15; 25) concept of "harmonic prolongation by arrival," which occurs "whenever a circle of fifths segment tonicizes a harmony at the end of a phrase," forms the basis of "higher-level patterns that mirror the 'giant step' structure of the melody itself." In contrast, Goodheart's (2001, 63; 76; 81) "positional analysis" of "Giant Steps" uses just intonation to posit G major as "the harmonic midpoint" of the tune. In Goodheart's view, G is flanked by B and D♯ above it and E♭ and C♭ below it; the tune ends "hanging up there on D♯ major." Finally, Russell's "Lydian Chromatic Concept" (2001, 95-99) represents a third analytic approach to "Giant Steps," in which each chord receives a Roman numeral designation based on major or Lydian scales. For instance, $\text{Ami}^7\text{-D}^7\text{-Gma}^7$ (mm. 4-5) is designated as vi^7 in C Lydian, II^7 in C Lydian, and Ima^7 in G major, not $\text{ii}^7\text{-V}^7\text{-Ima}^7$ in G major. By contrast, Martino's analysis, shown in Example 10, is cyclic in orientation; nowhere are his views on symmetry on better display. The tune is in two sections, labeled A and B. The numbers 1 through 6 on the triangles representing aug triads match the order of chords on the first line of the analysis; the letter "T" stands for turnaround, referring to the ii-V-Is at mm. 4-5 and 8-9. Martino parses the A section into two T4 cycles. The first cycle, which I have labeled Hex23, contains E♭ma^7, Gma^7, and Bma^7. The second cycle, which I have labeled Non013, contains Ami^7, C♯mi^7, and Fmi^7.

Example 9. Martino's lead sheet for "Giant Steps"

Example 10. Martino's analysis of "Giant Steps"
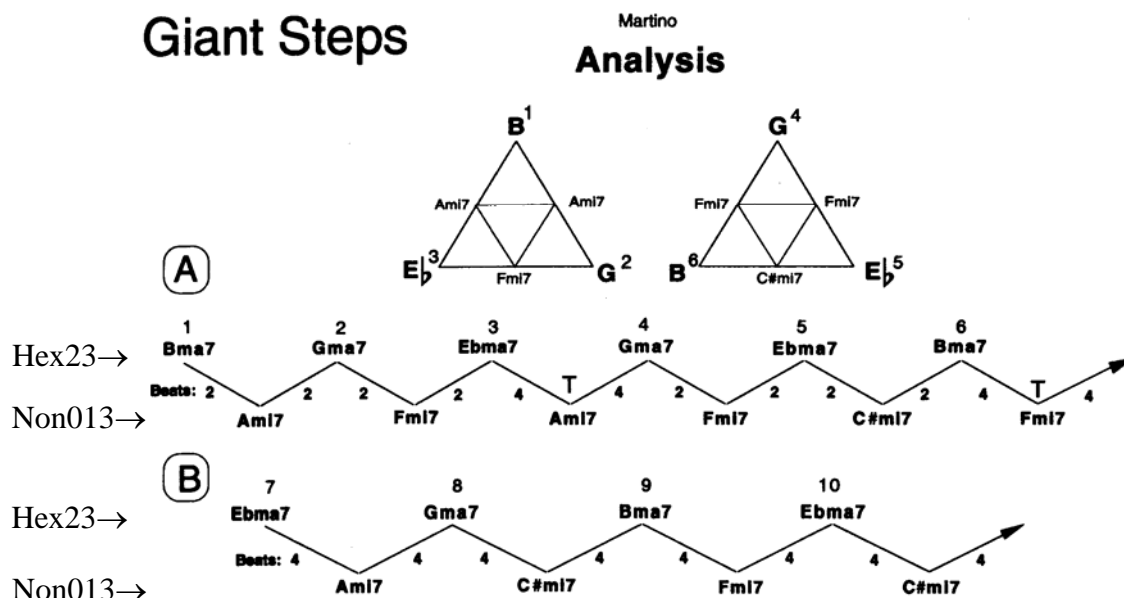
[3.2] Not all of the chords in Example 9 appear in Example 10. Specifically, Martino prunes the dom^7 chords from the A and B sections. Martino explained to me that he did this for two reasons, both of which intend to simplify the progression. The first reason involves harmonic substitution and chord extensions. By substituting the mi^{7}s (ii^{7}s) for the dom^{7}s, ii^7 occurs over $\hat{5}$ in the bass (the bass line typically still outlines $\hat{2}$-$\hat{5}$-$\hat{1}$), sounding the fifth, seventh, ninth, and eleventh of the V chord. Second, this substitution weaves two WT13 segments through the A section, formed by the chord roots B-A-G-F-E♭ (mm. 1-3) and G-F-E♭-C♯-B (mm. 5-7). Omitting the dom^{7}s from the B section has a different effect on the tune; it creates a T4 cycle of chord roots that relate by tritone followed by descending whole-step, E♭-A, G-C♯, B-F, E♭-C♯, forming a complete WT13 collection. Martino finds the tritone/whole-step pattern easier to improvise over than a series of ii-V-Is, given the rapid tempo of "Giant Steps." Even so, it would be easy to add the pruned dom^{7}s to his analysis; they create a T4 cycle containing D^7, F♯^{7}, and B♭^{7}, the total pc content of which forms Non012.

[3.3] To further appreciate how extensively Martino's take on "Giant Steps" overlaps with neo-Riemannian analytic practice, Examples 11 and 12 reproduce Santa's analysis of "Giant Steps." Example 11 displays Santa's (2003, 8) nonatonic systems, which are modifications of Cohn's hexatonic systems. Each nonatonic system contains a T4 cycle of three + triads and their respective dom^{7}s, with the chordal fifths of the dom^{7}s omitted. Example 12 shows how "Giant Steps" employs

Santa's Western nonatonic system (Non023). Parentheses isolate the chords that fall outside the Western nonatonic system, all of which are mi⁷ (on Martino's lead sheet and analysis) or - (on Santa's analysis); the two chord types are interchangeable, depending on the performer's use of extensions. While Martino and Santa both parse "Giant Steps" in a manner that reveals nonatonic collections, Martino privileges the ii⁷ chord while Santa privileges the V⁷ chord.

Example 11. Santa's (2003, 8) nonatonic systems

Northern: ⟨C+, E♭⁷, A♭+, B⁷, E+, G⁷, C+⟩

Southern: ⟨D+, F⁷, B♭+, C♯⁷, F♯+, A⁷, D+⟩

Eastern: ⟨D♭+, E⁷, A+, C⁷, F+, A♭⁷, D♭+⟩

Western: ⟨E♭+, F♯⁷, B+, D⁷, G+, B♭⁷, E♭+⟩

Example 12. Santa's analysis of "Giant Steps"
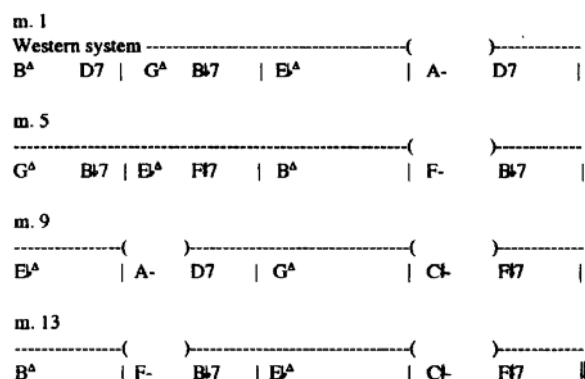
[3.4] Another link between Martino's analysis of "Giant Steps" and neo-Riemannian analytic practice emerges through Cohn's (2000, 100) analysis of a passage from Liszt's *Faust Symphony*, shown in Example 13. The six triads match those of the Caug diagrams in Examples 3 and 5, and the total pc content of the Liszt excerpt forms Non013, the same collection found in Example 10. Example 13 presents six triads in a *Nebenverwandt*-Relative cycle, in contrast with the T4 cycle of mi⁷ chords in Example 10.[11] But despite this difference, the Liszt progression is identical in pc content to the

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[11]The *Nebenverwandt* operation maps a + triad to the - triad a perfect fourth above it, and a - triad to the + triad a perfect fourth below it (Cohn 2000, 98).

Fmi⁷-Ami⁷-C♯mi⁷-Fmi⁷ cycle (on the downbeats of mm. 8, 10, 12, 14) of "Giant Steps"; the union of A- and C+ is Ami⁷, the union of F- and A♭+ is Fmi⁷, and the union of C♯- and E+ is C♯mi⁷.[12]

Example 13. Cohn's analysis of Liszt, *Faust Symphony*, mm. 305-311 (after Cohn 2000, 100)

E+   A-   C+   F-   A♭+   C♯-   E+

Caug Weitzmann region; Non013

[3.5] A relevant question raised by Example 10 is why the T4 cycles of ma⁷ chords form hexatonic collections, while the T4 cycles of dom⁷ and mi⁷ chords form nonatonic collections. The mod 4 labeling system introduced in footnote 2 answers this question. The T4 cycle in Example 10 that starts with Bma⁷ forms Hex23 since every pc in Bma⁷ is congruent to 2 or 3 mod 4, and reiterated transposition by T4 does not change these values mod 4. Likewise, the T4 cycle beginning on Ami⁷ forms Non013 since every pc in Ami⁷ is congruent to 0, 1, or 3 mod 4, and reiterated transposition by T4 does not change these values mod 4. The dom⁷ chord works similarly. Example 14 summarizes the interaction of the mod 4 labeling system and T4 cycles of mod 12 pcsets as follows: a mod 12 pcset that reduces to 1, 2, 3, or 4 values mod 4 will form aug triads, hexatonic (if one value is odd and the other even) or whole-tone collections (if both values are odd or both are even), nonatonic collections, and the total chromatic, respectively, under a T4 cycle.

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[12]While attached to their respective tonics, Fmi⁷-Ami⁷-C♯mi⁷-Fmi⁷ also attach to one another since each initiates a ii-V-I as well as the descending major second/ascending perfect fourth melodic contour.

Example 14. The interaction of the mod 4 labeling system and T4 cycles of mod 12 pcsets

Example of a mod 12 pcset	Number of values mod 4	Resulting mod 12 collection under a T4 cycle
Any major 3rd dyad	1	Augmented triad
Any + triad, - triad, or ma^7 chord	2 (1 odd value, 1 even value)	Hexatonic collection
Any dom7♯5 or dom7♭5 chord	2 (both odd values or both even values)	Whole-tone collection
Any ° triad, dom7 chord, ^{ø7} chord, or mi^7 chord	3	Nonatonic collection
Any °^{7} chord	4	Total chromatic

IV: FINAL CONSIDERATIONS

[4.1] For many musicians, *the* question raised by *The Nature of the Guitar* is: "How did Martino *get* this stuff?" As for the T4 cycles, initial signs pointed to Martino's private studies with the late Philadelphia jazz guitarist Dennis Sandole, who also taught Coltrane, introducing Coltrane to "equal divisions of the octave and third relationships" (Demsey 1995, 63). Another promising lead was Slonimsky's *Thesaurus of Scales and Melodic Patterns* (1947), whose terminology Martino uses freely in conversation (e.g. "ditone progression" for T4 cycle). As for the parsimonious voice-leading, I found no precedents in the jazz literature. My conversations with Martino confirmed that he developed this material independently, perhaps as a devout student of Coltrane's music and ideas, whose interests in numerology and sacred geometry, documented in Thomas (1976) and Demsey (1991; 1995), are shared by Martino. A second question raised by *The Nature of the Guitar* is whether its material applies to single-note improvisation. It turns out that Martino teaches improvisation through a two-page document titled "Chromatic Pivots."[13] The concept unfolds in three stages. First, Martino offers a Cmi^7 chord. Second, Martino generates a single-note line, drawn from the C Aeolian and C Dorian modes, whose notes occupy the same fretboard area as the Cmi^7 chord. Third, he uses a single-note chromatic scale run (typically three to four notes in length) to "pivot" to a second Cmi^7 voicing in a different area of the fretboard, at which point the player repeats the three stages, *ad infinitum*. This approach to improvisation is at once traditional in its matching of chord type with scale type ("for a mi^7 chord, play an Aeolian or Dorian scale") and original in its use of "chromatic pivots" to connect areas of the fretboard.

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[13]Martino (1972-present). The term is unrelated to chromatic pivot chords in tonal harmony.

[4.2] To further appreciate the originality of Martino's pedagogical methods, one need only compare them to those of other jazz guitar pedagogues, such as the widely-used books *Chord Chemistry* by Ted Greene (1971) and *The Advancing Guitarist* by Mick Goodrick (1987). Greene and Goodrick teach jazz harmony through chord formulas based on the major scale. For example, a + triad is represented as 1-3-5, a - triad as 1-♭3-5, a ° triad as 1-♭3-♭5, and so forth. While reliable, this method places considerable cognitive demands on a novice musician. Martino's method is more tactile than cerebral. In effect, Martino's student learns the fingerings for aug triads and °7 chords, and then moves one finger to produce the + and - triads, and the dom^7 chords. With this, Martino imparts a tactile component to the abstract world of parsimonious voice-leading. Of course, neither approach is better than the other; Martino's, Greene's, and Goodrick's methods have influenced legions of jazz guitarists.

[4.3] While this paper forges numerous connections between *The Nature of the Guitar* and neo-Riemannian theory, it is fitting to close by observing two differences as well. First, Martino's theory is not transformational. The objects are the same as those found in neo-Riemannian theory (+ and - triads, seventh chords, hexatonic and nonatonic collections) but the operations that characterize neo-Riemannian theory, such as L, P, and R, are absent. A second difference is evident in Martino's use of pc diagrams. Those in Example 10 vaguely resemble the *Tonnetz*, but none of Martino's diagrams duplicate it. Most of Martino's diagrams are more akin to the pc clockface used in atonal theory (cf. Examples 1, 3, 4, 7, and 8), with various notes set to 12:00 (or 0:00). But despite these differences, the heart of Martino's theories—the interplay of symmetry and asymmetry—lies at the core of neo-Riemannian theory as well. For Martino, asymmetrical perfect fourths and fifths, + and – triads, and dom^7 chords are born of semitonal displacements of symmetrical tritones, aug triads, and °7 chords respectively; Cohn (2000, 100-101) shows the very same relations in the neo-Riemannian sphere.

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