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A Pedagogical Approach to Minor Pentatonic Riffs in Rock Music

GUY CAPUZZO

I: INTRODUCTION

The college teacher of rock music is fortunate to have excellent pedagogical contributions covering topics such as form, melody, and harmony.¹ One central feature of rock music that has yet to receive pedagogical treatment is the *riff*, which J. Bradford Robinson defines as follows:

In jazz, blues, and popular music, a short melodic ostinato... The blues-influenced rock bands of the late 1960s and 70s and subsequent heavy metal groups often used riffs [to] confirm the tonic throughout the verses... Riffs were also an integral part of funk and other forms of dance music.²

Many riffs use the minor pentatonic scale (e.g. ⟨C, E \flat , F, G, B \flat ⟩) as a source of pitch material.³ Tonal and post-tonal theory textbooks illustrate the minor pentatonic scale with folk song melodies or art music excerpts, and present effective methods for identifying the

¹ See Burns 2005, Covach 2005, Everett 2004, Folse 2004, London 1990, Stephenson 2002, and Temperley 2007.

² Robinson 2007. Similar definitions of “riff” appear in Covach 2006, 283 and Garofalo 2008, 372. Other discussions of riffs include Danielson 2006, Fast 2001, and Monson 1999. The closest thing to a theoretical discussion of rock riffs that I have found is a passage in Moore 1995, 188–90 in which Moore discusses “melodic patterns” (188). Moore’s work differs in two important ways from the present paper: the melodic patterns take place against harmonic backgrounds, and he does not use scale degrees to generalize melodic functions.

³ Angle brackets ⟨ ⟩ indicate ordered segments. On the minor pentatonic scale in rock, see Covach 2004, Everett 2004, §19–22, 2008, 160–4, and 2009, 166–71 and 262–7, Temperley 2007, and Stephenson 2002, 37–8. In contrast to the present paper, these studies are primarily harmonic in orientation.

scale and determining the tonic pitch.⁴ Jane Piper Clendinning and Elizabeth West Marvin offer perhaps the most specific guideline in the literature: if a melody contains every natural minor scale degree except $\hat{2}$ and $\hat{6}$, and features $\hat{1}$ and $\hat{3}$, then the melody employs the minor pentatonic scale.⁵ However, this does not cover the many minor pentatonic riffs that do not use five pitch-classes (pcs) and do not contain $\hat{1}$ and $\hat{3}$. Example 1 shows three such riffs (for the time being, the reader is asked to ignore the keys suggested by the key signatures). Example 1a contains four pcs from the B minor (Bm) or F#m pentatonic scales.⁶ Example 1b contains three pcs from the Em or Am pentatonic scales. Example 1c contains two pcs from the Dm, Gm, or Cm pentatonic scales. How does each riff “confirm the tonic,” as per Robinson’s definition?

⁴ Tonic indicates the first degree of the minor pentatonic scale at hand, as distinct from the meaning of tonic in common-practice diatonic tonal theory, which carries connotations of key and harmony that do not apply to riffs.

⁵ Clendinning and Marvin 2005, 75. Scale degrees of the minor pentatonic scale appear as $\hat{1}$, $\hat{3}$, $\hat{4}$, $\hat{5}$, $\hat{7}$ to conform to the natural minor scale. This is the approach taken by Clendinning and Marvin, 74–5. Also following Clendinning and Marvin, 74–5, I notate minor pentatonic riffs with the key signature of the natural minor scale to which the minor pentatonic scale belongs. There is no standard practice for notating key signatures in popular music transcriptions; see Covach and Boone 1997, 86 and Winkler 1997.

⁶ Alternatively, Example 1a presents four pcs from the B Dorian, B Phrygian, B Mixolydian, or B Aeolian scales. However, in the present context I shall only consider minor pentatonic scales as supersets.

Bass, ♩ = 130



Example 1a. The Rolling Stones, "Jumpin' Jack Flash" (Mick Jagger-Keith Richards) (1968)

Bass, ♩ = 140



Example 1b. The Go-Go's, "We Got The Beat" (Charlotte Caffey), *Beauty and the Beat* (1981)

Bass, ♩ = 120



Example 1c. The Kinks, "You Really Got Me" (Ray Davies), *The Kinks* (1964)

To approach this question, this paper provides a pedagogical approach to the pitch characteristics of rock and funk riffs, placing melodic contour and scale-degree function at the forefront of the approach. I focus on riffs whose pcs form two-, three-, or four-note segments of the minor pentatonic scale. I will assume a working knowledge of music theory fundamentals and melodic figuration, as well as an aural (but not theoretical or analytical) familiarity with riffs.

II: SCALE-DEGREE PATTERNS

While it is not difficult to confirm by ear that Example 1a places greater emphasis on B than E, F#, or A, and thus presents four of the five Bm pentatonic pcs, it will be useful to spell out why this is so. There are two sets of factors at work. The first set involves

what Joseph N. Straus defines as *centricity*: “notes that are stated frequently, sustained at length, placed in a registral extreme, played loudly, and rhythmically or metrically stressed tend to have priority over notes that don’t have those attributes.”⁷ Indeed, in Example 1a, B is stated frequently (at the outset) and sustained, placed in a registral extreme, played loudly (through accents), and rhythmically and metrically stressed.

The second set of factors at work are *scale-degree patterns*, short melodic figures that permit the identification of a tonic note in the absence of a complete minor pentatonic scale. For this approach we need to define three terms: segment, neighbor, and scale-degree pattern. A *segment* is an ordered series of adjacent minor pentatonic scale pcs. Example 2a presents the minor pentatonic segments; strikethroughs eliminate stylistically uncommon segments. For instance, the two-note segments of the Em pentatonic scale are ⟨E, G⟩, ⟨G, A⟩, ⟨A, B⟩, ⟨B, D⟩, and ⟨D, E⟩. Of these, only ⟨E, G⟩ and ⟨D, E⟩ are common self-standing segments, perhaps since both contain $\hat{1}$. A *neighbor* is any two-note segment, whether the resultant interval is a major second or a minor third. A *scale-degree pattern* (SDP) assigns scale degrees to a segment. For example, the segment ⟨E, G, A⟩ realizes the SDP ⟨ $\hat{1}$, $\hat{3}$, $\hat{4}$ ⟩ in Em pentatonic or ⟨ $\hat{5}$, $\hat{7}$, $\hat{1}$ ⟩ in Am pentatonic. In actual riffs, the elements of an SDP may appear in any order and with duplications. For instance, the SDP ⟨ $\hat{1}$, $\hat{3}$ ⟩ can appear as ⟨ $\hat{1}$, $\hat{3}$ ⟩ or ⟨ $\hat{3}$, $\hat{1}$ ⟩ or ⟨ $\hat{1}$, $\hat{3}$, $\hat{1}$ ⟩ or ⟨ $\hat{3}$, $\hat{1}$, $\hat{3}$ ⟩, etc.

⁷ Straus 2005, 131.

	E	G	A	B	D	E	G	A...
2 note:	1̂	3̂ 3̂—4̂	4̂—5̂	5̂—7̂	7̂	1̂		
3 note:	1̂	3̂ 3̂—4̂	4̂—5̂	5̂—7̂	5̂ 7̂	1̂	1̂ 3̂	
4 note:	1̂—3̂	3̂—4̂	4̂—5̂	5̂—7̂	5̂ 7̂	1̂	1̂ 3̂	7̂—1̂—3̂—4̂

Example 2a. Minor Pentatonic Segments

Let us return to Example 1 to determine the role of SDPs in each riff. Example 1a employs the SDP $\langle 4̂, 5̂, 7̂, 1̂ \rangle$ in Bm pentatonic. The alternative, $\langle 7̂, 1̂, 3̂, 4̂ \rangle$ in F#m pentatonic, is not stylistically common and is thus ruled out (cf. Example 2a). Example 1b employs the SDP $\langle 1̂, 5̂, 7̂ \rangle$ in Am pentatonic. The alternative, $\langle 1̂, 3̂, 4̂ \rangle$ in Em pentatonic, is unlikely given the metric emphasis on A2, the registral emphasis on A2 and A3, and the $\langle A2, E3 \rangle$ and $\langle E3, A2 \rangle$ perfect fifth leaps, all of which point to an A tonic.⁸ Lastly, Example 1c employs the SDP $\langle 7̂, 1̂ \rangle$ in Gm pentatonic. Following Example 2a, this is the only possibility for a lone whole-step, and the metric emphasis on and repetitions of G2 support this reading.

There are numerous pedagogical strategies for teaching SDPs. The material can be used at any point in the undergraduate aural skills curriculum, in a class on rock harmony, or as part of a class on twentieth-century music. In class, I have students conduct and

⁸ C4 indicates middle C.

sing in rhythm the vocal warm-ups in Example 2b, using solfège syllables, scale degree numbers, or note names. Throughout, I direct their attention to the tonic pitch. Additionally, instructors can point to solfège syllables, scale degree numbers, or note names on the board and ask students to sing the given notes. A given student can then sing or play a series of SDPs, asking the other students to sing each back in call-and-response style. I also devote class time to identifying SDPs by name in recorded songs, and to “melodic dictation” with riffs as well. Finally, I often assign dictation for homework, using carefully chosen songs that feature particular SDPs.

The image displays four staves of musical notation in G major (one sharp). The first staff contains four measures with solfège syllables above: $\hat{1}, \hat{3}$ (G, B), $\hat{7}, \hat{1}$ (F#, G), $\hat{1}, \hat{3}, \hat{4}$ (G, B, C), and $\hat{5}, \hat{7}, \hat{1}$ (E, F#, G). The second staff starts at measure 6 with $\hat{7}, \hat{1}, \hat{3}$ (F#, G, B) and $\hat{4}, \hat{5}, \hat{7}, \hat{1}$ (C, D, F#, G). The third staff starts at measure 11 with $\hat{5}, \hat{7}, \hat{1}, \hat{3}$ (E, F#, G, B). The fourth staff, labeled 'Complete Scale', starts at measure 16 and shows the full G major scale: G, A, B, C, D, E, F#, G.

Example 2b. Vocal Warm-ups

TWO-NOTE SEGMENTS

In the $\langle \hat{7}, \hat{1} \rangle$ and $\langle \hat{1}, \hat{3} \rangle$ SDPs, $\hat{7}$ acts as a lower neighbor to $\hat{1}$ while $\hat{3}$ acts as an upper neighbor to $\hat{1}$. Example 3 presents two riffs that illustrate $\langle \hat{1}, \hat{3} \rangle$. Both riffs end with $\hat{3}$ on a weak beat, creating a drive toward $\hat{1}$ and the downbeat upon repetition. Other songs featuring $\langle \hat{1}, \hat{3} \rangle$ include “The Wizard” by Black Sabbath, “Bring the Pain” by Missy Elliott, and “Drown Me” by Soundgarden.

Bass, ♩ = 80



Example 3a. Poundhound, “Rain” (Doug Pinnick), *Pineappleskunk* (2001): $\langle \hat{1}, \hat{3} \rangle$

Guitar, ♩ = 110

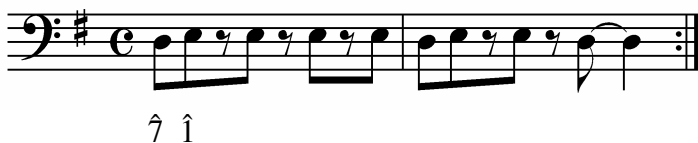


Example 3b. Beck, “Nausea” (Beck Hansen), *The Information* (2006): $\langle \hat{1}, \hat{3} \rangle$

Example 4 illustrates $\langle \hat{7}, \hat{1} \rangle$. Each riff uses only two pcs, D and E. In “Novacane” [sic], D and E occupy a single register. In “Thank You,” D and E occupy two registers, with $\langle D2, E2 \rangle$ in the lower register connected by octave leap to $\langle E3, D3 \rangle$ in the upper register. Scale degrees above and below the staff indicate the upper and lower registers. The octave leap and metric emphasis on E3 highlight pc E as $\hat{1}$. Both riffs end with $\hat{7}$ on a weak beat, creating a strong push toward $\hat{1}$ and the downbeat upon repetition. Other songs featuring $\langle \hat{7}, \hat{1} \rangle$ include “To Bring You My Love” by PJ Harvey, “My Generation” by The Who, and “Abacab” by Genesis.⁹

⁹ See Everett 2004, §17 on “My Generation.”

Bass, ♩ = 90



Example 4a. Beck, “Novacane” [*sic*] (Beck Hansen-John King-Michael Simpson), *ODelay* (1996): $\langle \hat{7}, \hat{1} \rangle$

Bass, ♩ = 100

Example 4b. Sly and the Family Stone, “Thank You (Falettinme Be Mice Elf Agin)” [*sic*] (Sly Stone), *Greatest Hits* (1970): $\langle \hat{7}, \hat{1} \rangle$ and $\langle \hat{1}, \hat{7}, \hat{1} \rangle$

THREE-NOTE SEGMENTS¹⁰

Example 5 illustrates the three-note segment $\langle \hat{1}, \hat{3}, \hat{4} \rangle$.¹¹ E2 frames the riff in Example 5a to support $\langle \hat{1}, \hat{4}, \hat{3}, \hat{1} \rangle$ in Em pentatonic over $\langle \hat{5}, \hat{1}, \hat{7}, \hat{5} \rangle$ in Am pentatonic. Additional factors supporting the E

¹⁰ Pertinent discussion of three-note minor pentatonic segments appears in Everett 2004 and Capuzzo 2004. Everett notes that “the three-note collection [0-2-5] appears at four different places in the five-note (pentatonic) scale” (§17). Capuzzo discusses “three-chord segments whose root successions can be derived from pentatonic collections” (193). The present article differs from Everett’s and Capuzzo’s work in its systematic derivation of pentatonic segments, its assignment of scale degrees to those segments, and its focus on non-triadic riffs.

¹¹ Examples 5a and 5b are the first riffs in this paper that are not monophonic. The parallel dyads elaborate monophonic ideas; the extra voices form root/fifth “power chords” (Everett 2008, 160–4). As a rule of thumb: with parallel fourths (Ex. 5b), the upper pitch is the root of the power chord; with parallel fifths (Ex. 5a), the lower pitch is the root of the power chord.

tonic include the closing $\langle \hat{3}, \hat{1} \rangle$ neighbor motion and the registral and metric placement of E2. In Example 5b, parentheses below the staff isolate A \flat 3 and D \flat 4 because these pitches fall outside of the governing Gm pentatonic scale.¹² As in Example 5a, a closing $\langle \hat{3}, \hat{1} \rangle$ favors the SDP $\langle \hat{1}, \hat{3}, \hat{4} \rangle$ in Gm pentatonic over $\langle \hat{5}, \hat{7}, \hat{1} \rangle$ in Cm pentatonic. Another factor in G's status as $\hat{1}$ is the total pc content of the riff: a complete Gm pentatonic scale (again excepting D \flat /A \flat). Other songs featuring $\langle \hat{1}, \hat{3}, \hat{4} \rangle$ include "Bad To The Bone" by George Thorogood, "Lubbock or Leave It" by The Dixie Chicks, and "Tush" by ZZ Top.

Guitar, ♩ = 70

Example 5a. "Rocky Mountain Way" (Rocke Grace-Kenny Passarelli-Joe Vitale-Joe Walsh), *The Smoker You Drink, The Player You Get* (1973): $\langle \hat{1}, \hat{4}, \hat{3}, \hat{1} \rangle$

Guitar, ♩ = 95


Example 5b. Deep Purple, "Smoke on the Water" (Ritchie Blackmore-Ian Gillan-Roger Glover-Jon Lord-Ian Pace), *Machine Head* (1972): $\langle \hat{1}, \hat{3}, \hat{4} \rangle$ and $\langle \hat{1}, \hat{3}, \hat{4}, \hat{3}, \hat{1} \rangle$

Example 6 shows the next three-note segment, $\langle \hat{5}, \hat{7}, \hat{1} \rangle$. In Example 6a, registral and metric emphasis combine with the leap of a fifth from B \flat 2 to F2 to favor a B \flat tonic over the alternative F tonic, SDP $\langle \hat{1}, \hat{3}, \hat{4} \rangle$. Similarly, in Example 6b, registral and metric emphasis combine with the leap of an octave from E3 to E2 to favor an E tonic over the alternative B tonic, SDP $\langle \hat{1}, \hat{3}, \hat{4} \rangle$. Also in support of the E tonic, Example 6b features $\hat{7}$ (D3) as a lower neighbor to

¹² However, D \flat is the character note of the G blues scale, which I discuss later in this paper. The term "character note" appears in Levine 1995, 62 n. 51 and 77, and Williams 1997, 172.


$\hat{1}$ (E3), much in the same way that the Example 5 riffs feature $\hat{3}$ as an upper neighbor to $\hat{1}$. Other songs featuring $\langle \hat{5}, \hat{7}, \hat{1} \rangle$ include “Fire” by The Jimi Hendrix Experience, “Whole Lotta Love” by Led Zeppelin, and “Love Me Two Times” by The Doors.

Bass, $\text{♩} = 70$



Example 6a James Brown, “The Payback” (James Brown-Fred Wesley-John Starks), *The Payback* (1973): $\langle \hat{1}, \hat{5}, \hat{7} \rangle$

Keyboard, $\text{♩} = 160$



Example 6b. Ray Charles, “What’d I Say” (Ray Charles), *What’d I Say* (1959): $\langle \hat{1}, \hat{5}, \hat{7}, \hat{1} \rangle$

The final three-note SDP is $\langle \hat{7}, \hat{1}, \hat{3} \rangle$. Example 7 illustrates it in a formation that I call the *pentatonic double-neighbor figure*.¹³ The figure combines $\hat{1}$ with $\hat{7}$ (lower neighbor) and $\hat{3}$ (upper neighbor). The figure takes two forms. In the first form, illustrated by Example 7a, the SDP is $\langle \hat{1}, \hat{7}, \hat{3}, \hat{1} \rangle$.¹⁴ In the second form, illustrated by Example 7b, the SDP is $\langle \hat{1}, \hat{3}, \hat{7}, \hat{1} \rangle$.¹⁵ The two forms are equally common. Other songs featuring pentatonic double-neighbor figures include “Hello, I Love You” by The Doors, “I Can’t Drive 55” by Sammy Hagar, and “Rebel Yell” by Billy Idol.

FOUR-NOTE SEGMENTS

Example 8 illustrates $\langle \hat{4}, \hat{5}, \hat{7}, \hat{1} \rangle$. This SDP often occurs at the end of riffs, just prior to repetition. The material preceding $\langle \hat{4}, \hat{5}, \hat{7}, \hat{1} \rangle$

¹³ See Traut 2005, 15 for a discussion of double-neighbor figures in non-pentatonic, triadic rock contexts.

¹⁴ See Everett 2004, §21 on “All Day and All of the Night.”

¹⁵ Parentheses isolate D and E because they are not part of the double-neighbor figure. Interpreted as $\langle \hat{6}, \hat{7}, \hat{1} \rangle$ (Aeolian scale degrees) and harmonized with power chords or major triads, $\langle D, E, F\# \rangle$ forms a common rock cadence.

Bass, ♩ = 130

LN UN

1 2 3 1

Example 7a. The Kinks, “All Day and All of the Night” (Ray Davies) (1964): Pentatonic Double-Neighbor Figure

Bass, ♩ = 120

UN LN

1 3 2 1 ()

Example 7b. Ozzy Osbourne, “Crazy Train” (Ozzy Osbourne-Randy Rhoads-Bob Daisley), *Blizzard of Ozz* (1981): Pentatonic Double-Neighbor Figure

establishes the tonic by presenting scale degrees 1, 4, and 5 (Example 8a) or (1, 2, 1) (Example 8b). By contrast, two songs featuring (4, 5, 2, 1) at the onset of their riffs are “Desperate People” by Living Colour and “Changes” by Yes.

Guitar, ♩ = 150

4 5 2 1

Example 8a. Black Sabbath, “Paranoid” (Ozzy Osbourne-Tony Iommi-Geezer Butler-Bill Ward), *Paranoid* (1970): (4, 5, 2, 1)

Guitar, ♩ = 90

4 5 2 1

Example 8b. Wild Cherry, “Play That Funky Music” (Robert Parissi), *Wild Cherry* (1976): (4, 5, 2, 1)

Example 9 illustrates $\langle \hat{5}, \hat{7}, \hat{1}, \hat{3} \rangle$. The riffs in Examples 9a and 9b display the arc melodic contour typical of this SDP. The $\langle \hat{5}, \hat{7}, \hat{1}, \hat{3} \rangle$ SDP places little metric or registral emphasis on $\hat{1}$, substituting durational emphasis and repetition instead. Other songs featuring $\langle \hat{5}, \hat{7}, \hat{1}, \hat{3} \rangle$ include “Iron Man” by Black Sabbath and “Wanted Dead or Alive” by Bon Jovi.

Guitar, ♩ = 110

Example 9a. Sly and the Family Stone, “Don’t Call Me Nigger, Whitey” (Sly Stone), *Stand!* (1969): $\langle \hat{5}, \hat{7}, \hat{1}, \hat{3}, \hat{1} \rangle$

Piano, ♩ = 90


Example 9b. Genesis, “That’s All” (Phil Collins-Tony Banks-Mike Rutherford), *Genesis* (1983): $\langle \hat{5}, \hat{7}, \hat{1}, \hat{3}, \hat{1} \rangle$

MINOR PENTATONIC, BLUES, AND ALTERED BLUES SCALES

Example 10 presents two riffs that use complete minor pentatonic scales. In addition to the presence of all five pentatonic pcs, each riff defines its tonic through two-, three-, or four-note SDPs. For example, Example 10a begins with $\langle \hat{7}, \hat{1} \rangle$ to confirm D as $\hat{1}$. Likewise, $\langle \hat{4}, \hat{5}, \hat{7}, \hat{1} \rangle$ and $\langle \hat{1}, \hat{7}, \hat{1} \rangle$ confirm E \flat as $\hat{1}$ in Example 10b.¹⁶ Other songs featuring complete minor pentatonic scale riffs include “Shining Star” by Earth, Wind, and Fire, “I’m The Slime” by Frank Zappa, and “Born Under a Bad Sign” by Albert King.


¹⁶ Hughes 2003, 140–77 discusses “Superstition.” With Hughes’s permission, I have reproduced his Example 14 (157) in my Example 10b.

Guitar, ♩ = 120



Example 10a The White Stripes, “Cold Cold Night” (Jack White), *Elephant* (2003): D Minor Pentatonic Scale


Clavinet, ♩ = 90



Example 10b Stevie Wonder, “Superstition” (Stevie Wonder), *Talking Book* (1972): E \flat Minor Pentatonic Scale


Example 11 illustrates the *blues scale*, a six-note scale consisting of the minor pentatonic scale with an added lowered (\downarrow) $\hat{5}$.¹⁷ As with the minor pentatonic scale, SDPs permit the identification of $\hat{1}$. Specifically, Example 11a begins with $\langle \hat{1}, \hat{7}, \hat{1} \rangle$ and ends with $\langle \hat{1}, \hat{3}, \hat{1} \rangle$, while Example 11b begins with $\langle \hat{1}, \hat{3} \rangle$ and ends with $\langle \hat{5}, \hat{7}, \hat{1} \rangle$ on the repeat. Other songs featuring blues scales include “Heartbreaker” by Led Zeppelin, “Outshined” by Soundgarden, and “Rockit” [*sic*] by Herbie Hancock.

Guitar, ♩ = 100



Example 11a. Cream, “Sunshine of Your Love” (Eric Clapton-Jack Bruce-Pete Brown), *Disraeli Gears* (1968): D Blues Scale

Bass, ♩ = 85



Example 11b. King’s X, “Groove Machine” (Jerry Gaskill-Doug Pinnick-Ty Tabor), *Tape Head* (1998): B \flat Blues Scale

¹⁷ The arrow notation for scale-degree alterations appears in Henry and Rogers 2005, 60.

Example 12 illustrates the *altered blues scale*, a seven-note scale consisting of the blues scale with an added raised ($\hat{1}$) $\hat{7}$.¹⁸ While the riff in Example 12b lacks $\hat{3}$, the closing SDP $\langle \hat{1}, \hat{7}, \hat{1} \rangle$, the metric and registral emphasis on A2, and the octave leap from A2 to A3 combine to secure A as tonic.

Guitar, ♩ = 64

Example 12a. Black Sabbath, "Iron Man" (Ozzy Osbourne-Tony Iommi-Geezer Butler-Bill Ward), *Paranoid* (1970): B Altered Blues Scale

Guitar, ♩ = 125

Example 12b. The Jimi Hendrix Experience, "Manic Depression" (Jimi Hendrix), *Are You Experienced?* (1967): A Altered Blues Scale

III: CONCLUSION

Scale-degree patterns offer a concise approach to the pitch language of minor pentatonic riffs. Example 13 summarizes the minor pentatonic SDPs. The two-note SDPs act as neighbors to $\hat{1}$. Each three-note SDP adds a neighbor to the two-note SDPs: $\langle \hat{1}, \hat{3} \rangle$ becomes $\langle \hat{1}, \hat{3}, \hat{4} \rangle$, while $\langle \hat{7}, \hat{1} \rangle$ becomes $\langle \hat{5}, \hat{7}, \hat{1} \rangle$ or $\langle \hat{7}, \hat{1}, \hat{3} \rangle$. The latter typically occurs as $\langle \hat{1}, \hat{3}, \hat{7}, \hat{1} \rangle$ or $\langle \hat{1}, \hat{7}, \hat{3}, \hat{1} \rangle$, the pentatonic double-neighbor figure. The four-note SDPs both elaborate $\langle \hat{5}, \hat{7}, \hat{1} \rangle$. In addition, $\langle \hat{5}, \hat{7}, \hat{1}, \hat{3} \rangle$ combines $\langle \hat{5}, \hat{7}, \hat{1} \rangle$ and $\langle \hat{7}, \hat{1}, \hat{3} \rangle$.

Several avenues for further study present themselves. One involves the enumeration of common SDPs formed by *every other* note of the minor pentatonic scale, such as $\langle \hat{1}, \hat{4}, \hat{7} \rangle$ in "Toys in the Attic" by Aerosmith, "Desire" by U2, and "Gloria" by Patti Smith (written by the band "Them"). A second avenue is the study of riffs that do not use the minor pentatonic scale. The most common alternatives are the major pentatonic scale (e.g. "My Girl" by The Temptations, "Sir Duke" by Stevie Wonder, and "In the

¹⁸ The term "altered blues scale" is in widespread use among pop musicians. See Capuzzo 1996, 48, Haslip 2001, 95, and Hiland 1995, 50.

	$\hat{1}$	$\hat{3}$	$\hat{4}$	$\hat{5}$	$\hat{7}$	$\hat{1}$	$\hat{3}...$	Comment
2 note:	$\hat{1}$	$\hat{3}$			$\hat{7}$	$\hat{1}$		$\hat{3}$ = UN to $\hat{1}$ $\hat{7}$ = LN to $\hat{1}$
3 note:	$\hat{1}$	$\hat{3}$	$\hat{4}$					Elaborates $\langle \hat{1}, \hat{3} \rangle$
				$\hat{5}$	$\hat{7}$	$\hat{1}$		Elaborates $\langle \hat{7}, \hat{1} \rangle$
					$\hat{7}$	$\hat{1}$	$\hat{3}$	Double neighbor
4 note:			$\hat{4}$	$\hat{5}$	$\hat{7}$	$\hat{1}$		Elaborates $\langle \hat{5}, \hat{7}, \hat{1} \rangle$
				$\hat{5}$	$\hat{7}$	$\hat{1}$	$\hat{3}$	Elaborates $\langle \hat{5}, \hat{7}, \hat{1} \rangle$; combines $\langle \hat{5}, \hat{7}, \hat{1} \rangle$ and $\langle \hat{7}, \hat{1}, \hat{3} \rangle$

Example 13. Summary of SDPs.

Summertime” by Mungo Jerry), the diatonic modes (e.g. G Dorian in “Cult of Personality” by Living Colour, F Lydian in “Free Will” by Rush, and E Mixolydian in “Third Stone From The Sun” by The Jimi Hendrix Experience), and arpeggio riffs (e.g. “Pretty Woman” by Roy Orbison, “Day Tripper” by The Beatles, and “Ain’t Talkin’ ‘Bout Love” by Van Halen). Third, attention to the instrument that a given riff is played on introduces issues such as timbre, the relation between the tonic note and the keys idiomatic to the instrument, and often microtonal inflections, particularly those involving $\hat{3}$ and $\hat{1}\hat{3}$; $\hat{4}$, $\downarrow\hat{5}$ and $\hat{5}$; and $\hat{7}$, $\uparrow\hat{7}$, and $\hat{1}$. Fourth, the analysis of complete songs can demonstrate the interaction of riffs with hypermeter, as well as how simultaneous riffs may combine to establish a tonal center (or competing tonal centers). Finally, the use of riffs as springboards for improvisation can clarify the relation between the minor pentatonic scale and the diatonic modes that contain it (Dorian, Phrygian, and Aeolian).¹⁹

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