

Music theory for guitar nerds

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- Gives the recipe not just examples
- If you give a man a fish, you feed him for a day. If you teach a man to fish, you feed him for a lifetime

1 Intervals: where do notes come from?

1.1 Harmonic series

Figure 1: The harmonic series

Table 1: Intervals and

Harmonics					Ratio to fundamental	Intervals	Equal Temperament
1	2	4	8	16	1,2,3,4	unison/octave	1.000
				17	$17/16 = 1.0625$	minor second	1.059
			9	18	$9/8 = 1.125$	major second	1.122
				19	$19/16 = 1.1875$	minor third	1.189
		5	10	20	$5/4 = 1.2500$	major third	1.260
				21	$21/16 = 1.3125$	fourth	1.335
			11	22	$11/8 = 1.375$	tritone	1.414
				23	$23/16 = 1.4375$		
	3	6	12	24	$3/2 = 1.500$	fifth	1.498
				25	$25/16 = 1.5625$	minor sixth	1.587
			13	26	$13/8 = 1.625$		
				27	$27/16 = 1.6875$	major sixth	1.682
		7	14	28	$7/4 = 1.7500$	minor seventh	1.782
				29	$29/16 = 1.8125$		
			15	30	$15/8 = 1.875$	major seventh	1.888
				31	$31/16 = 1.9375$		

1.2 Consonance and dissonance

Table 2: Intervals chart in relation to C note. Minor (m or “-”), major (M or “maj”), augmented (A or “aug” or “#” or “+”) and diminished (d or “dim” or “b”).

Semitones	Name	Notation	Songs
0	Perfect unison	P1	-
1	Minor second	m2	JAWS theme
2	Major second	M2	Frè-re Jacques
3	Minor third	m3	Iron Man by Black Sabbath
4	Major third	M3	”Oh-When the Saints”
5	Perfect fourth	P4	Here Comes the Bride (Wedding song)
6	Triton	T	”The - Simp- sons”
7	Perfect fifth	P5	”Twinkle - Twinkle Little Star”
8	Minor sixth	m6	The Entertainer
9	Major sixth	M6	Jingle Bells (”Dash-ing through the snow”)
10	Minor seventh	m7	Theme song Star Trek : The Original Series
11	Major seventh	M7	Take On Me (”Take-on ”)
12	Perfect octave	P8	”Some-where over the rainbow”
13	Minor ninth	m9	-
14	Major ninth	M9	-
16	Diminished eleventh	d11	-
17	Perfect eleventh	P11	-
18	Augmented eleventh	A11	-
20	Minor thirteenth	m13	-
21	Major thirteenth	M13	-

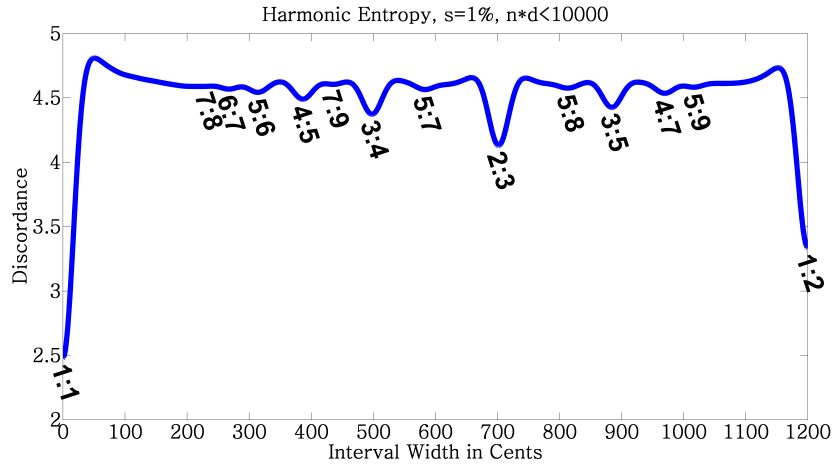


Figure 2: Harmonic entropy

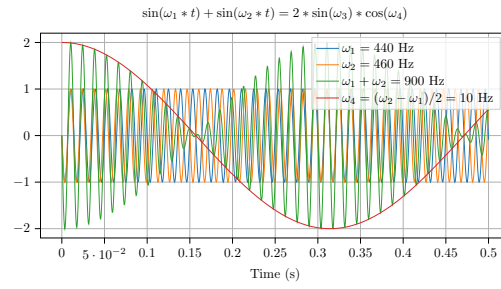


Figure 3: Beat tone

2 Scales

Table 3: Scales formula (relative to the major scale)

Scale name	Formula							Comment
Major	1	2	3	4	5	6	7	
Pentatonic Major	1	2	3	-	5	6	-	
Natural minor	1	2	b3	4	5	b6	b7	
Pentatonic minor	1	-	b3	4	5	-	b7	
Harmonic minor	1	2	b3	4	5	b6	7	
Melodic minor	1	2	b3	4	5	6	7	
Ionian (Major)	1	2	3	4	5	6	7	
Dorian	1	2	b3	4	5	6	b7	Mad world, So What
Phrygian	1	b2	b3	4	5	b6	b7	Symphony of destruction
Lydian	1	2	3	#4	5	6	7	Legend of Zelda
Mixolydian	1	2	3	4	5	6	b7	Clock by Coldplay
Aeolian (natural minor)	1	2	b3	4	5	b6	b7	Smell Like Teen Spirit
Locrian	1	b2	b3	4	b5	b6	b7	Rush-YYZ intro
Ionian b6	1	2	3	4	5	b6	7	
Dorian #4 (4 th Harm. min)	1	2	b3	#4	5	6	b7	
Phrygian dominant (5th Harm. min)	1	b2	3	4	5	b6	b7	Flamenco, egyptian
Lydian dominant (4th Melo. min)	1	2	3	#4	5	6	b7	Prog futuristic, Simpsons theme
Mixolydian b6 (5th Melo. min)	1	2	3	4	5	b6	b7	Prog rock
(or Aeolian dominant)								
Neapolitan minor	1	b2	b3	4	5	b6	7	
Bizantine scale (double harmonic major)	1	b2	3	4	5	b6	7	Opeth - Bleak
Lydian #2,#6								
Ultra-Phrygian	1	b2	b3	b4	5	b6	bb7	
Hungarian minor (double harmonic minor)	1	2	b3	#4	5	b6	7	
Oriental (Asian)								
Ionian Aug#2	1	#2	3	4	#5	6	7	
Locrian bb3,bb7	1	b2	bb3	4	b5	b6	bb7	

2.1 Major scale

Modes ranked by brightness: Super-locrian, locrian, phrygian, aeolian, dorian, mixolydian, major, lydian, lydian augmented

- Major scales and the modes (and all modes)
- Pentatonic scale (Major, Egyptian, Man Gong, Ritusen)
- Minor scale (natural, harmonic, melodic)
- Phrygian dominant (hijaz) (I-bII-iiidim-iv-vdim-bVI+-bvii) Ex: Come out and Play The Offsprings

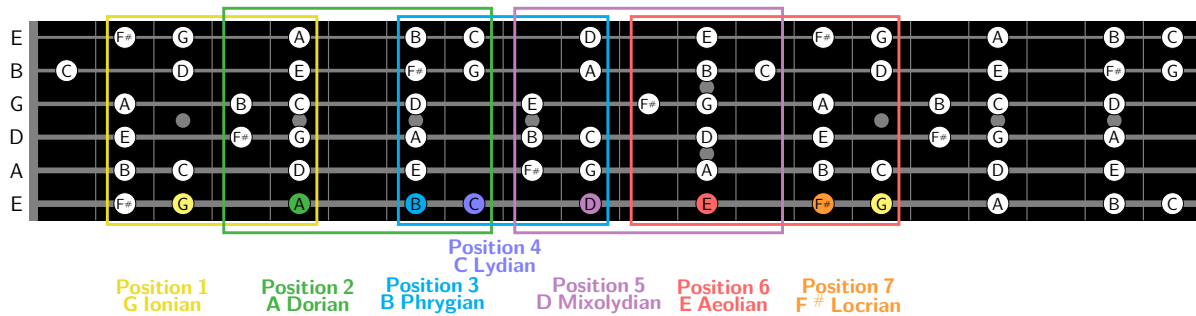


Figure 4: G Major scale on the fretboard

2.2 Pentatonic scale

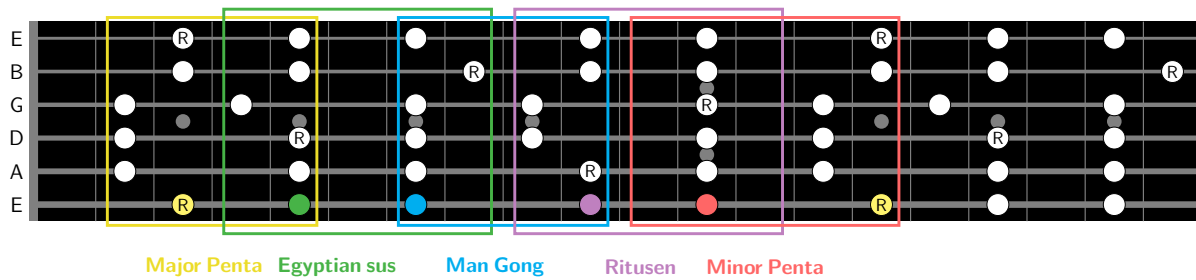


Figure 5: Pattern of pentatonic scales

2.3 Blues

Table 4: Blues scales (relative to the major scale)

Scale name	Formula							
Blues Major	1	2	b3	3	-	5	6	-
Blues minor	1	-	b3	4	b5	5	-	b7

Table 5: 12 bar blues in C major

G7	G7	G7	G7
C7	C7	G7	G7
D7	C7	G7	D7

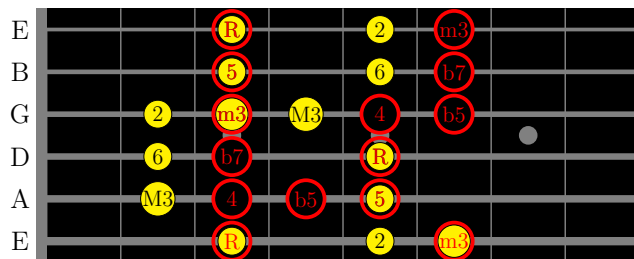


Figure 6

3 Chords

- Tonic: I, iii, vi
- Pre-dominant: IV, ii
- Dominant: V, vii°
- “Sus” chords: chord without third
- “sus9” will often replace the dominant 7th chord

3.1 Formation of chords

Table 6: Construction of chords (notation is relative to the major scale)

# notes	Chords						
triad	-	1	M3	5	-	-	-
	m	1	m3	5	-	-	-
	dim or $^{\circ}$	1	m3	b5	-	-	-
	aug or $\#5$	1	m3	$\#5$	-	-	-
	sus2	1	M2	5	-	-	-
	sus4	1	4	5	-	-	-
tetrad	7	1	M3	5	m7	-	-
	Δ	1	M3	5	M7	-	-
	m^7	1	m3	5	m7	-	-
	m^{Δ}	1	m3	5	M7	-	-
	m^{7b5} or \emptyset	1	m3	b5	m7	-	-
	$^{\circ}7$	1	m3	b5	b7	-	-
	6	1	M3	5	6	-	-
	m6	1	m3	5	6	-	-
	m6(9)	1	m3	6	M9	-	-
	6(9)	1	M3	6	M9	-	-
	7sus4	1	4	5	m7	-	-
	add2	1	M2	M3	5	-	-
	add9	1	M3	5	M9	-	-
pentad	7(b9)	1	M3	5	m7	m9	-
	Δ^9	1	M3	5	M7	M9	-
	9	1	M3	5	m7	M9	-
	m9	1	m3	5	m7	M9	-
	sus9	1	4	5	m7	M9	-
	11	1	5	m7	M9	11	-
hexad	7(13)	1	M3	5	m7	M9	M13
	7(b9,13)	1	M3	5	m7	m9	M13

3.2 Chord inversions

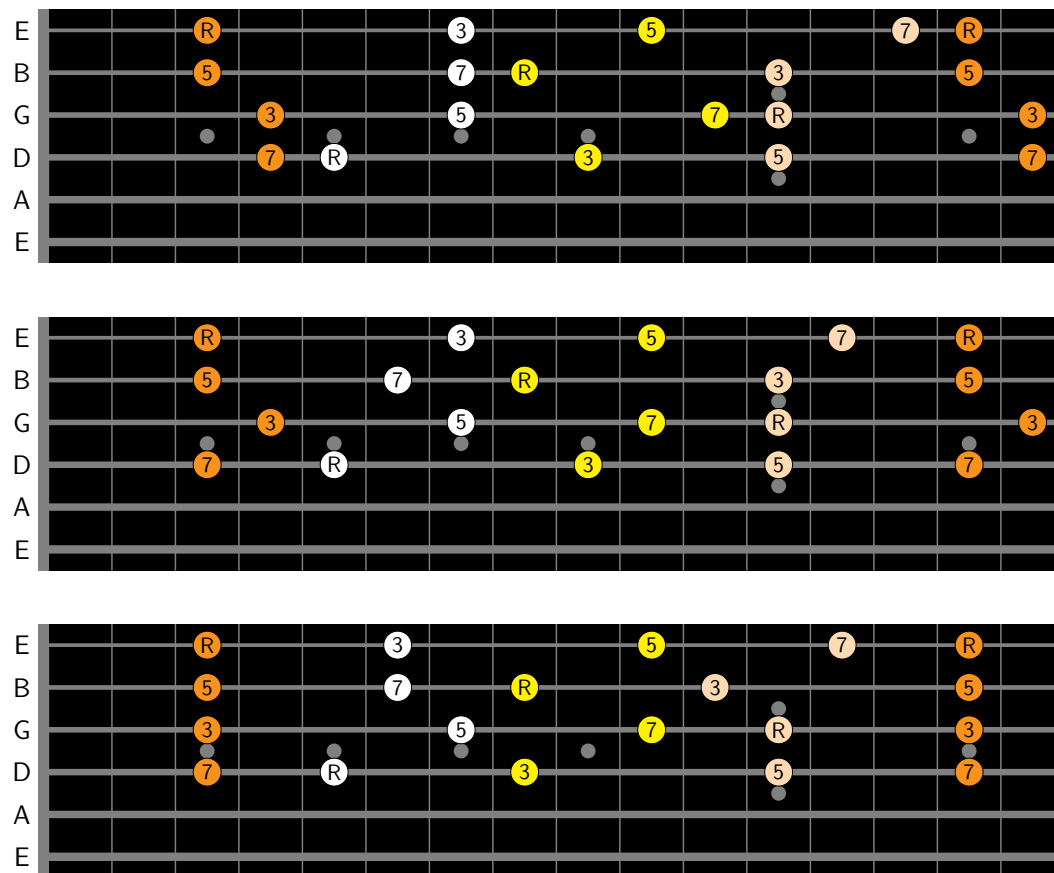


Figure 7

3.3 Chord progression and example

Table 7: Famous chord progressions

Name	Progression	Example
Pop major (punk)	I – V – vi – IV	Dammit, Let it be, Country Road
Anatol (turnaround)	I ^Δ – vi ⁷ – ii ⁷ – V ⁷	Blue Moon
50s progression	I – vi – IV – V	Every Breath You Take, Crocodile Rock
Ragtime	I – VI ⁷ – II ⁷ – V ⁷	I want to be like you (Disney)
Jazz (ii-V-I)	ii ⁷ – V ⁷ – I ^Δ	Autumn leaves
Blues/Rock (Major)	I ⁷ – IV ⁷ – V ⁷ – I ⁷	Johnny B. Goode
Mixo vamp (mixo)	I – bVII – IV – I	Hey Jude, Sweet home Alabama
Japanese “Royal road”	IV ^Δ – V ⁷ – iii ⁷ – vi ⁷ – (ii ⁷ – V ⁷ – I ^Δ)	Shogo theme, anime
“Storyteller”	I – IV – vi – V	
Creep chord	I – III – IV – iv	Creep, Space Oddity
Pop minor	i – bVI – bIII – bVII	Save Tonight, Africa Toto
Aeolian vamp	i – bVII – bVI – bVII	Stairway to Heaven, All Iron Maiden
Minor progression 01	i – i – bVI – V	Sweet Dreams
Minor progression 02	i – bVI – bIII – bVII	
Minor progression 03	i – bVI – iv – bVII	Final countdown
Minor progression 04	i – bIII – bVII – iv	Boulevard of Broken Dreams
Andalusian (phrygian)	i – bVII – bVI – V ⁷	Happy Together The Turtles
Blues/Rock (minor)	i ⁷ – iv ⁷ – V ⁷ – i ⁷	Minor swing
Anime	bVI – bVII – i	
Neapolitan	i – bII ⁶ – V – i	Classic

Concepts:

- Borrowed chord: chord that is not built from the scale of the tonic. Examples:
 - “Picardy third”: a progression with an ending major triad instead of an expected minor triad to create an impression of resolution.
 - Use the bVII
- Transistion Chords:
 - Secondary dominant chord (tonicization) (V/x): using the fifth of a chord (even if it’s not a diatonic chord) in order to feel a “resolution” on this chord.
 - Tritone substitution (Vsub/x or bV7/V): Approach any target chord with a diminished 7 chord a semitone above.
 - Backdoor [ii V]. Approach the tonic with iv7 - bVII7 - I.

– Modulation (Rick Beato):

- * Diatonic common chord (“close” keys have many chords in common that can be used to modulate from a key to another. Common chords are called pivot chords)
- * Chromatic pivot chord
- * Enharmonic dominant
- * Deceptive
- * Enharmonic Dim7
- * Dim7 to Dom7 (lower the root of the dim7 chord to create a dominant chord that leads to a new tonic)
- * Chromatic Mediant
- * Common tone (Pivot note)
- * Direct or Linear (Abrupt change of key without preparation to “lift” the song)
- * Chain Modulation ()
- * Parallel modulation (Modulation of the mode but keep the same root ex: C to Cm)

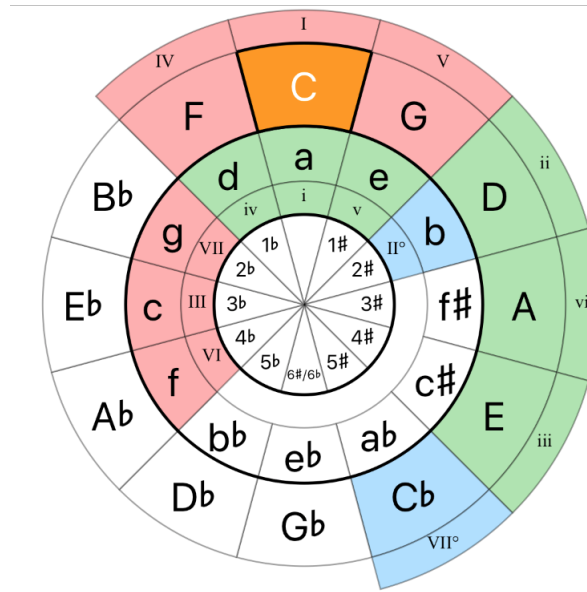


Figure 8

- Substitution tritonique

- Substitution diatonique

4 Modes

Table 8: Table of modes

Major scale degree	I ^Δ	ii ⁷	iii ⁷	IV ^Δ	V ⁷	vi ⁷	vii [∅]
Mode	Ionian	Dorian	Phrygian	Lydian	Mixolydian	Aeolian	Locrian
Example	(joy)	(jazzy)	(flamenco)	(floaty, mystery)	(blues)	(sad)	(tension)
#####	F [#]	G [#]	A [#]	B	C [#]	D [#]	E [#]
#####	B	C [#]	D [#]	E	F [#]	G [#]	A [#]
#####	E	F [#]	G [#]	A	B	C [#]	D [#]
####	A	B	C [#]	D	E	F [#]	G [#]
###	D	E	F [#]	G	A	B	C [#]
##	G	A	B	C	D	E	F [#]
#	C	D	E	F	G	A	B
-	F	G	A	B ^b	C	D	E
b	B ^b	C	D	E ^b	F	G	A
bb	E ^b	F	G	A ^b	B ^b	C	D
bbb	A ^b	B ^b	C	D ^b	E ^b	F	G
bbbb	D ^b	E ^b	F	G ^b	A ^b	B ^b	C
bbbbb	G ^b	A ^b	B ^b	C ^b	D ^b	E ^b	F

Table 9: harmonization of scales

Major	1 I ^Δ	2 ii ⁷	3 iii ⁷	4 IV ^Δ	5 V ⁷	6 vi ⁷	7 vii [∅]
Minor natural	1 i ⁷	2 ii [∅]	b3 bIII ^Δ	4 iv ⁷	5 v ⁷	b6 bVI ^Δ	b7 bVII ⁷
Harmonic minor	1 i ^Δ	2 ii [∅]	b3 bIII ^{Δ, aug}	4 iv ⁷	5 V ⁷	b6 bVI ^Δ	7 vii ^{∅7}
Melodic minor	1 i ^Δ	2 ii ⁷	b3 bIII ^{Δ, aug}	4 IV ⁷	5 V ⁷	6 vi [∅]	7 vii [∅]
Dorian	1 i ⁷	2 ii ⁷	b3 bIII ^Δ	4 IV ⁷	5 v ⁷	6 vi [∅]	b7 bVII ^Δ

- Ionian (Joy), dorian(Jazz), phrygian(flamenco,doom), lydian (floaty,mystery) (ex: E.T., Jurassic Park, Back to the Future), mixo(blues)(ex: AC/DC), aeolian(sad)(ex: Losing my Religion), locrian(tension)(ex:Bjork Army of Me)
- Harmonization of harmonic minor scale
- Harmonization of melodic minor scale

- How to use this table
- Example of chord progression

5 Arpeggios

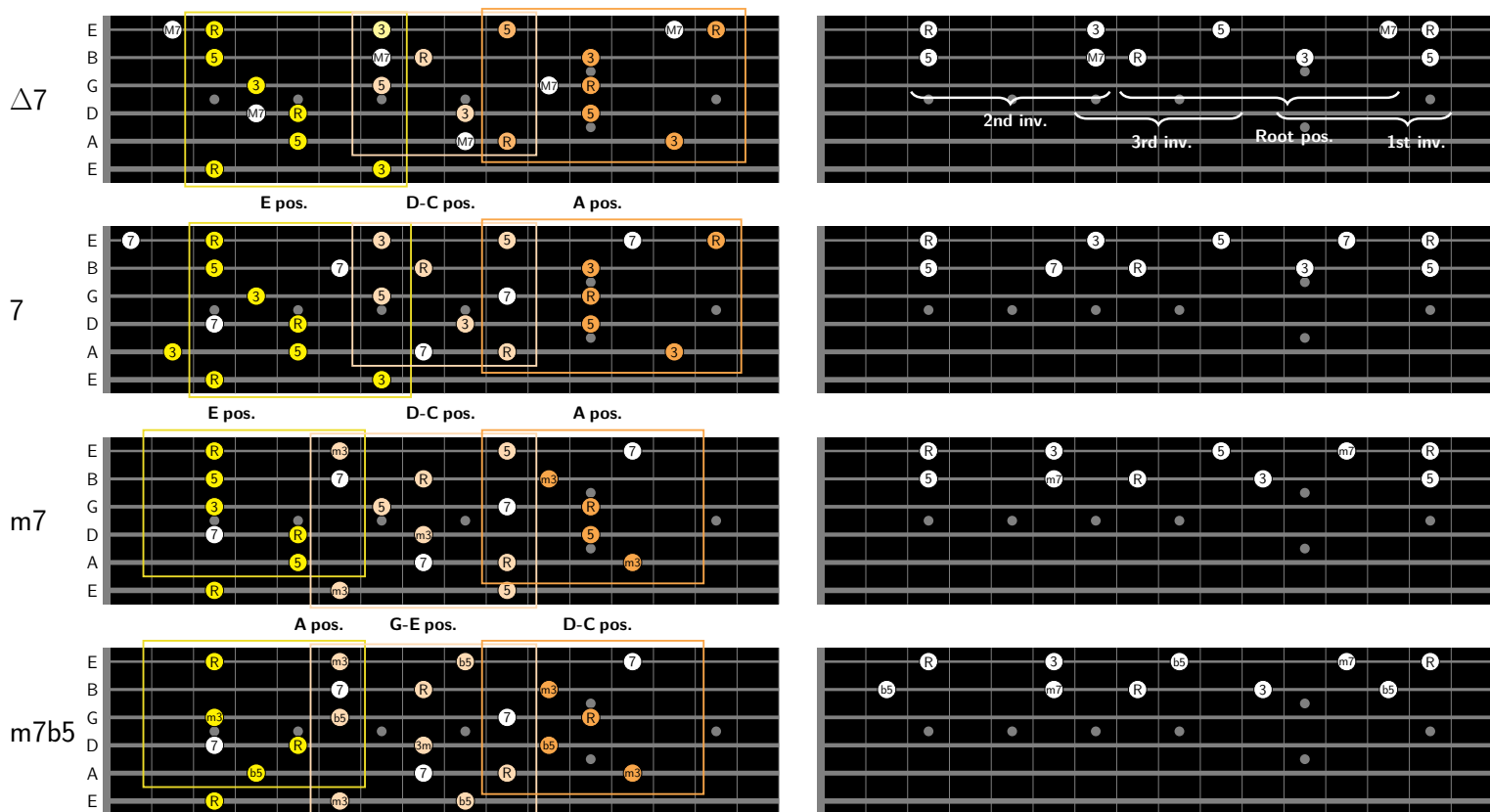


Table 10: G arpeggio

6 Transposition

<https://www.youtube.com/watch?v=Vxac3hHrxg8>

7 Composition variation (Shred Master Scott)

- Pedal tone
- Inversion
- Voice leading

References