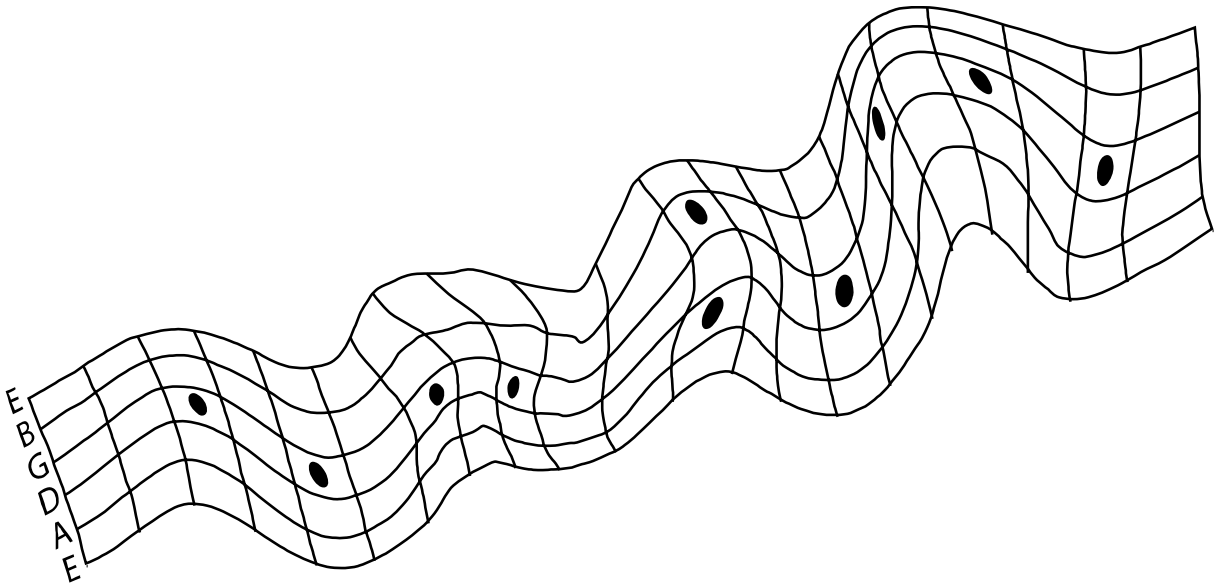
STANDARD GUITAR TUNING:



A HISTORICAL MISTAKE?

A guitar method exploring Tuning in Perfect Fourths

by Çağlayan Yıldız

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A big “thanks” goes to Anne-Marieke Meij for her endless support, proof-reading, being a guinea pig for the understanding of the concepts and fingerings represented in this book

Another big “thanks” goes to Erkan & Amy Sevil for their friendship and the great working space they have provided during the creation of this book

Kaş, Turkey
August 2006
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PREFACE

In 1994, I stopped playing and composing music for one whole year. I wanted to evaluate my relationship to music in all aspects. I wanted to figure out how it fitted my life, what was ego and what was inspiration, what was spiritual and what was social.

At the end of this period, with the revelations I had, I wanted to make a fresh start and along with this came the idea of changing my guitar tuning into perfect 4th's just by tuning the 1st & 2nd strings ½ step up (E A D G C F) to get rid of the irregular major 3rd in the standard guitar tuning.

Later on, I realized that there were other guitarists tuning in perfect 4th's, one famous example being Stanley Jordan who is known for his incredible 2 hand tapping technique. I started to research the subject, but found out that there was hardly any literature available. Considering the amount of publications on guitar, this seemed quite a gap to fill in.

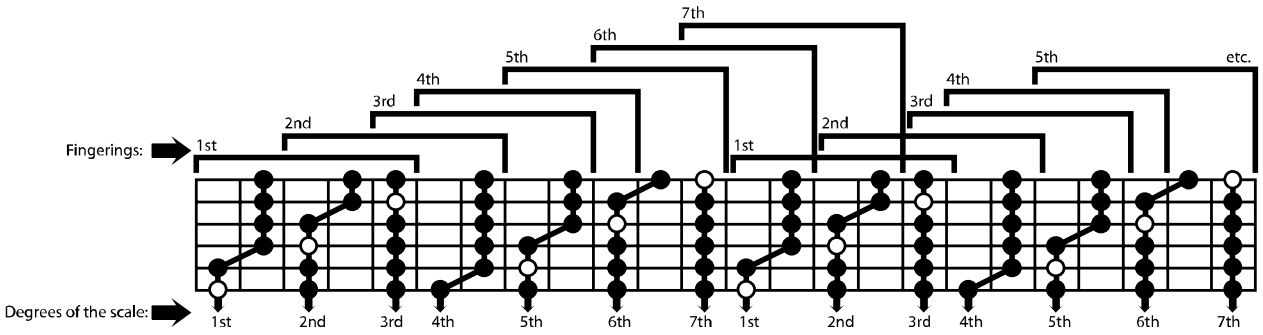
After 12 years of playing in this tuning, I am ready to write a method about it. This is worth the effort because this tuning changes the technique and the fingering system of the guitar completely. I can boldly state that tuning in 4th's makes it far easier to learn and play the guitar on a professional contemporary level.

This book compares the tuning in 4th's to the standard tuning in the basic vocabulary of contemporary guitar playing. It might inspire some guitarists to try or completely switch to Tuning in Perfect 4th's. Those who want to keep on using the Standard Tuning might still like to use the materials discussed here, because it gives an overview of most materials used in contemporary guitar playing.

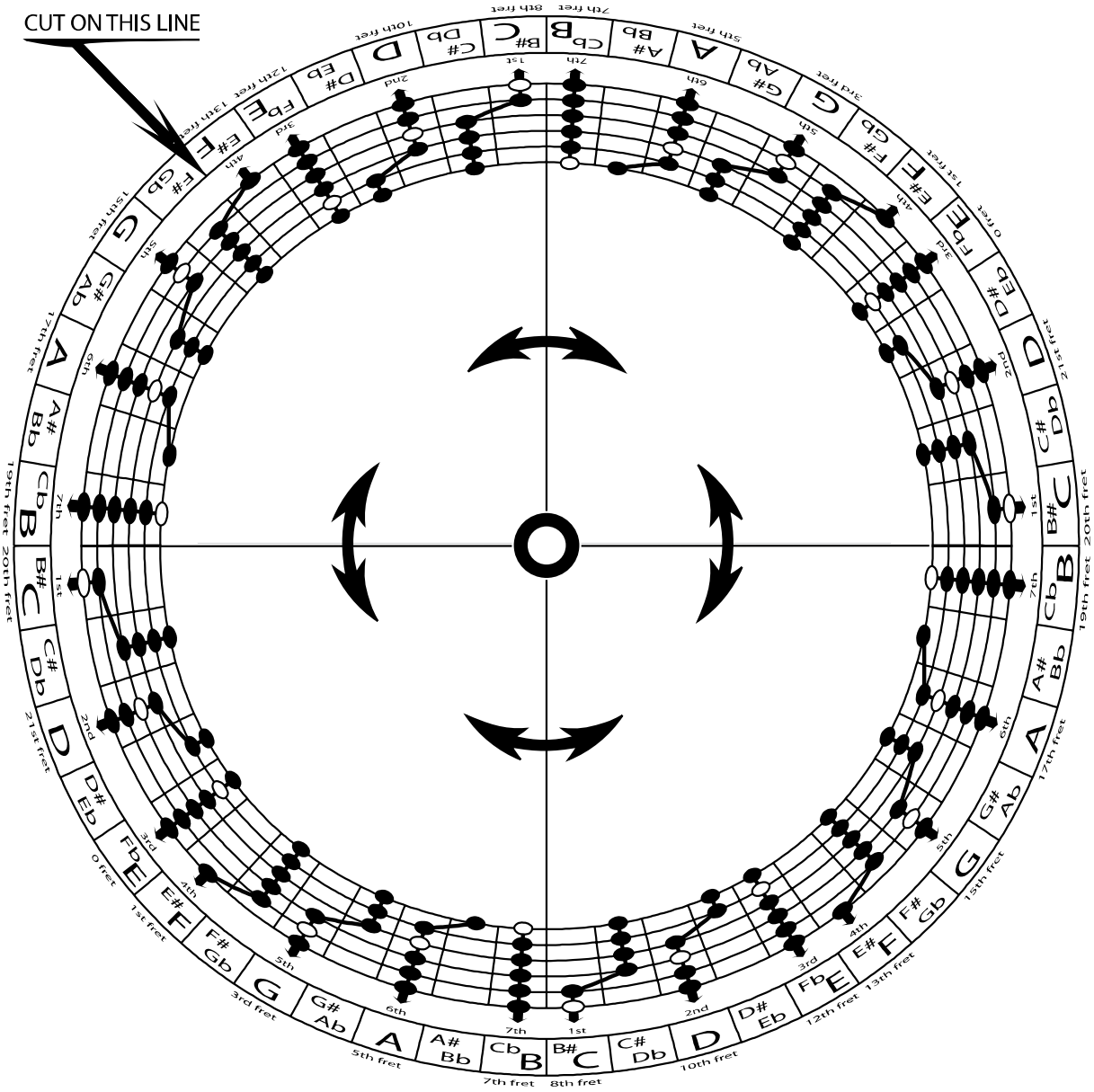
INTRODUCTION

How to read the fingerings in this book?

Here is the fingering of major scale in Tuning in Perfect 4th's on the fretboard. The major scale is a seven note scale, so if we select "positions" (6 fret areas) each starting with a new scale degree on the 6th string, we naturally end up with 7 fingerings that in fact correspond to the 7 modes of the major scale. Then, the same fingerings keep repeating themselves as far as the fretboard goes. The root is drawn as a white circle, and the other scale degrees can be located relative to the roots at all times.



Then, if we imagine a constantly rotating fretboard….

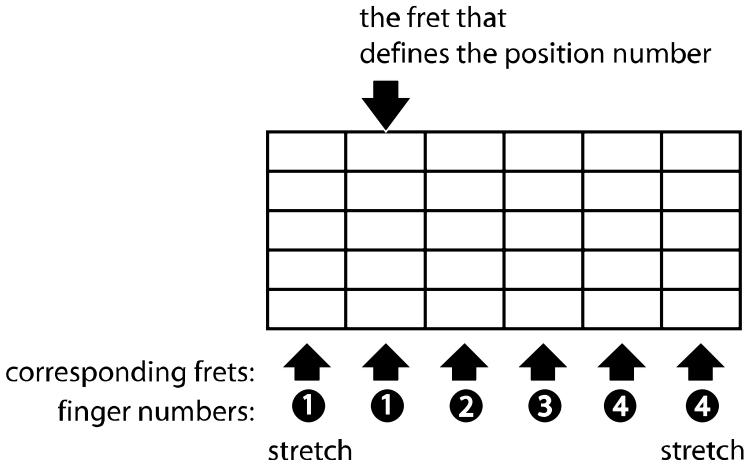


If we cut the outer circle line and rotate the inner circle, we can find all of the seven fingerings of twelve major scales in Tuning in Perfect 4th's.

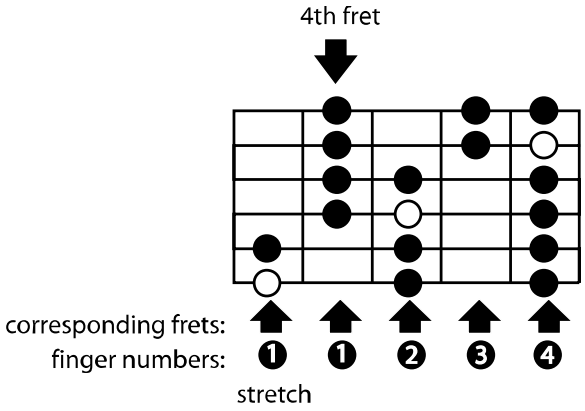
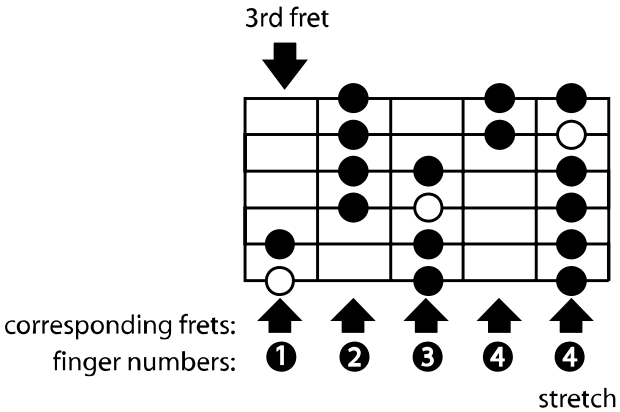
The same logic of a rotating fretboard is valid for all the fingerings in this book.

The Concept of Position Playing

On the guitar, a "position" is an area on the fretboard covering six frets across all six strings. The range of a position in Standard Tuning is "two octaves + a Perfect 4th " and in Tuning in Perfect 4th's, it is "two octaves + an augmented 4th ".
2nd&3rd fingers are used on a "one fret/finger" basis in the middle, and 1st&4th fingers are used on a "two frets/finger" basis, the outside frets being called "stretches".



The position number is determined by the 1st finger's "non-stretch" position. For example:

G major on 4th position in Tuning in Perfect 4th's	G major on 3rd position in Tuning in Perfect 4th's
	

So, although the shape of the scale on the fretboard is the same, the position number defines which stretches have to be used. Notice that G major on the 3rd position is more difficult, because two consecutive notes of the scale have to be played by the 4th finger on the 1st &2nd strings. The natural choice of the player than should be G major on the 4th position, since each consecutive scale degree lies naturally on another finger.

Chapter 1

A BRIEF HISTORY OF GUITAR TUNING

Standard tuning

The 'standard' guitar tuning (EADGBE) has been around from about the 17th century. The earliest guitars came in a variety of shapes and sizes and did not have six strings as the modern guitar. They could have anything ranging from 3 to 20 strings, based on old pictures. Unfortunately not much is known about the tuning of these ancient guitars. Not much is known as well as to why the six string guitar finally became the standard and why the tuning developed as it has.

However there are several texts and books referring to tuning in their present time. In the 16th century Adrian leRoy writes about the guitar having 4 strings, tuned to the intervals of a 4th, a major 3rd and another 4th. Bermudo mentions this as the 'new' tuning of that time. It corresponded to the 4 inner strings of the lute and vihuela (a predecessor of the guitar). In the 'old' tuning the lowest string was one tone lower. Mudarra mentions both tunings in 'Tres Libros de Musica' (1546).

The most common tuning of the 4 string guitar was CFAD. However Michael Praetorius mentions a tuning of FBDG in 1618. In Spain soon after a fifth string is added to the guitar. This string was tuned as a G. (The new tuning becoming GCFAD). This guitar became known outside of Spain as the Spanish guitar. It became very popular in Italy and spread on to the rest of Europe. During the 17th century the pitch was raised by a tone, creating the following tuning: ADGBE. Espinel used both tunings. However since Ribayez in 1677 the higher pitch became the standard.

Around the 18th century the guitar had become an instrument for amateurs. The reason that the 5 strings made way for 6 strings might be doubling of E string in the bass for *barre* chords. The guitar is now tuned EADGBE as today.

Alternate tunings

Even though the standard tuning exists since the 17th century, guitarists have always experimented with alternate tunings. 'The Elements of Guitar', an 1838 guitar method book, mentions 'peculiar tuning'. A Spanish song called 'Fandango' is presented as an example of tuning in 'open G' (DGDGBD).

Around 1920 alternate tunings start to become popular in the United States with the rise of the blues music. The most popular tuning around blues players is 'open G'. This tuning is also known as Slack Key tuning. Today it is still used as a playing style in Hawaii.

The reason one preferred an open tuning, was that the tension of guitar strings and the amount of finger pressure required to hold down the string is reduced. A player owning a cheap guitar (meaning that he has to work harder holding the strings in place on the fretboard) is easily convinced why to change to open G tuning. The

other early blues alternate tunings were 'open E minor' (EBEGBE), DADGBD and DGDGCD.

When folk and blues players became more progressive, the usage of these tunings declined. The reasons for this were the lack of flexibility of using only one finger to make a chord and that almost all guitar method books (then as well as now) were made for standard tuning.

At one moment players started to realize that one could play scales and chords in alternate tunings and make much more complex arrangements using these skills. Chords and arpeggios that are difficult or even impossible in the standard tuning become workable in alternate tunings. For certain musical styles, such as folk, the different open intervals sound much better than the fretted versions in standard tuning. Finally composers of guitar tunes found themselves 'freed' from the 'normal' chords and sounds they were used to in the standard tuning.

The recent movement of alternate tuning started in the 1960's. Most players using alternate tunings today can trace their decision back to three different influences. The first wave came in the early 1960's with the British fingerstyle guitarists Davey Graham, Martin Carthy, John Renbourn and Bert Jansch. They say Davey Graham invented the DADGAD tuning and that he is the founder of the British folk revival.

The British players had no obvious tradition to draw on for inspiration and were in the sense absolutely free to experiment. This experimentation extended to the uses of alternate tunings. They would use it to enhance and extend their style or to simulate ethnic music sounds.

The second wave came from the 'Fingerstyle Guitar Heroes'. This group contained players like John Fahey and Leo Kottke. Almost everything played by them was in a different tuning than the standard tuning. Fahey and Kottke were mostly influenced by blues and country music. One of their favorite tunings was the Open G tuning (DGDGBD.)

The third wave came with the songwriters and singers of the late 1960's and early 1970's. David Crosby and Joni Mitchell are among these. The number of tunings used by Crosby and Mitchell ranges into the hundreds. (See appendix 1 for a list of various tunings for guitar.)

The history of Tuning in Perfect 4th's

Tuning in fourths as presented in this thesis stands on a different level than the earlier mentioned alternate tunings in this chapter. Most mentioned alternate tunings are used for different sounds and are meant to coexist next to each other. There are guitar players using up to five different kinds of tuning next to each other. However the tuning in fourths is presented as a competitor of the standard tuning. It makes the general guitar technique easier and clearer. It is not meant to provide a different color. (Although it does make different open chords possible as discussed later in this thesis).

Tuning in Perfect 4th's is much older than the Standard Tuning in guitar. If we look at the current tuning of string instruments of Middle East and Far East which have a history of thousands of years, we mostly encounter a symmetric tuning, consisting of Perfect 4th's

and Perfect 5th's. This is due to the fact that this symmetry makes the playing of the melodic material easy, which is always modal in these cultures. The open string Perfect 4th's and 5th's are used to supply the "Drone" of the modes.

There is written evidence of Tuning in Perfect 4th's goes back as far as the 13th century. Safi al-Din (1216-1294) wrote a treatise 'Kitab al-Adwar' (Book of cycles) discussing the tuning of the oud in perfect fourths. The tuning in fourths is absolutely certain from his detailed descriptions. Of course it is not known if standard tuning of the instrument existed in his time in terms of absolute pitches. He designated the pitches using alphabetical letters rather than tone names as is common in Arabian music. Later Medieval and early modern writers are discussing tunings of oud using the traditional tone names for strings, so there were clearly standard tunings by then. However there is once again no indication of absolute pitch. One should understand these tunings as relative, with the instruments being in tune with themselves and then adjusted to each other. Absolute pitches were made standard only very recently in 1932 at the first Congress of Arab Music in Cairo, Egypt.

A theory of how Tuning in Perfect 4th's became Standard Tuning on the guitar

In 711 AD, the Moors who invaded Spain brought with them stringed instruments called the oud and the rebab. Gypsies wandering west from Persia and Crusaders returning from the east to Europe, in the 12th Century, brought early versions of the lute and the vihuela. All of these instruments most probably had symmetric tunings in Perfect 4th's and Perfect 5th's. From these instruments, the 'modern classical guitar' came as a result of experimentation in Europe. Most probably the "major third" had to be introduced because of the transition from modal music to triadic harmony and the prominence of the Major Scale, making the major and minor *barre* chords easier.

Chapter 2

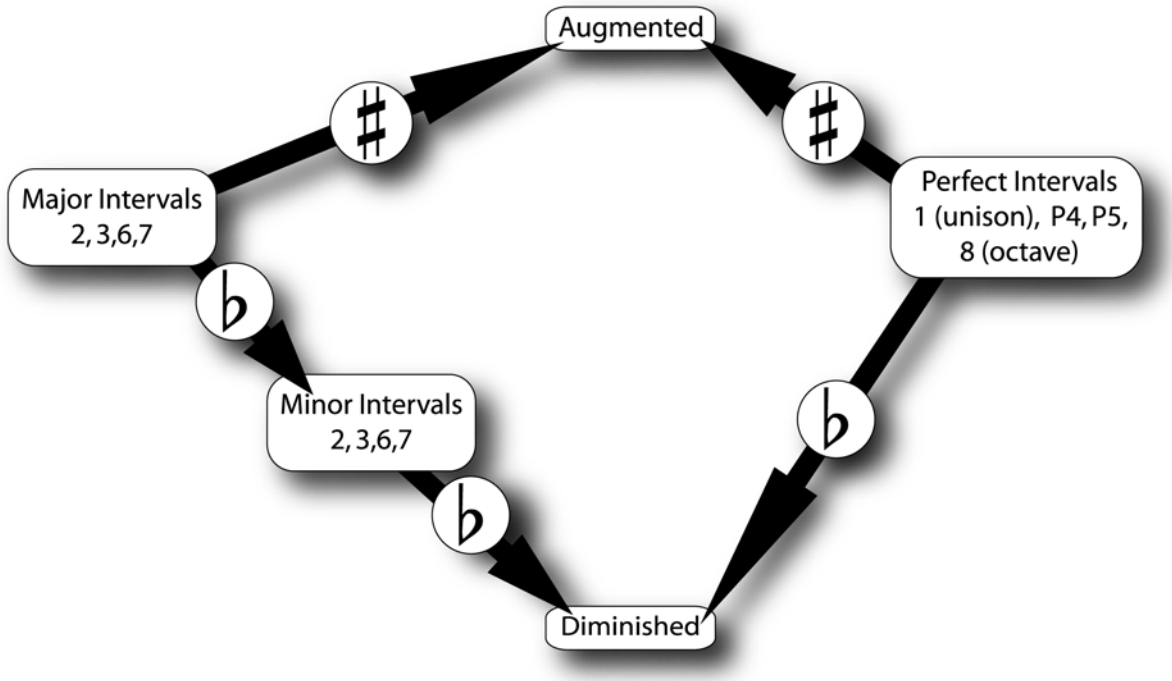
COMPARATIVE STUDIES OF INTERVALS

An interval is the distance between two notes. In Western music, an octave is divided into 12, which are called half steps. Because of the prominence of the major scale, the naming of the intervals has been based on it.

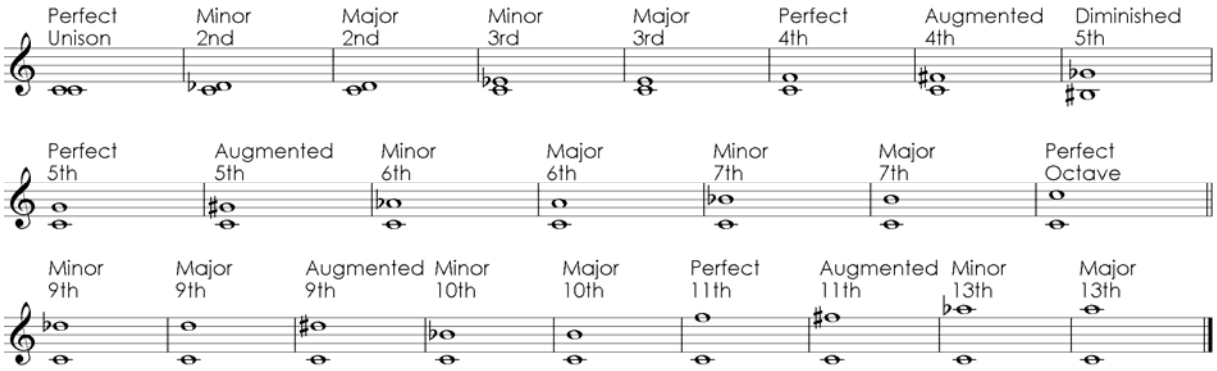
	One octave												
Half steps	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Major Scale Degrees	1		2		3	4		5		6		7	8
Example: C major Scale	C		D		E	F		G		A		B	C

There are two groups of intervals:

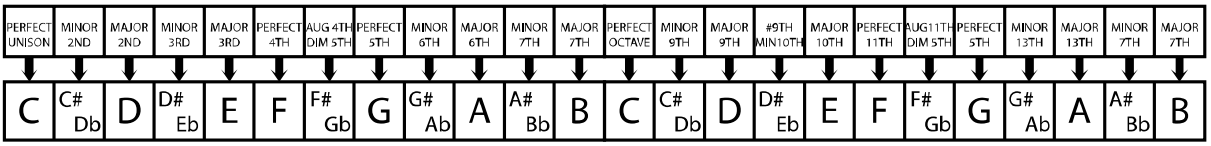
- Major Intervals: They are 2nd, 3rd, 6th, 7th. When these intervals are lowered one half step, they are called Minor 2nd, 3rd, 6th, 7th. When they are lowered two half steps, they are called Diminished 2nd, 3rd, 6th, 7th. When these intervals are made higher by one half step (♯), they are called Augmented 2nd, 3rd, 6th, 7th .
- Perfect Intervals: They are 1st (unison), 4th, 5th, 8th (octave). When these intervals are lowered by one half step (♭), they are called Diminished 1st (unison), 4th, 5th, 8th (octave). When these intervals are made higher by one half step (♯), they are called Augmented 1st (unison), 4th, 5th, 8th (octave).



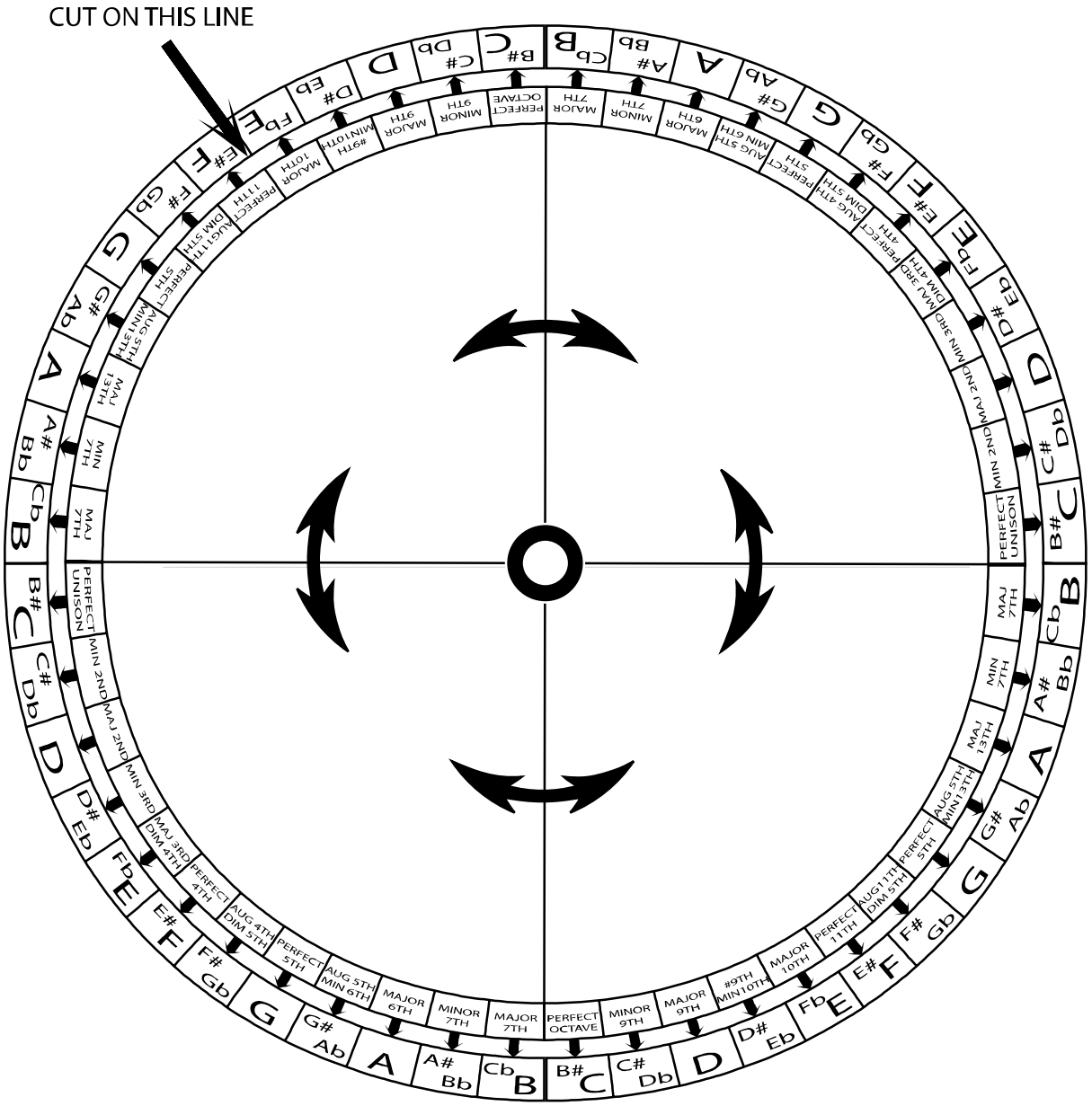
Beyond the first octave, we start adding "7" to the interval names; that is 2nd becomes 9th, 3rd becomes 10th, 4th becomes 11th, 6th becomes 13th. For the 5th and 7th and octave, this "addition naming" is rarely used. Here are the common intervals in C as an example:



If we convert the information above into a diagram in C:

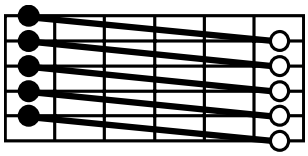
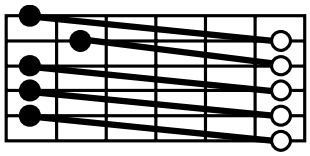
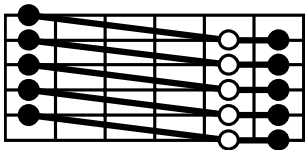
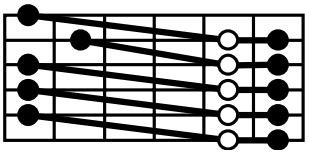
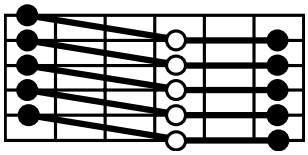
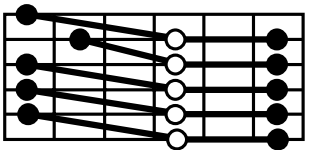
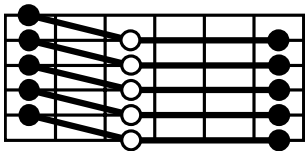
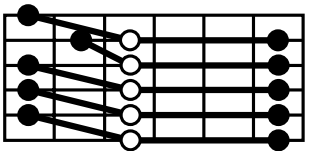
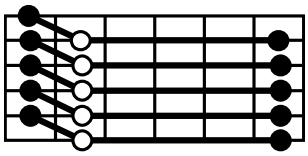
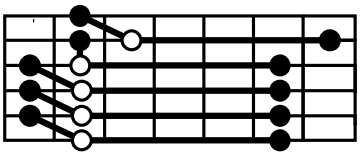
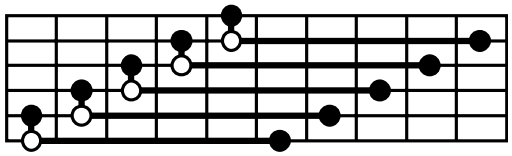
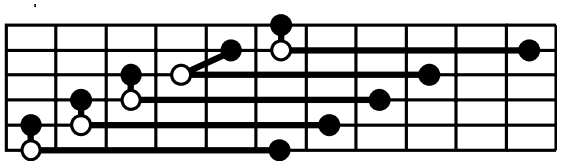
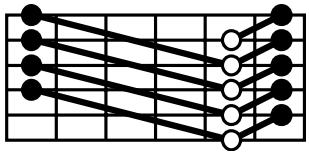
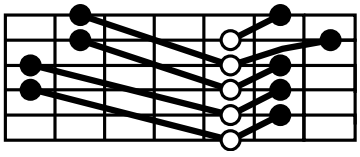
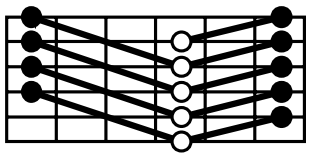
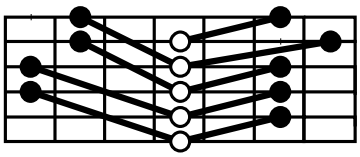


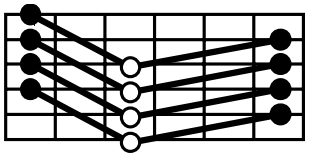
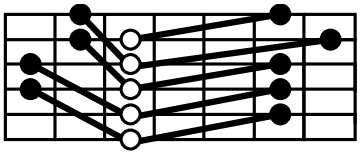
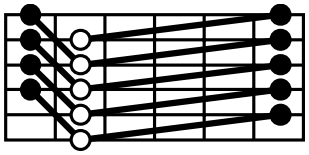
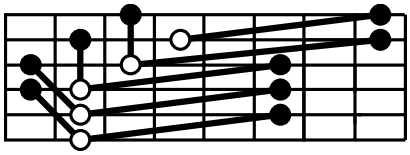
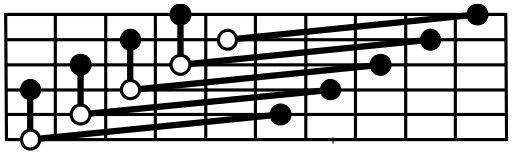
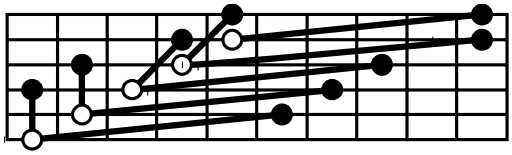
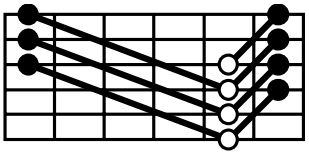
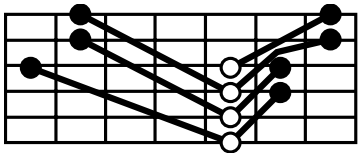
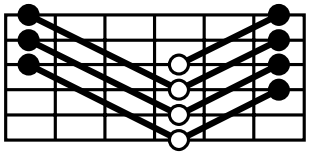
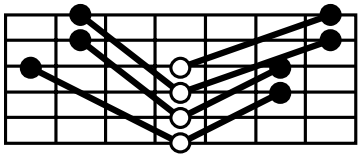
If we would like to find intervals relative to another note, then we simply have to add the same number of half-steps to that note. So if we make a system to rotate the lower row in the chart above, we get our "interval wheel". The outer circle line should be cut and the inner circle should be rotated:



So much for the theory of intervals. Let's take a look at the intervals on the guitar, both in Tuning in Perfect 4th's and Standard Tuning:

All of the intervals relative to a certain root note lie on two locations in a position. The root notes in the diagrams are drawn with a white circle and the intervals have been drawn with black circles, connected to the root note with a straight line. These diagrams are drawn to explain how the *shapes* of intervals *look like* on the fretboard. If one wants to locate the intervals relative to a determined note (such as B, F etc), then the root notes have to be placed on the correct position on each string.

Interval	Tuning in Perfect 4th's	Standard Tuning
Perfect Unison	 One shape	 Two shapes
Minor 2nd	 Two shapes	 Three shapes
Major 2nd	 Two shapes	 Three shapes
Minor 3rd	 Two shapes	 Three shapes
Major 3rd	 Two shapes	 Three shapes
Perfect 4th	 Two shapes	 Three shapes
Augmented 4th's/ Diminished 5th	 Two shapes	 Four shapes
Perfect 5th	 Two shapes	 Four shapes

Augmented 5th/ Minor 6th	 Two shapes	 Four shapes
Major 6th	 Two shapes	 Four shapes
Minor 7th	 Two shapes	 Four shapes
Major 7th	 Two shapes	 Four shapes
Octaves	 Two shapes	 Four shapes

Tuning in Perfect 4th's means that there is less information for the performer to be mastered both mentally and physically. Out of the 13 intervals we have compared:

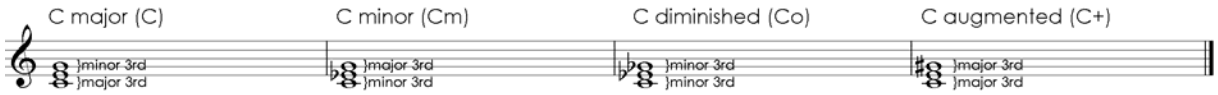
1. One interval, namely Perfect Unison, has in Tuning in Perfect 4th's a 1/2 less information ratio, compared to Standard Tuning
2. Five intervals, from Minor 2nd to Perfect 4th have in Tuning in Perfect 4th's a 1/3 less information ratio compared to Standard Tuning.
3. Seven intervals, from Augmented 4th to Perfect Octave, have in Tuning in Perfect 4th's a 1/2 less information ratio compared to Standard Tuning.

We can conclude with the total of 25 shapes/45 shapes, Tuning in Perfect 4th's is 1.8 times easier than Standard Tuning.

Chapter 3

COMPARATIVE STUDIES OF TRIADS

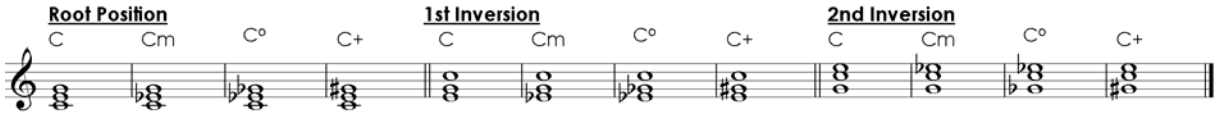
Triads are three note chords, constructed by stacking intervals of minor and major thirds. We have four types of triads: Major (major 3rd+minor 3rd), Minor (minor 3rd+major 3rd), Diminished (minor 3rd+minor 3rd) and Augmented (major 3rd+major 3rd). Here is an example in C, with the symbols of the chords in brackets:



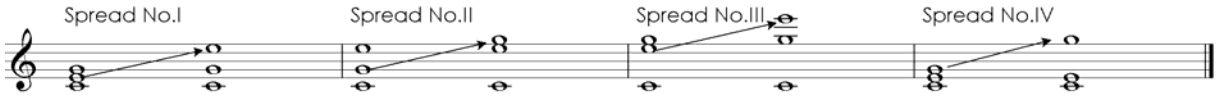
Another attempt to visualize them with a table in any key would be:

	One octave												
Half steps	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Degrees of the Major Scale	1		2		3	4		5		6		7	8
Major Chord	1				3			P5					
Minor Chord	1			♭3				P5					
Diminished Chord	1			♭3			♭5						
Augmented Chord	1				3				♯5				

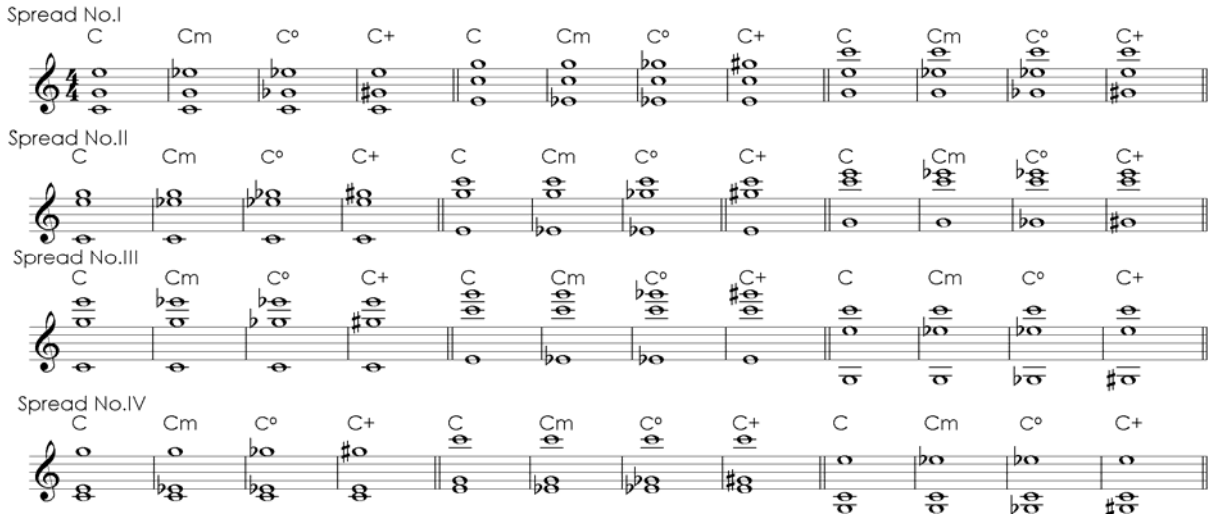
Triads can be *inverted* twice, that is putting the lowest note of the chord one octave higher and apply the same procedure to the resulting chord:



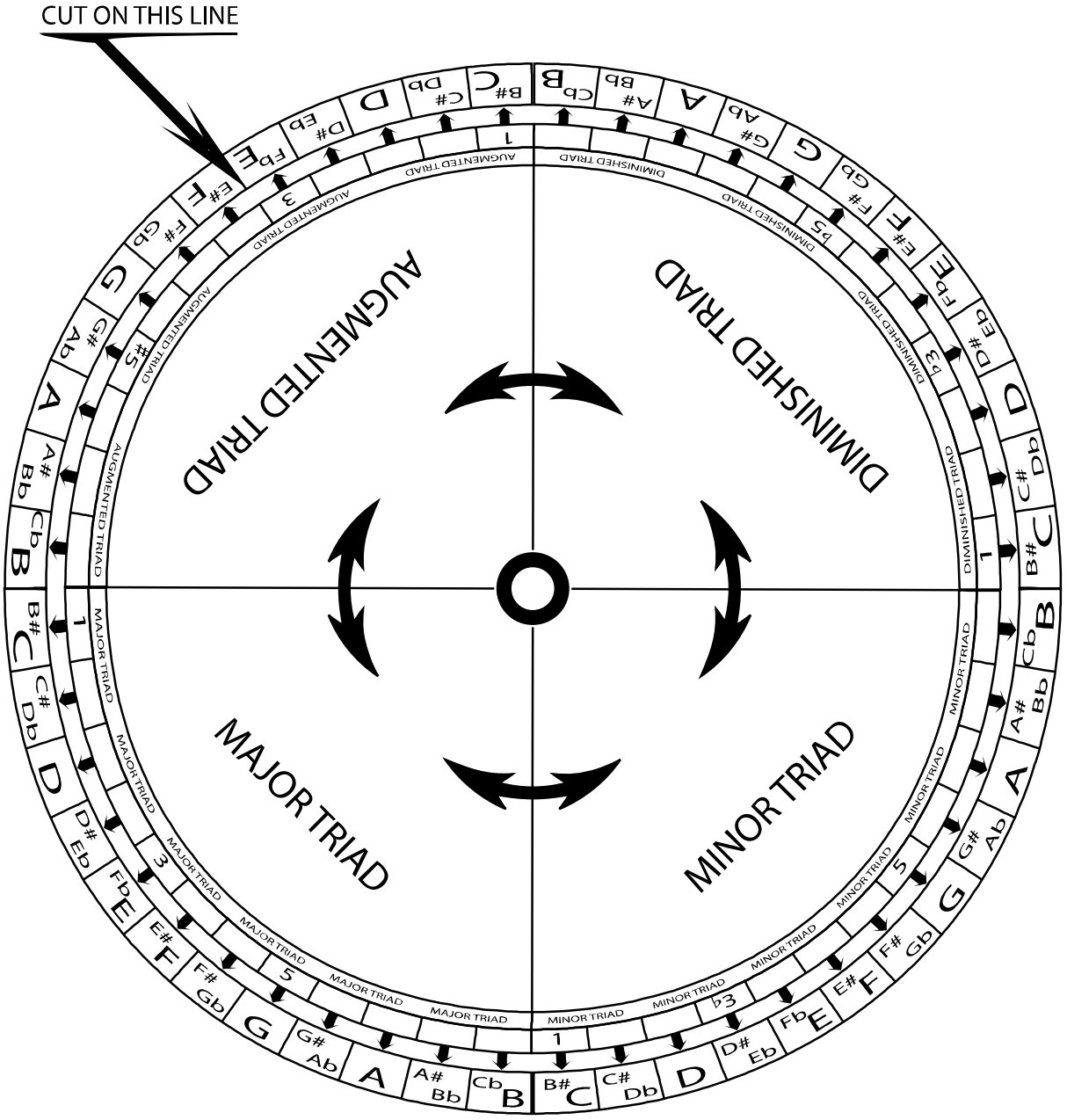
Further techniques can be used to spread the voices of the triads. This involves moving the voices of the chords by an octave:



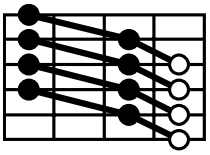
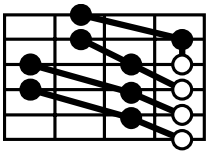
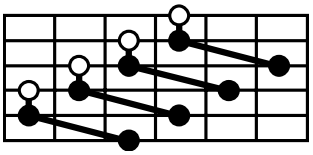
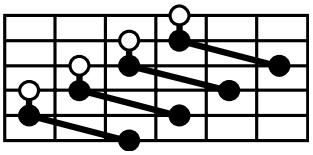
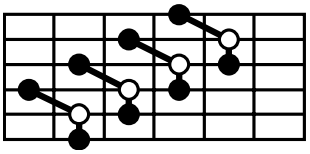
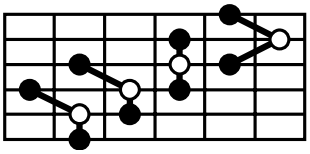
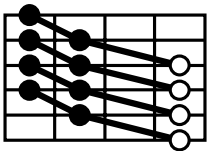
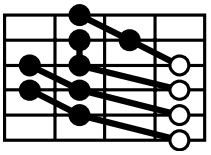
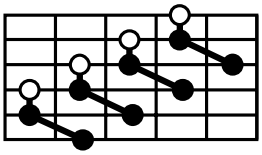
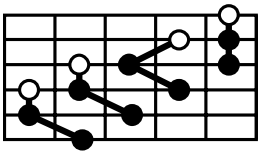
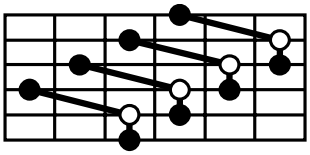
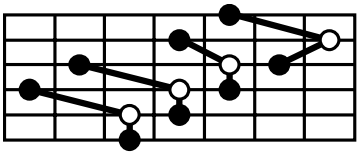
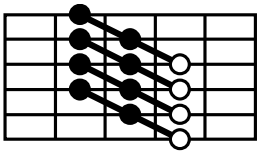
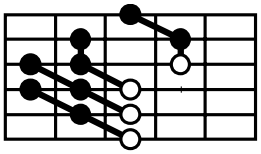
These spread voicings can be applied to all inversions:

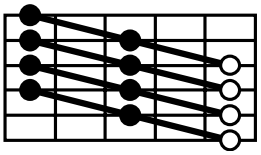
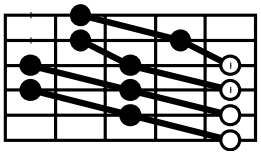
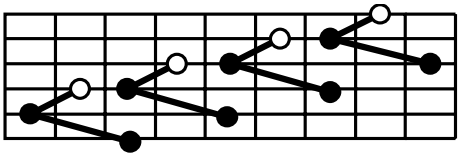
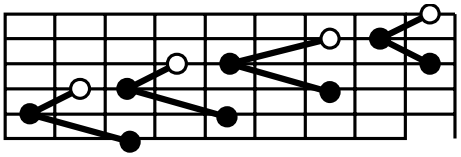
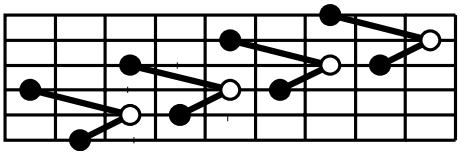
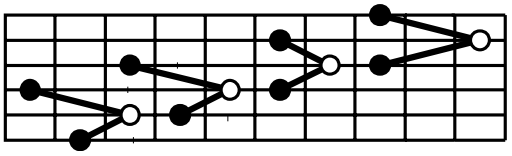


If we want to find all the triads in all keys, we simply have to apply the intervallic structures of the triads to 12 keys. The triad wheel below might help in visualization of this process:



Now, let's take a look at the fingerings of the triads and their inversions on the fretboard of the guitar:

Triad	Tuning in Perfect 4th's	Standard Tuning
Major Root Position	 One shape	 Three shapes
Major 1st inversion	 One shape	 Three shapes
Major 2nd inversion	 One shape	 Three shapes
Minor Root Position	 One shape	 Three shapes
Minor 1st inversion	 One shape	 Three shapes
Minor 2nd inversion	 One shape	 Three shapes
Augmented Root Position	 One shape	 Three shapes
Augmented 1st inversion	Same as root position One shape	Same as root position Three shapes
Augmented 2nd inversion	Same as root position One shape	Same as root position Three shapes

Diminished Root Position	 One shape	 Three shapes
Diminished 1st inversion	 One shape	 Three shapes
Diminished 2nd inversion	 One shape	 Three shapes

All of the 12 triads we have compared have one shape in Tuning in Perfect 4th's and three shapes in Standard Tuning.

We can conclude with the total of 12 shapes/36 shapes, Tuning in Perfect 4th's is 3 times easier than Standard Tuning.

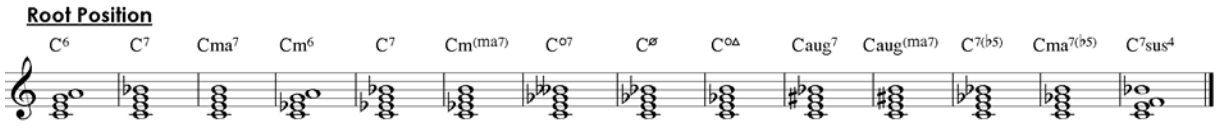
Chapter 4

COMPARATIVE STUDIES OF 7TH CHORDS

7th chords are four note chords, constructed by stacking intervals of minor and major thirds, with few exceptions. We have 14 types of common 7th chords:

1. Major 6th: is a major triad +a major second and its symbol is "6"
2. Dominant 7th: is a major triad +a minor third and its symbol is "7"
3. Major 7th : is a major triad +a major third and its symbol is "ma7" or "$^{\Delta}$"
4. Minor 6th: is a minor triad +a major second and its symbol is "6"
5. Minor 7th: is a minor triad +a minor third and its symbol is "7"
6. Minor Major 7th : is a minor triad +a major third and its symbol is "m-ma7" or "m$^{\Delta}$"
7. Diminished 7th: is a diminished triad +a minor third and its symbol is "dim7" or "^{o}"
8. Half Diminished: is a diminished triad +a major third and its symbol is "m7♭5" or "ø"
9. Tonic Diminished : is a diminished triad +an augmented third and its symbol is "dim-ma7" or "$^{o\Delta}$"
10. Augmented 7th: is an augmented triad+ diminished third and its symbol is "aug7" or "+7" or "7(♯5) "
11. Augmented major 7th: is an augmented triad+ minor third and its symbol is "aug ma7" or "+ $^{\Delta}$" or "ma$^{7(\sharp5)}$ "
12. Dominant 7th ♭5: is a major triad with a lowered 5th +a major third and its symbol is "7(♭5)"
13. Major 7th ♭5: is a major triad with a lowered 5th +a augmented third and its symbol is "ma$^{7(\flat5)}$" or "$^{\Delta(\flat5)}$"
14. Dominant 7th suspended 4th: is a major triad where 3rd is suspended by a 4th +a minor third and its symbol is "7sus4"

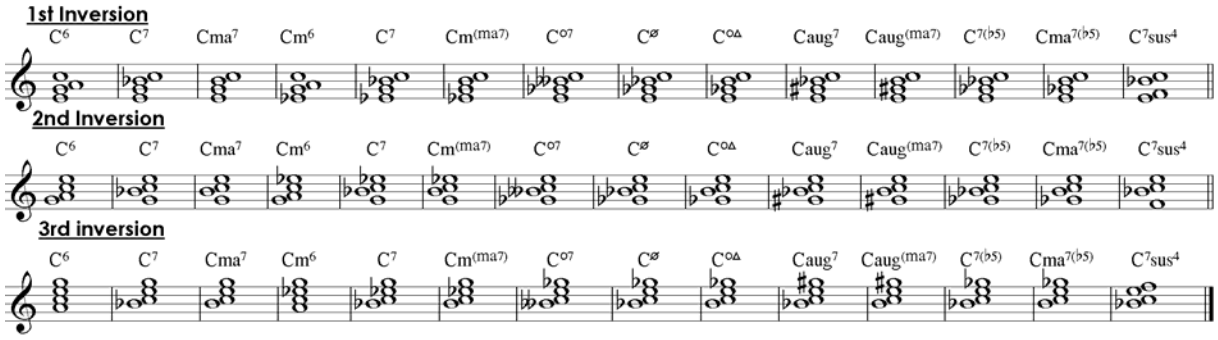
Here is an example of fourteen 7th chords in C in their Root Position:



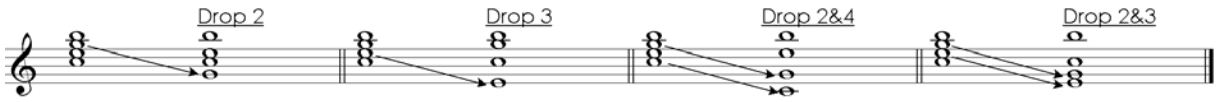
Another attempt to visualize them with a table in any key would be:

	One octave											
Half steps	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Degrees of the Major Scale	1		2		3	4		5		6		7
Major 6th	1				3			P5		6		
Dominant 7th	1				3			P5			♭7	
Major 7th	1				3			P5				7
Minor 6th	1			♭3				P5		6		
Minor 7th	1			♭3				P5			♭7	
Minor-major 7th	1			♭3				P5				7
Diminished 7th	1			♭3			♭5			♭♭7		
Half Diminished	1			♭3			♭5				♭7	
Tonic Diminished	1			♭3			♭5					7
Augmented 7th	1				3				♯5		♭7	
Augmented major 7th	1				3				♯5			7
Dominant 7th ♭5	1				3		♭5				♭7	
Major 7th ♭5	1				3		♭5					7
Dominant 7th suspended 4th	1					4		P5			♭7	

Of course, all of these chords can be inverted 3 times:

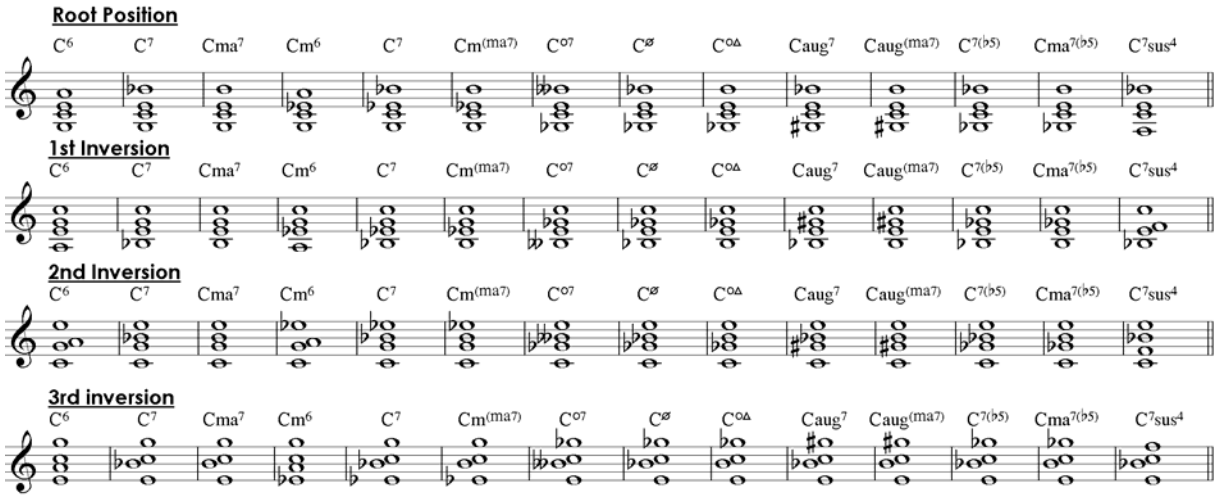


The voicings we have seen until now are called "close voicings". Further, a technique called "Drop" can be used to spread the voices of these chords. This involves systematically moving the voices of the chords down by an octave. For example:

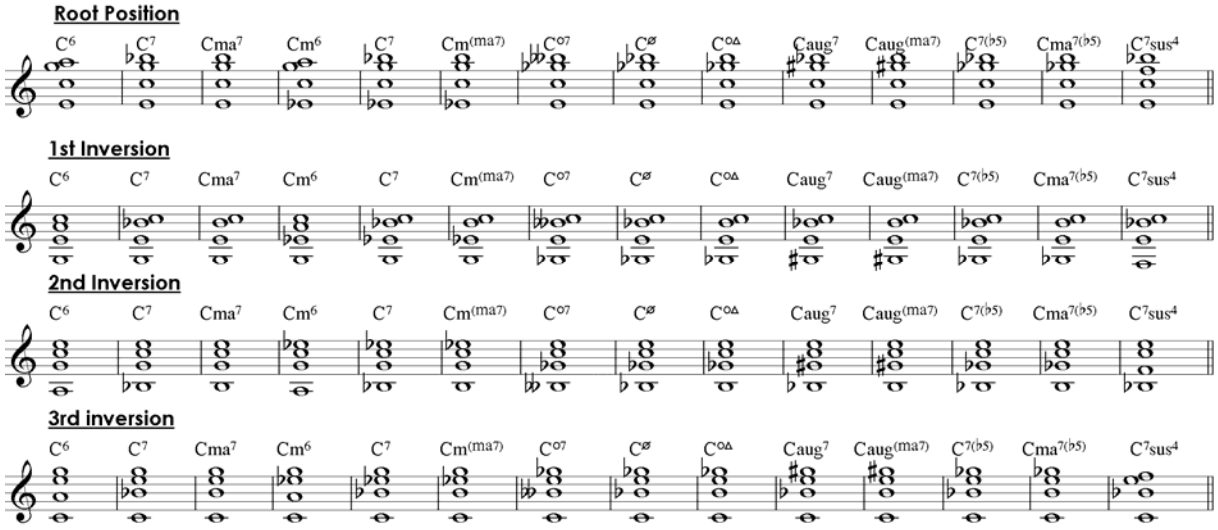


And of course all of this techniques can be applied to all of the 7th chords.

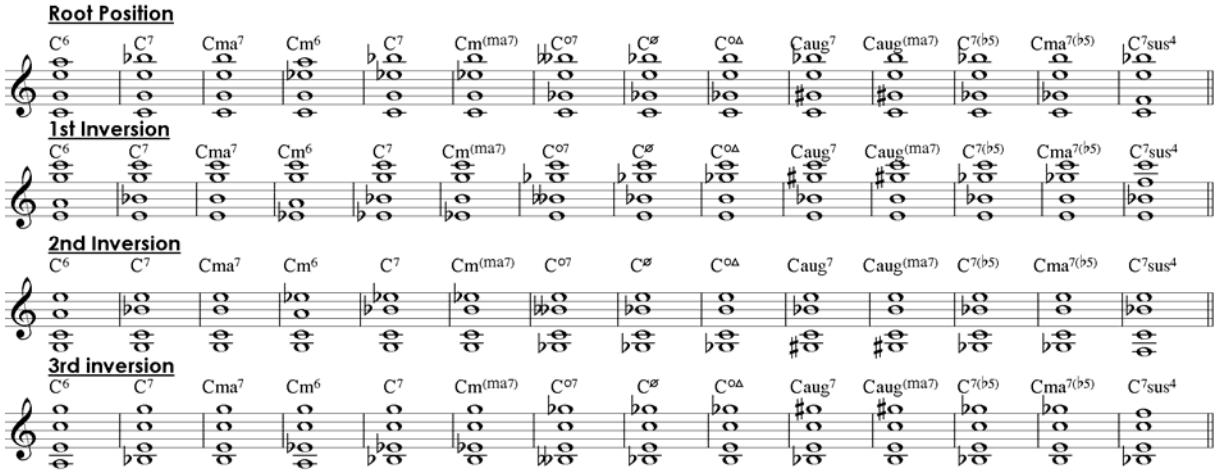
Drop 2:



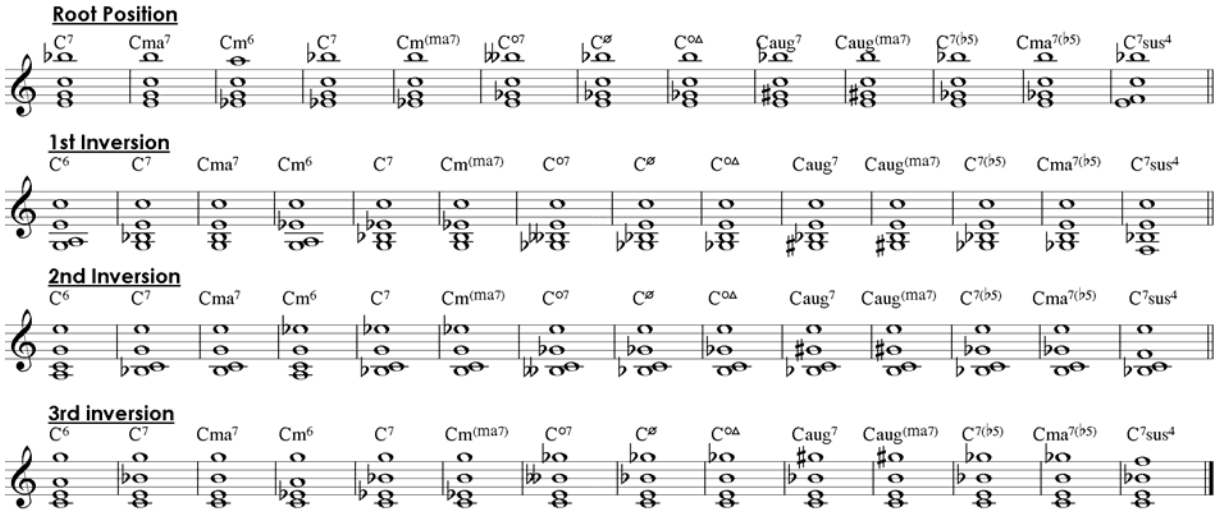
Drop 3:



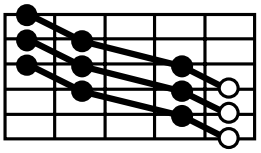
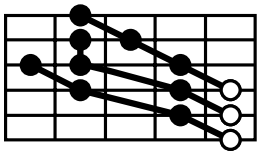
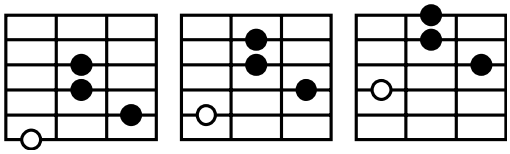
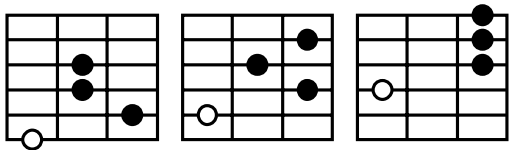
Drop 2&4:

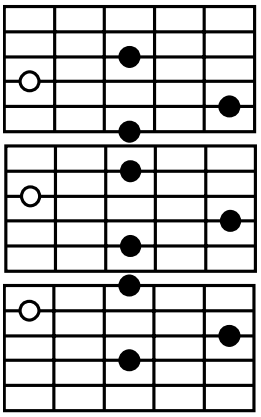
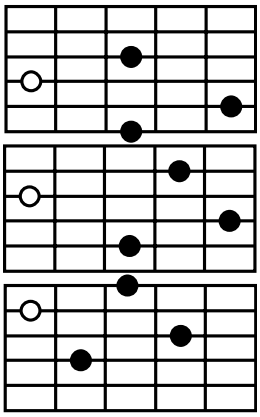
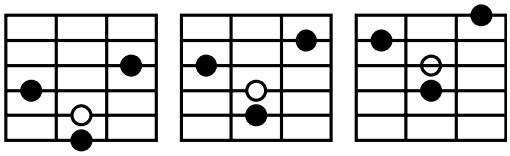
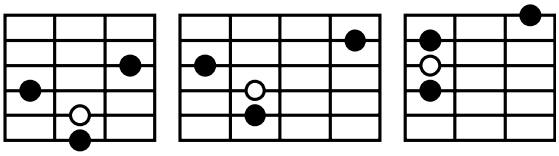
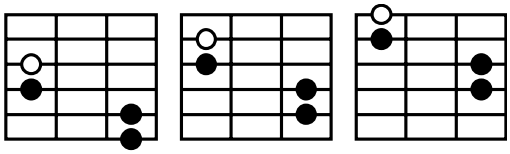
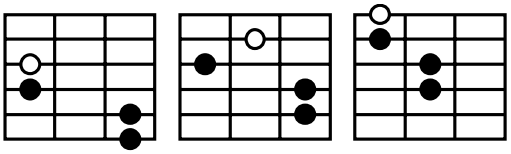
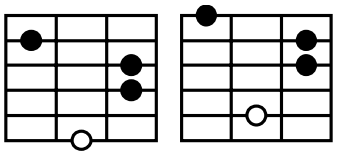
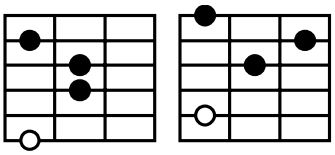
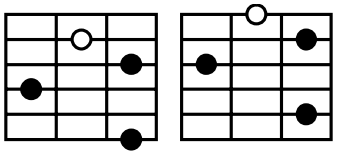
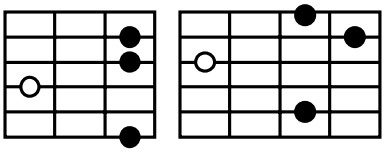
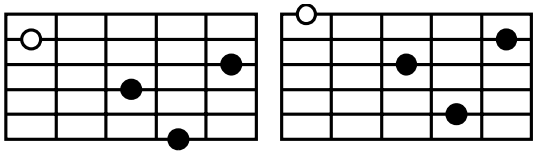
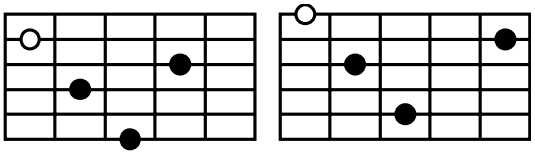
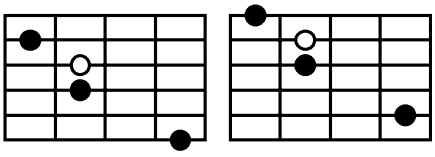
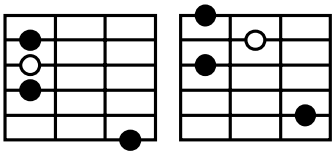


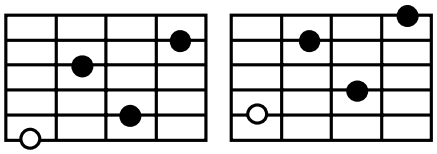
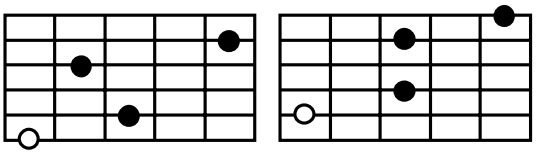
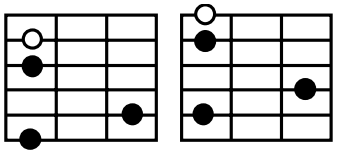
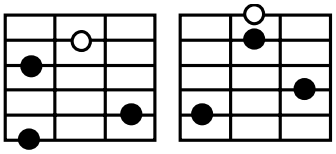
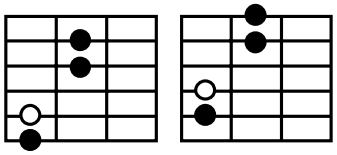
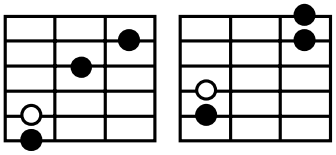
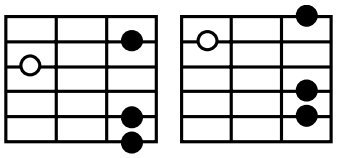
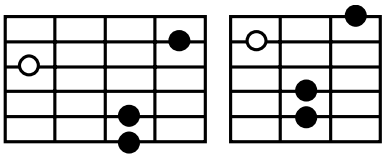
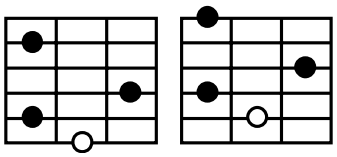
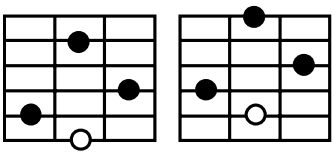
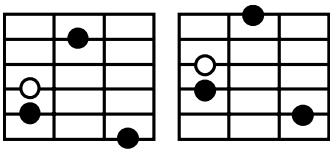
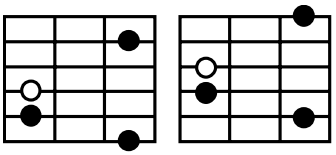
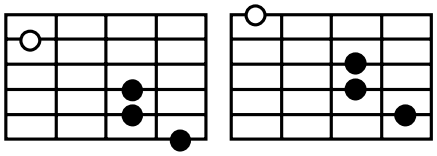
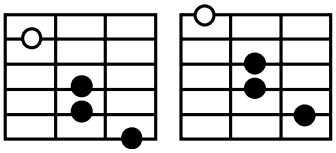
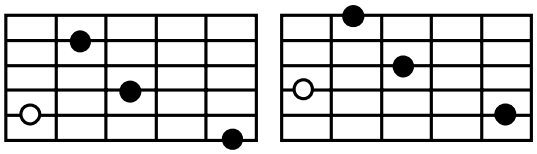
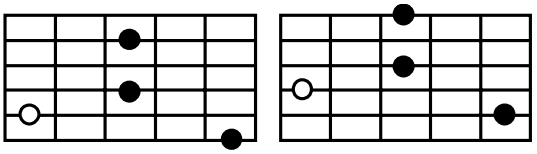
Drop2&3:



Now, let's take a look at the fingerings of the "Major 7th" chord on the fretboard of the guitar as an example:

Chord	Tuning in Perfect 4th's	Standard Tuning
Major 7th Close Voicing Root Position	 One shape	 Three shapes
Major 7th Close Voicing 1st inversion 2nd inversion 3rd inversion	Unplayable	Unplayable
Major 7th Drop 2 2ndinversion	 One shape	 Three shapes

Major 7th Drop 2 3rd inversion	 One shape	 Three shapes
Major 7th Drop 2 Root Position	 One shape	 Three shapes
Major 7th Drop 2 1st inversion	 One shape	 Three shapes
Major 7th Drop 3 3rd inversion	 One shape	 Two shapes
Major 7th Drop 3 Root Position	 One shape	 Two shapes
Major 7th Drop 3 1st inversion	 One shape	 Two shapes
Major 7th Drop 3 2ndinversion	 One shape	 Two shapes

Major 7th Drop 2&4 Root Position	 One shape	 Two shapes
Major 7th Drop 2&4 1st inversion	 One shape	 Two shapes
Major 7th Drop 2&4 2ndinversion	 One shape	 Two shapes
Major 7th Drop 2&4 3rd inversion	 One shape	 Two shapes
Major 7th Drop 2&3 3rd inversion	 One shape	 One shape
Major 7th Drop 2&3 Root Position	 One shape	 One shape
Major 7th Drop 2&3 1st inversion	 One shape	 One shape
Major 7th Drop 2&3 2ndinversion	 One shape	 One shape

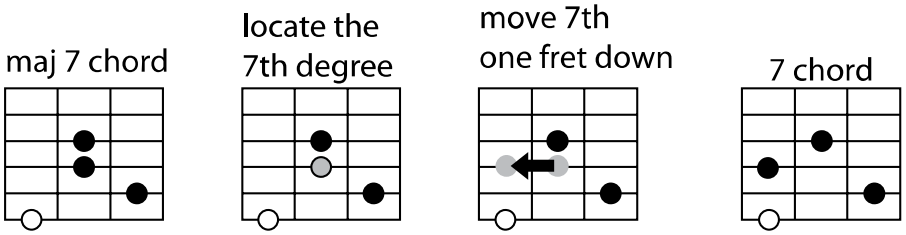
Out of the seventeen Major 7th chords we have compared:

1. Four Major 7th chords (Drop 2&3 with all inversions) have both in Standard Tuning as in Tuning in Perfect 4th's one shape.
2. Eight Major 7th chords (Drop 3 and Drop 3&4 with all inversions) have in Tuning in Perfect 4th's a 1/2 less information ratio than in Standard Tuning.
3. Five Major 7th chords (Close voicing and Drop 2) have in Tuning in Perfect 4th's a 2/3 less information ratio than in Standard Tuning. It is interesting to see that these voicings are the most commonly used ones and Tuning in Perfect 4th's is 3 times easier.

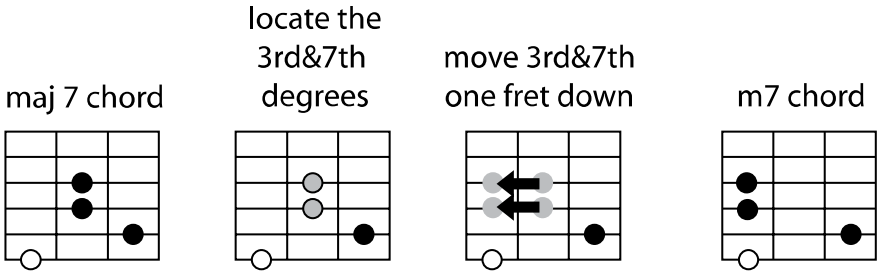
Note that (except for the Drop 2&3 chords) all the Standard tuning 7th chords have a different shape every time you change a set of four strings!

We can conclude with the total of 17 shapes/35 shapes, Tuning in Perfect 4th's is 2.06 times easier than Standard Tuning.

To provide all the fingerings of the other thirteen "7th chords" is beyond the scope of this thesis. It should be noted that, with a simple "chord transition" technique, all of the fingerings of the "Major 7th" chord can be transformed into any of the "7th chords". For this, use the interval table of the 7th chords in the beginning of this Chapter. For example, to transform "Major 7th" chord into a "Dominant 7th" chord, we have to lower the 7th degree of the chord by half step. So in any fingering, we have to find the 7th degree and lower it one fret:



To give another example, to transform "Major 7th" chord into a "Minor 7th" chord, we have to lower both the 3rd and 7th degrees of the chord by half step. So in any fingering, we have to find the 3rd & 7th degree and lower it one fret:

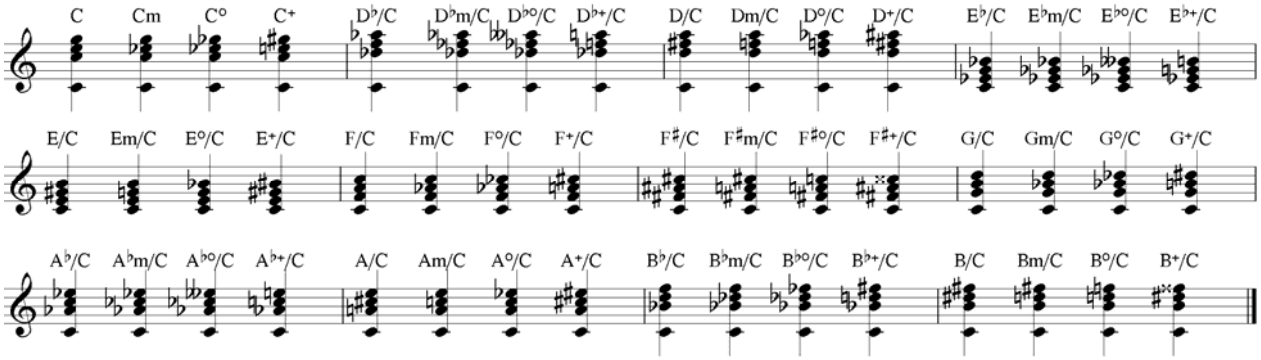


Finally, all of the 7th chords will have the same amount of shapes as the "Major 7th" chord. We can conclude that Tuning in Perfect 4th's is 2.06 times easier than Standard Tuning with all of "7th chords".

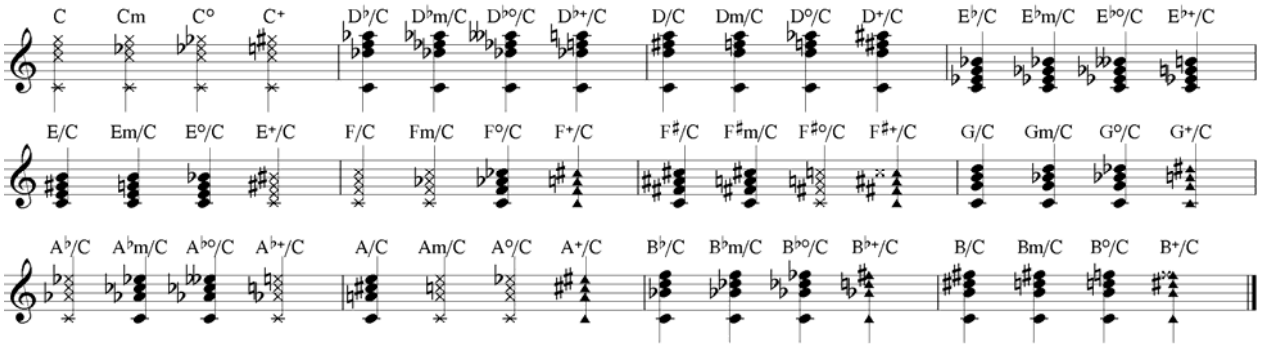
Chapter 5

COMPARATIVE STUDIES OF SLASH CHORDS

One of the techniques to use triads in a more advanced and complex context is to use them over different bass notes which are called slash chords. Since we have four types of triads and 12 keys, then we have 48 different possibilities over any bass note. For example on C bass note:

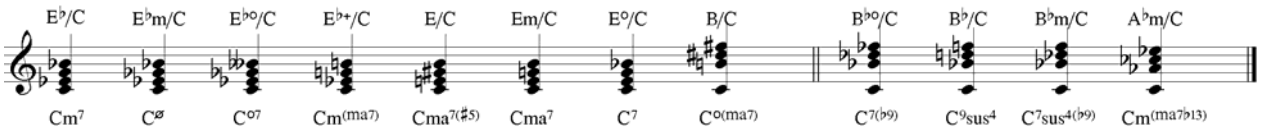


If we eliminate the chords in which C is doubled to have real "four note chords" and mark them with "x" shaped note heads and also eliminate the inversions of the augmented triad which end up with the same set of pitches and mark them with "△" shaped note heads, we have 30 "four note chords".

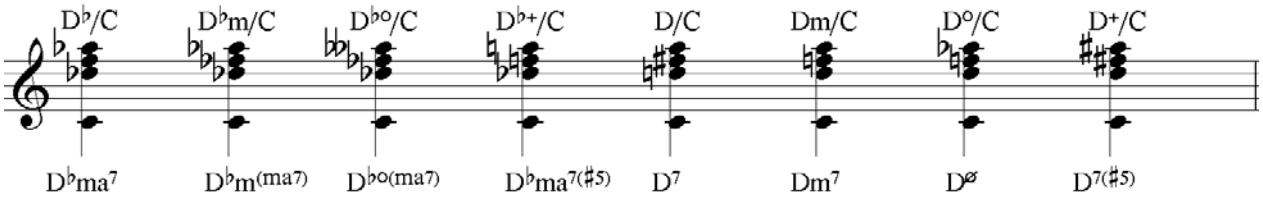


These 30 chords may be classified into three categories:

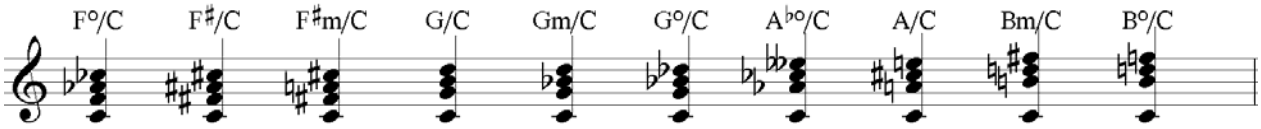
1. Obvious 7th chords: These are eight 7th chords in their root position and four chords with higher extensions (chords with a root, 3rd, 7th and an extension).



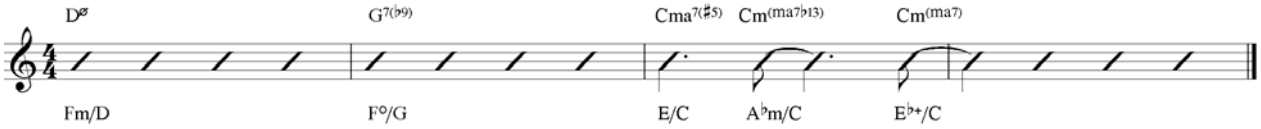
2. Less obvious 7th chords: These are eight 7th chords in their 3rd inversions.



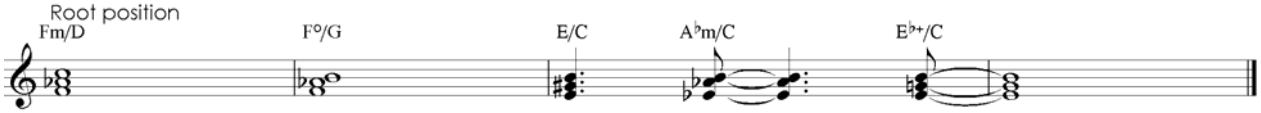
3. Hybrid structures: These are ten chords which can be analyzed as incomplete 9th, 11th and 13th chords. For example F#/C is a C7(b9#11) chord without the 3rd or Bm/C is a C,9(#11) chord without the 3rd and 5th etc. So these chords, though being incomplete, might still be used in a functional context.



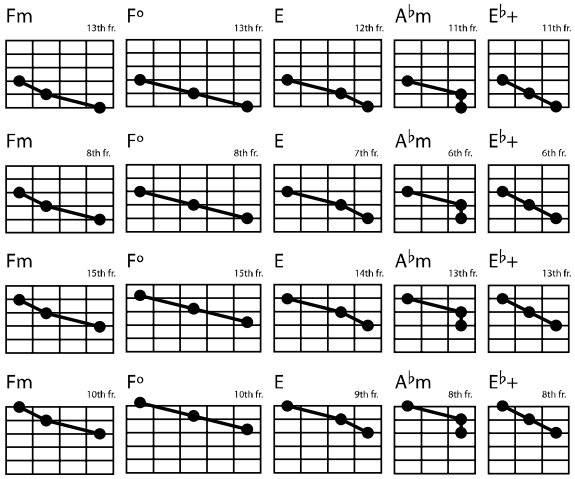
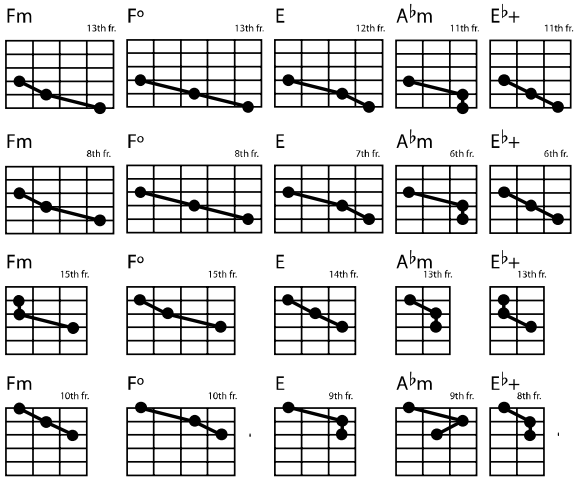
All the advantages of Tuning in Perfect 4th's discussed in Chapter 4 apply here.
Here is an example how slash chords could work in practice:



The chord progression written below the stave is the slash chord equivalent of the chords above the stave. What can be done is that the bass notes can be ignored and the voice-leading can take place in the triads only. The bass notes can be added later to the fingerings or can be completely left out in the presence of a bass player (which usually is the case in a conventional band setting):



(Notice that C♭ has been respelled as B for the sake of clarity in voice leading in F o & A♭m triads.)

Tuning in Perfect 4th's	Standard Tuning
	

Tuning in Perfect 4th's has the same progression shape for four sets of three adjacent strings, so the chord progression consists of five different chord shapes, whereas Standard Tuning has 15 different chord shapes for four sets of three adjacent strings. This would also apply to all the inversions of these triads.

Tuning in Perfect 4th's is 3 times easier than Standard Tuning, in the realm of slash chords just as they are in the realm of triads.

Chapter 6

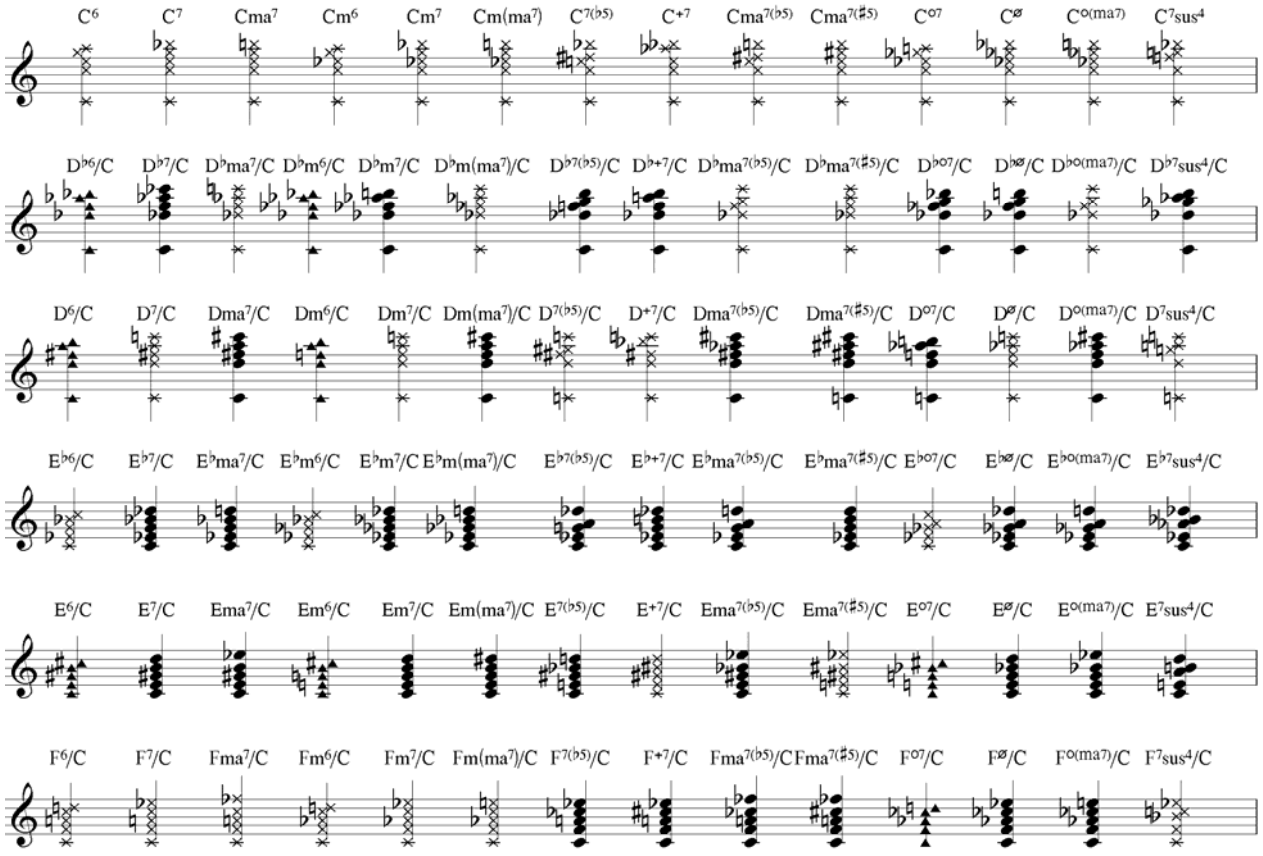
COMPARATIVE STUDIES OF 7TH CHORDS AS UPPER STRUCTURES

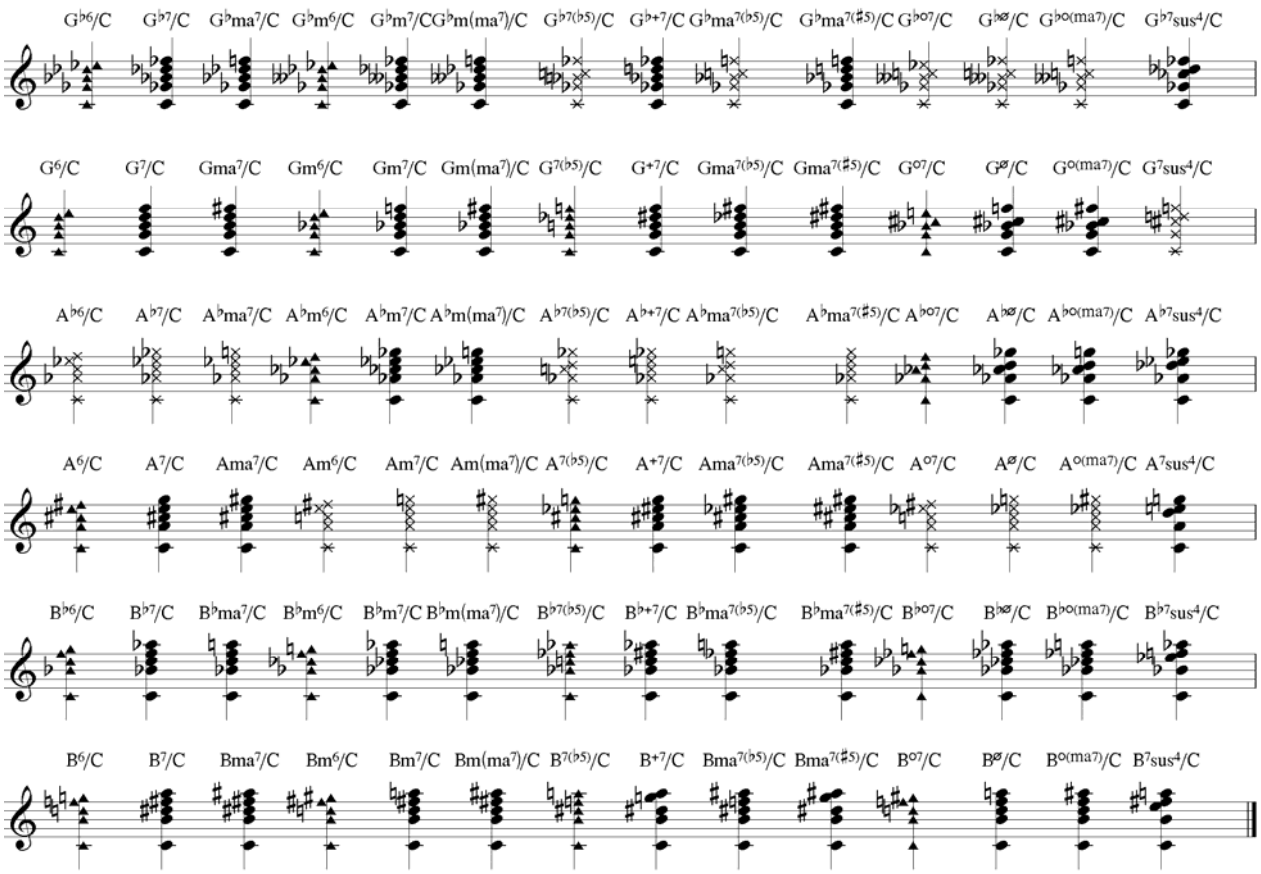
We have discussed the use of triads over different bass notes in Chapter 6. In this chapter, we'll discuss the use of 7th chords over different bass notes to obtain upper structure chords. Since we have 14 types of 7th chords and 12 keys, then we have 168 different possibilities over any bass note.

Here we go through some simplification process:
First, we eliminate the chords in which C is doubled to have real "five note chords" and mark them with "x" shaped note heads.
The chords eliminated and marked with "▵" shaped note heads are:

1. The inversions of the diminished 7th chord which end up with the same set of pitches ($D^{\flat o7}= E^{o7}= G^{o7}= B^{\flat o7}$, $D^{o7}= F^{o7}= A^{\flat o7}= B^{o7}$)
2. "6" and "m6" chords since they are the same as "m7" and "ø" chords a minor 3rd lower (e.g. $C^{6}= Am^{7}$, $Cm^{6}= A^{ø}$)
3. The 2nd inversions of the "7♭5" ($D^{\flat 7(\flat 5)}= G^{7(\flat 5)}$, $D^{7(\flat 5)}= A^{\flat 7(\flat 5)}$ etc)

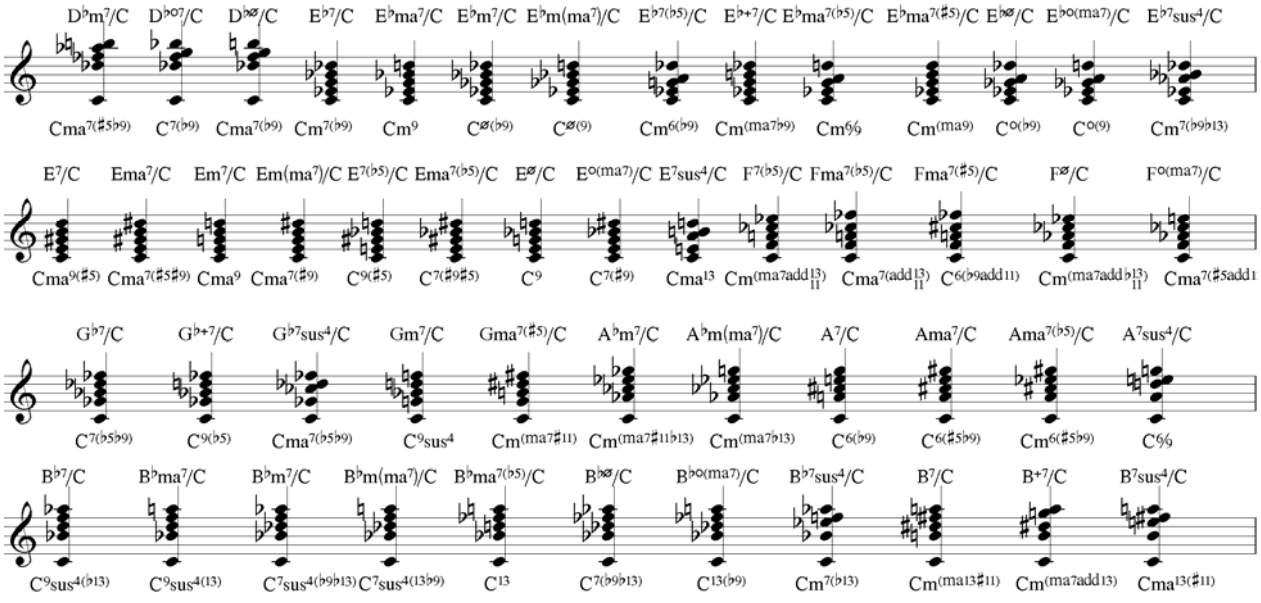
Then we finally have 86 "five note chords". For example on C bass note:





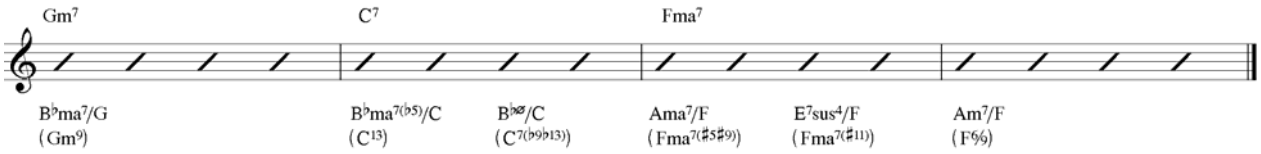
These 86 chords may be classified into two categories:

1. Obvious five note chords: These are chords with a root, 3rd (or a 4th), 7th (or a 6th) and extensions. There are 40 of them. Some of them are universally accepted functional harmony chords and some of them still need a bit of exploration to use in a functional or modal harmony context.

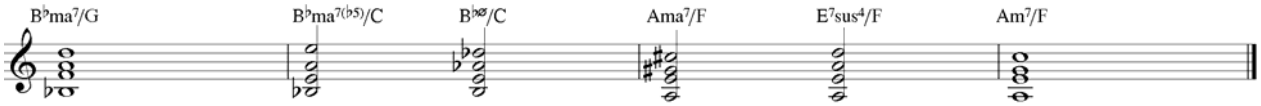


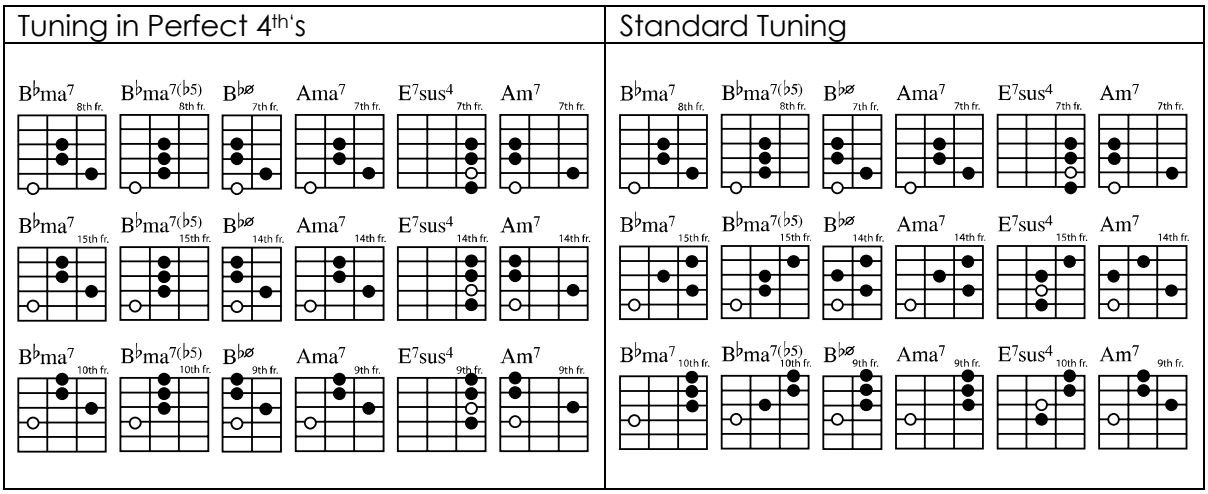
2. Hybrid structures: The remaining 46 chords can be analyzed as incomplete 9th, 11th and 13th chords or unnamable chordal structures. These chords, though being incomplete, are worth exploring because they might still be used in an ambiguous functional harmony or might be used as building blocks in a non-functional harmony context.

The advantage of using the 7th chords over different bass notes may best be explained by an example. For instance, let's take B♭ø/C which is in fact a $C^{7(\flat9\flat13)}$ chord. Most guitar players memorize a few "block" shapes of the $C^{7(\flat9\flat13)}$ chord and the possibilities are quite limited. In a conventional band setting, the bass is played by the bass player, so the guitar player can free himself/herself of the C root. Then $C^{7(\flat9\flat13)}$ chord can be thought as B♭ø only and used with all the inversions that we've discussed in Chapter 5, which opens up many voicing possibilities. An example of this situation:



The progression written above the stave is the basic II-V-I progression in F. The chords written below the stave are the "spiced up" version of these chords using 7th chords as upper structures. Here are the voice leading and the comparative fingerings of these chords in "Drop2 Root Position".





Notice that Tuning in Perfect 4th's has the same progression shape for three sets of four adjacent strings, so the chord progression consists of six different chord shapes, whereas Standard Tuning has 24 different chord shapes for three sets of four adjacent strings.

Also notice the vast amount of possibilities when all inversions in Drop2, Drop 3, Drop2&4and Drop2&3 would be used. To supply all of these possibilities are beyond the scope of this thesis, but it is important to emphasize once again how efficient Tuning in Perfect 4th's is in "information economy".

Chapter 7

COMPARATIVE STUDIES OF QUARTAL, SECUNDAL AND COMPOUND CHORDS

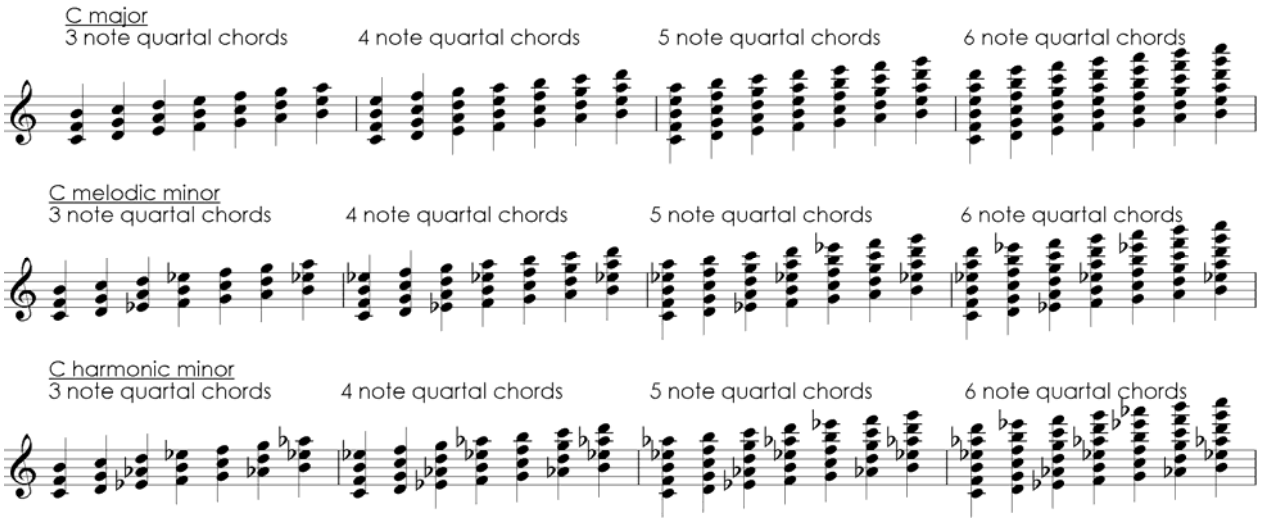
Chords by Fourths-Quartal Harmony

Twentieth Century composers as well as contemporary jazz composers and players make use of quartal harmony (chords by fourths) as well as tertian harmony (chords by thirds).

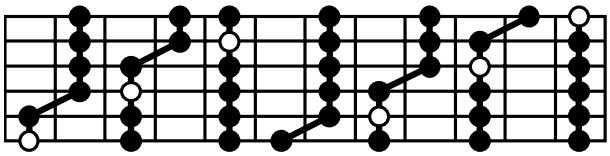
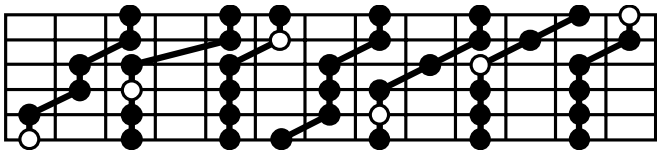
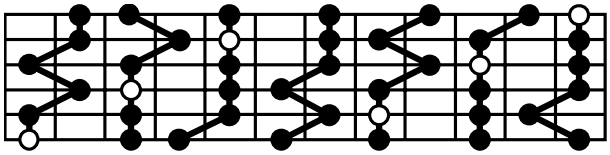
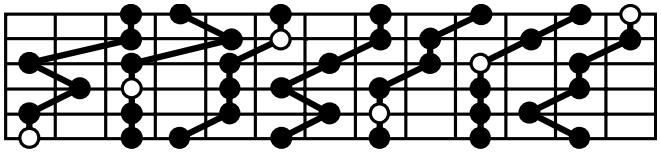
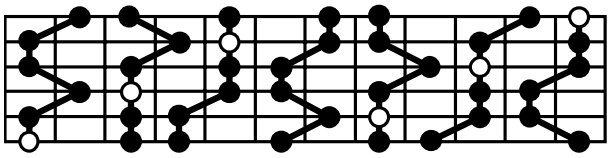
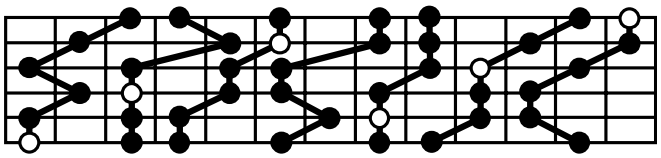
Chords by fourths are built by stacking intervals of fourths within the decided scale/mode. Quartal harmony is ambiguous in the sense that any of the members of the chord might function as the root, that is to say quartal chords more or less imply a tonality/modality and a color rather than a function.

Needless to say, Tuning in Perfect 4th's make the use of Quartal Harmony easier since the open tuning of the instrument is already in perfect 4th's.

Quartal chords might have three to six voices on the guitar. Here they are in three common scales, namely major, melodic minor and harmonic minor scale, though they might be constructed in any scale/mode:



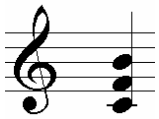
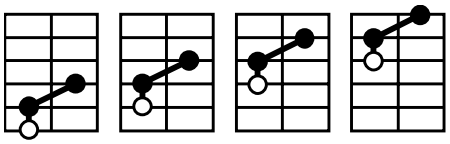
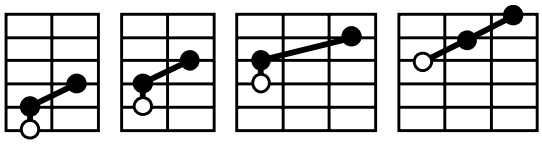
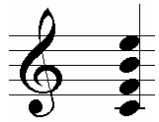
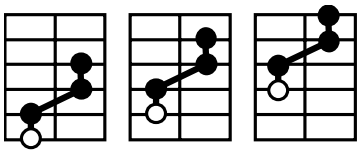
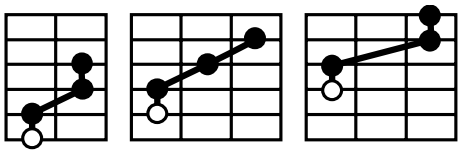
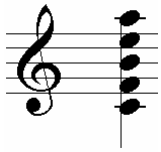
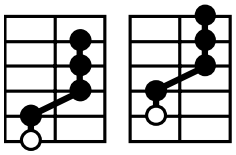
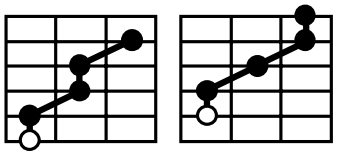
It will be best that fingerings of six note quartal chords are given, because out of those six notes, five, four or three note quartal chords might be chosen at will.

Quartal Chords	Fingering Chart
Major Quartal Chords Tuning in Perfect 4th's	
Major Quartal Chords Standard Tuning	
Melodic Minor Quartal Chords Tuning in Perfect 4th's	
Melodic Minor Quartal Chords Standard Tuning	
Harmonic Minor Quartal Chords Tuning in Perfect 4th's	
Harmonic Minor Quartal Chords Standard Tuning	

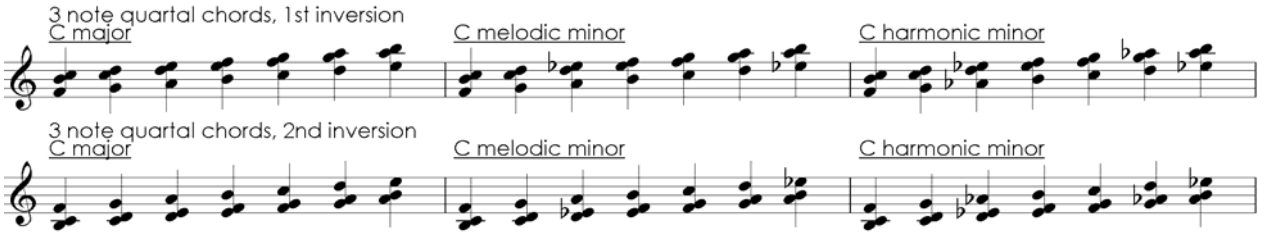
Here we observe that the intervals used in these chords are Perfect 4th's, Augmented 4th's or Diminished 4th's. Out of these 21 chords, in Tuning in Perfect 4th's, two of them lie on one fret, 18 of them lie on two frets and one of them lies on 3 frets, whereas in Standard Tuning, two of them lie on two frets, 18 of them lie on three frets and one of them lies on 4 frets, making them slightly more difficult to finger with *barre*'s and *semi-barre's.*

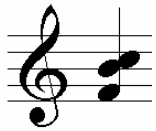
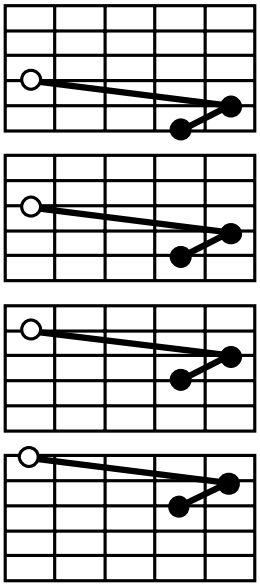
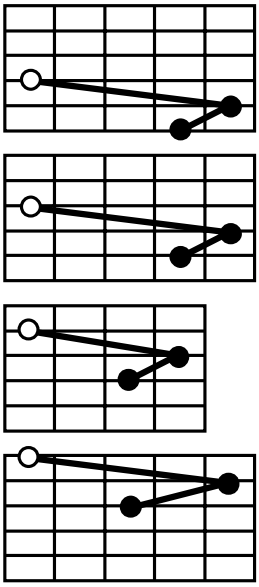
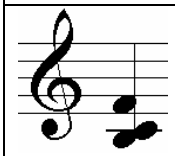
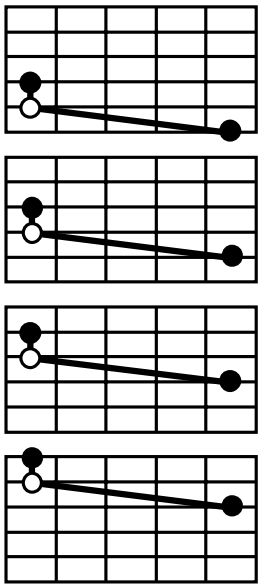
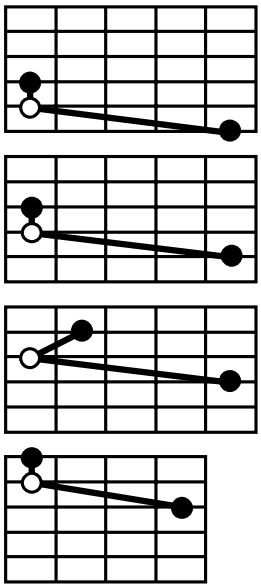
If we compare the three, four and five note quartal chords, then we encounter the same problem in Standard Tuning that we have encountered before. For the same

chord, three and four note chords have three different shapes and five note chords have two different shapes. For example:

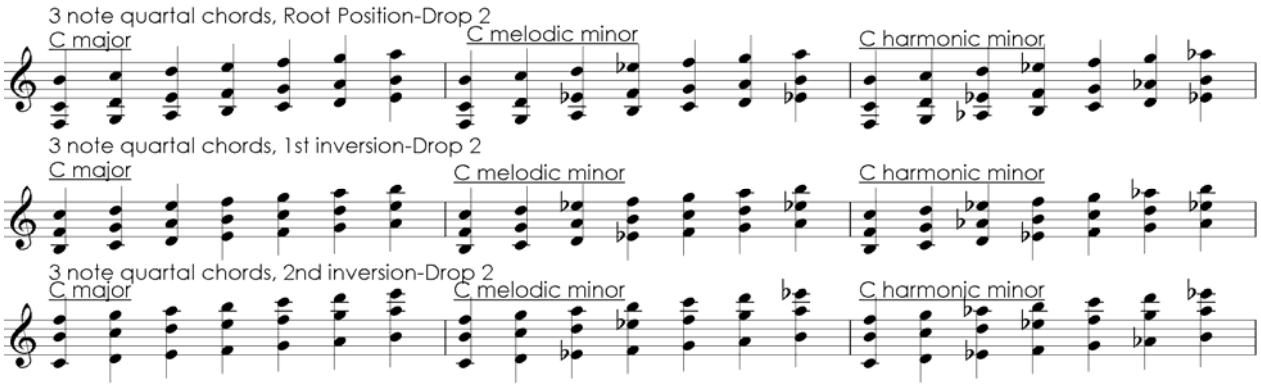
Quartal Chord	Tuning in Perfect 4th's	Standard Tuning
	 One shape	 Three shapes
	 One shape	 Three shapes
	 One shape	 Two shapes

If we look at the inversions of three note quartal chords, we'll see that the same type of problem persists in Standard Tuning.



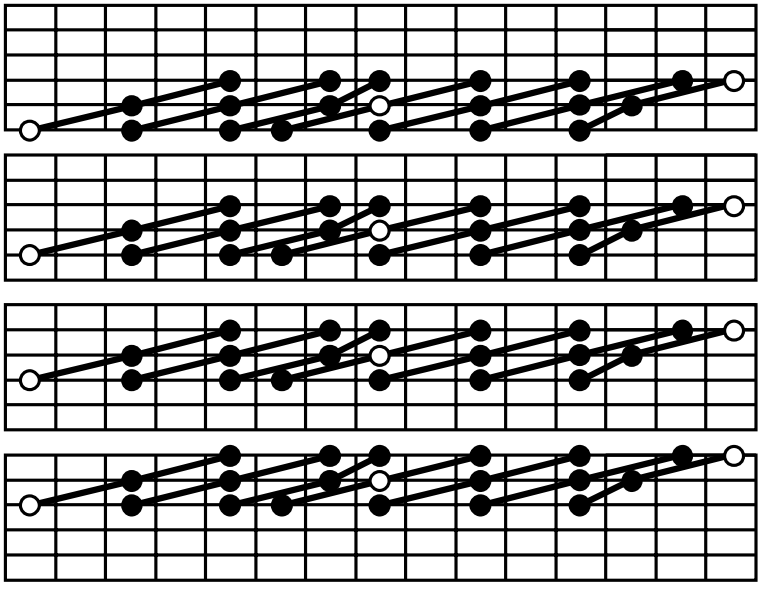
Quartal Chord	Tuning in Perfect 4th's	Standard Tuning
 1st Inversion	 One shape	 Three shapes
 2nd Inversion	 One shape	 Three shapes

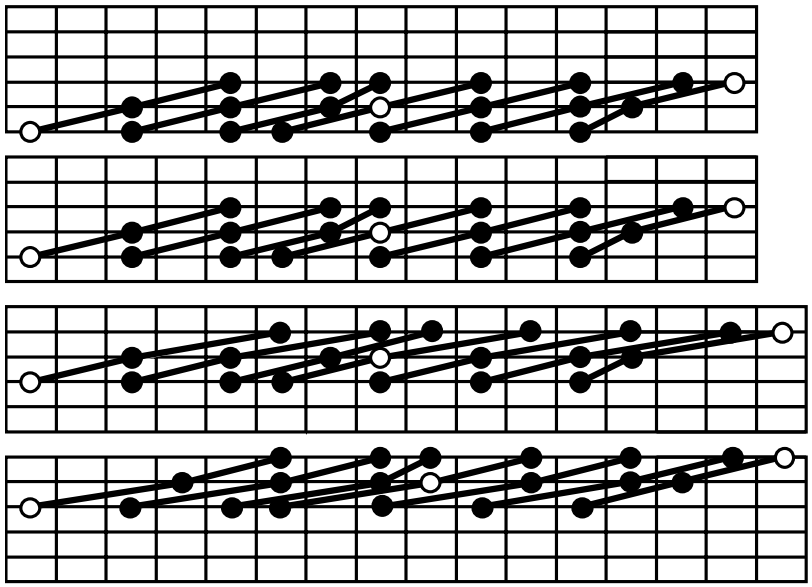
3 note Quartal chords can be spread using the "Drop 2" technique, which is dropping the second note from the top an octave down.



Among these chords, probably the most popularly used ones are "1st Inversion-Drop 2", since these chords have voices 5th+5th apart, whereas "Root Position-Drop 2" and "2nd Inversion-Drop 2" are worth exploring with their 5th+7th and 7th+5th intervallic structures.

Here, again, Standard Tuning has the usual disadvantage of having three different shapes for one chord:

Quartal Chords	Fingering Chart
Major 1st Inversion-Drop 2 Tuning in Perfect 4th's	 One shape

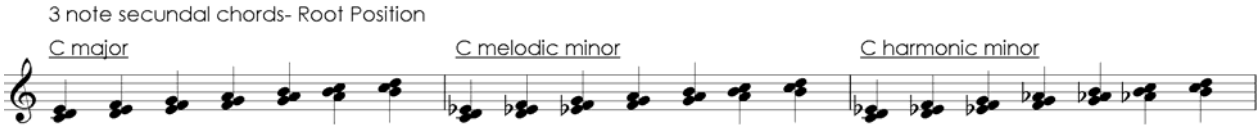
Major 1st Inversion-Drop 2 Standard Tuning	 Three shapes

Chords by Seconds- Secundal Harmony

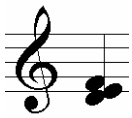
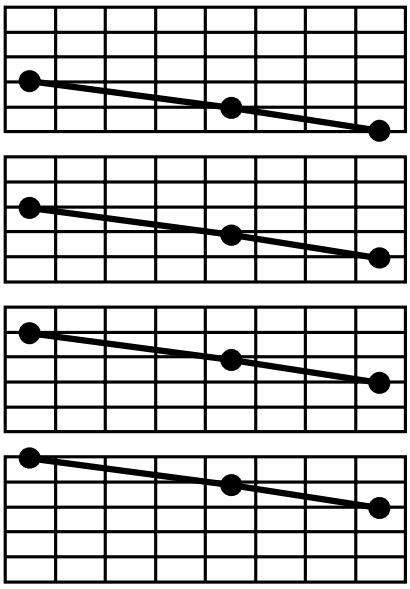
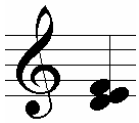
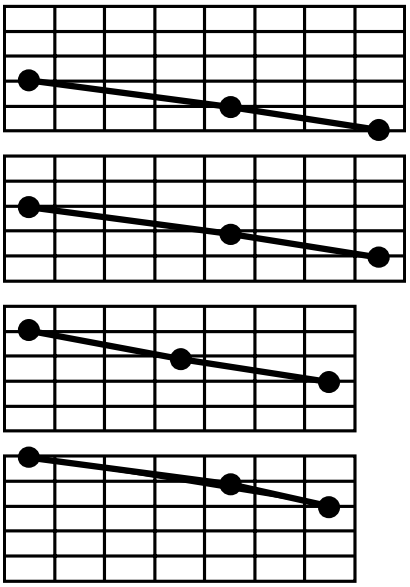
After the already discussed chords by thirds (tertian harmony) and chords by fourths (quartal harmony), the third category of chords are chords by seconds (secundal harmony). These are again commonly used by Twentieth Century composers as well as contemporary jazz composers and players.

Secundal Harmony, like the Quartal harmony, is also ambiguous in the sense that any of the members of the chord might function as the root, that is to say secundal chords more or less imply a tonality/modality and a color rather than a function.

Only 3 note secundal chords can be played on the guitar. Here they are in three common scales, namely major, melodic minor and harmonic minor scale, though they might be constructed in any scale/mode:

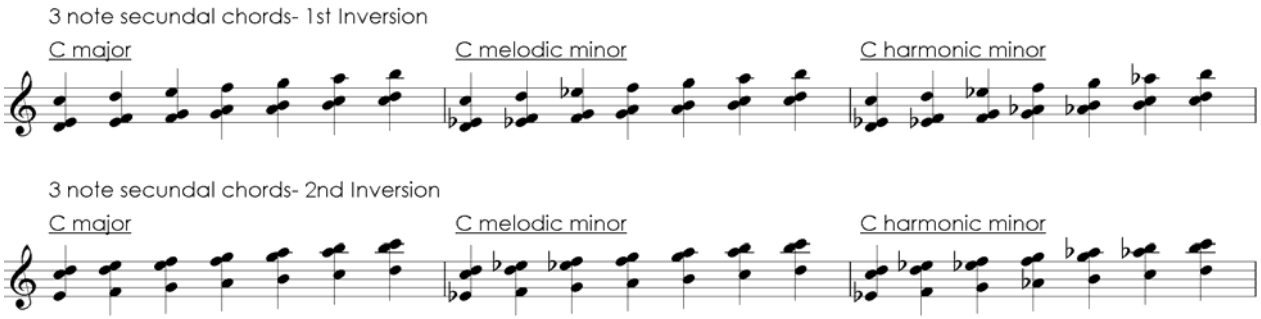


Because of the intervallic construction of the guitar, close voicings of chords by seconds are very difficult to play since they sometimes are spread over 8 frets.

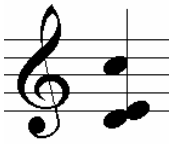
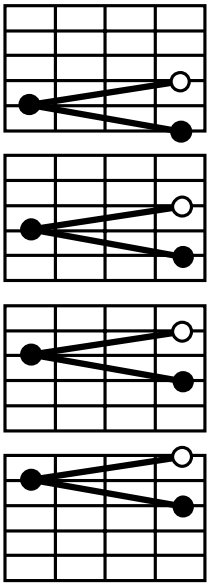
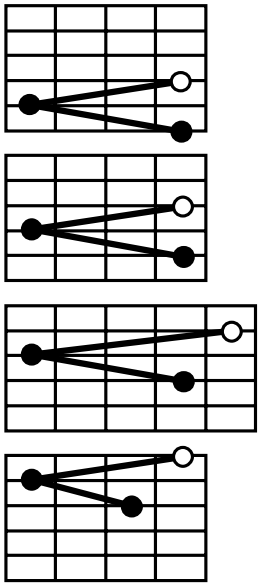
Secundal Chord	Fingering Chart
 Tuning in Perfect 4th's	 One shape
 Standard Tuning	 Three shapes

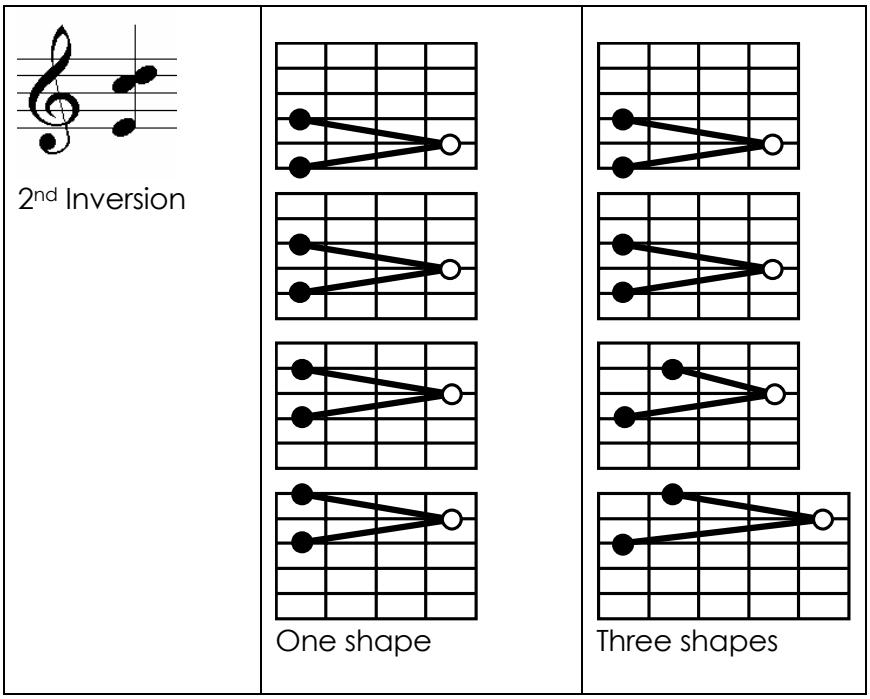
Here, Standard Tuning both has an advantage of having narrower shapes which are easier to finger, along with the usual disadvantage of having three shapes for one chord.

First and second inversions of three note secundal chords are easier to play on the guitar and are very rich in color, since they have a 2nd+6th or 6th+2nd.

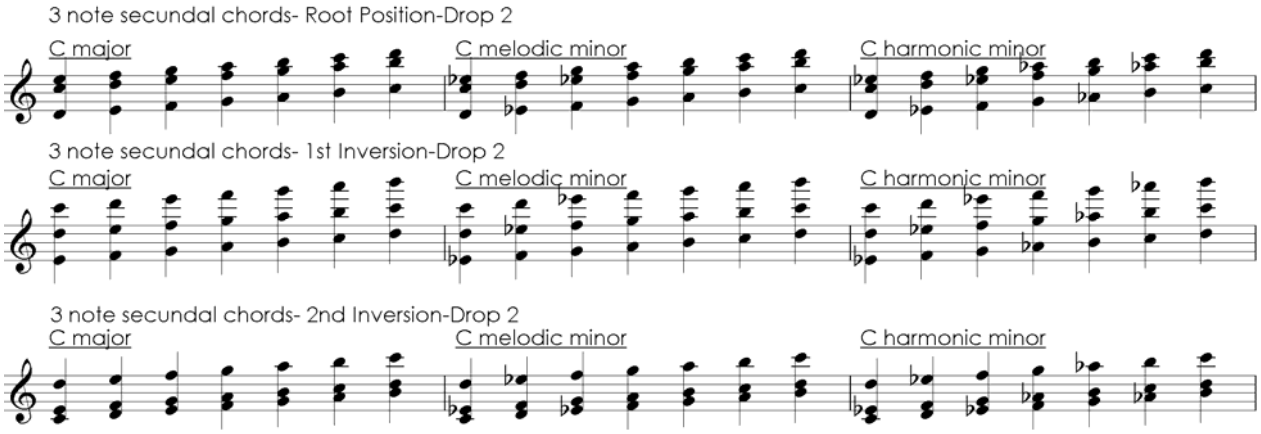


Here, Standard Tuning has again the usual disadvantage of having three different shapes for one chord:

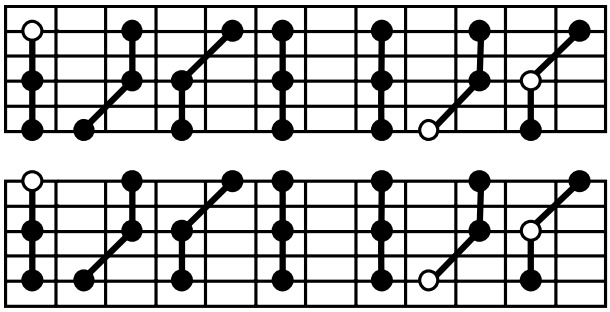
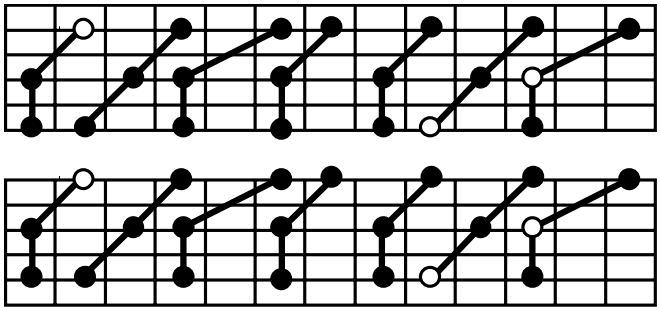
Secundal Chord	Tuning in Perfect 4th's	Standard Tuning
 1st Inversion	 One shape	 Three shapes



Secundal chords can be spread using the "Drop 2" technique, which is dropping the second note from the top an octave down.



Among these chords, probably the most interesting ones are "1st Inversion-Drop 2", since these chords have voices 7th+7th apart, whereas "Root Position-Drop 2" and "2nd Inversion-Drop 2"somehow are closer to tertian harmony, since they include 3rd+7th or 7th+3rd in them and are less ambiguous.

Secundal Chords	Fingering Chart
Major 1st Inversion-Drop 2 Tuning in Perfect 4th's	 One shape
Major 1st Inversion-Drop 2 Standard Tuning	 One shape

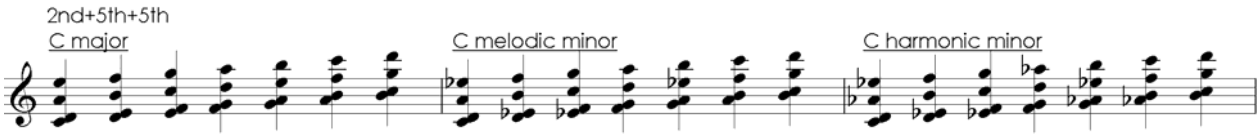
Here we have one shape for each chord in both tunings. This is because the chords are spread over five strings and the second 7th interval extends already over the irregular major 3rd between G and B strings in the Standard Tuning.

Compound Chords

We've seen that Quartal Harmony uses stacked fourths in a decided scale/mode and its inversions lead to interesting intervallic constant structures such as 4th+2nd, 2nd+4th, 5th+7th, 5th+5th, 7th+ 5th and Secundal Harmony uses stacked seconds and its inversions lead to interesting intervallic constant structures such as 2nd+6th, 6th+2nd, 7th+ 3rd, 7th+7th, 3rd+7th.

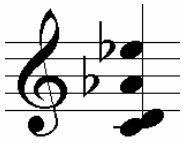
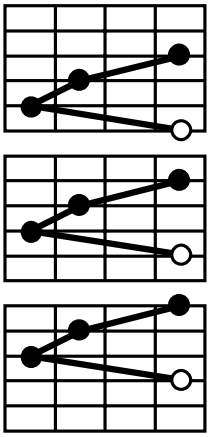
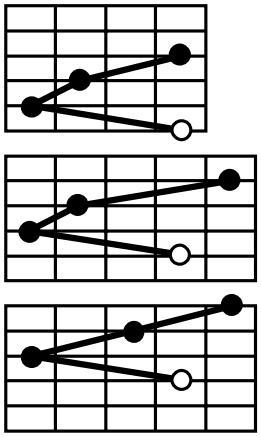
To obtain Compound Chords, different types of intervals chosen at will in a certain scale/mode are stacked, resulting in non-functional, coloristic harmonies, or harmonies that are in the grey area between functional and non-functional.

For example, let's take 2nd+5th+5th, again in three common scales:



These chords might be analyzed as "6" chords with added 9th, but because of the spacing of the intervals, they don't quite sound "functional".

Again, any of these chords have the disadvantage of having three shapes in the Standard Tuning:

Secundal Chord	Tuning in Perfect 4th's	Standard Tuning
	 One shape	 Three shapes

Out of the eleven constant structure chords we have compared:

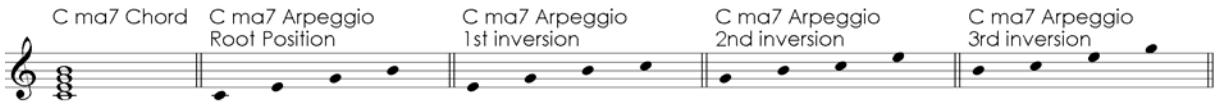
1. One chord has both in Standard Tuning as in Tuning in Perfect 4th's one shape.
2. Nine chords have in Tuning in Perfect 4th's a 2/3less information ratio than in Standard Tuning.
3. One chord has in Tuning in Perfect 4th's a 1/2 less information ratio than in Standard Tuning.

We can conclude with the total of 11 shapes/29 shapes, Tuning in Perfect 4th's is 2.63 times easier than Standard Tuning in the realm of the chords that have been compared in this Chapter.

Chapter 8

COMPARATIVE STUDIES OF 7TH CHORD ARPEGGIOS

Arpeggios can simply be described as chord notes played horizontally. Like the inversions of the chords, arpeggios also have inversions.

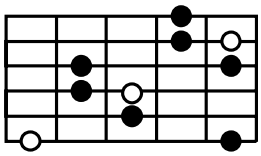
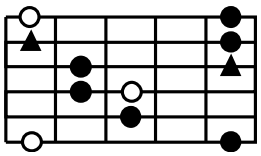
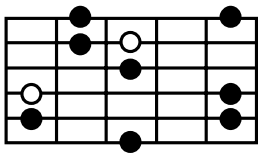
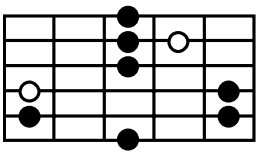
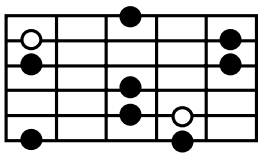
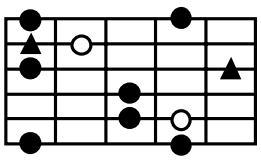


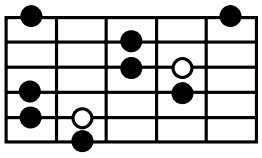
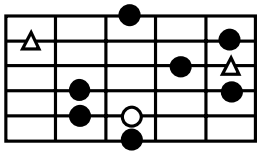
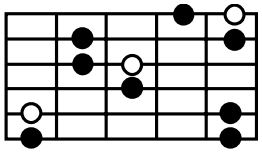
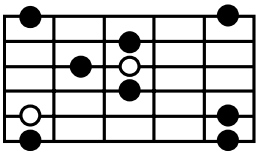
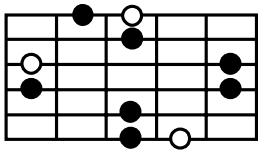
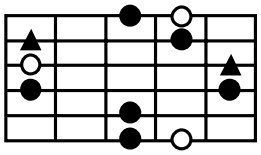
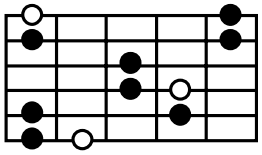
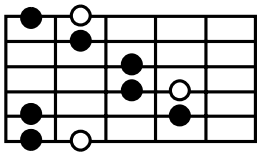
7th chord arpeggios in position

Remember that the chord root is shown as an empty circle. The placing of other voices of the chord can be recognized relative to the root.

These arpeggios are tricky because they use usually 2 notes/string, but once or twice 1 note/string and their inner shape logic is complicated. It gets more complicated in Standard Tuning because of the same note can be played both on the G or the B string in position. The triangles in the fingerings mean that the player has to choose one of the two.

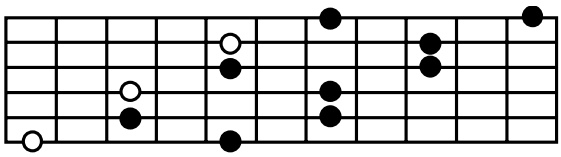
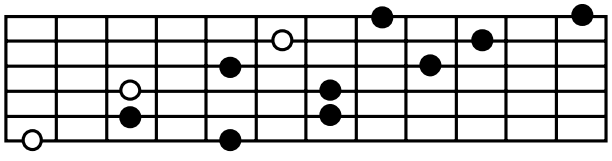
Notice that the shape in the bottom 4 strings becomes the same shape in top 4 strings in the next fingering in tuning in Perfect 4th's. This doesn't occur in the standard tuning because of the intervallic asymmetry of the tuning. Also an extra note is missing in Standard Tuning, if the player wants to stay in position.

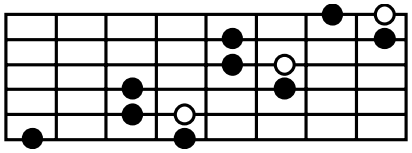
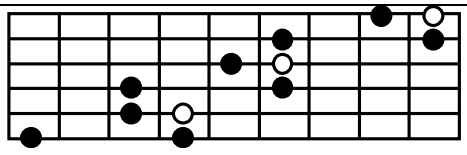
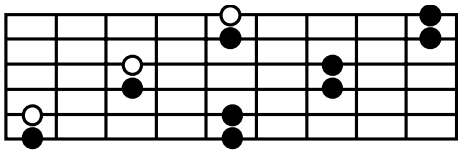
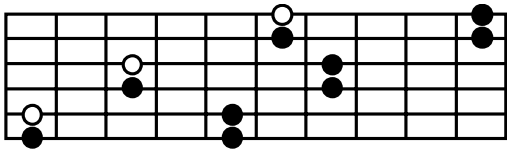
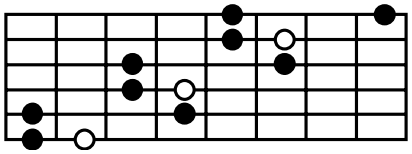
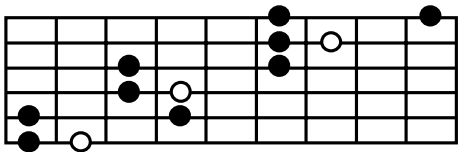
4note chord arpeggio	Tuning in Perfect 4th's	Standard Tuning
Major 7th 1st fingering		
Major 7th 2nd fingering		
Major 7th 3rd fingering		

Major 7th 4th fingering		
Major 7th 5th fingering		
Major 7th 6th fingering		
Major 7th 7th fingering		

7th chord arpeggios 2 notes per string

Playing 7th chord arpeggios 2 notes per string makes it much easier to play them than in position playing, since the same shape repeats every pair of strings. However, again because of the intervallic asymmetry of the standard tuning, a shift has to be made on the 2nd &1st strings, which balances off the smoothness movement. Further, the arpeggio extends to one fret higher, which is a longer distance to "travel" and might not be handy on guitars with less frets or guitars with the necks joining the body on a lower fret number such as classical or jazz guitars.

4note chord arpeggio	Fingering Chart
Major 7th 1st fingering Tuning in Perfect 4th's	
Major 7th 1st fingering Standard Tuning	

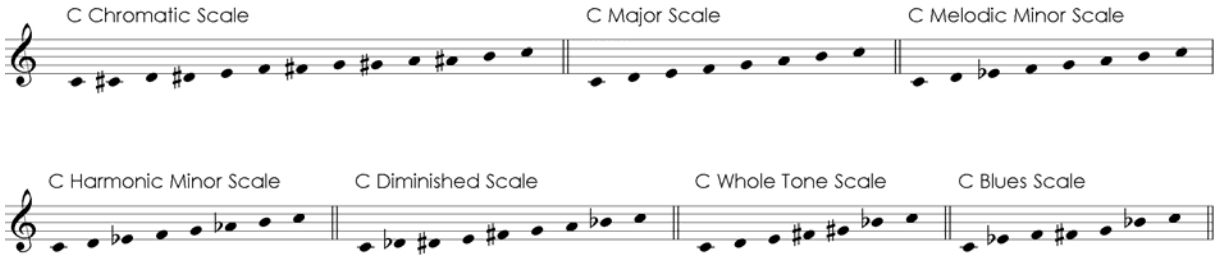
Major 7th 2nd fingering Tuning in Perfect 4th's	
Major 7th 2nd fingering Standard Tuning	
Major 7th 3rd fingering Tuning in Perfect 4th's	
Major 7th 3rd fingering Standard Tuning	
Major 7th 4th fingering Tuning in Perfect 4th's	
Major 7th 4th fingering Standard Tuning	

Chapter 9

COMPARATIVE STUDIES OF COMMON SCALES & MODES

A scale is a set of ascending and descending steps within in an octave. An octave is divided into 12 equal parts, called half-steps in Western Music and a scale might have 5 to 12 notes. The *chromatic scale* includes all 12 half-steps of an octave. Other common scales are classified after how many notes they have, such as pentatonic (5 notes), hexatonic (6 notes), septatonic (7 notes), octatonic (8 notes) etc.

Here are most common scales in C as an example:

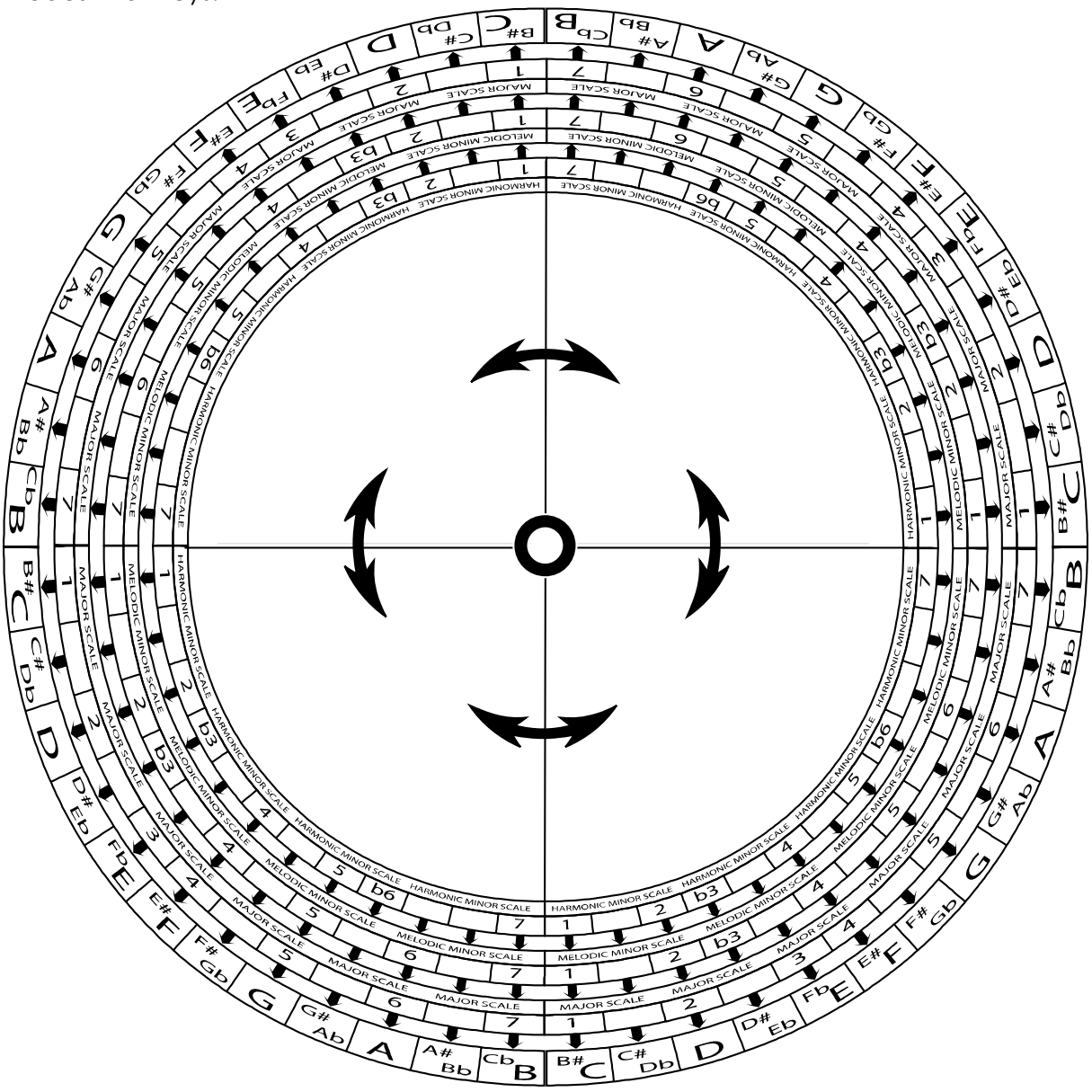


Here is a way of visualizing their steps in a table:

	One octave												
Half steps	**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**IX**	**X**	**XI**	**XII**	**XIII**
Chromatic Scale	1	2	3	4	5	6	7	8	9	10	11	12	1
Major Scale	1		2		3	4		5		6		7	1
Melodic Minor Scale	1		2	♭3		4		5		6		7	1
Harmonic Minor Scale	1		2	♭3		4		5	♭6			7	
Diminished Scale (Octatonic)	1	♭2		♯2	3		♯4	5		6	♭7		1
Whole Tone Scale (Hexatonic)	1		2		3		♯4		♯5		♭7		1
Blues Scale (Hexatonic)	1			♭3		4	♭5	5			♭7		1

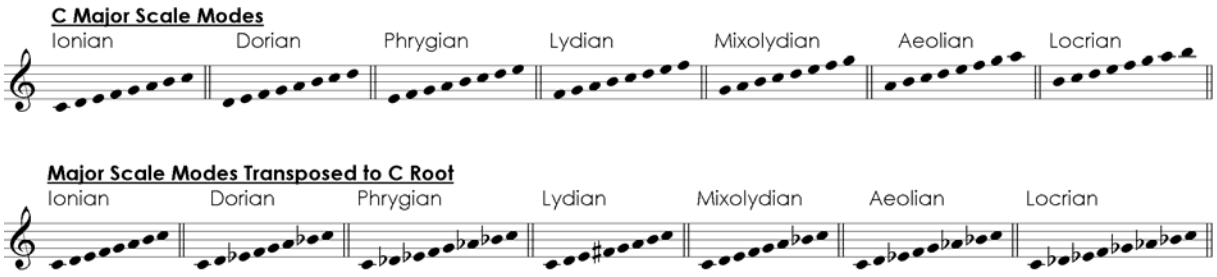
Modes are scales derived from main scales. Each step of the main scale is treated as the tonic. Then, of course, the whole/half step configuration of each of the scales change completely, giving each of these modes a unique sound. The most common modes are those derived from Major, Melodic Minor and Harmonic Minor Scales.

Here is a wheel for finding Major, Melodic Minor and Harmonic Minor Scales and their modes in all keys:



On the guitar fretboard, fingerings of the scales actually correspond to their modes. That is to say 1st fingering starts on the 1st degree of the scale, 2nd fingering on the 2nd degree and so on, just like the modes do.

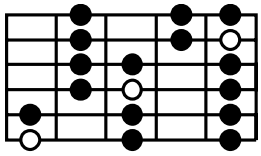
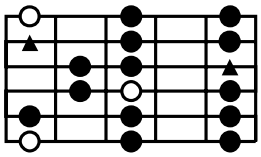
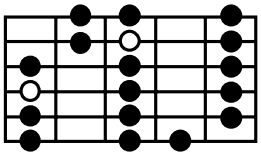
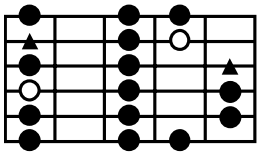
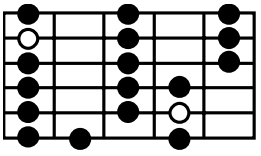
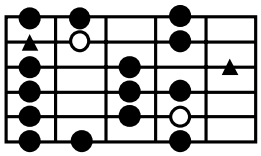
Major scale and its modes

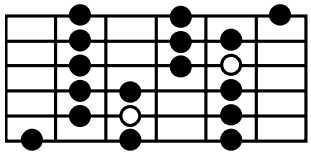
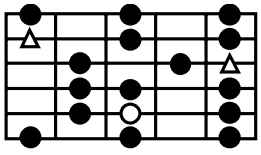
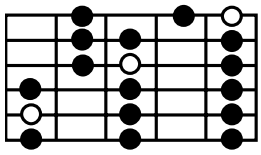
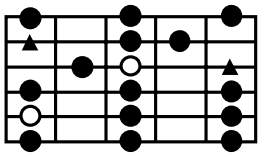
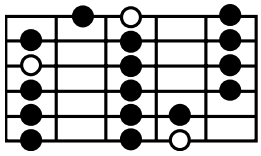
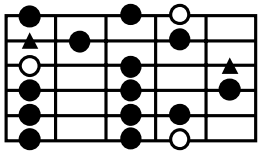
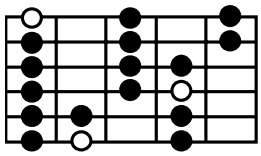
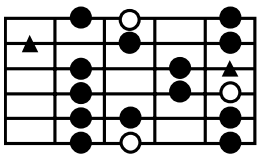


Here is a way of visualizing Major Scale Modes in a table:

	One Octave												
Half steps	**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**IX**	**X**	**XI**	**XII**	**XIII**
Ionian	1		2		3	4		5		6		7	1
Dorian	1		2	♭3		4		5		6	♭7		1
Phrygian	1	♭2		♭3		4		5	♭6		♭7		1
Lydian	1		2		3		♯4	5		6		7	1
Mixolydian	1		2		3	4		5		6	♭7		1
Aeolian	1		2	♭3		4		5	♭6		♭7		1
Locrian	1	♭2		♭3		4	♭5		♭6		♭7		1

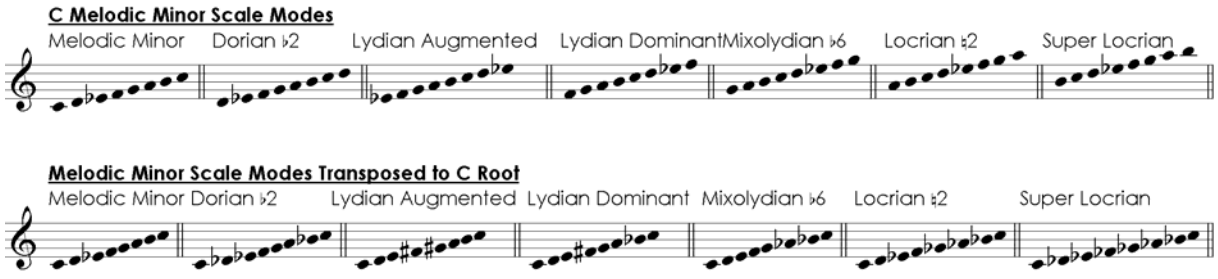
Here are the fingerings of the major scale. The triangles mean that the player has to choose one of the two.

Major Scale	Tuning in Perfect 4th's	Standard Tuning
1st fingering		
2nd fingering		
3rd fingering		

4th fingering		
5th fingering		
6th fingering		
7th fingering		

Melodic Minor Scale and its modes

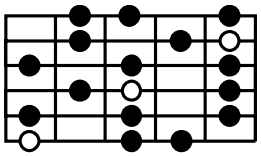
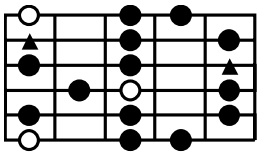
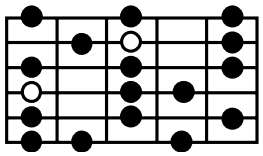
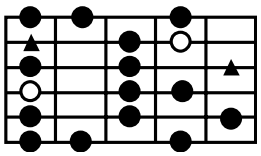
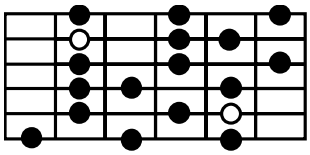
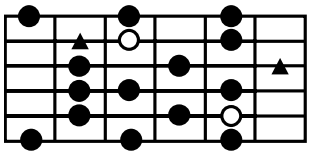
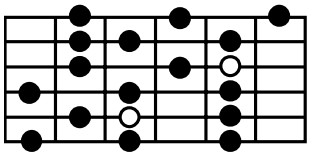
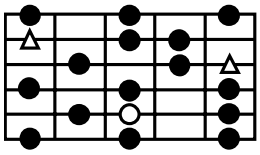
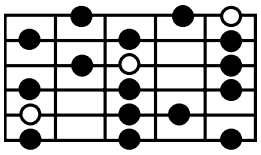
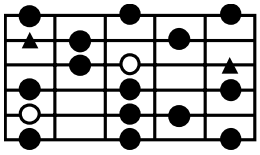
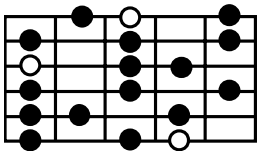
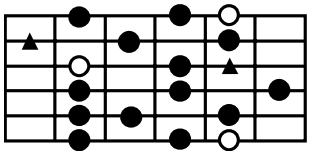
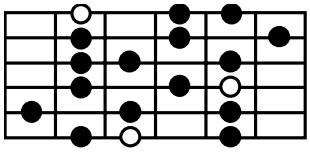
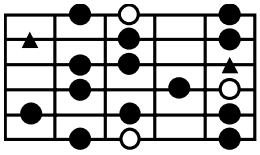
Here is an example of the Melodic Minor Scale Modes in C:



Here is a way of visualizing Melodic Minor Scale Modes in a table:

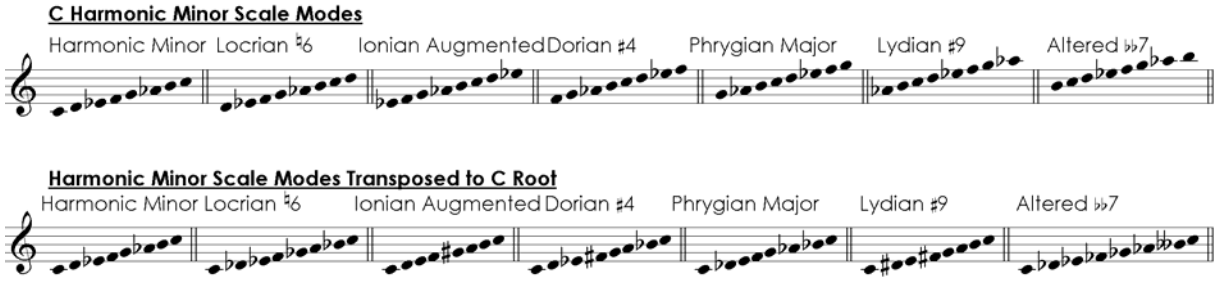
	One Octave												
Half steps	**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**IX**	**X**	**XI**	**XII**	**XIII**
Melodic Minor	1		2	♭3		4		5		6		7	1
Dorian ♭2	1	♭2		♭3		4		5		6	♭7		1
Lydian Augmented	1		2		3		♯4		♯5	6		7	1
Lydian Dominant	1		2		3		♯4	5		6	♭7		1
Mixolydian ♭6	1		2		3	4		5	♭6		♭7		1
Locrian ♮2	1		2	♭3		4	♭5		♭6		♭7		1
Super Locrian	1	♭2		♭3	♭4		♭5		♭6		♭7		1

Here are the fingerings of the Melodic Minor scale. The triangles mean that the player has to choose one of the two.

Melodic Minor Scale	Tuning in Perfect 4th's	Standard Tuning
1st fingering		
2nd fingering		
3rd fingering		
4th fingering		
5th fingering		
6th fingering		
7th fingering		

Harmonic Minor scale

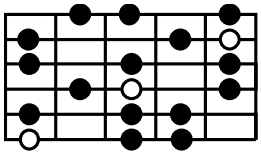
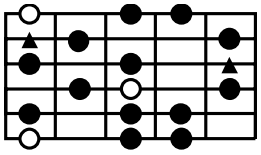
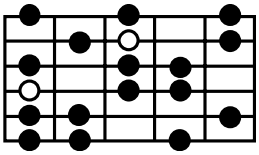
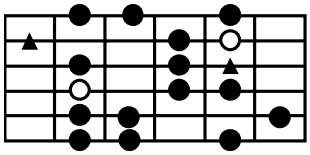
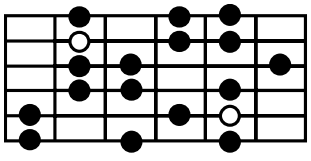
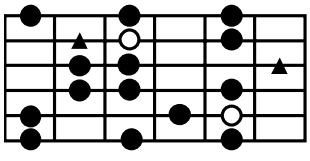
Here is an example of the Harmonic Minor Scale Modes in C:

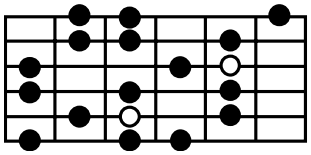
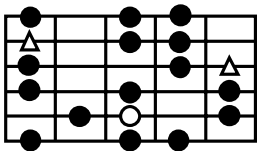
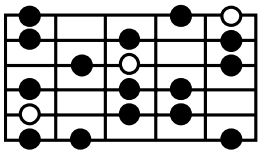
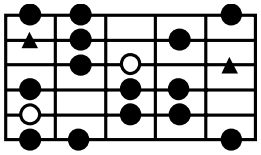
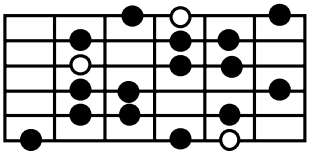
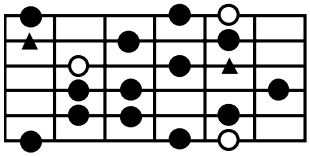
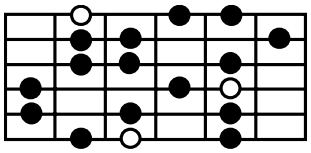
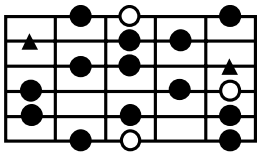


Here is a way of visualizing Harmonic Minor Scale Modes in a table:

	One Octave												
Half steps	**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**IX**	**X**	**XI**	**XII**	**XIII**
Harmonic Minor	1		2	♭3		4		5	♭6			7	1
Locrian ♮6	1	♭2		♭3		4	♭5			6	♭7		1
Ionian Augmented	1		2		3	4			♯5	6		7	1
Dorian ♯4	1		2	♭3			♯4	5		6	♭7		1
Phrygian Major	1	♭2				4		5	♭6		♭7		1
Lydian ♯9	1			♯2	3		♯4	5		6		7	1
Altered ♭♭7	1	♭2		♭3	♭4		♭5		♭6	♭♭7			1

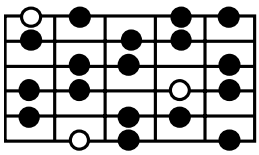
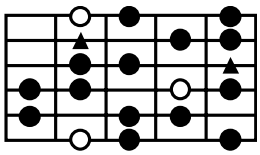
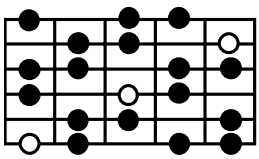
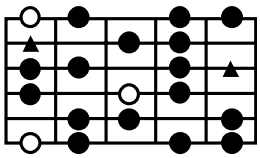
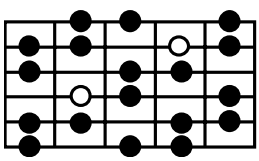
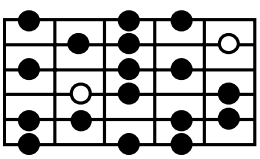
Here are the fingerings of the Harmonic Minor scale. The triangles mean that the player has to choose one of the two.

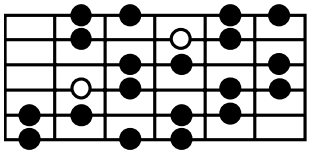
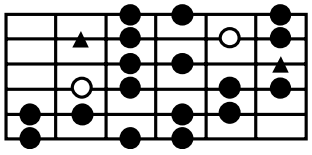
Harmonic Minor Scale	Tuning in Perfect 4th's	Standard Tuning
1st fingering		
2nd fingering		
3rd fingering		

4th fingering		
5th fingering		
6th fingering		
7th fingering		

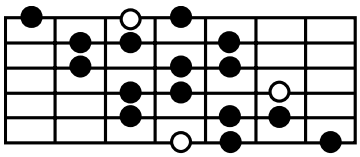
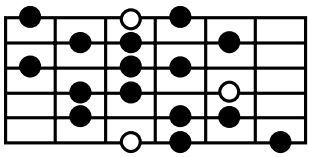
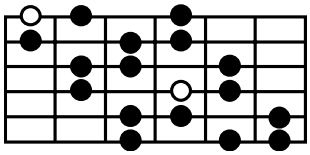
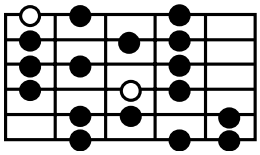
Diminished Scale

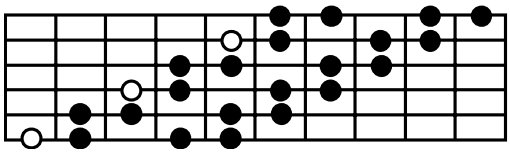
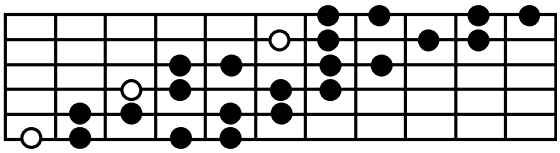
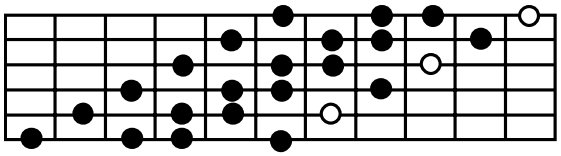
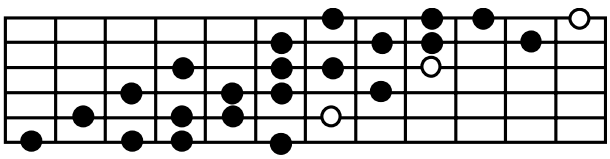
Since the diminished scale consists of "½+1" steps only, there are only four fingerings in position and two fingerings for "3 notes/string" and "4 notes/string". The same fingerings repeat themselves on every other step of the scale.

Diminished Scale (½- 1)	Tuning in Perfect 4th's	Standard Tuning
1st fingering		
2nd fingering		
3rd fingering		

4th fingering		

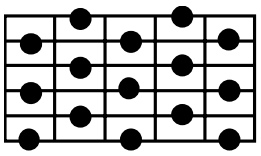
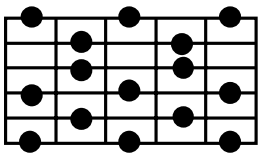
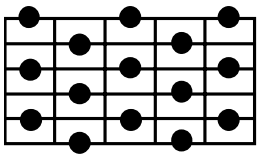
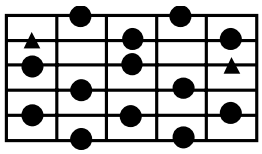
Diminished Scale is a lot easier to play "3 notes/string" or "4 notes/string" due to its symmetric nature.

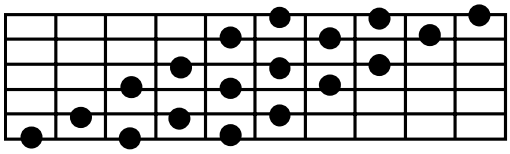
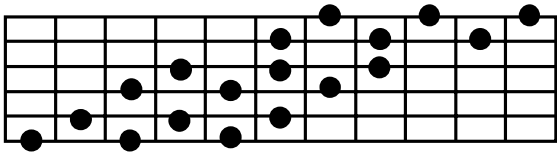
Diminished Scale (½- 1) 3 notes/string	Tuning in Perfect 4th's	Standard Tuning
1st fingering		
2nd fingering		

Diminished Scale (½- 1) 4 notes/string	
1st fingering Tuning in Perfect 4th's	
1st fingering Standard Tuning	
2nd fingering Tuning in Perfect 4th's	
2nd fingering Standard Tuning	

Whole Tone Scale

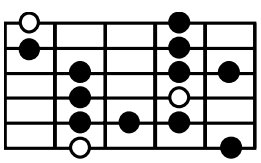
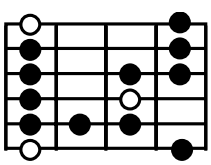
Since the whole tone scale consists of whole steps only, there are only two fingerings in position and only one fingering for "3 notes/string". The same fingerings repeat themselves on every step of the scale.

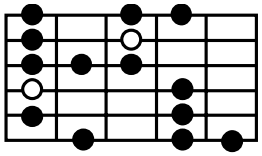
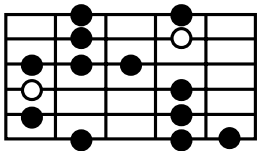
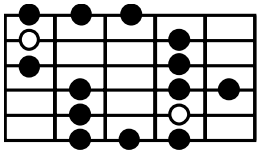
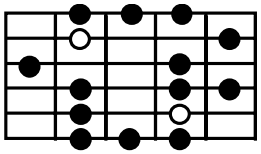
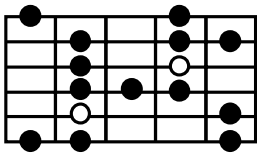
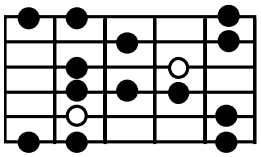
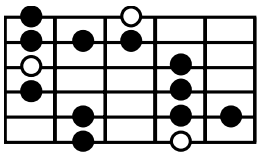
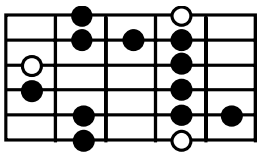
Whole Tone Scale	Tuning in Perfect 4th's	Standard Tuning
1st fingering		
2nd fingering		

Whole Tone Scale 3 notes per string	
Tuning in Perfect 4th's	
Standard Tuning	

Blues Scale

Blues Scale, though being Hexatonic, is a derivative of Minor Pentatonic Scale with a ♭5 as a passing note, so it has five fingerings.

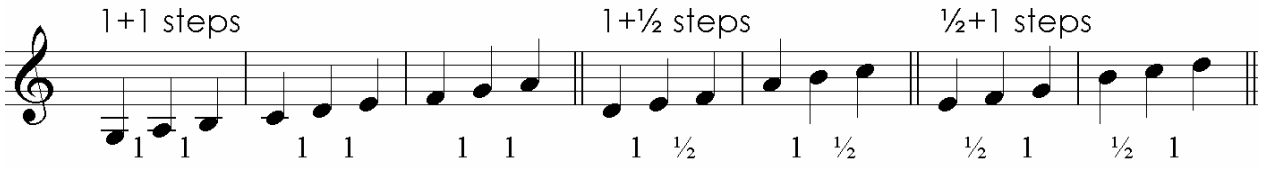
Blues Scale	Tuning in Perfect 4th's	Standard Tuning
1st fingering		

2nd fingering		
3rd fingering		
4th fingering		
5th fingering		

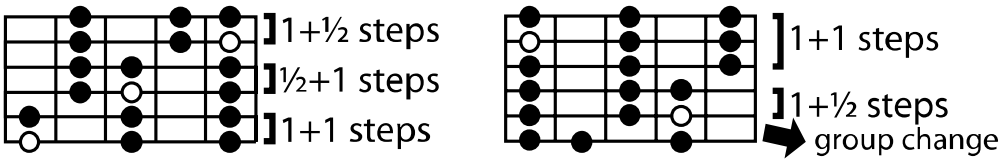
Observations about common scale fingerings

An interesting phenomenon to observe in Tuning in Perfect 4th's is that in "position playing" of any 7 note scale, there are naturally "three notes per string", whereas the standard tuning has to have a "bug of two notes" on either G or B string. The player has to choose which string has the two notes. These notes are drawn as a small triangle instead of a circle in the fingering charts, so one of the triangles has to be played and the other has to be left out. Having constantly three notes per string has advantage of smooth, uninterrupted movement both for the right and the left hand. It is also more efficient to memorize both mentally and physically.

Another interesting phenomenon to observe in Tuning in Perfect 4th's is in "position playing" of major scale and its modes: If we take three steps on each step of the major scale and look at its intervallic design, we see that only three different interval configurations exist:

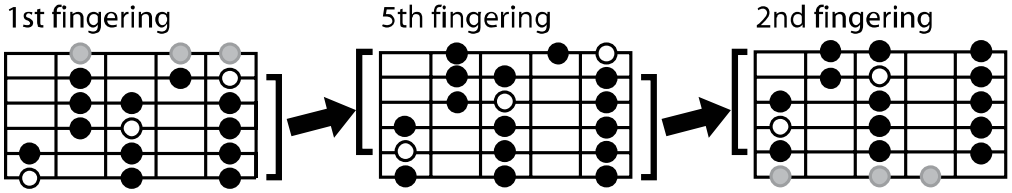


Furthermore, we see that the starting notes within these groups are a perfect 4th apart (G-C-F, D-A, E-B). This means that the same intervallic design groups are on adjacent strings. This is another advantage for the left hand movement. For example:

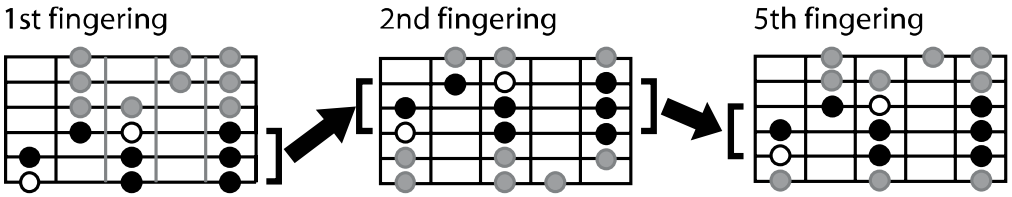


Yet another interesting phenomenon is that parts of the fingerboard shapes keep repeating themselves because of the symmetric intervallic structure of the Tuning in Perfect 4th's, and these groups can be seen in groups of five adjacent strings to groups of two adjacent strings (or mini positions). For example:

Groups of five adjacent strings



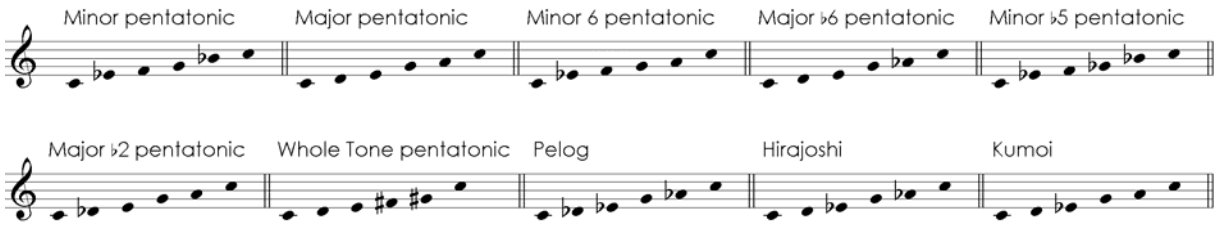
Groups of three adjacent strings



C h a p t e r 1 0

COMPARATIVE STUDIES OF PENTATONIC SCALES

Pentatonics are five notes scales. Some of the pentatonics in common use are:



Each of these scales has their derivative modes. These modes will be explored with the fingerings.

In music, sometimes it is important which notes you *don't* compose/play. Pentatonics are very much in use for thinning out scale materials, getting rid of the stepwise motion and leading notes, emphasizing strong tensions of harmony and also for *outside* playing in improvised music.

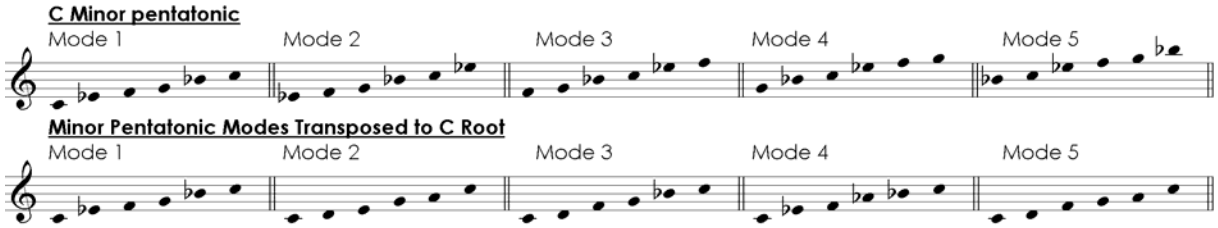
Here is a table that shows the common harmonic use of pentatonics:

Pentatonic Scale	Chords with which the pentatonics can be used
C min pentatonic (C E♭ F G Bb)	Cm7 E♭ ma7 E♭7 Fm7 A♭ ma7 B♭m7 D♭ ma7 A7 Am7♭5
C min6 pentatonic (C E♭ F G A)	Cm6 F7 Am7♭5 B7alt A7alt Am7♭5 E♭ ma7♯11 E♭7♯11 D 7♭9sus Dm7 (Phrygian) D♭ ma7♯5 A♭ma7 (♯11,♭9)

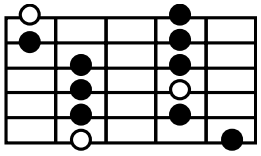
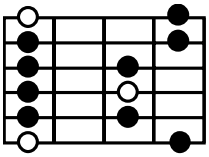
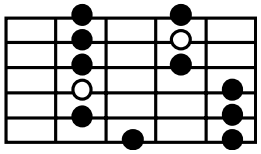
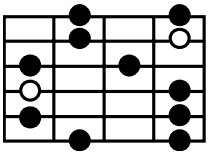
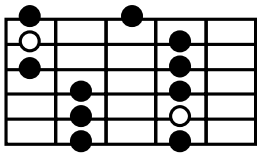
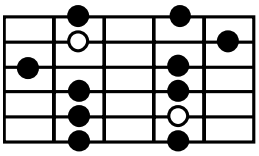
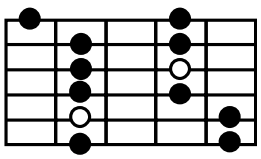
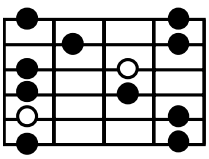
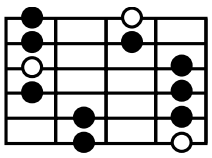
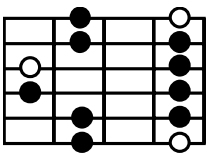
C min7 ♭5 pentatonic (C E♭ F G♭ B♭)	Cm7♭5 E♭ m6 A♭7 D7alt G♭ ma7♭5 B♭ m7 B♭7 D♭ ma7
C major ♭6 pentatonic (C D E G A♭)	F m/maj7 E7alt B♭7♯11 D m7♭5 (9) A♭ ma7♯5
C major ♭2 pentatonic (C D♭ E G A)	C7 E♭7 F♯7 A7
C whole-tone pentatonic (C D E F♯ G♯)	D-maj7 E♭7 F♯7 B♭ 7 B♭ m7♭5 (9) C7alt D7 A♭7

Other 3 scales???

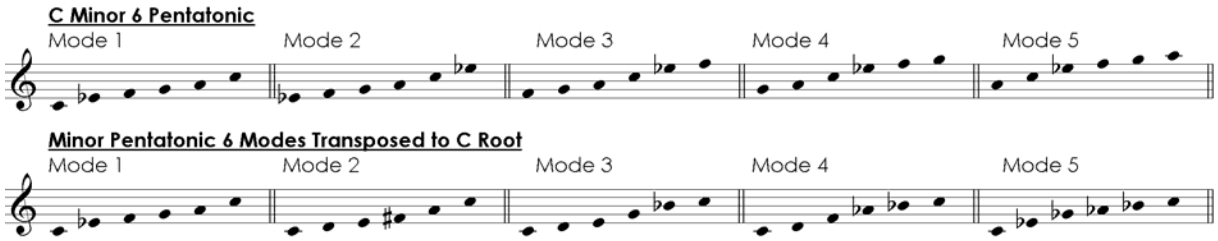
Minor Pentatonic Scale

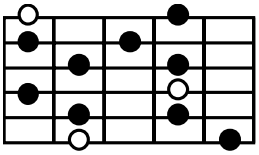
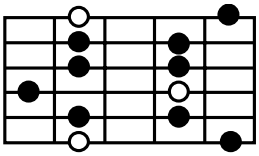
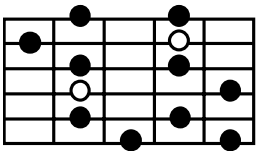
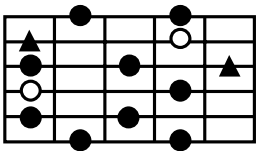
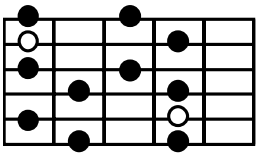
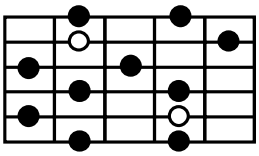
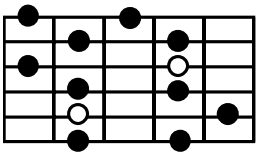
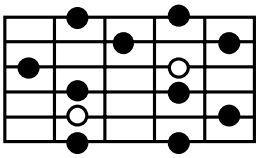
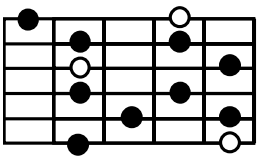
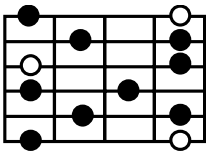


Notice that Mode 2 of Minor Pentatonic Scale is the Major Pentatonic Scale, so the following fingerings apply for both scales.

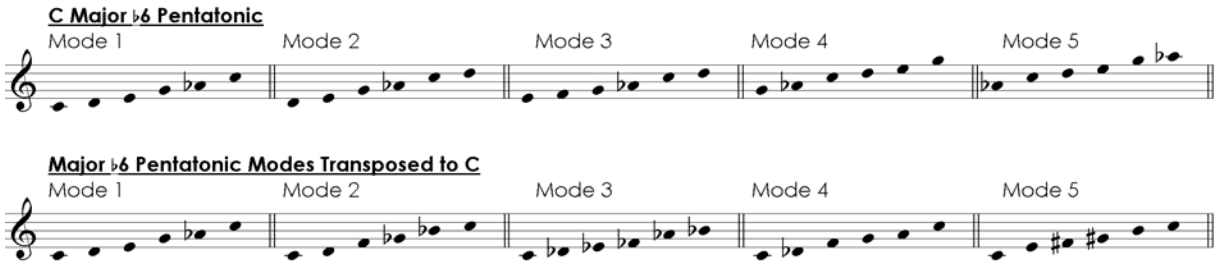
Minor Pentatonic Scale	Tuning in Perfect 4th's	Standard Tuning
1st fingering		
2nd fingering		
3rd fingering		
4th fingering		
5th fingering		

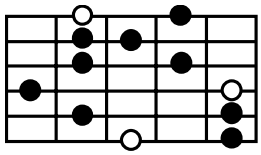
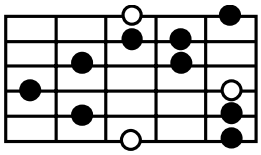
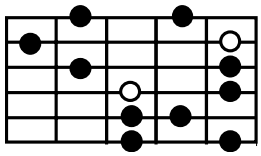
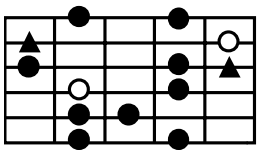
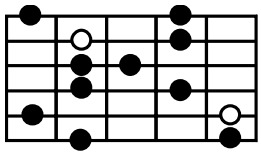
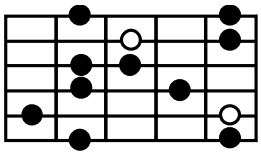
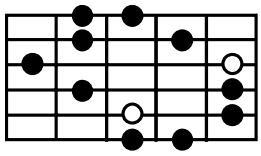
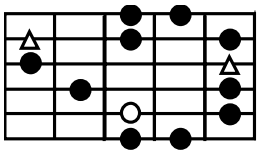
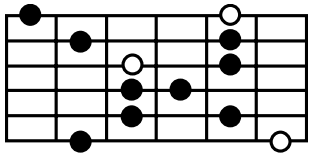
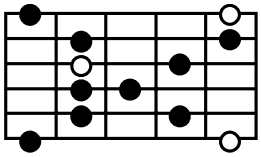
Minor 6 Pentatonic Scale



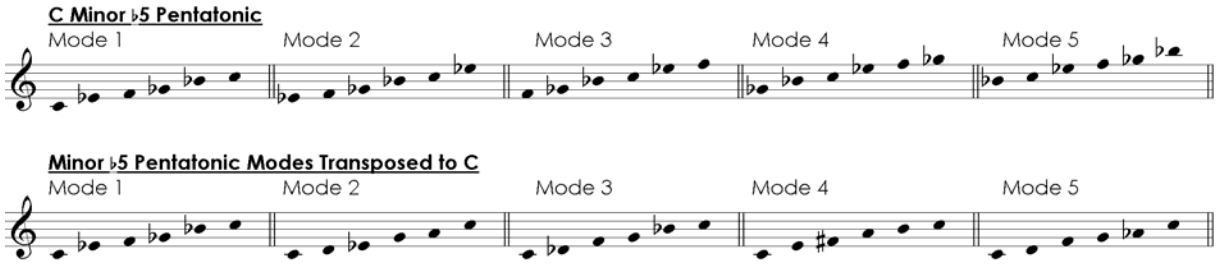
Minor 6 Pentatonic Scale	Tuning in Perfect 4th's	Standard Tuning
1st fingering		
2nd fingering		
3rd fingering		
4th fingering		
5th fingering		

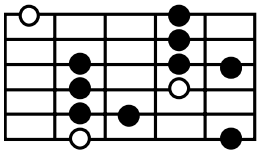
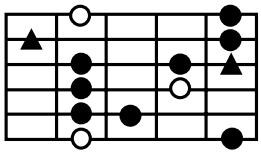
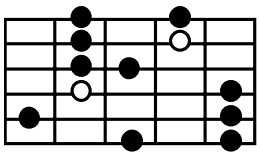
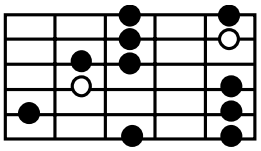
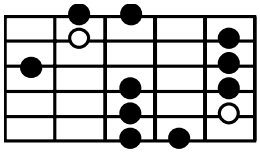
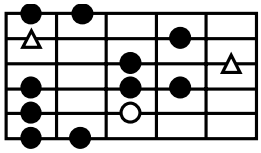
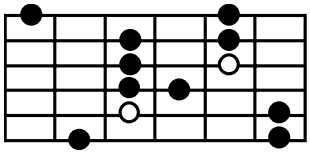
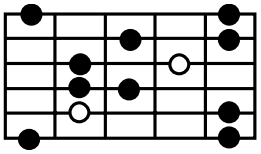
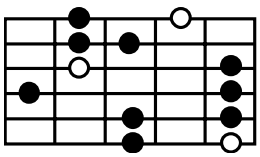
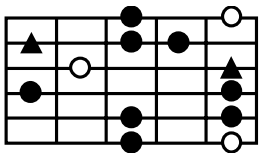
Major ♭6 Pentatonic Scale



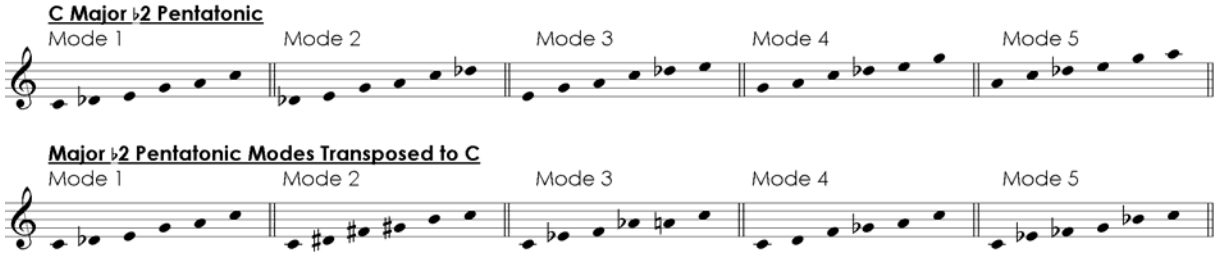
Major ♭6 Pentatonic Scale	Tuning in Perfect 4th's	Standard Tuning
1st fingering		
2nd fingering		
3rd fingering		
4th fingering		
5th fingering		

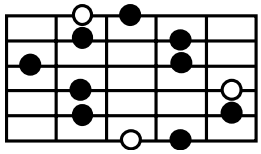
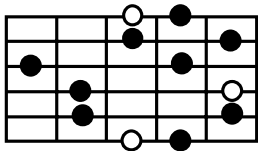
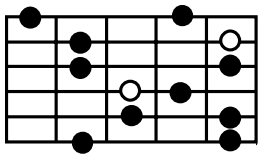
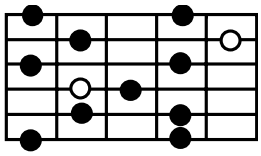
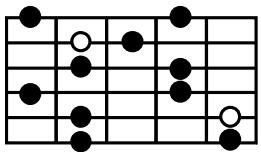
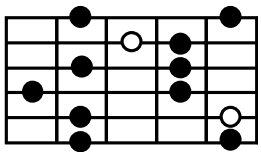
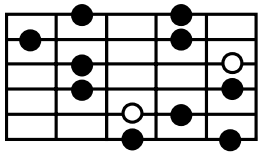
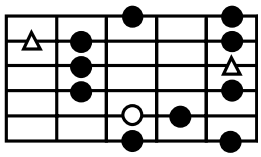
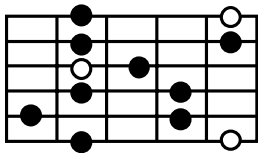
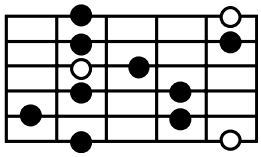
Minor ♭5 Pentatonic Scale



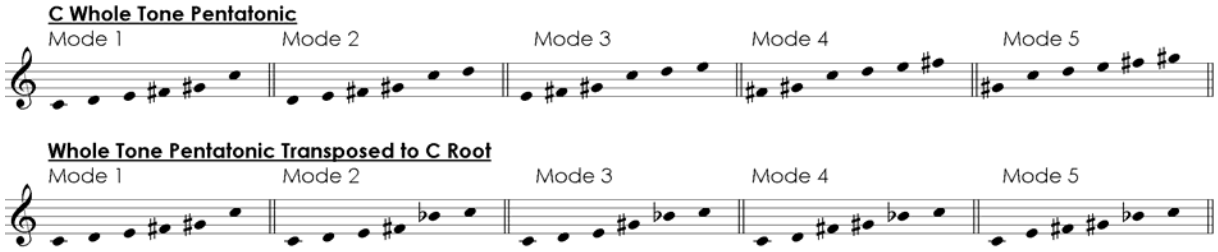
Minor ♭5 Pentatonic Scale	Tuning in Perfect 4th's	Standard Tuning
1st fingering		
2nd fingering		
3rd fingering		
4th fingering		
5th fingering		

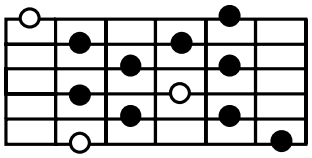
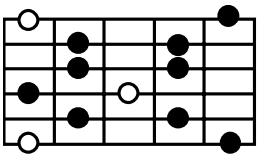
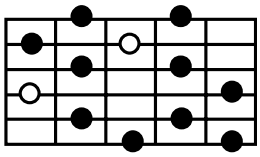
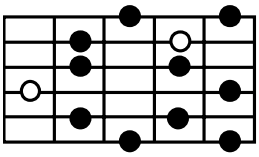
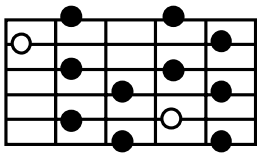
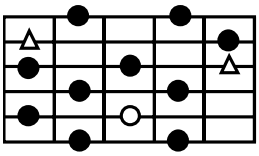
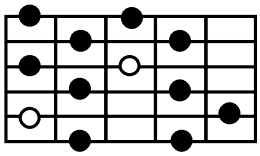
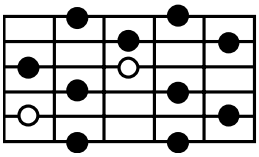
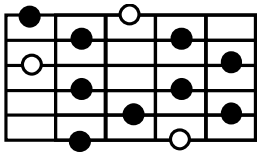
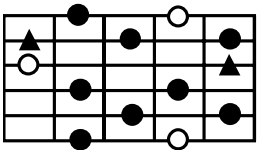
Major ♭2 Pentatonic Scale



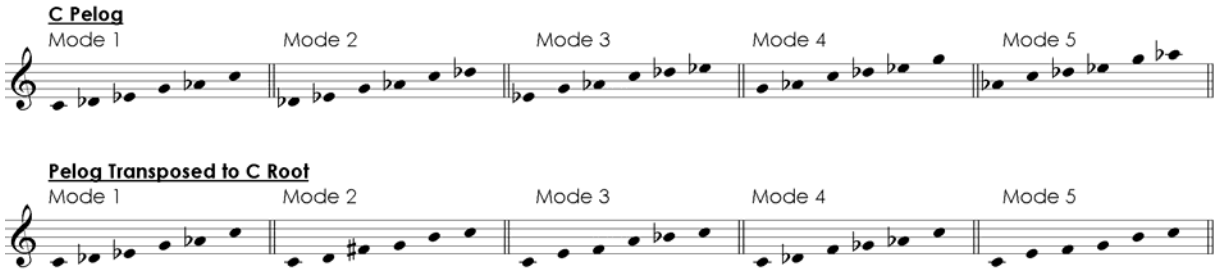
Major ♭2 Pentatonic Scale	Tuning in Perfect 4th's	Standard Tuning
1st fingering		
2nd fingering		
3rd fingering		
4th fingering		
5th fingering		

Whole Tone Pentatonic Scale

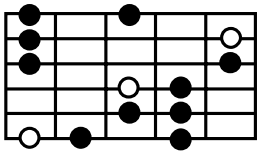
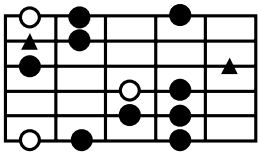
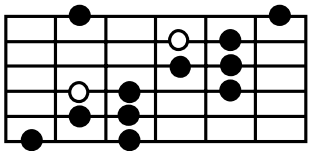
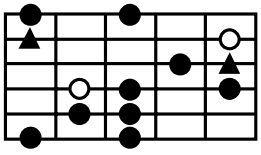
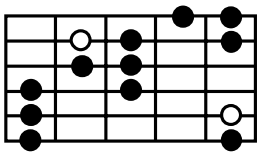
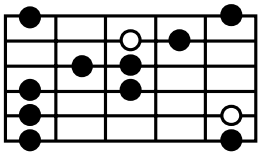
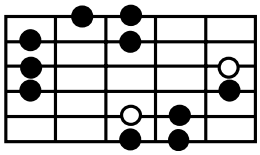
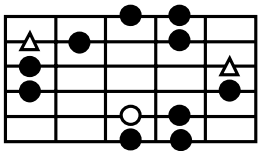
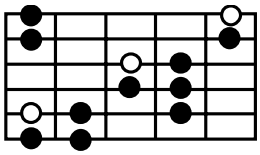
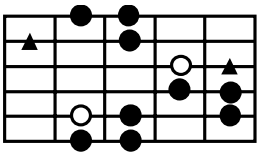
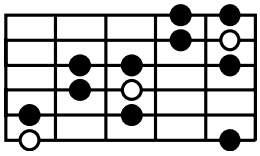
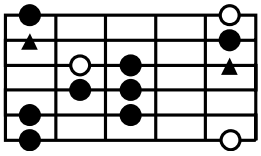
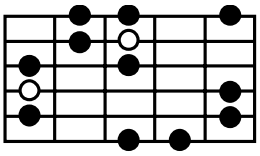
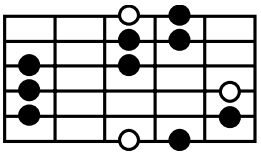


Whole Tone Pentatonic Scale	Tuning in Perfect 4th's	Standard Tuning
1st fingering		
2nd fingering		
3rd fingering		
4th fingering		
5th fingering		

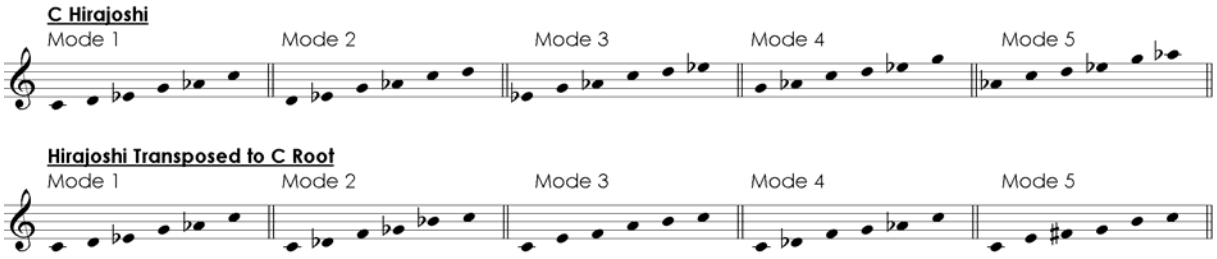
Pelog



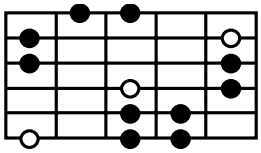
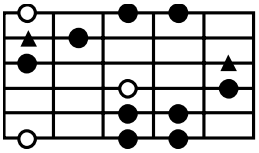
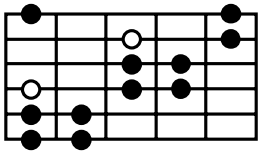
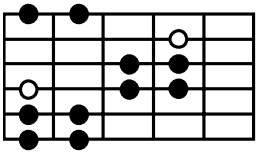
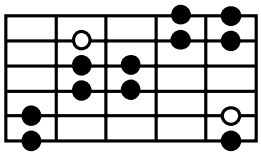
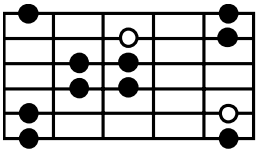
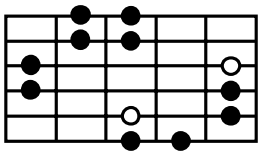
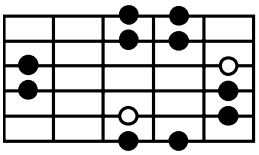
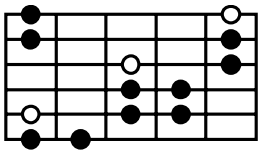
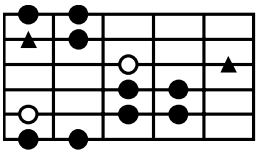
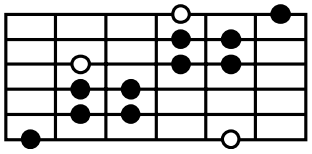
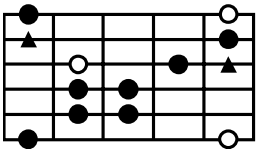
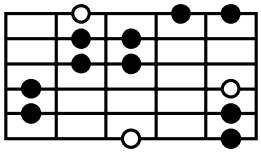
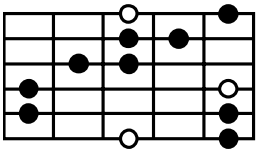
Pelog can be thought as Phrygian Mode without the 4th and the 7th. Notice that because of this, there are 7 fingerings like the Major Scale.

Pelog	Tuning in Perfect 4th's	Standard Tuning
1st fingering		
2nd fingering		
3rd fingering		
4th fingering		
5th fingering		
5th fingering		
7th fingering		

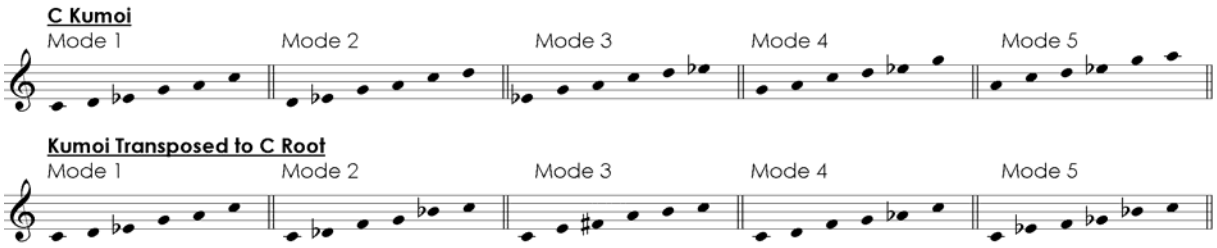
Hirajoshi



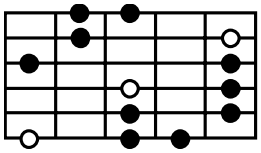
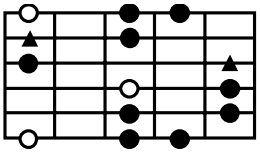
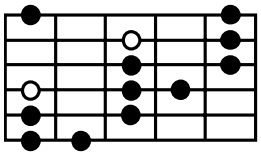
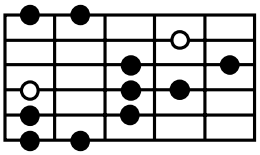
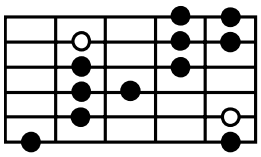
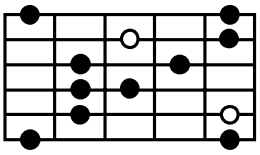
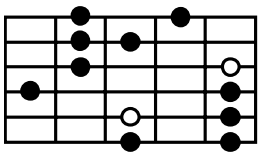
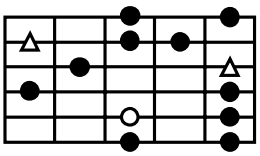
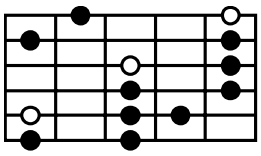
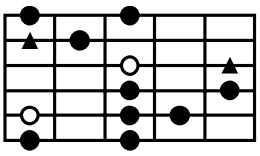
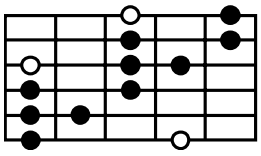
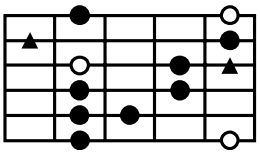
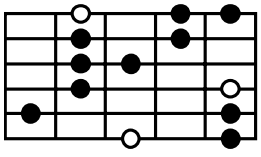
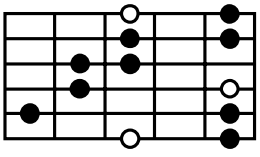
Hirajoshi can be thought as Aeolian Mode without the 4th and the 7th. Notice that because of this, there are 7 fingerings like the Major Scale.

Hirajoshi	Tuning in Perfect 4th's	Standard Tuning
1st fingering		
2nd fingering		
3rd fingering		
4th fingering		
5th fingering		
6th fingering		
7th fingering		

Kumoi



Kumoi can be thought as Dorian Mode without the 4th and the 7th. Notice that because of this, there are 7 fingerings like the Major Scale.

Kumoi	Tuning in Perfect 4th's	Standard Tuning
1st fingering		
2nd fingering		
3rd fingering		
4th fingering		
5th fingering		
6th fingering		
7th fingering		

Chapter 11

COMPARATIVE STUDIES OF UNCOMMON SEVEN NOTE SCALES & MODES

Uncommon seven note scales can be formed by free manipulation of the scale degrees. Certain rules apply during this process. Let's look at the table below to have an overview of these rules:

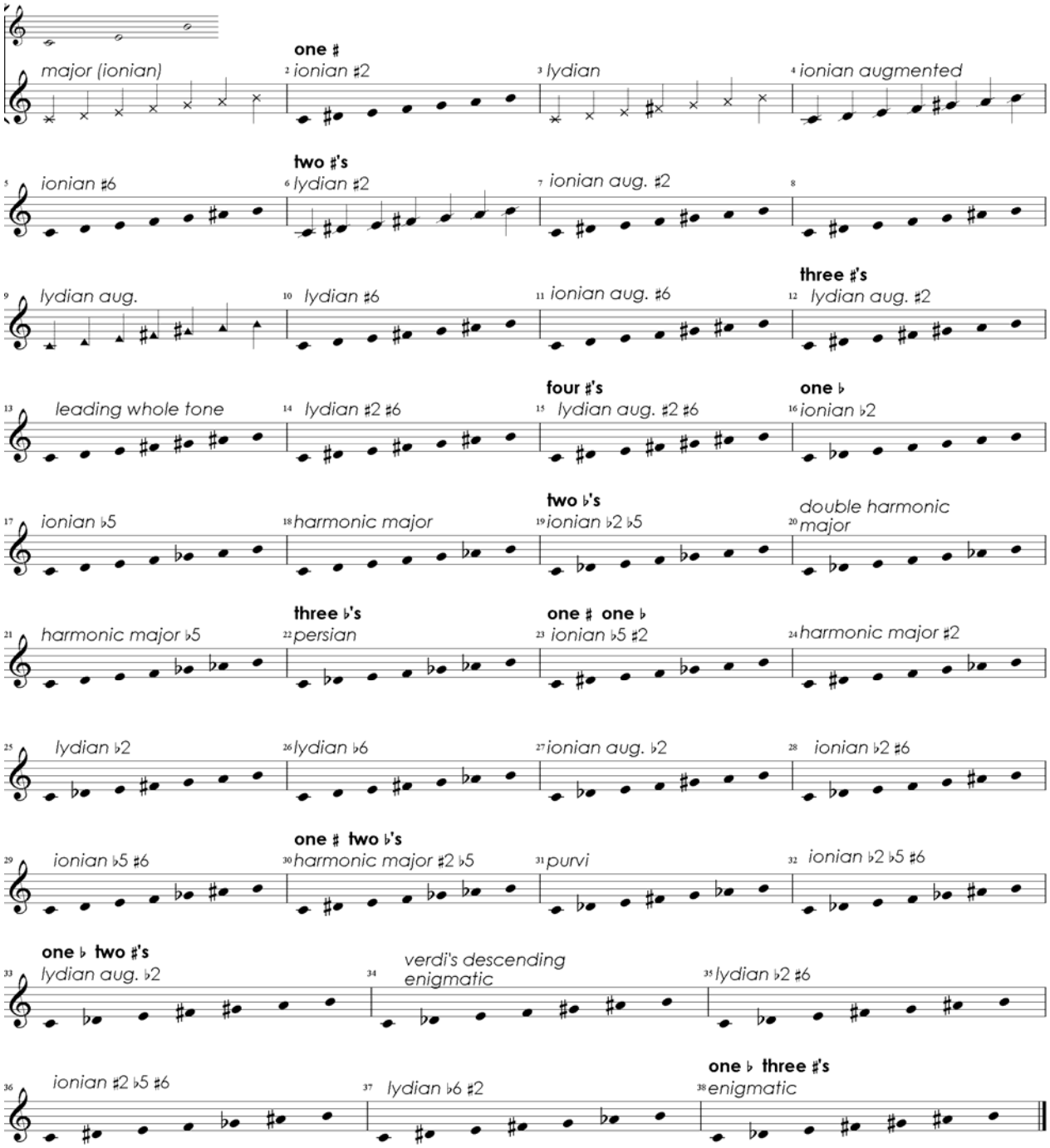
Scale Degree	1	2	3	4	5	6	7
Possibility	Root cannot be manipulated, for it to stay as the root	a. ♭ b. ♮ c. ♯ only if 3rd is ♮	a. ♭ b. ♮	a. ♮ b. ♯ c. ♭ only if 3rd is ♭	a. ♮ b. ♯ only if 6th is not ♭ c. ♭ only if 4th is not ♯	a. ♮ b. ♯ only if 7th is not ♭ c. ♭ only if 5th is not ♯	a. ♮ b. ♭

It is clear that the root "stays as the root" and the most important voices of the chord that define the final quality of the chord, namely 3rd and 7th can either be ♭ (Minor) or ♮ (Major) The rest can be manipulated freely and care should be taken so that they won't produce enharmonic pitches (E-F♭, G♯-A♭ etc).

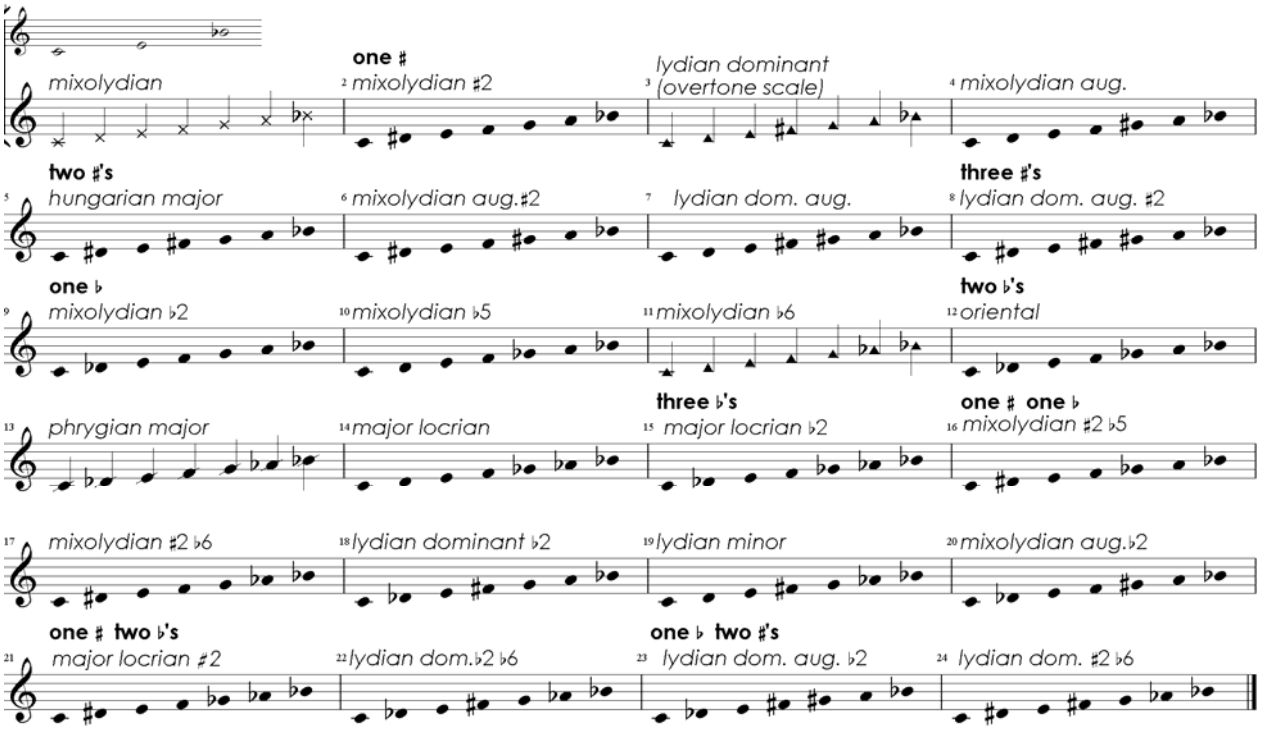
Obviously, some of these seven note scales turn out to be common scales, such as major scale and its modes, which are marked with "x" shaped note heads; melodic minor and its modes, which are marked with "△" shaped note heads; harmonic minor and its modes, which are marked with "ø" shaped note heads. The rest are written with notes without stems.

We can systematically generate seven note scales and classify these seven note scales into four categories, according to their 3rd's and 7th's: (the following example takes C as the root and has to transposed into 12 keys for further study) Naming of these scales are quite a topic of discussion in itself, but here we adhered to widely accepted names (also inherited from non-western cultures) and made up new names using the modes of the major scale when necessary and marked them with a "?" if the scale itself was too ambiguous.

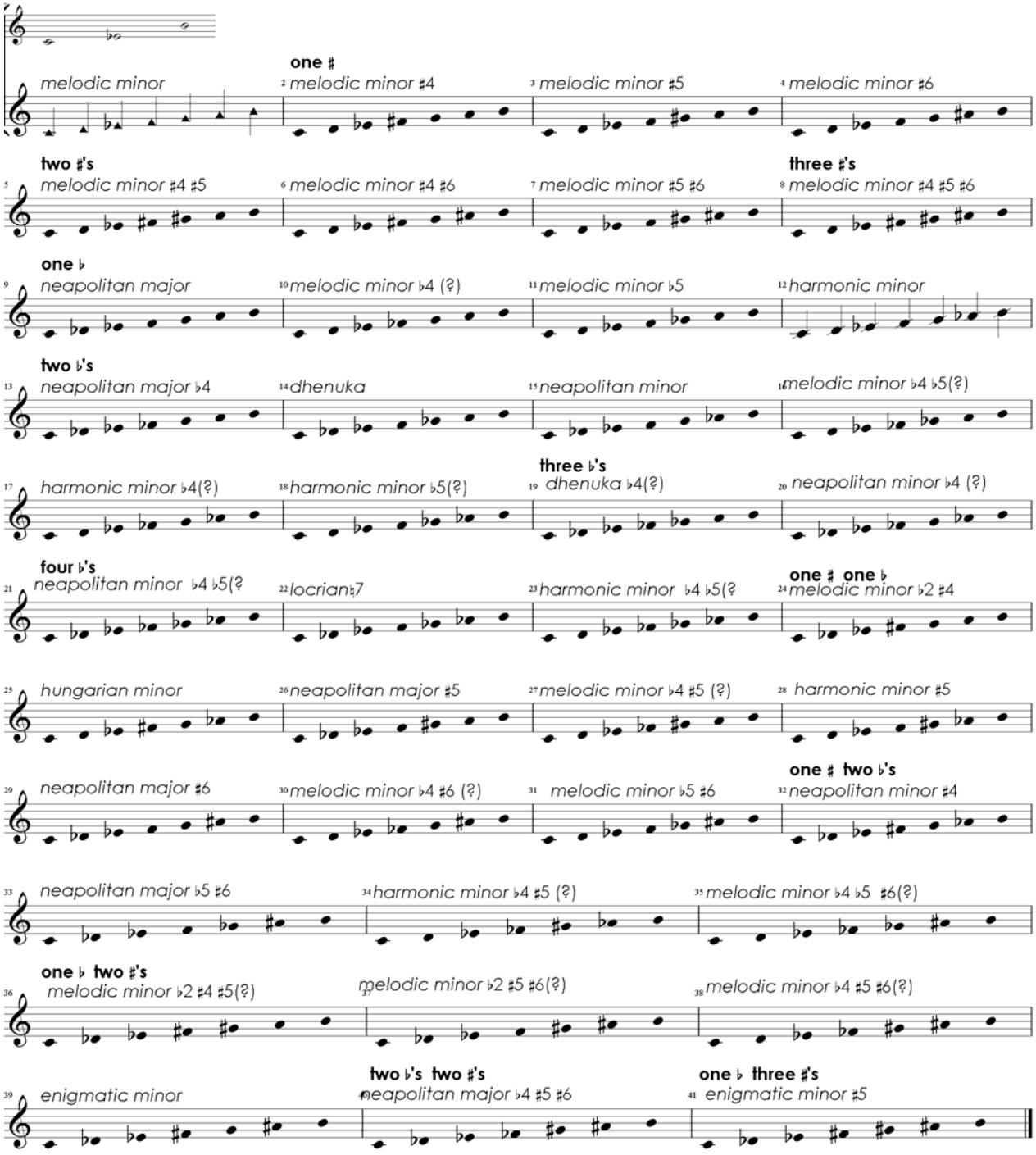
Scales with a Major 3rd and a Major 7th:



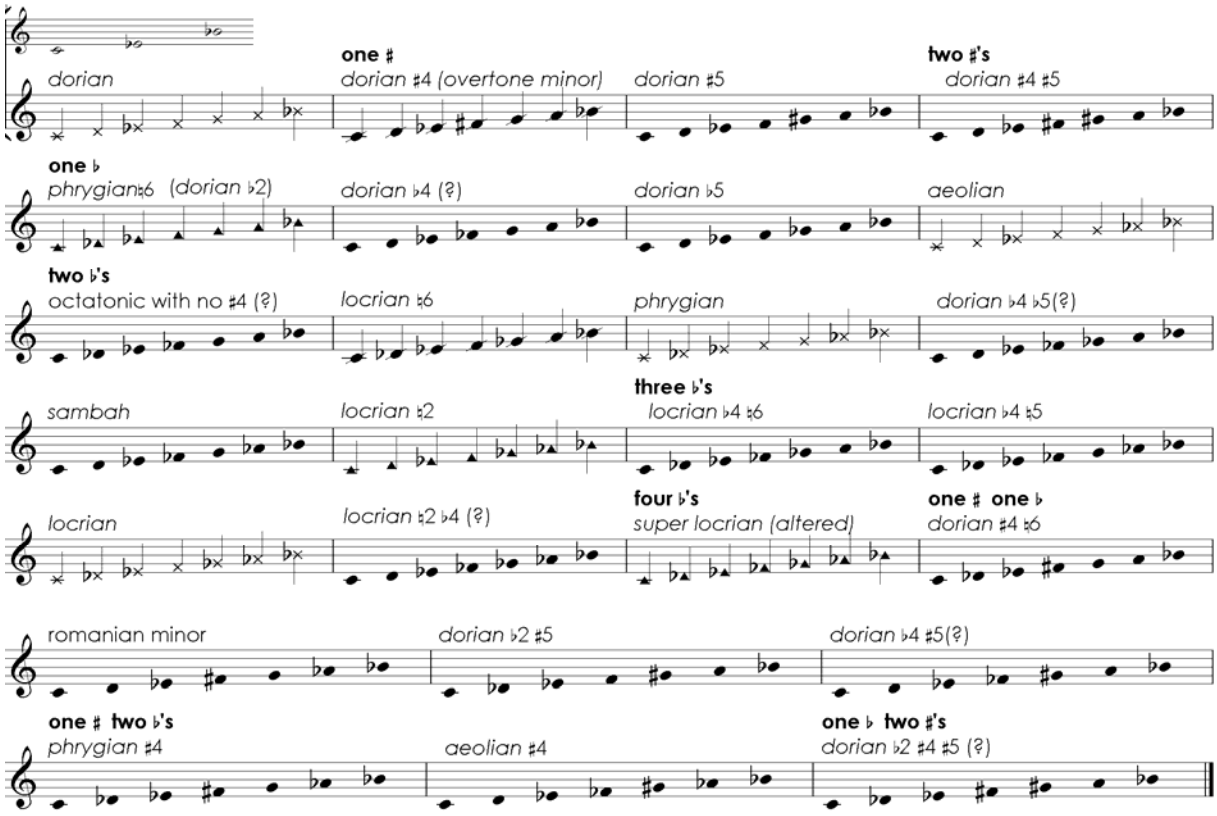
Scales with a Major 3rd and a Minor 7th:



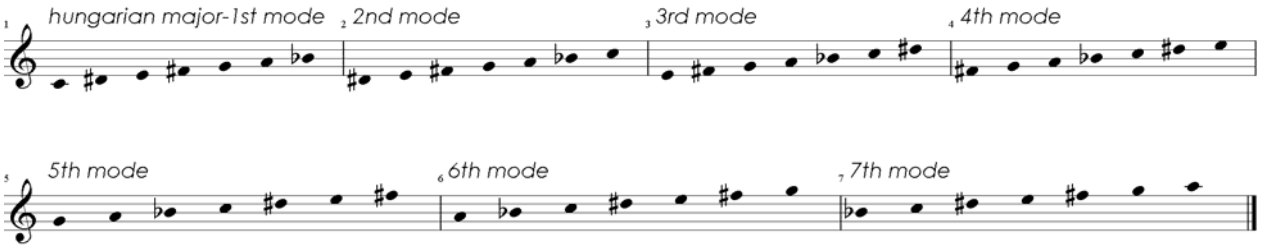
Scales with a Minor 3rd and a Major 7th:



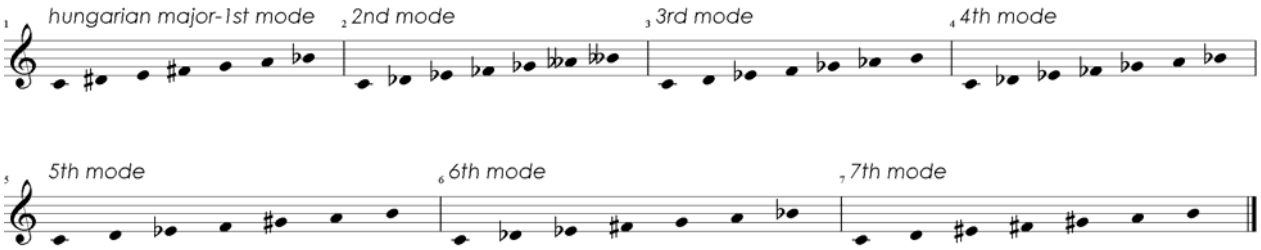
Scales with a Minor 3rd and a Minor 7th:



Any of these scales can be used for further modal construction, creating seven modes for each scale (same principle as Major scale is used for Dorian, Phrygian, Lydian etc.) For example:



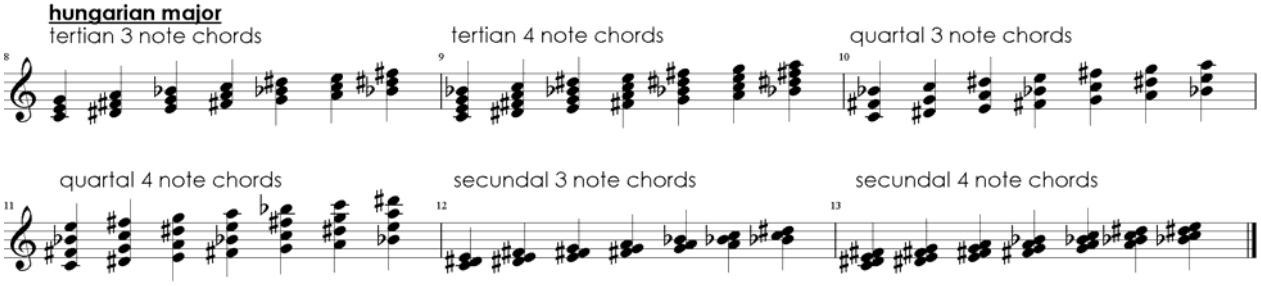
Transposed to C tonic for comparison:



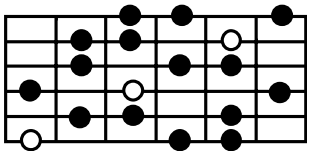
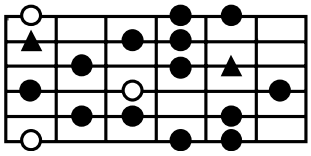
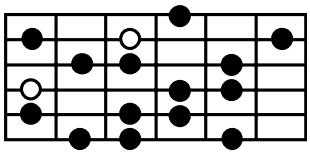
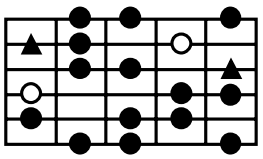
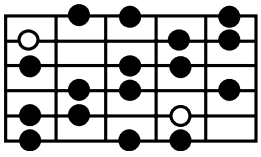
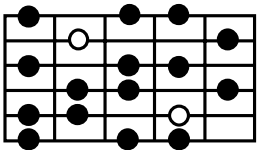
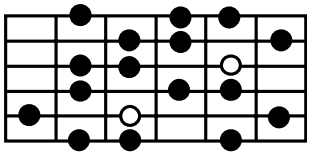
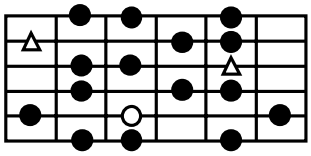
Obviously, most of the modes derived from these scales end up to be one of the scales that are already produced by the systematic alteration technique that has

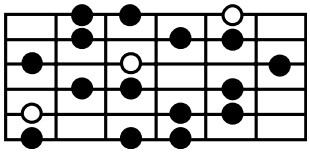
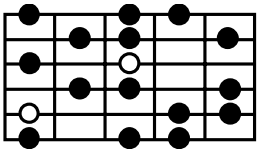
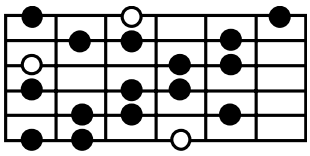
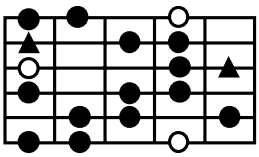
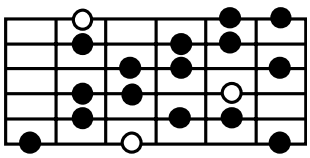
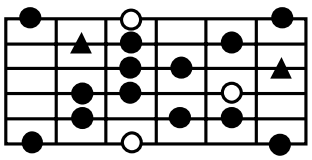
been used. But also some new scales appear such as the 2nd and 7th modes of Hungarian Major Scale in the example above. To explore all of these modes are beyond the scope of this thesis.

Of course, all of the scales can be harmonized with the usual techniques of tertian, quartal and secundal harmony. Exploring all of these possibilities is beyond the scope of this thesis. For example:



The main point to emphasize here is that these seven note scales are a wealth of new sound possibilities for the contemporary guitarist and are materials that are sooner or later worth visiting. Then, Tuning in Perfect 4th's again comes up with all the advantages over the Standard Tuning that has been discussed in depth in *Chapter* 9. Let's use the Hungarian Major as an example:

Hungarian Major	Tuning in Perfect 4th's	Standard Tuning
1st fingering		
2nd fingering		
3rd fingering		
4th fingering		

5th fingering		
6th fingering		
7th fingering		

Chapter 12

COMPARATIVE STUDIES OF MISCELLANEOUS SCALE MATERIALS: MODES OF LIMITED TRANSPOSITIONS, EQUAL DIVISION OF THE OCTAVE(S)

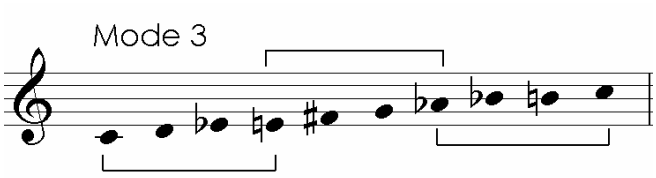
Composers of 20th Century have delved deeper into symmetry for forming new scale materials, based on the division of the octave(s) into equal parts and filling in these parts with symmetric intervals.

I would like to mention two composers that clearly explain their system in their books: Olivier Messiaen in "*Technique de Mon Langage Musical*" (The Technique of My Musical Language) and Nicolas Slonimsky in "*Thesaurus of Scales*".

Modes of Limited Transpositions

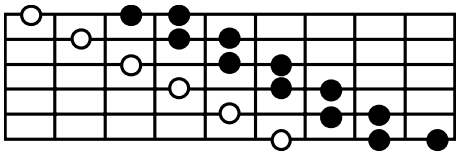
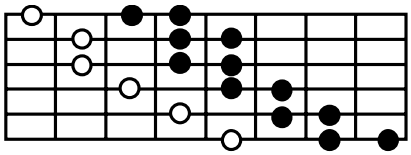
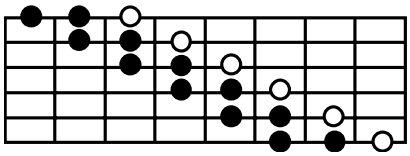
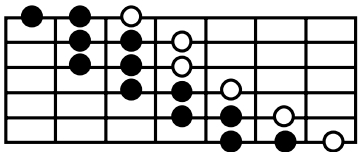
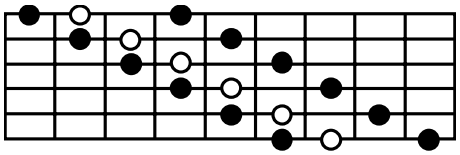
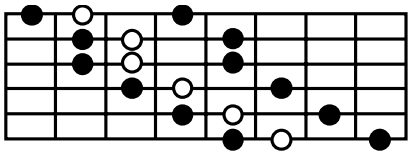
Olivier Messiaen in the 16th Chapter of his "The Technique of My Musical Language" explains his "Modes of Limited Transpositions". The theory behind the "Modes of Limited Transpositions" is that these modes are formed of several symmetrical groups obtained by the division of the octave, the last note of each group always being common with the first note of the following group. This way, there are only limited numbers of transpositions before arriving at the same group of notes.

First Mode of Limited Transpositions: This mode is actually the "whole tone scale". (See chapter 11 for discussion)
Second Mode of Limited Transpositions: This mode is actually the "diminished scale". (See chapter 11 for discussion)
Third Mode of Limited Transpositions: This mode is based on the equal division of the octave into three, resulting in an augmented triad and filling these divisions with "1+½+ ½ tones".



It is clear that this mode is transposable three more times. If we transpose this mode ½ step up, these transpositions would be starting on Db, D and Eb before ending up in the same scale. The transposition starting on E would have the same pitches as the one starting on C.

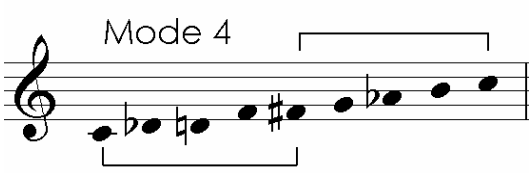
On the guitar, Mode 3 is easy to play "three notes per string" because of the symmetry of the scale. Since any of C, E and G#/Ab might be considered as tonic, they have been drawn as empty circles. Mode 3 looks like this on the fretboard:

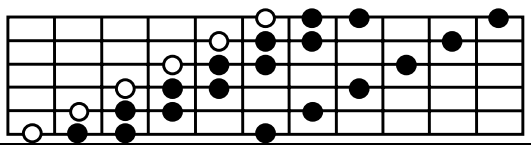
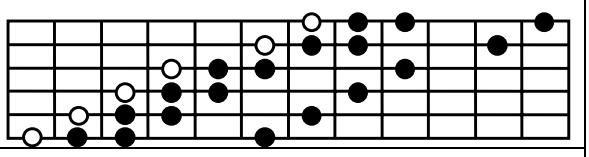
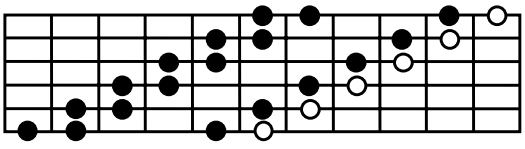
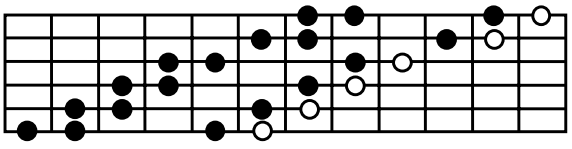
Mode 3 3 notes/string	Tuning in Perfect 4th's	Standard Tuning
1st fingering		
2nd fingering		
3rd fingering		

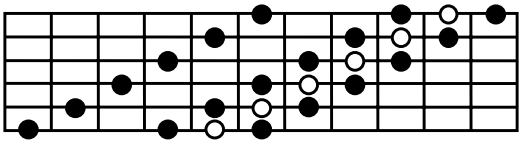
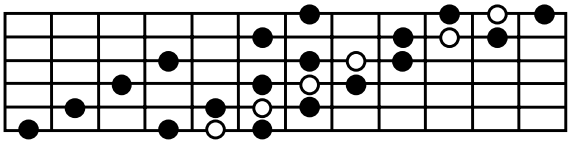
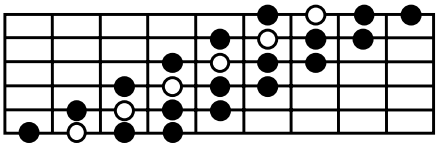
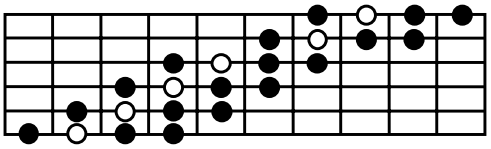
4th, 5th, 6th and 7th Modes of Limited Transpositions: This mode is based on the equal division of the octave into two, resulting in an augmented fourth and filling this division with various tones and semitones.

All of these modes are transposable five more times, where the others would be starting on Db, D, Eb ,E, F before ending up in the same scale, but this time starting on F#. Here are these modes and how they look on the guitar:

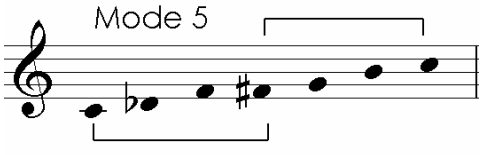
Mode 4 fills each augmented fourth with "½+ ½+1,5 tones".

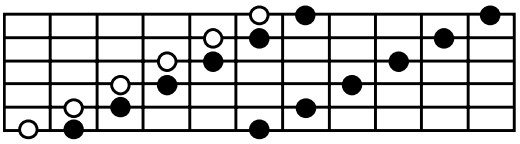
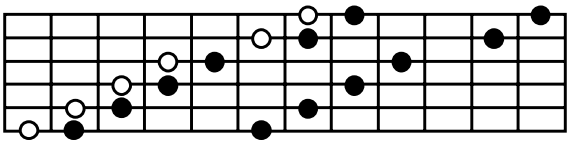
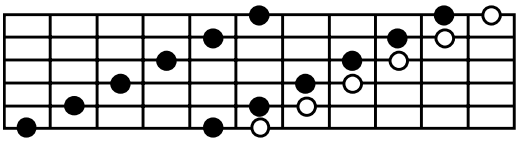
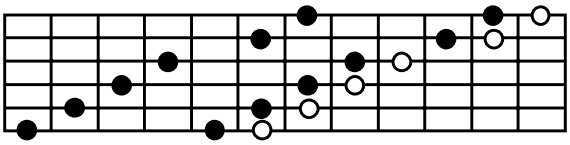
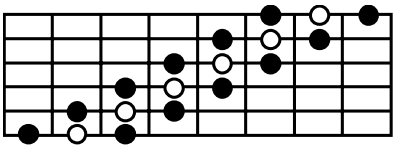
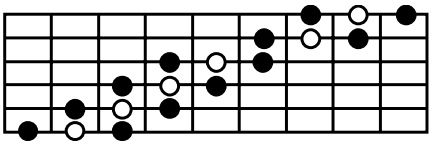


Mode 4	Tuning in Perfect 4th's	Standard Tuning
1st fingering		
2nd fingering		

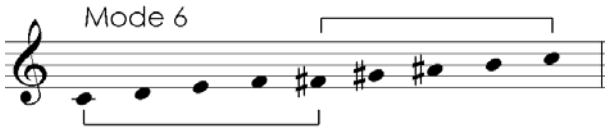
3rd fingering		
4th fingering		

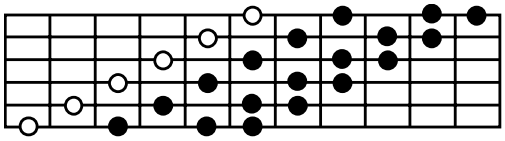
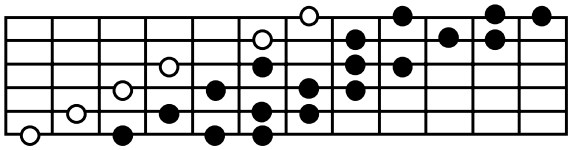
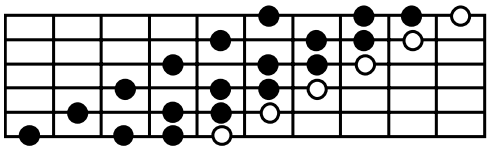
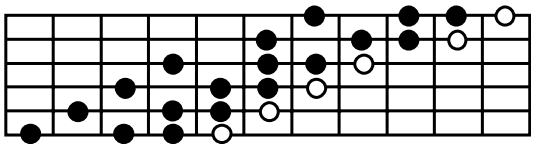
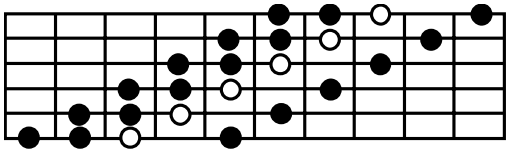
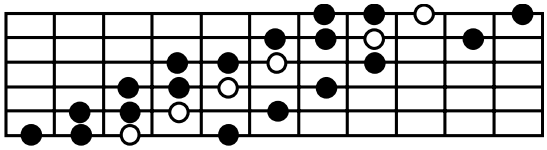
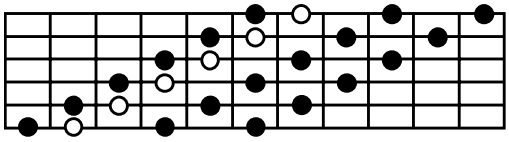
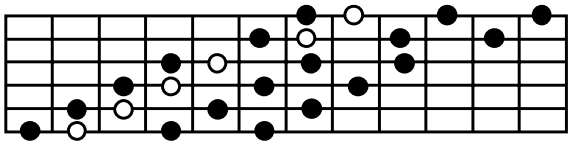
Mode 5 fills each augmented fourth with "½+1,5+ ½ tones".



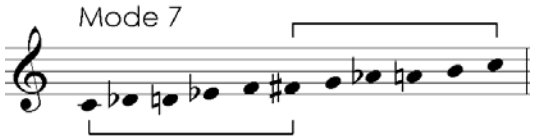
Mode 5	Tuning in Perfect 4th's	Standard Tuning
1st fingering		
2nd fingering		
3rd fingering		

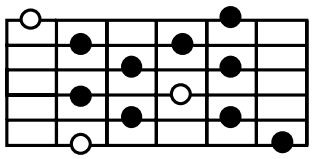
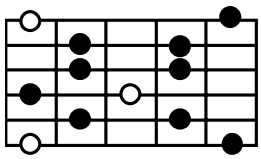
Mode 6 fills each augmented fourth with "1+1+ ½ tones".

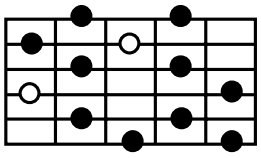
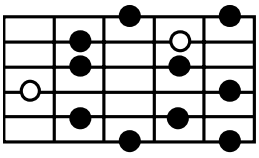
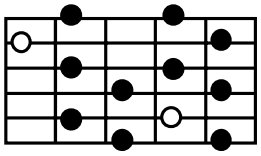
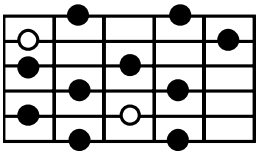
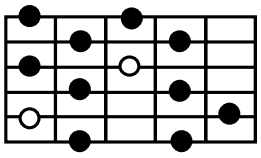
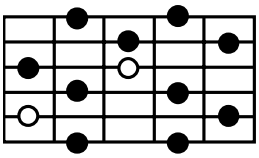
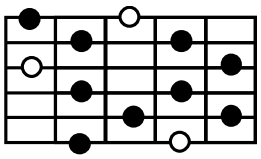
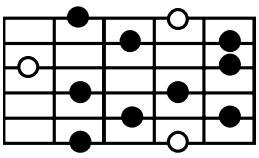


Mode 6	Tuning in Perfect 4th's	Standard Tuning
1st fingering		
2nd fingering		
3rd fingering		
4th fingering		

Mode 7 fills each augmented fourth with "½+½+½+1 tones".



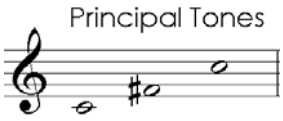
Mode 7	Tuning in Perfect 4th's	Standard Tuning
1st fingering		

2nd fingering		
3rd fingering		
4th fingering		
5th fingering		

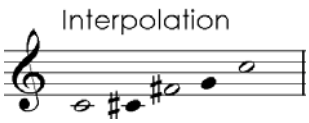
Equal Division of the Octave(s)

Nicolas Slonimsky in "Thesaurus of Scales" goes much deeper into the "equal division of the octave(s)" and ends up with 12 "equal divisions" and 1033 scales and patterns derived from these divisions. These scales and patterns are formed by the processes of what he calls "Interpolation", "Infrapolation" and "Ultrapolation" and combinations of these after dividing the octave(s) into equal parts and obtaining the "Principal Tones".

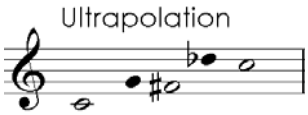
For example, Principal Tones after dividing one octave into two:



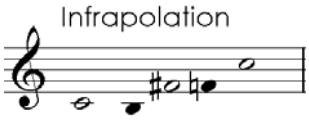
"Interpolation" is the insertion of one or several intervals of the same type between the principal notes.



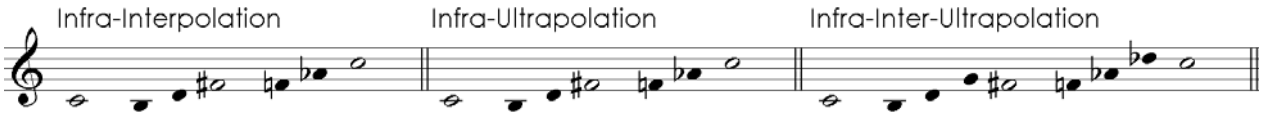
"Ultrapolation" is the insertion of one or several intervals of the same type above the next principal note.



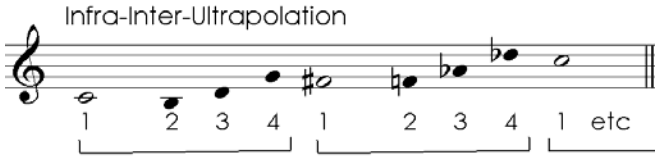
"Infrapolation" is the insertion of one or several intervals of the same type below a principal note.



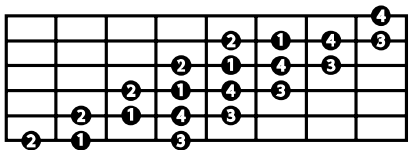
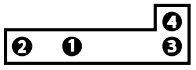
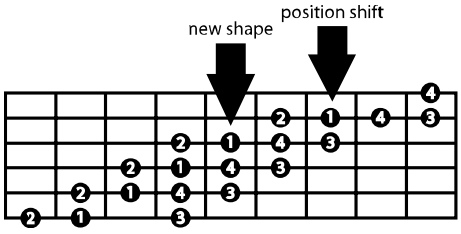
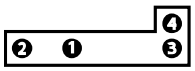
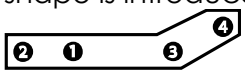
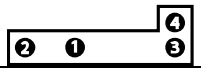
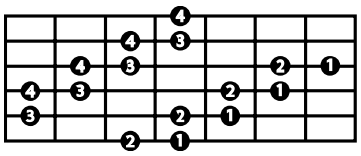
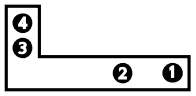
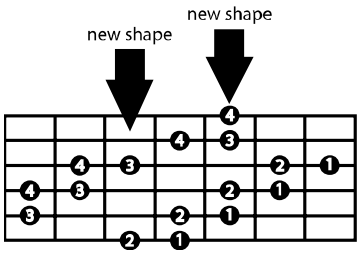
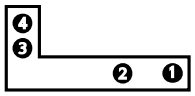
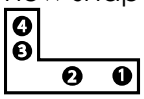
"Interpolation", "Infrapolation" and "Ultrapolation" may be freely combined, resulting in hyphenated forms: "Infra-Interpolation", "Infra-Ultrapolation" and "Infra-Inter-Ultrapolation"



When we look at Messiaen's Modes, we see that they are simply interpolation of several notes and are naturally included in the "Thesaurus". Mode 3 is No.185, Mode 4 is No.16, Mode 5 is No.8, Mode 6 is No.21 and Mode 7 is No.23 in the "Thesaurus".
It is beyond the scope of this thesis to cover the materials in the "Thesaurus", but here is No.141 as an example to compare how these patterns lie on the fretboard of the guitar in Tuning in Perfect 4th's and Standard Tuning:



The pattern consists of two identical inner patterns an augmented 4th apart. The notes of these patterns have been numbered for ease of visualization on the fretboard of the guitar.

Fingering	Tuning in Perfect 4th's	Standard Tuning
Fingering 1	  This shape repeats every ♯4 on all of the strings	  This shape repeats every ♯4 on the bottom strings, but between G&B strings, a new shape is introduced :  Then there is position shift up a fret and back to this shape: 
Fingering 2	  This shape repeats every ♯4 on all of the strings	  This shape repeats every ♯4 on the bottom strings, but on D string, a new shape is introduced:  And on the G string, yet another new shape is introduced: 

All of the patterns in "*Thesaurus of Scales*" are based on the same logic of symmetry, so the situation we have encountered in one example will be repeating itself all the time.

In the above pattern, we have seen that there are two main fingerings. Tuning in Perfect 4th's has one shape per fingering which repeats itself in consistent shifts of the

frets. Standard Tuning, for the Fingering 1, has two shapes and an inconsistent shift, and for the Fingering 2 has three shapes, but stays consistent in the shift of frets. This once again proves that Tuning in Perfect 4th's achieves the same result with considerable amount of less information for the intellectual and motoric memory.

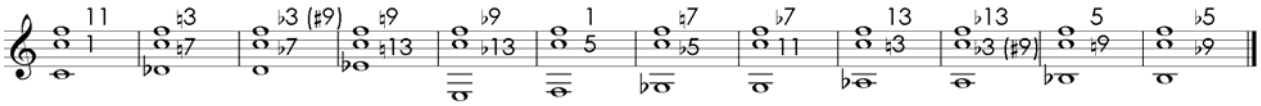
Chapter 13

SPECIAL CHORDS WITH OPEN STRINGS

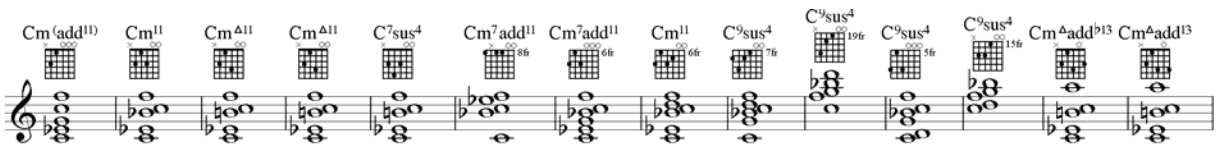
Another question that arises naturally is "What happens to the special open string chords in Tuning in Perfect 4th's?" Though the advantage of using the open B and E strings are not available in tuning in perfect 4th's, new opportunities arise with the use of open C and F strings.

Guitar's nature does not lend itself to creating chords with very close voicings and clusters in it. The only possibility for achieving this is to use open strings and use higher position fingerings that are "around" the notes of the open strings.

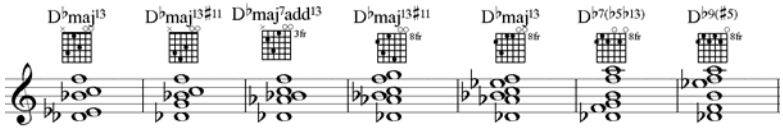
One systematical way of exploring functional harmony chords using open C and F strings is to analyze these two notes against all 12 roots and find out what kind of chord tones they produce:



Then, the next step is simply to fill in the remaining chord tones. For example, some chords with a C root:

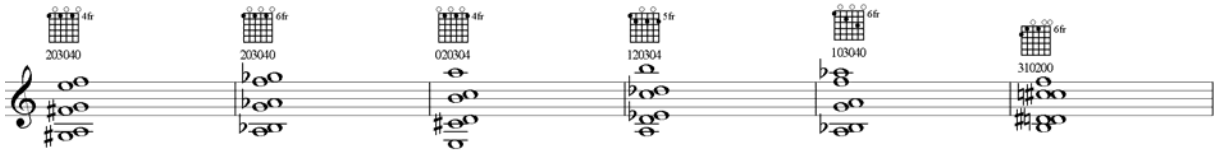


Some chords with a Db root:



etc

Here are some non-functional harmony chords. These chords serve well as tonal colors:



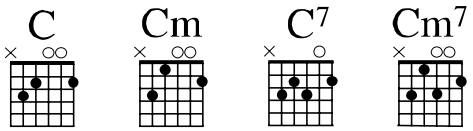
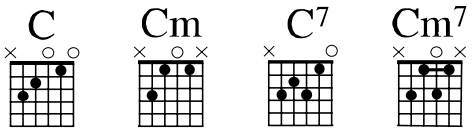
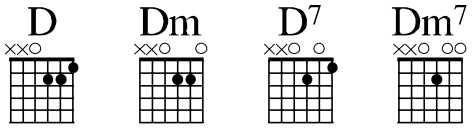
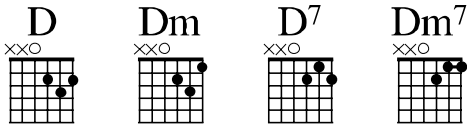
To explore all the possibilities of special chords with open strings is beyond the scope of this thesis. However, it should be clear that Tuning in Perfect 4th's is equally available for creating vast amounts of these chords as the Standard Tuning.

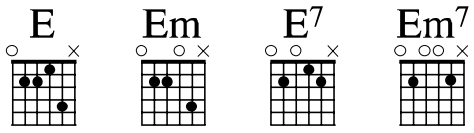
Chapter 14

…AND FOR THE "BEACH STRUMMERS"

Guitar's popularity owes a lot to getting a very easy and reasonable first level result in quite a short time. Most of that depends on "strumming" chords, which are mostly the first position chords and the *barre* chords. Standard tuning is thought to make the shapes of the first position chords very easy. This is true, but also applies to most first position chords in tuning in perfect fourths.

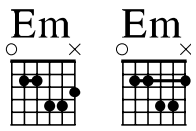
Here is a comparison table of beginning level first position chords:

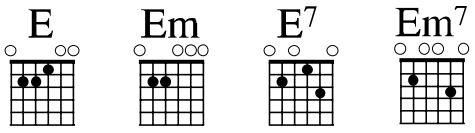
Root	Tuning in Perfect 4th's	Standard Tuning
C	 x31002 x31002 x32401 x41302 C and C7 chords are as easy as they are on Standard Tuning, Cm and Cm7 are easier because the 1st string does not need to be muted and fingers are spread over 3 different frets.	 x32010 x3102x x32410 x3141x C and C7 chords are as easy as they are on Tuning in Perfect 4th's. Cm and Cm7 are more difficult because the 1st string has to be muted and Cm fingering is tricky with fingers 1&2 on the same fret and Cm7 requires a *semi-barre*.
D	 xx0321 xx0320 xx0301 xx0300 All of these chords are easier because they need less number of fingers, use more open strings and lie more ergonomically on the fretboard.	 xx0321 xx0321 xx0312 xx0211 All of these chords are more difficult because they need more number of fingers, use only one open string and lie less ergonomically on the fretboard and Dm7 needs a *semi-barre*.

<table>
<tr>
<td>E</td>
<td>


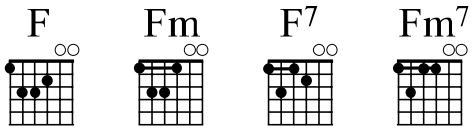
03214x 03204x 03014x 03004x

Unfortunately, here we don't have the fat open E and Em chords. The 4th finger stretch on the 2nd string and also the muting on the 1st string make these chords a bit difficult to play. So two chords below might be a solution, though they require a barre which might not be easy for the starters. E7 and Em7 chords easy as they are on Standard Tuning.

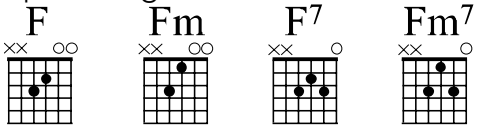


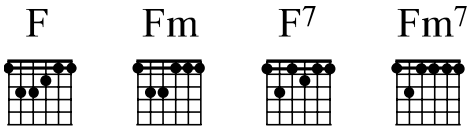
011342 011341
</td>
<td>


032100 032000 030140 020030

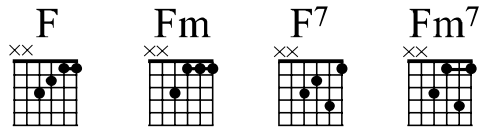
These chords are probably the easiest, fat and open sounding and first learned chords on the guitar and are very easy to finger.
</td>
</tr>
<tr>
<td>F</td>
<td>


134200 134100 131200 131100

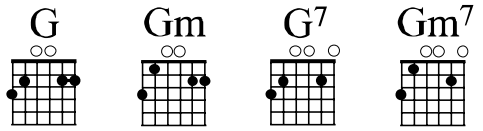
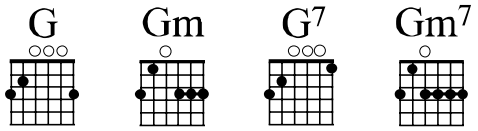
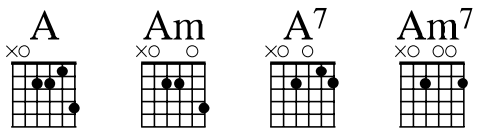
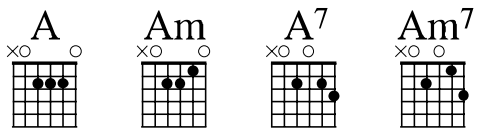
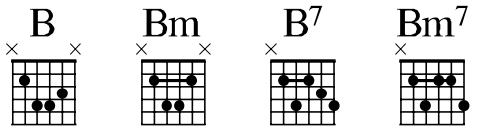
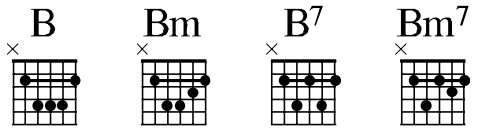
F chord is very easy since it does not require a barre, but the rest is a bit tricky since they require a semi-barre leaving the 1st&2nd strings open, but the difficulty level for the beginners is probably the same with a barre an a semi-barre.
The alternate fingerings below are much easier, since they make use of open strings.


x3200 xx3100 002130 003140
</td>
<td>


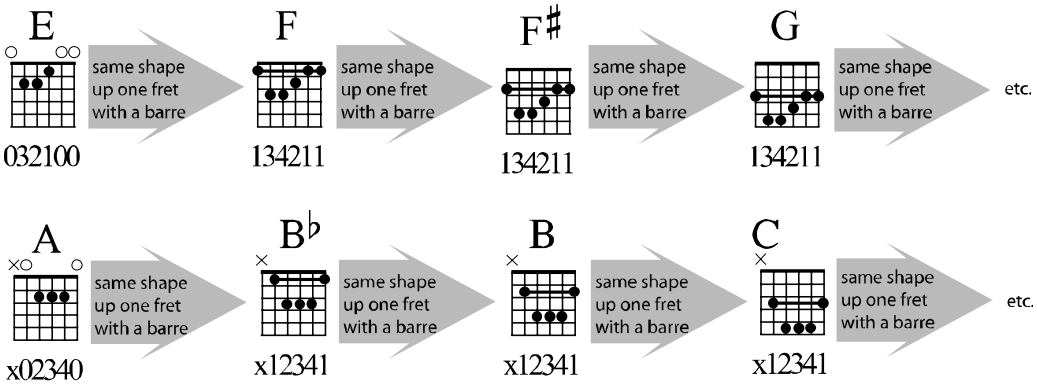
134211 134111 131211 131111

All of these chords are kind of the "first challenge" for the beginners, since they require a full barre.
The alternate fingerings below are more difficult than the Tuning in Perfect 4th's, since they make use of semi-barre's.


xx3211 xx3111 xx3241 xx3141
</td>
</tr>
</table>

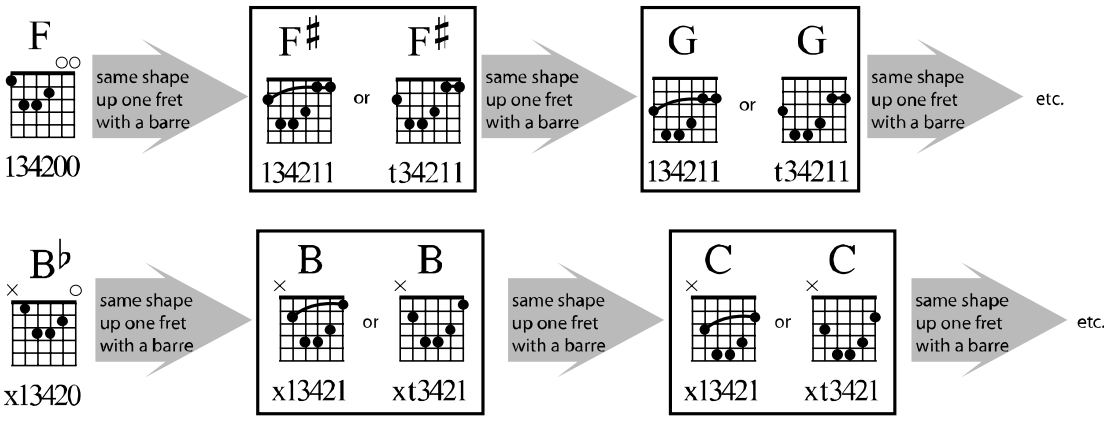
G	 320011 410023 320010 410020 G is more difficult requiring a *semi-barre* and on the same fret with the 2nd finger, G7 is equally easy and Gm&Gm7 are easier since they use open strings.	 320004 210333 320001 213333 G is easier, G7 is equally easy and Gm&Gm7 are more difficult since they require *semi-barre*'s of 3 or 4 strings.
A	 x03214 x03204 x03014 x03004 A and Am are more difficult because of the 4th finger stretch on the 1st string. A7 is equally easy and Am7 is easier since it makes use of another open string.	 x02340 x02310 x02034 x02014 All of these chords are very easy to play on Standard Tuning, though Am7 is slightly easier on Tuning in Perfect 4th's.
B	 x1342x x1341x x13124 x13114 These are probably the most difficult first position chords for the beginning level, since they require *barre*'s and are equally difficult in both tunings.	 x12341 x13421 x13141 x13121 These are probably the most difficult first position chords for the beginning level, since they require *barre*'s and are equally difficult in both tunings.

The *barre* is probably the main reason for the Standard Tuning to become established in the history of guitar. It makes playing major, minor, 7 and m7 chords extremely easy in all keys. All *barre* chords are derived from E shaped chords and A shaped chords and the transposition to other keys is easy with the *barre* being placed on the right fret.

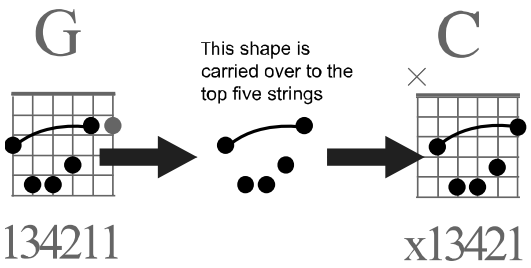


For minor, 7 and m7 chords in all keys, the same process has to be applied to Em, E7,Em7 and Am, A7, Am7 chords.

On Tuning in Perfect 4th's, to get exactly the same *barre* chords is difficult for the beginning level, but not impossible. It requires either using a *barre* that is diagonal across two frets or the thumb on the 5th&6th strings, which is marked with "t" on the fingering chart.



One consistent phenomena in Tuning in Perfect 4th's is that there is one shape for one type of chord in stead of the two shapes in the Standard Tuning. For example, the major chord:

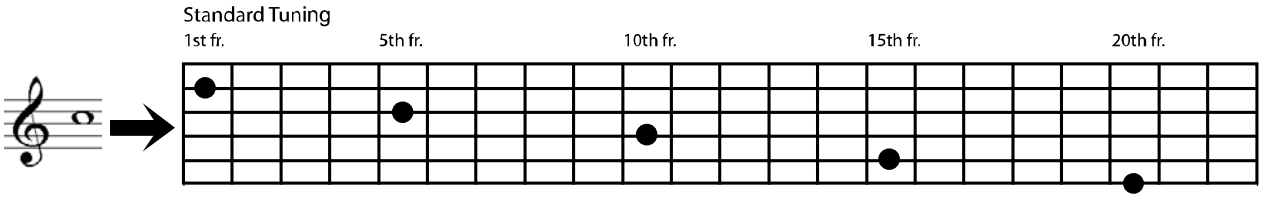


And this applies to all types of barre chords.

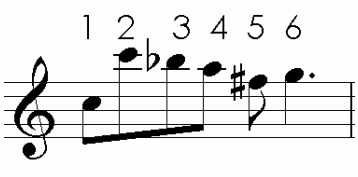
Chapter 15

TRANSPOSITION & PLAYING IN DIFFERENT OCTAVES AND FINGERINGS

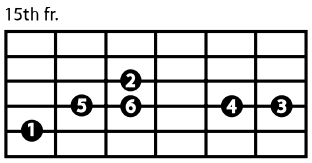
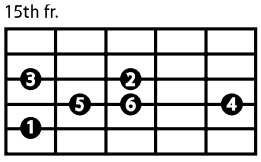
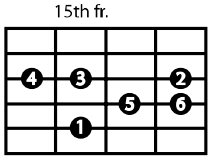
The guitars complexity arises from the fact that the notes in the middle range of the instrument have multiple locations on the fretboard and can also be fingered many ways.

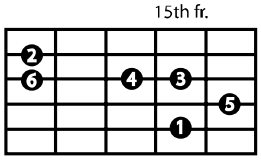
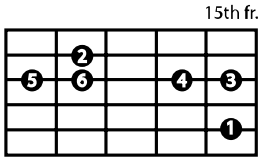
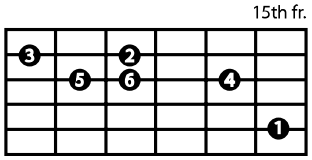


According to Mick Goodrick's thorough calculation, as he states in his *Advancing Guitarist*, an average note on the guitar neck has 2.8 locations and 9.2 fingerings. So, a simple phrase like this can be played on many locations of the instrument with many fingerings:

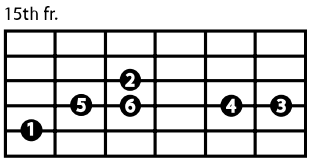
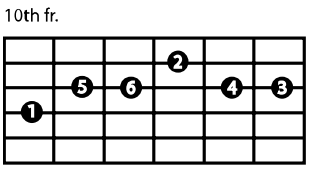
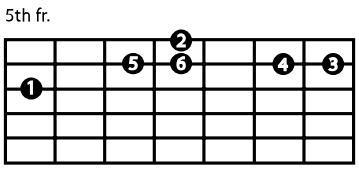
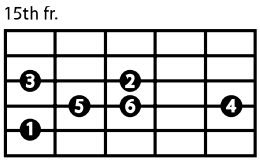
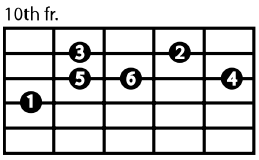
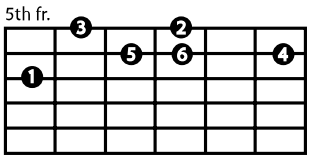
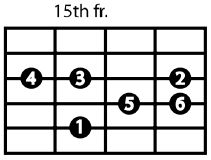
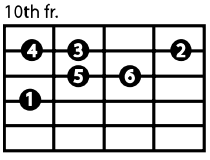
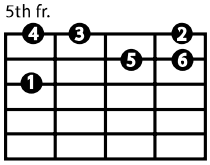


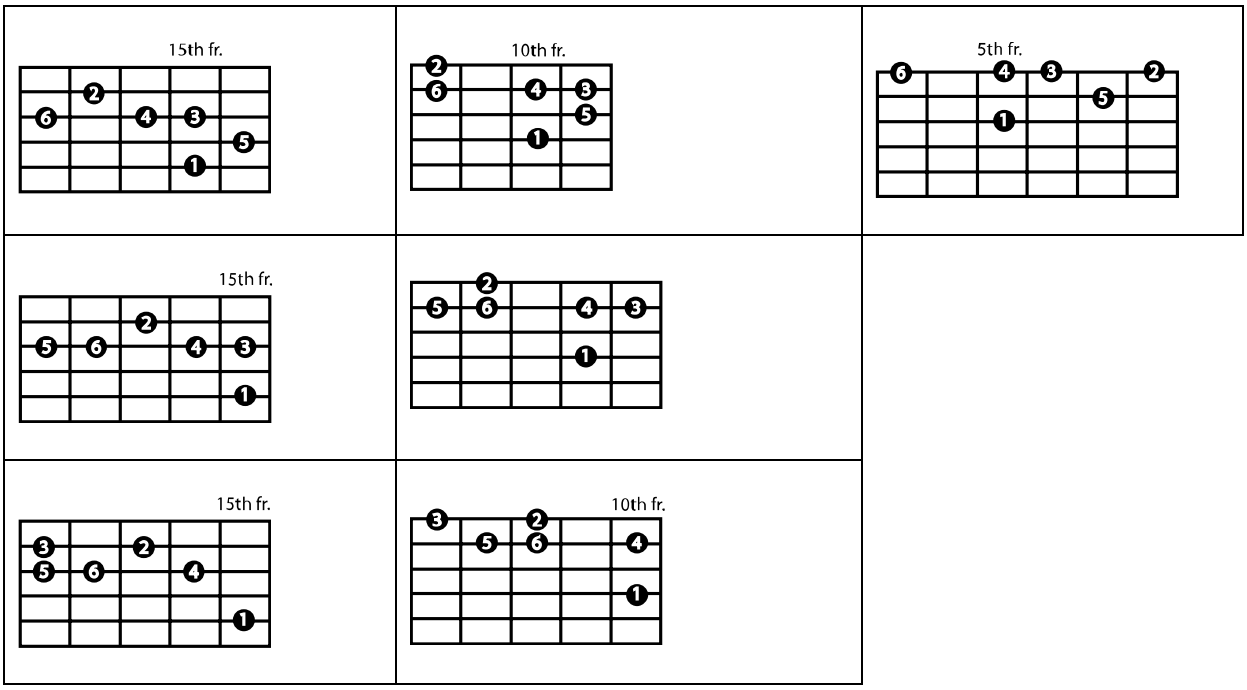
The numbers refer to the note numbers of the phrase (1st note, 2nd note etc) for a clear view on the guitar fretboard. In this case what determines the position and the stretches is which finger the first and second notes are played with.

Fingering	Tuning in Perfect 4th's
Phrase starting on the A string 15th fret, 1st note fingered by the 1st finger 2nd note being fingered by the 2nd finger	
Phrase starting on the A string 15th fret, 1st note fingered by the 1st finger 2nd note being fingered by the 3rd finger	
Phrase starting on the A string 15th fret, 1st note fingered by the 2nd finger 2nd note being fingered by the 4th finger	

Phrase starting on the A string 15th fret, 1st note fingered by the 3rd finger 2nd note being fingered by the 1st finger	
Phrase starting on the A string 15th fret, 1st note fingered by the 4th finger 2nd note being fingered by the 1st finger	
Phrase starting on the A string 15th fret, 1st note fingered by the 4th finger 2nd note being fingered by the 2nd finger	

There are six ways of playing this phrase and if you want to play this on the D string 10th fret or G string 5th fret, the same fingerings apply for Tuning in Perfect 4th's. In the standard tuning the fingerings will have to be changed. The fingering rules that decide upon the "position" of the phrase apply here, too.

Standard Tuning		
Starting on A string	Starting on D string	Starting on G string
		 Out of "position"
		
		



Furthermore, the same rules apply when transposing a phrase, or a whole piece. This involves shifting the whole fingering up or down the fretboard as many frets as necessary. But the problem arises when certain fingerings get too high or too low to comfortably play in the same set of strings. Then the fingering has to be shifted to a higher or a lower set of strings. In Tuning in Perfect 4th's, there's no problem, since the same fingerings work on all sets of strings. But in Standard Tuning, the fingerings change so drastically that it is almost as if re-learning the whole phrase or the piece.

Chapter 16

CONCLUSION

The statement in this thesis is that Tuning in Perfect 4th's is easier than Standard Tuning. There are fewer shapes to memorize and the shapes that have to be memorized are more logical in themselves. I have proven this by systematically comparing both tunings in almost every aspect of contemporary guitar playing. To master the contemporary music language, huge amounts of data need to be memorized by the mind and fingers. So Tuning in Perfect 4th's requires less information to achieve the same result.

The complexity in Standard Tuning rises from asymmetry. This is like a snowball effect. It starts with the irregularity in the shape of intervals, the triads get exponentially more complex because they are made of two intervals, four note chords and slash chords get even more complex because they are made of three intervals, five note chords are made of four intervals…etc etc. Tuning in Perfect 4th's is much more consistent because it is fully symmetrical.

Since Tuning in Perfect 4th's has less shapes involved than Standard Tuning, we can show how much more easier Tuning in Perfect 4th's is, by using some numbers to express it. Proven in this thesis is that:

- Intervals are 1.8 times easier in Tuning in Perfect 4th's
- Triads and slash chords are 3 times easier in Tuning in Perfect 4th's
- 7th Chords and 7th chord as upper structures are 2,06 times easier in Tuning in Perfect 4th's
- Quartal, Secundal and Compound Chords are 2.63 times easier in Tuning in Perfect 4th's
- All scales are easier because of the "multiple choice fingering area" in the G&B strings of the Standard Tuning.
- 7 note scales are easier because they all have 3 notes/string in position playing.
- All symmetric structures have constant shapes shifting at constant frets
- Transpositions and playing in different octaves and fingerings are much easier because of the symmetry in Tuning in Perfect 4th's

There is a reason that people once chose the Standard Tuning as their standard. It is because some of the most basic chords in guitar playing seem easier with the major 3rd in the tuning. Also the open chords make more sense for the starting level and our 'beach strummers'. However I have proven in this thesis that even the simple beach strumming chords are more or less at the same difficulty level in Tuning in Perfect 4th's. But the *barre* chords are more difficult to finger for the beginners.

Finally there is even the small detail to consider that with Tuning in Perfect 4th's, the tuning of the instrument with harmonics is easier, because the harmonics at the 5th and 7th frets which are very stable are used for all pairs of strings.

The biggest, if not the only, disadvantage of Tuning in Perfect 4th's is that the literature and the repertoire of the guitar has to be translated into this tuning, which is a huge project in itself.

Maybe it is time to reconsider a new "Standard Tuning" for the same reason that once people accepted the current standard tuning: Choosing the most practical solution necessary for the music of the time.

APPENDIX 1: VARIOUS TUNINGS FOR GUITAR

VARIOUS TUNINGS FOR GUITAR

TUNINGS:						USUAL NAME:	ALTERNATIVE NAMES & INFORMATION:	Tuning No.:
6	5	4	3	2	1			
E	A	D	G	B	E	Standard Tuning	Normal Tuning	001
D	A	D	G	B	E	Dropped 'D' Tuning	'D' Tuning, Lowered 'D' Tuning, Low 'D' Tuning, Drop 'D'	002
D	G	D	G	B	E	Dropped 'G' Tuning	Lowered 'G' Tuning, Low 'G' Tuning, Double Dropped 'D' Tuning, Drop 'G'	003
D	G	D	G	B	D	Open 'G' Tuning	Slack-Key, Spanish, Hawaiian, Sebastopol Tuning	004
D	A	D	F#	A	D	Open 'D' Tuning	Vestapol Tuning, 'D' Tuning	005
C	G	C	G	C	E	Open 'C' Tuning		006
E	A	C#	E	A	E	Open 'A' Tuning (1)		007
E	A	E	A	C#	E	Open 'A' Tuning (2)		008
E	B	E	G#	B	E	Open 'E' Tuning(1)		009
E	A	E	G#	B	E	Open 'E' Tuning (2)		010
E	B	E	G#	C#	E	Open 'E6th' Tuning (1)		011
E	B	E	G#	B	C#	Open 'E6th' Tuning (2)		012
E	A	E	A	C	E	Open 'Amin' Tuning (1)		013
E	A	C	E	A	E	Open 'Amin' Tuning (2)		014
D	A	D	F	A	D	Open 'Dmin' Tuning	Cross-Note, D-Cross-Note Tuning	015
E	B	E	G	B	E	Open 'Emin' Tuning	Cross-Note, E-Cross-Note Tuning	016
D	G	D	G	Bb	D	Open 'Gmin' Tuning	G-Cross-Note Tuning	017
D	G	D	G	C	D	G-Modal Tuning	Saw-Mill Tuning	018
D	A	D	G	A	D	D-Modal Tuning	'DADGAD' Tuning	019
E	A	D	F#	B	E	Lute Tuning	Vihuela Tuning	020
E	A	D	G	B	D	Lowered 1st Tuning		021
E	A	Db	G	B	E	Lowered 4th Tuning		022
C	G	C	G	A	D	'C-D' Tuning		023

C	G	D	G	B	E			024
D	A	D	G	A	E			025
E	A	D	E	A	E			026
C	G	C	G	C	F			027
D	A	E	G	B	E			028
D	A	D	A	A	D			029
C	G	D	G	A	D	Low C	Lowered C	030
C	G	D	G	B	D			031
D	G	D	G	A	D			032
D	A	D	G	B	D			033
D	A	D	E	B	C#			034
C	G	C	G	A	C			035
D	A	D	F#	B	D			036
C	G	D	G	Bb	D			037
D	A	D	F#	A	C			038
D	A	D	F#	A	C#			039
D	A	D	E	B	D			040
D	A	D	E	A	D			041
D	G	D	E	A	D			042
D	G	D	E	B	D			043
D	A	D	G	D	D			044
D	F#	D	G	B	E			045
E	G	D	G	B	E			046
G	G	D	G	B	D			047
D	A	D	D	A	D			048
D	A	D	E	A	E			049
D	B	D	G	B	F			050
C	A	B	A	B	E			051
G	D	G	D	B	D			052

C	G	C	G	B	E			053
C	G	C	G	C	C			054
D	G	D	G	G	D			055
C	G	C	G	G	C			056
D	A	D	A	D	D			057
D	A	D	F#	A	C#			058
D	F#	D	G	B	D			059
E	E	B	E	B	E			060
D	G	D	D	A	D			061
C	G	D	G	C	D	Mountain Minor	Shifted DADGAD, Orkney Tuning, Gsus4 with C bass	062
D	A	D	F#	A	B			063
C#	F#	C#	F#	C#	F#			064
D	A	D	G	G	D			065
E	E	E	E	B	E	Still's Tuning		066
D	A	D	G	C	C	Hedge's Tuning (1)		067
D	A	E	E	A	A	Hedge's Tuning (2)		068
E	A	D	G	B	E	Hi-Note Tuning (See Note 2. Below)	Hi-String Tuning	069
D	B	G	D	G	D	Open 'G' Tuning (2)		070
G	B	D	G	B	D	Open 'G' Tuning (3)	Dobro Tuning	071
G	Bb	D	G	Bb	D	Open 'Gmin' Tuning (2)		072
G	C	D	G	C	E			073
G	G	G	G	G	D			074
E	A	B	E	A	E			075
D	G	G	D	G	A			076
D	A	D	A	A	E			077
C	G	C	D	G	A		A Martin Carthy Tuning	078
D	G	D	G	G	D			079
C	G	C	G	C	Eb	Cmin Tuning		080
B	F#	B	E	G#	C#	Heavy Metal Tuning		081

D	D	D	D	D	D	Velvet Underground Tuning	The strings are tuned in pairs in unison (i.e. strings 6&5, 4&3, 1&2)	082
E	Ab	B	E	Ab	B	Jackie Leven Tuning		083
E	A	D	G	C	F	Tuning in Perfect 4th's	Stanley Jordan Tuning	084
D	G	C	F	A	D	Ben Harper Tuning		085
F#	A	D	F#	A	E			086
C	G	D	A	E	G	New Standard Tuning	As used by the: California Guitar Trio	086
D	A	D	A	D	E	Robin Williamson (1)		088
C	G	C	G	C	D	Robin Williamson (2)	Same as (RW 1) (tuning 088) but 1 tone down	089
C	G	C	F	A	D			090
D	A	D	G	C	D	D-Modal Version 1a	ex Trey Buchanan (III)	091
B	E	B	E	B	E	Nick Drake 1		092
D	A	C	E	B	E	Sergio 1		093
C	G	C	F	C	D	Csus4/9		094
A	A	D	G	B	E	Dropped 'A' Tuning	Drop 'A'	095
E	A	D	G	C	E			096
C	A	D	G	C	E			097
C	A	D	G	B	E	Dropped 'C' Tuning		098
F	G	D	G	C	D			099

BIBLIOGRAPHY

Bergonzi, Jerry - *Inside Improvisation Series*
Befumo, J.P. – *Exotic Scales, New Horizons for Jazz Improvisation*
Goodrick, Mick- *Almanac of Guitar Voice-Leading*
Goodrick, Mick- *Advancing Guitarist*
Greene, Ted - *Chord Chemistry*
Kadmon, Adam - *The Keyboard Grimoire: A Complete Guide for the Guitarist and Keyboardist*
Messiaen, Olivier- *Technique de Mon Langage Musical*
Persichetti, Vincent- *Twentieth Century Harmony*
Roberts, Howard- *Guitar Compendium*
Slonimsky, Nicolas- *Thesaurus of Scales and Melodic Patterns*