

## Scale Visualisation and Application

The basic scale used in western music is the *Major Scale*, and for simplicity the examples that follow are in the key of C, once you have grasped the concepts you are encouraged to apply this information into different keys.

### Basic Musical Terms

Here are a few musical terms and their meanings, for now just make a mental note of the information in blue text from the following, you will soon see how it all fits in;

A *Sharp* sign raises the pitch of a note by one degree (#).

A *Flat* sign lowers the pitch of a note by one degree (b).

The *Natural* returns to pitch a note that has been altered by a sharp or a flat (♮)

The *Double Sharp* raises the pitch of a note by two degrees (x).

And the *Double Flat* lowers the pitch of a note by two degrees (bb).

A *Tone* is equal to two frets on the guitar (T is the abbreviation for a Tone)

A *Semitone* is equal to one fret on the guitar (S is the abbreviation for a Semitone)

When a note has two names that represent the same pitch they are termed enharmonic equivalents of each other.

Abb	Ab	A	A#	Ax
(G)	(G#)	(♮)	(Bb)	(B)

Abb is the enharmonic equivalent of G,

Ab is the enharmonic equivalent of G#,

A is Natural,

A# is the enharmonic equivalent of Bb,

Ax is the enharmonic equivalent of B.

Chromatic means; note names are repeated but are not of the same quality.

Diatonic means; all notes have a different letter name.

Interval means; the difference in pitch between two musical notes.

### The Chromatic Scale.

The Western Worlds musical system is comprised of the first seven letters of the alphabet, in music these notes represent the diatonic notes (no sharps or flats), in-between some of these notes there are five chromatic notes (these include the sharps and flats, more on this soon), so far we have this;

**A-B-C-D-E-F-G.**

These notes are then repeated over and over so that the note that follows G is A, so we now have;

**A-B-C-D-E-F-G-A-B-C** etc.

The musical alphabet usually starts with the letter C, so we now have;

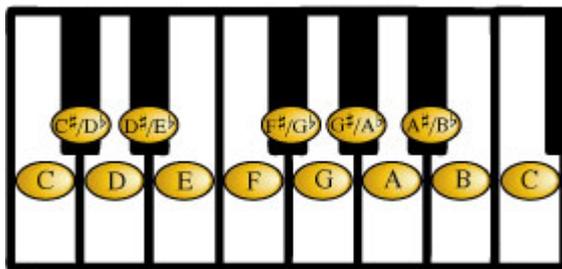
**C-D-E-F-G-A-B-C** then as above the sequence repeats so if we were to continue after the last C we would have D, then E then F etc.

The Distance or Interval between one note and the next with the same name is called an Octave. We can divide an octave in many different ways, when an Octave is divided into a set number of Tones and Semitones a Scale forms.

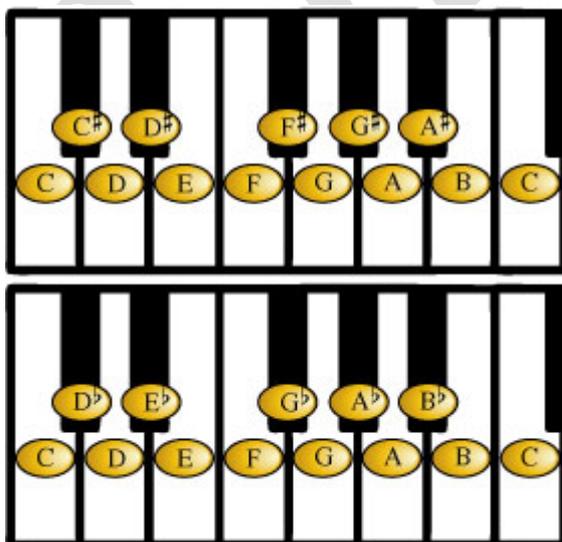
When an octave is divided into 12 semitones or 12 steps, the result is the chromatic scale, which contains seven Diatonic and five Chromatic notes

The chromatic notes take their names from the diatonic notes by making use of Sharps and Flats and they all have enharmonic equivalents. However, we only need to choose one name for each note and it is easier to remember if either all sharps, or all flats are used. Good practice is to use sharps on the way up the neck and flats on the way down. When enharmonic notes are related to a key they are named diatonically.

If we use the keys on a piano to plot out the chromatic scale, the white keys would represent the Diatonic notes and the black keys would represent the Chromatic notes. When the C chromatic scale is played on a piano from C to C it includes the black notes as well as the white notes. Now if we look at the chromatic scale on the piano keyboard we can see that there is no black note, between the E and the F, and there is no black note, between the B and the C.

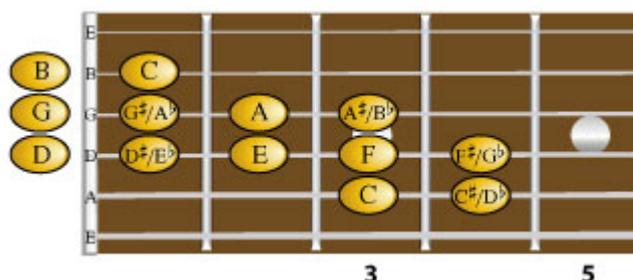


An easy way to remember the chromatic scale is to repeat the standard alphabet from A to G, using sharps or flats between each letter apart from the E and the F, and the B and the C, but starting on the letter C.

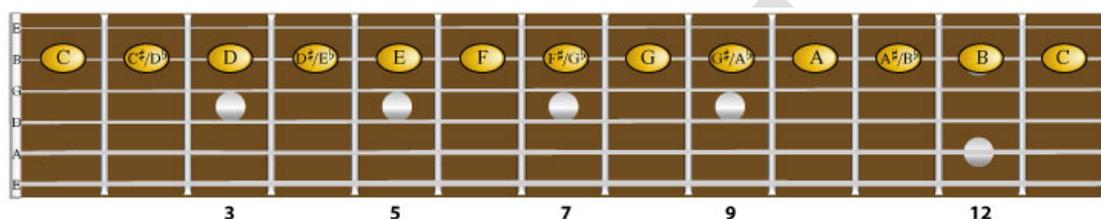


The left top image shows exactly what is meant by using all sharps and looking at the scale like this helps commit it to memory, you will also find it extremely useful for future reference as the order of notes never change. The left bottom image shows the chromatic scale using all flats.

Here you can see the C chromatic scale played in the lowest position possible.



Here is what the chromatic scale looks like on the guitars fret board if we line it up like the notes we saw on the piano.



## The Major Scale

The Major Scale originally came from the Greeks; they called it the Ionian mode.

The way they came up with this scale was by taking just the white notes on a piano keyboard and playing them consecutively from C to C. This produced the following sequence of notes;

**C D E F G A B C**

You can see that once again this is an Octave but this time instead of being divided into 12 equal steps, it is divided into seven steps, which forms the Diatonic C Major Scale. If this Scale were to be played it would immediately be recognised as; Do-Re-Mi-Fa-Sol-La-Ti-Do.

Now if we compare the Major scale to the chromatic scale by checking exactly how far apart each note is from the preceding note the resultant formula is;

Tone, Tone, Semitone, Tone, Tone, Tone, Semitone.  
 This can be written as; **T T S T T T S**.

**C<sup>T</sup> D<sup>T</sup> E<sup>S</sup> F<sup>T</sup> G<sup>T</sup> A<sup>T</sup> B<sup>S</sup> C**

You can try this yourself by counting the steps between each note in the C major scale, and if you do you will see that, Between **C** and **D** is a Tone, **D** and **E** is a Tone, **E** and **F** is a Semitone, **F** and **G** is a Tone, **G** and **A** is a Tone, **A** and **B** is a Tone and **B** and **C** is a Semitone.

This formula will repeat itself consistently whichever Major Scale we analyse in this way. The resulting formula is always the same and we can use the Chromatic scale and the formula for a Major Scale to produce any of the fifteen different Major Scales.

*Seven scales with Sharps, seven scales with Flats, and one scale with neither makes fifteen Major Scales, however it is important to note that three of them are enharmonic which is why there are only 12 notes in the musical alphabet (the chromatic scale).*

### **Degrees**

Each degree of the scale is given a Roman numeral and a name, according to its position. The first degree or Root is called the *Tonic*, which is the key note, all the other notes in the scale are directly related to this, the second degree of the scale is called the *Super Tonic*, super meaning above, the third degree of the scale is called the *Mediant* which is a third above the tonic, the fourth degree is called the *Sub Dominant*, it lies a fifth below the tonic, the fifth degree is called the *Dominant* it has a dominating influence on the key, the sixth degree is called the *Relative Minor* or the *Sub Mediant* it lies a third below the tonic, the seventh degree is called the *Leading Note* it leads the ear back to the tonic, and the eighth degree is called an *Octave*, it is the same note as the tonic but has a different pitch.

<b>C</b>	<b>D</b>	<b>E</b>	<b>F</b>	<b>G</b>	<b>A</b>	<b>B</b>	<b>C</b>
<b>I</b>	<b>II</b>	<b>III</b>	<b>IV</b>	<b>V</b>	<b>VI</b>	<b>VII</b>	<b>VIII</b>
<b>TONIC</b>	<b>SUPER TONIC</b>	<b>MEDIANT</b>	<b>SUB DOMINANT</b>	<b>DOMINANT</b>	<b>SUB MEDIANT</b>	<b>LEADING NOTE</b>	<b>OCTAVE</b>

### **Intervals**

An interval describes the difference in sound quality between one note and another, they are very important in music as they are the building blocks for chords, they denote whether a chord or scale is major or minor, and are used to extend chords and build melodies.

The interval distances never change no matter what the key so it is worth remembering that a minor second is 1 fret (which is equal to one semitone, and is sometimes called a step), away from the root, a Major Second is 2 frets or 2 steps from the root etc, etc.

Here are the intervals names distances and notes for the key of C

Interval	Distance	Note
Root	0 Frets	C
Minor Second	1 Frets	Db
Major Second	2 Frets	D
Minor Third	3 Frets	Eb
Major Third	4 Frets	E
Perfect Fourth	5 Frets	F
Tritone	6 Frets	Gb
Perfect Fifth	7 Frets	G

Minor Six	8 Frets	Ab
Major Six	9 Frets	A
Minor Seven	10 Frets	Bb
Major/Dominant Seven	11 Frets	B
Perfect Octave	12 Frets	C

Note: When the intervals extend beyond an octave the extended intervals are created, Just think of the Octave as the eighth step (which it is), you can then see how an interval of a ninth is just an interval of a second but an octave higher, a shortcut is to just add seven to the interval you are extending, so once again a second becomes a ninth, and a fourth becomes an eleventh, and a sixth becomes a thirteenth, and so on.

### RELATIVE MAJORS AND MINORS

All major scales have a relative minor scale; because they are relative the two scales contain exactly the same notes as one another they just start from a different degree.

The way to tell if a scale is major or minor is to look at the interval between the Root note and the third degree. If the interval is a minor third, (three semitones) the scale is Minor. If the Interval is a Major third, (four semitones) the scale is Major.

The major scales relative minor uses the *sixth* degree of the major scale as its tonic or root, all the notes stay in the same places and their pitch remains the same, but because they have a new root, their intervallic quality changes to reflect the new root.

The minor scales relative major uses the *third* degree of the minor scale as its root or tonic, all the notes stay in the same places and their pitch remains the same, but because they have a new root, their intervallic quality changes to reflect the new root.

If you happen to be in a major scale and you need to find the relative minor you just count backwards (towards the nut of the guitar) three frets (minor third) from the root you are on not including the root itself.

If you happen to be in a minor scale and you need to find the relative major you just count upwards (towards the bridge of the guitar) three frets (minor third) from the root you are on not including the root itself.

Believe it or not when we learned about the major scale we also learned the Natural minor scale because another name for the natural minor scale is the Aeolian mode, and as mentioned above the Aeolian mode starts on the 6<sup>th</sup> degree of its relative major

So to work out a major scales relative minor all we need to do is take the 6<sup>th</sup> degree of the Major scale.

As we can see the scale which has an **A** as its sixth degree, is the C Major Scale. All we need do is write out the exact same notes, but this time we start and end with **A** instead of C. We are still in the key of C this produces the **A** Natural Minor Scale.

### C MAJOR RELATIVE OF A MINOR

<b>I</b>	<b>II</b>	<b>III</b>	<b>IV</b>	<b>V</b>	<b>VI</b>	<b>VII</b>	<b>VIII</b>
<b>C</b>	<b>D</b>	<b>E</b>	<b>F</b>	<b>G</b>	<b>A</b>	<b>B</b>	<b>C</b>

### A MINOR RELATIVE OF C MAJOR

<b>I</b>	<b>II</b>	<b>III</b>	<b>IV</b>	<b>V</b>	<b>VI</b>	<b>VII</b>	<b>VIII</b>
<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>	<b>F</b>	<b>G</b>	<b>A</b>

### The Modes

The method we mentioned for producing scales from just the white notes on a piano keyboard can be repeated for all degrees of the Major Scale.

So from **D** to **D**, then **E** to **E**, and then **F** to **F**, and so on, the scales produced are the seven modes; *Ionian, Dorian, Phrygian, Lydian, Mixolydian, Aeolian, Locrian*, respectively.

Here are the modes in order;

- The **C** Ionian Mode is just the **C** Major Scale,
- The **D** Dorian mode is just the **C** Major Scale, starting from **D** and ending on **D**,
- The **E** Phrygian mode is just the **C** Major Scale, starting on **E** and ending on **E**,
- The **F** Lydian Mode is just the **C** major Scale, starting on **F** and ending on **F**,
- The **G** Mixolydian Mode is just the **C** Major scale, starting on **G** and ending on **G**,
- The **A** Aeolian Mode is just the **C** Major Scale, starting on **A** and ending on **A**,
- The **B** Locrian Mode is just the **C** Major Scale, starting on **B** and ending on **B**.

The modes always appear in the same order no matter which Major Scale you are taking them from, so it is advisable to remember them this way.

Using different Modes and Scales produces various different effects depending which chords are used, like a haunting sound with the Phrygian mode, a happy sound with the Ionian mode, a sad sound with the Aeolian mode. To make full use of the modes and scales you must know how, when and where to use them. This is a lot easier than it sounds (more about this soon). It is also helpful to know which chords contain which notes, you can then choose which mode or scale will fit. This brings us on to chord construction.

### Triads

First we will learn how to build Triads (a three note chord) from a Major Scale, this may sound complicated but it is just a simple matter of harmonising the Major scale we have already covered.

We start with the first degree of the scale which in this case is **C** and we jump up a third, the third could be a Major or a Minor, we will analyse this afterwards.

So starting from C we skip a note, which leads us to the E, and then from the E we skip a note, which leads us to the G. This produces our first triad in the key of C Major, the triad C Major. The triads are all named and numbered the same as the scale degrees.

I	II	III	IV	V	VI	VII	VIII
C	D	E	F	G	A	B	C
E							
G							

This process is repeated for all the other scale degrees;

I	II	III	IV	V	VI	VII	VIII
C	D	E	F	G	A	B	C
E	F	G	A	B	C	D	E
G	A	B	C	D	E	F	G

Now we know which notes are contained in the different triads we must find out whether they are Major or Minor, to do this we compare the triads with their Major Scales, or we calculate the distance between the root note and the 3rd.

There are four different types of triad;

A Major triad is just a Major Third with a Minor Third stacked on top, and consists of the first, the third and the fifth notes from the relevant major scale.

A Minor triad is just a Minor Third with a Major Third stacked on top, and consists of the first, the flattened third and the fifth notes from the relevant major scale.

A diminished triad (Minor with a flat 5<sup>th</sup>) is just a Minor Third with a Minor Third stacked on top, and consists of the first, the flattened third, and the flattened fifth.

And an Augmented triad is just a Major Third with a Major Third stacked on top, and consists of the first, the third, and the sharpened fifth. Augmented chords are constructed from the third degree of the Melodic or Harmonic Minor Scales.

Now we know this we can compare the first triad which is **C E G**; to its Major scale.

**1 2 3 4 5 6 7 8**  
**C D E F G A B C**

As we can see the notes from the triad formed, exactly match the first, third and fifth notes of the C Major scale so the triad is a C Major.

The second triad is **D F A**, we compare this to the D Major Scale;

**1 2 3 4 5 6 7 8**  
**D E F# G A B C# D**

As we can see the first and the fifth notes match but the third note is flattened so the triad must be a D Minor triad.

If you were to sit down and work out the quality of the rest of the triads built from the major scale (which you are encouraged to do), they would be;

Maj, Min, Min, Maj, Maj, Min, Dim.

Once again the order of triads is always the same no matter what key you are analysing, it is also important to note that the triads can be further harmonised to produce 7<sup>th</sup> chords then 9<sup>th</sup> chords etc.

Here is the result if we were to harmonise the triad's one more step by stacking another note on top of the triads we already have, building the 7<sup>th</sup> chords.

Maj7, Min7, Min7, Maj7, 7, Min7, Min7b5.

As above and with a lot of musical principles the order of chords never change, so the order of triads and 7<sup>th</sup> chords is definitely worth adding to the list of useful information to remember for future reference.

Ok this seems like a good place to stop, but before we do we will look at one way we can use some of this new found knowledge by discussing the basic theory behind modes, this will enable you to grab your guitar and try out some of this new found knowledge.

So to recap, we already know that the C major scale is spelt, C D E F G A B C, we know that the triads built on the notes in the scale are going to be Maj, Min, Min, Maj, Maj, Min, Dim, we also know that the order of modes is going to be Ionian, Dorian, Phrygian, Lydian, Mixolydian, Aeolian & Locrian, Note, here that the quality of the modes follow the chords that are built on the same scale degree, so Ionian, Lydian & Mixolydian have a Major quality and Dorian, Phrygian, Aeolian & Locrian have a Minor quality, and yes that does mean that you can play the same root Dorian or Phrygian Mode over a minor chord, or use the mixolydian mode over a major chord.

So using C Major as an example, if we were to play a C chord then play the notes from the C major scale from C to C over the top of the C chord, we are said to be playing in C Ionian Mode (which as we know is just the C major scale), you can try this yourself by recording a C chord then use the notes from the C major scale to improvise over the top, you can also do the same with the rest of the modes, you will then be able to hear for yourself how the quality of the sound changes even though you are playing the exact same notes.

Now, if we play a Dm chord but stay with the notes from the C major scale but this time we play the notes from D to D, we are said to be playing in D Dorian mode.

If we play an Em chord but stay with the notes from the C major scale but this time we play the notes from E to E, we are said to be playing in E Phrygian mode.

If we play an F chord but stay with the notes from the C major scale but this time we play the notes from F to F, we are said to be playing in F Lydian mode.

Now, if we play a G chord but stay with the notes from the C major scale but this time we play the notes from G to G, we are said to be playing in G Mixolydian mode.

Now, if we play an Am chord but stay with the notes from the C major scale but this time we play the notes from A to A, we are said to be playing in A Aeolian mode (which as we have seen is just the Natural Minor Scale).

Now, if we play a B Dim chord and stay with the notes from the C major scale but this time we play the notes from B to B, we are said to be playing in B Locrian mode.

As you can see the theory behind the construction of modes is fairly straight forward when you relate the modes to their relative major.

Be aware that despite the fact that there is a step formula for every other scale, they are also usually related to the major scale of the same root using scale degrees, so the major scale is referred to as 1 2 3 4 5 6 7 1, the Minor Scale is written as 1 2 b3 4 5 b6 b7 1, meaning that we play the major scale but flatten the 3<sup>rd</sup>, the 6<sup>th</sup> and the 7<sup>th</sup> degrees to spell the Minor scale (note: sharps and flats are always written before a scale degree but after a note, as in the 3<sup>rd</sup> of E Minor is the b3 or Eb).

So now, how does this information relate to the guitars fret board?

*The answer and many more are the concept behind ScaleViz an interactive theory application for guitarists, currently available for sale on the App Store.*

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