Technical Teach-ins

Derek Hasted MA (Cantab) DipABRSM MISM

What is this e-book?
It's a collection of Mini Masterclasses - short tutorials on a whole variety of guitar topics

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What are they for?
They're for people learning the basics of guitar and for guitar teachers

What do they cover?
These little articles cover some of the topics which Tutor books tend to miss out.

They explain why things are as they are, and they explain them from the perspective of a guitarist.

What don't they cover?
These articles aren't about guitar technique, they are about understanding the music behind the notes.

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Most recent changes - latest first

Chord Types added
Campanella added
Cadences and Three Chord Trick added

Articulation

Articulation is how successive notes in a phrase are “joined together” or “separated” to give the phrase a sense of urgency or relaxation that is over and above “conveying the mood by the speed of playing”.

Articulation denotes the change to normal playing to *legato* (smooth playing) and *staccato* (detatched playing)

Normal playing

In guitar, all notes die away starting at the moment they are sounded.

In a succession of notes all played at the same volume, the start of each new note is very clear, since it is, by definition, louder than the (already-decaying) previous note.

Legato

Legato - literally “bound” - is when notes have an almost invisible gap between them.

In addition to the word *legato* as a performance indication, the slur sign can be used to call up a smooth and unobtrusive start to the second note.

- On a piano or organ, *legato* may actually involve a fraction of a second’s overlap between the old note and the new, especially on a Church Organ which takes a while to “speak” a new note
- On a wind instrument, the second note is not tongued, but simply continues from the first. *Legato* is difficult on brass instruments if the jump between the notes is large because the lip has to suddenly change tension
- On orchestral strings, *legato* playing uses a uni-directional bow, instead of “sawing back and forth”
- In singing, *legato* is where one syllable lasts for more than one note
- On guitar we can use ligados - snaps & hammers (pull-offs & hammer-ons) to give our second note a smooth start
    - As a general principle, ligados work best if the first note is on the beat, and the second note is off the beat - for example, when the first note of a set of beamed quavers or semiquavers is plucked, and the second is slurred.

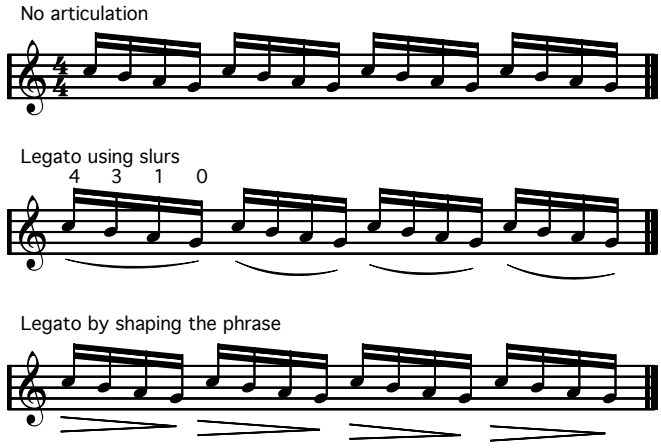
It is hard to maintain the character and volume of a phrase with snaps & hammers if the notes we slur don't go with the beats in the music.

One technique that can be used effectively is to duck down the volume of the notes that are off the beat.

Here's an example you can play three ways...

1. With no articulation
2. Using slurs - long snaps (pull-offs) to shape the notes
3. Using dynamics to shape the notes

It seems illogical that a phrase in which all the notes are at different volumes can sound smoother than a phrase which is totally uniform, but a constant barrage of notes can be tiring on the ear.



Staccato

Staccato notes are cut short - indicated with a '.' above or below the note-head (or the word *stacc*)

- On all the above instruments, the note is cut short simply by "not playing the note any more".
- On a piano or organ, the key is released
- On a wind instrument, the breath is stopped
- On a bowed instrument, the bow stops
- On guitar, a note continues once it is started, and has to be explicitly damped The left hand can be removed (but not on an open string of course!)
    - The left hand can touch the vibrating string (easier said than done sometimes if other notes are following)
    - The right hand can back and touch the string to stop it (often the favoured method)

Articulation

Articulation is the mixing of normal, legato and staccato playing to shape individual notes as well as phrases.

Articulation isn't easy to incorporate into solo playing because different notes may overlap each other in the piece.

In ensemble music, we have much more control - any or all the players can use articulation easily - it makes sense to use it!

An example

A good example of using articulation in an ensemble piece is when the tune is in the bass.

The human ear tends to assume that the highest note is the tune. To overcome this in a symphony orchestra, one uses sustain and tone colour (for example, putting a low tune on trombones so that it cuts through).

On guitar, we can lighten the textures in the higher parts by articulating them with gentle staccato, creating the illusion of more power and more sustain in the bass.

See also the Damping article

Cadences

What is a cadence?

In simple terms, a "cadence" is the pair of chords that harmonise the end of a phrase - that is to say, the final two chords that underpin the conclusion of a melody, or a section of melody.

The majority of music phrases, at least in classical music, choose from a surprisingly limited range of chord-pairs, and even music which modulates (changes to a different key), will usually pick from the same small set based around the notes in the new (temporary) key.

This short article defines the principal sorts of cadence, at the level normally found in the Aural section of Classical Guitar Graded Exams, and doesn't cover the more exotic cadences that can be constructed.

Naming the chords

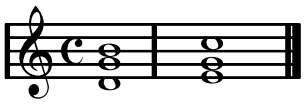
In order to name the chords, we traditionally use the key-independent names such as Dominant, or key-independent degrees of the scale, such as V. My "Degrees of the Scale" article defines these families of names.

Seeing inside the chords

In Classical Guitar, chord names are not written in the music, and so there is an element of detective work to tie together the notes on the page and the chords they make up. My "Three Chord Trick" article includes a list of the notes in the common chords for the common guitar keys, and sure enough, the principal contenders for the chords in a cadence are the same chords as in the three chord trick.

The perfect cadence

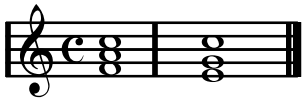
The perfect cadence is the cadence that brings closure to a piece, and is V to I.



Here is an example in the key of C that has been tailored to fit on guitar.

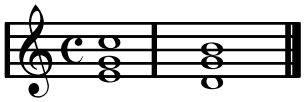
The plagal cadence

Often called "the amen cadence", this also brings closure but does not have the finality of the leading note rising to the tonic. The progression is IV to I and often the melody stays on the tonic, as in the example here.



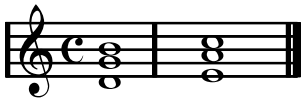
The imperfect cadence

Not so much imperfect musically, but rather simply the opposite of the perfect cadence - one that moves the phrase to the dominant (without a clear modulation involving a change of key and an accidental), and leaves the phrase there, ready for an answering phrase that returns the music home. The progression is I to V.



The interrupted cadence

Strictly speaking, the interrupted cadence is a perfect cadence that is diverted from V to anywhere other than I, often II or VI (which are minor chords). It generates a feeling of tension, where the expected resolution doesn't come.



See also the Degrees of the Scale article and the Three Chord Trick article

Campanella

Campanella - “like bells” - (from the same root as “campanology”) is where we deliberately let notes over-ring onto the following notes, like a peal of bells.

That’s the simple bit!

The complicated bit follows on from that - for over-ringing, it has to be that each note is on a different string to its predecessor and successor.

That’s easy when we’re playing arpeggios - the music is written precisely to achieve that. But bells play scales!

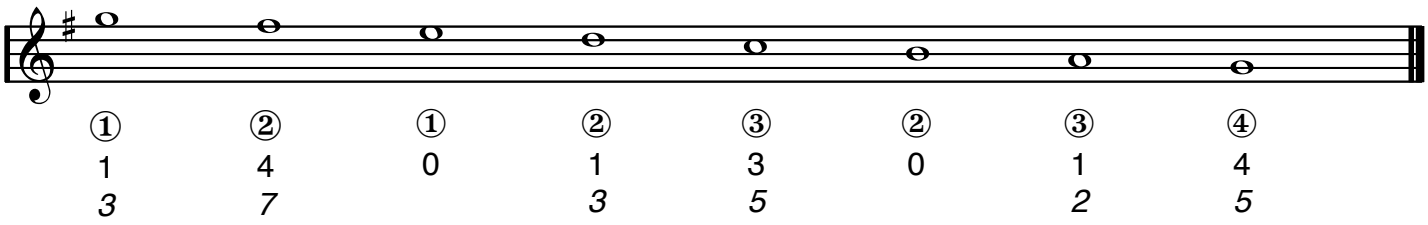
When we’re playing scales, surely that’s impossible - we have to play three notes on each string before we go to the next string, not all of them can overlap….

Wrong!

Campanella works by going up the neck and using open strings to help. When we’re up the neck, the pitch of the open strings gets “left behind”. Open string notes are not on the same string as the fingered notes of nearby pitch.

Confused? I imagine so!

Here’s a worked example…. It’s the descending scale of G, which we want to sound like a peal of bells…



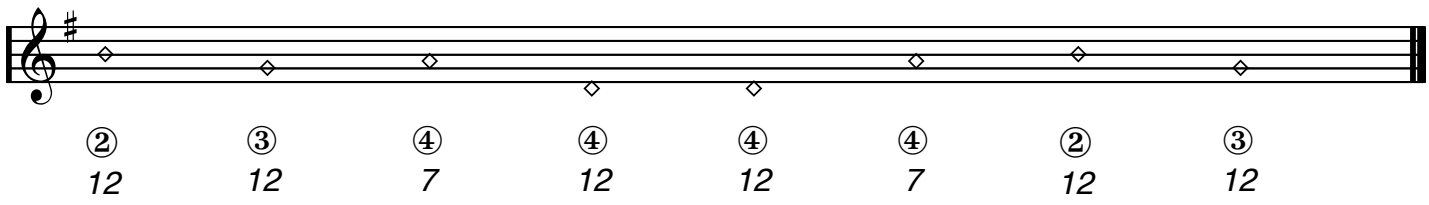
I’ve added the string (circled), the finger number (roman font), and the fret number (italic) so you can re-create this.

If you look at the string numbers (circled) you’ll see that every note is on a different string to the note before and after. Mind you that doesn’t make it easy to play!

Campanella using harmonics

Sometimes people associate harmonics with a bell-sound, and if you play different natural harmonics on different strings, these too, will ring on.

Here’s part of the Westminster Peal, but there are consecutive notes on one string. The A harmonic is also available on fret 5 of string 5, which will improve the ringing on, but the harmonic is less likely to speak well and it’s a long way to move in a hurry.



All the notes are natural (left-hand) harmonics.

I’ve added the string (circled) and the fret number (italic) so you can re-create this.

Welcome to the world of Campanella, where some of the notes aren’t where you expect them to be!

Chord Types

What is a chord?

At its simplest, a basic Chord (a Triad) has 3 different notes, each of which may be repeated in different octaves.

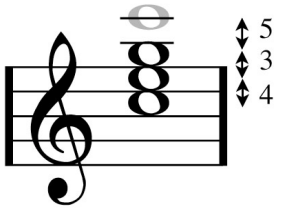
To name the chord, we juggle the notes into "Root Position", so that the 3 notes are 2 notes apart (eg C E G)

A Major Chord in Root position has 3 notes each with a gap between them (eg C E G)

The notes are spaced with 4 semitones (4 frets) between the first two, 3 between the next

The gap between the top and bottom is 7 and is a "perfect fifth"

If the starting note is placed on top as well (eg C E G C) the gaps are 4 3 5

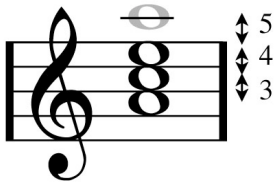


A Minor Chord in Root position has 3 notes with the same one-letter gap (eg A C E)

The notes are spaced with 3 semitones between the first two, 4 between the next

The gap between the top and bottom is again 7 and is a "perfect fifth"

If the starting note is placed on top as well (eg A C E A) the gaps are 3 4 5



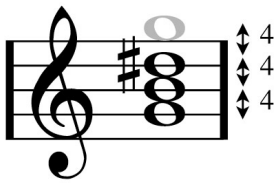
An Augmented Chord has 3 notes with the same one-letter gap (eg G D B#)

The notes are spaced with 4 semitones between the first two, and 4 between the next

The gap between the top and bottom is 8 and is an "augmented fifth"

If the starting note is placed on top as well (eg G B D# G) the gaps are 4 4 4

A correctly written augmented chord always has an accidental somewhere



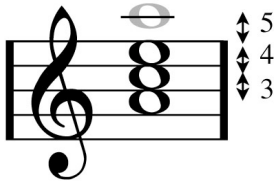
A Diminished Chord has 3 or 4 notes with the same one-letter gap (eg B D F or B D F Ab)

The letter names are spaced with 3 semitones throughout

The gap between the first three notes is 6 and is an "diminished fifth"

If the starting note is placed on top as well (eg B D F Ab B) the gaps are 3 3 3 3

A correctly written diminished chord always has an accidental somewhere



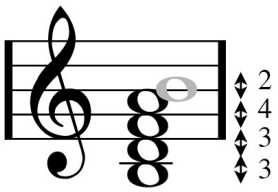
A Half Diminished Chord has four letter names with the same one-letter gap (eg B D F A)

The letter names are spaced 3, 3, 4, 2 semitones apart

The gap between the first three notes is 6 and is an "diminished fifth"

If the starting note is placed on top as well (eg B D F A B) the gaps are 3 3 4 2

A correctly written half diminished chord may not always have notes outside of the key signature



It's worth noting that this half-diminished chord is sometimes called Bm7b5.

More confusingly, if the bottom note is D, then the same notes form Dm6, which isn't diminished at all!

Any numbers after the chord denote the addition of an extra note at that interval. For example G7 includes an F because G-F is an interval of a seventh.

We don't discuss here the circumstances in which a chord can be reduced to 2 letter names and still function.

Damping

There are two sides to mastering "Damping" or the deliberate stopping of a string's vibrations.

- One is damping that is required in the music notation - indicated by a staccato mark or a rest
- The other is damping that is necessary to ensure the music is clean and pleasing

Damping that notation calls up

Whenever the notation includes a staccato mark (a . on the note-head) or an explicit rest, we need to silence the string or strings necessary. There are 5 basic ways to achieve this…

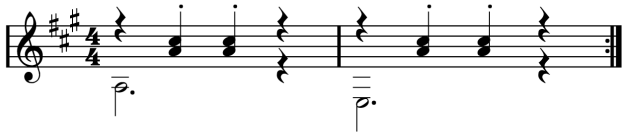
1. Lifting the left hand finger (no good for open strings!)
2. Touching the string(s) with the left hand finger (hard to do if the hand is playing other notes too)
3. Touching the string(s) with "the other" right hand finger (great for really short notes)
4. Touching the string(s) with the same right hand finger (great for chords)
5. Touching all the strings with the side of the right hand (be careful not to make a clonking sound!)

Sometimes a "belt and braces" approach is the best - if the music has an extended staccato passage, for example, it's good to release the left hand and replace the right hand at the same time.

Note - when lifting the left hand finger, lift it just enough to let the string rise off the fret…
If you lift the finger right off the string, the open string will sound.
Conversely, if you don't lift it enough, the string will rattle on the fret till it's damped

Playable example

Here's a simple example to bring together some of these techniques.



The staccato is best effected using methods 1 and 4 together.
The rest at the end of the bass note is best effected by method 4.

Damping to improve the music

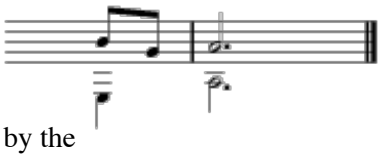
Damping is an important part of solo and ensemble technique, and a lot of it isn't indicated in the music.

Orchestral instruments (strings, brass & woodwind) have sustain and the player maintains each note throughout its life; the guitar is bit of a maverick - a note continues (but decays) with a life of its own. Stopped (fingered) notes cease when the finger is lifted, but open strings ring on.

Damping is needed when notes we don't want ring on through notes we do. The music won't tell us when, but our ears will! Let's look in more detail...

The problem

Here's the end of Brouwer's Un Dia de Noviembre, simplified just a little. It's all first position - no tricks!



When you play the As, the open E & B of the previous bar both ring on. (The G is killed by the A, of course). As they were played earlier, they're not as loud as the As, but they definitely ring on.

If you touch the E & B strings immediately before sounding the As, your ear will notice the gap or silence. But...

The solution (1)

Touch the E & B strings immediately after sounding the As, your ear won't notice the discord for the brief time it exists.

The solution (2)

There are other subtle ways that the guitar sings on... Sympathetic vibration means a string stopped at the fifth fret can make the open string of the same pitch burst into life, so be careful using 5th fret notes to replace open strings - they may bite back. What you thought was a way to control when the (fingered) note stops (instead of using an open string) may leave you with the open string ringing on just the same!

Just as an open string can vibrate in sympathy with another string of the same pitch, so a harmonic in an open string can be excited by another string of a much higher pitch. Try the following experiment - be sure your guitar is accurately tuned first.

- Play just the open B - the first note of the incipit. Now place a right hand finger on it and leave it there. The B apparently rings on - actually, it has excited the 3rd harmonic on the bottom E string, which is now vibrating.

If you have a nice guitar, it will bite back even harder. Try this scenario - you need to be quick ...

- Just play the open B loudly and then stop it with your right hand
- Take the right hand away and now stop the bottom E string whose harmonic is vibrating in sympathy
- Now listen. The B is still sounding.
- Why? The open B has started back up, excited (yes, that's the proper word) by the bottom E string's harmonic

So to stop these spurious vibrations, we have to get'em all at the same time.

Yet another caution!

Most ensemble music is single line so it's not too hard to tidy up these ghost notes as you go along. Except...

- Your guitar will also vibrate in sympathy with your neighbour's, so you may find a totally unexpected note spilling from your soundhole!

Degrees of the scale

What is it?

This is about the various ways we can name the degrees of the scale.

This isn't a detailed look at Tonic Solfa, it's just touching the surface and doesn't deal with accidentals.

Ever listen to someone whistling a well-known tune?
Did they know what key the original was in, and what key they're whistling in? No!
Does it matter? No!

All that matters is whether the next note of the tune goes up or down, and by how much. As long as you move around the piece by the correct amount relative to the previous note it doesn't matter what the starting note is.

Naming notes relative to other notes

There are two issues in describing a tune's next note relative to the previous note.

- How to name a jump up or down the scale in relative terms - see my Intervals sheet
- How to name the note we've landed on in relative terms - that's this sheet.

Three ways to name a note without using its name!

I'll give you some examples further down the page, but here are the three ways...

1. Numeric names... I for the first note in a scale, II for the second, and so on
2. Formal Names... Tonic, Supertonic, Mediant, Subdominant, Dominant, Submediant, Leading Note, Tonic
3. Tonic Solfa... Doh, Re, Me, Fa, Sol, La, Ti, Doh (note different languages spell these differently!)

To complicate matters a little, there are two sorts of Tonic Solfa -

- Moveable Doh (where the first note of a scale is Doh)
- Fixed Doh (Doh = C)

Here are two worked examples

Key C

Scale note	C	D	E	F	G	A	B	C
Numeric names	I	II	III	IV	V	VI	VII	VIII
Formal names	Tonic	Supertonic	Mediant	Subdominant	Dominant	Submediant	Leading Note	Tonic
Fixed Doh	Doh	Re	Me	Fa	Sol	La	Ti	Doh
Moveable Doh	Doh	Re	Me	Fa	Sol	La	Ti	Doh

Key G

Scale note	G	A	B	C	D	E	F#	G
Numeric names	I	II	III	IV	V	VI	VII	VIII
Formal names	Tonic	Supertonic	Mediant	Subdominant	Dominant	Submediant	Leading Note	Tonic
Fixed Doh	Sol	La	Ti	Doh	Re	Me	Fi (*)	Sol
Moveable Doh	Doh	Re	Me	Fa	Sol	La	Ti	Doh

(*) Fi is one of many spellings that are applied to indicate that the note is sharpened compared to Fa.

An aside - why is the submediant above the mediant when the subdominant is below the dominant?

The prefix "sub" denotes below. Why is the submediant above the mediant then?

The Dominant is the name of the key that is one sharper than the current key. It is five to the right of the Tonic.
The Mediant is halfway between the Tonic and the Dominant.

The Subdominant is the name of the key that is one flatter than the current key. It is properly regarded as being five to the left of the Tonic (as you can see if you start at the right hand edge of the table and move left.

The Subdominant isn't "one under the Dominant", it's "as far below the Tonic as the Dominant is above".

If you start at the right hand Tonic and move left, the Submediant is halfway between the Tonic and the Subdominant.

Dynamic Range

Dynamic Range

It's just a posh phrase for difference between the softest and loudest sounds. Different volumes are indicated by the well-known symbols *ppp, pp, p, mp, mf, f, ff, fff*

How big are the differences?

Now that's the tricky bit! A symphony orchestra has a massive dynamic range because one flute is a lot quieter than 100 brass, string and woodwind players all going flat out. But a single guitar has a limited range - capped at the top by the sound of strings slapping against the fingerboard, and at the bottom by sheer inaudibility.

Certainly, a guitar ensemble or guitar orchestra has the ability to extend the range by varying the number of players, but the key to it all is still to maximise the dynamic range of each guitar.

But didn't you just say....

So we need to maximise the dynamic range of each guitar. But didn't we just say that it is fixed?

Once we accept that the guitar really has a workable range from *pp* to *ff*, we have agreed that we should be able to play at 6 different volumes.
And that's what this article is about - maximising the dynamic range *of the player*!

Why this article?

There are two skills to acquire in gaining a full dynamic range

- Being able to play at six noticeably different volumes
- Bringing those volumes to bear in performance

Playing at six different volumes

Make no mistake, playing mf is effortless, but playing at the ends of the dynamic range are not.

- Playing quietly requires great control and nails free from snags and catches.
- Playing loudly is physically hard work and if anything is out of kilter with the left hand, will be peppered with buzzes.

A guitar will speak more loudly and with a more rounded and pleasing tone if the string is pushed towards the front of the guitar as it is plucked. Any slapping of the first and most intense excursion of the string is also minimised.

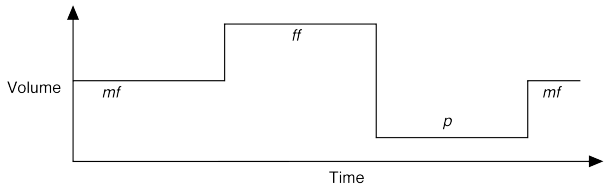
A well-known way to improve the production of loud notes is to weave a tissue between the strings at the bridge and play loudly in comparative silence.

Dynamics in performance

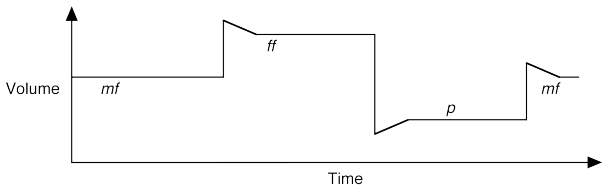
We all know the “rabbit in the headlights” feeling a performance can bring and it’s no surprise that the body’s response to all this is to put the right hand back in the middle of its comfort zone, and to watch the notes on the page but not the performance markings.

Marking volume changes in red is a good start to unpicking this response - they won't get missed.

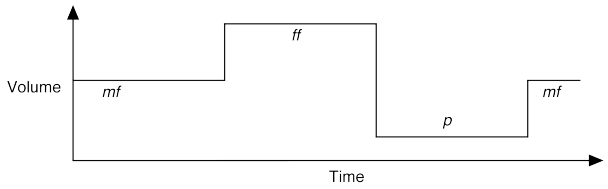
Another well-known trick is to over-emphasise volume changes and then having placed in the audience's mind the new volume, gradually back off from the limits of your range a little. You’re back nearer your comfort zone (and no-one knows except us...)



What the music requires



What you play



What the audience is convinced they hear!

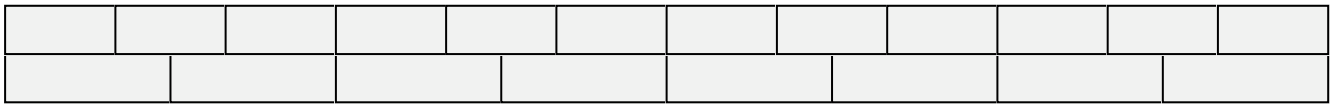
Equal Temperament

It was Pythagoras who first discovered that notes which blend well together have frequencies of vibration that are related by simple fractions.

For example, the octave is when one note vibrates exactly twice as fast as another.

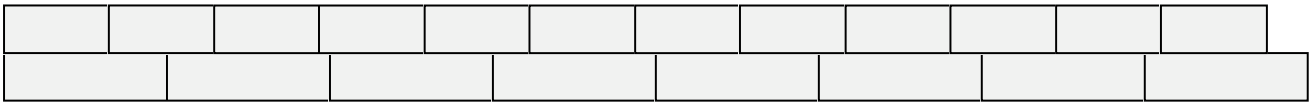
The perfect fifth (for example C to G) is when the G vibrates exactly 3/2 times as fast as the C.

Here are some building bricks laid out with lengths in the ration of 3 to 2 - see how the pattern repeats regularly, and how the resulting composite pattern has an innate structure.



This structure is not so different from the regular pattern of vibration of the eardrum when a perfect fifth is sounded - the eardrum vibrates in a simple pattern, pleasing to the brain.

When two notes do not have this sort of relationship, the pattern does not repeat for a long time, and the vibration of the eardrum changes constantly. Here, the ratio is just slightly more than 3 to 2.



When a perfect fifth is out of tune, you'll be familiar with the "beating" or vibration that is perhaps once or twice a second, and needs to be slowed to zero to get the fifth "perfect".

The problem

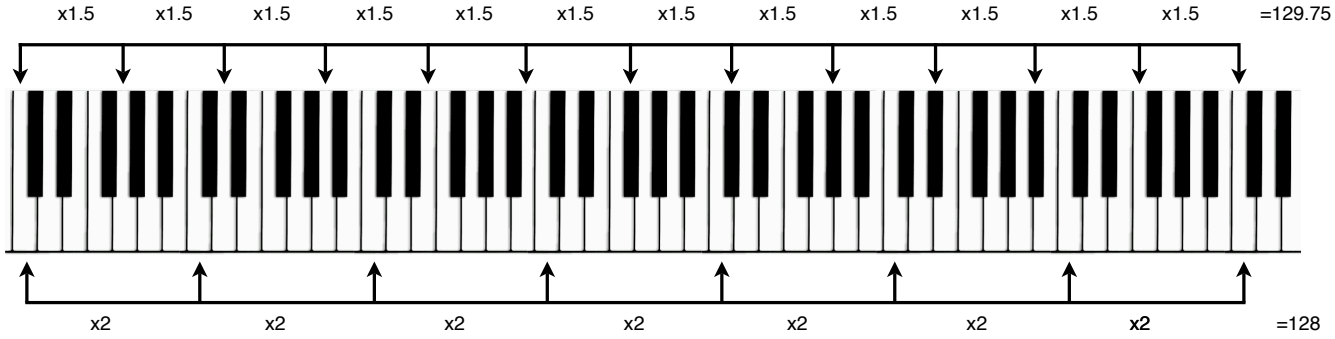
There's a problem. Indeed, the problem has been known to occupy whole books about tuning, but we can cut to the chase in one page.

Suppose we start at bottom C on the piano, and go up in perfect fifths - C G D A E B F# C# G# D# A# F C.

In 12 steps we have got back to C, just as we arrive at the top reaches of the keyboard.

Each time we have gone up, we have increased the frequency by 50%.

After 12 steps we have gone up in frequency by 1.5^{12} which is 129.75. Here's a picture...



But we've gone up exactly 7 octaves, and each has double the frequency, so we have gone up in frequency by 2^7, or 128.

Does not compute!

In order for the octaves of the piano (and indeed the guitar) to be perfect, the fifth needs to be slightly smaller than 1.5

It needs to be $2^{(7/12)}$, which is 1.4983 instead of 1.5.

But that's not in tune!

The tiny flattening of the perfect fifth doesn't notice. If I redrew the top picture in the ratio of 1.4983:1 instead of 1.5:1, it would take about a thousand blocks before the growing displacement was obvious.

In musical terms, the beating between, say, C on the second string and G on the top string, is slower than once every two seconds. It's hard to hear.

And so...

And so in guitar terms, tuning a chord to perfection instead of to "near perfection" will make another chord sound worse! When tuning a guitar, it's vital to try different chords so make sure that the tuning errors (which we have to have) are distributed evenly (so they don't notice) and not unevenly (so they accumulate in certain chords).

An example

Here's an example - play the chord of E in first position, and you will find you can flatten the G string and the chord stays sounding nice. However, if you flatten the G string as much as you can with the E chord still sounding pleasant, you will then find a chord of C sounds intolerably "out" !

When I tune using a tuning fork, rather than a chromatic tuner, I double check my tuning by playing the chords of E and C, and also an open chord of D (just Ds and As). I'm checking to make sure they all sound reasonably in tune, rather than some in tune and some most definitely not!

Graded Exams

What is a Graded Exam?

Here in the UK, a number of examination boards have set up Graded Exams in all the common musical instruments, including Classical Guitar.

As an adult reading this, you might well be wondering what one is.

Well, it's not like a driving test. There are 8 main levels, not one single standard; and although you can fail, just as you can fail a driving test, if you do fail, you don't have to be accompanied by a "proper guitarist" each time you take your guitar out for a spin!

But let's talk about passing, not failing!

- Do I need to pass a Graded Exam?
  Not unless music is going to be your career
- So what's in it for me?
  As an adult, not necessarily anything. But some students love a goal, and they love proof they've attained it
- What will I gain, doing an exam, that I won't gain just with lessons?
  A focus on perfection, rather than progress.
  A chance to play to someone else (most teachers, like me, provide dozens of other chances to play to someone else!)

Types of Grade

There are three types of Graded Exam provided by most examination boards....

- Practical - show you have mastered your instrument
- Theory - show you understand how music works
- Musicianship - show you can apply musical techniques on the fly

In a broad brush summary, Practical is the one that interests Classical musicians, and Musicianship interests those with a Jazz leaning.

The theory, by contrast, is a desk-based exam. It's entirely optional in the lower grades, but to be able to enter a Practical exam above Grade 5, you need to demonstrated that you understand Theory at Grade 5 level.

What are the Grades?

Most exam boards have 8 Grades, and for an adult, a Grade is about the amount of progress one makes in a year if one is keen and dedicated.

It's possible to do the Grades faster, but doing exams end-to-end is a blinkered and poor way to master the Guitar. I'd rather play a thousand fun pieces than just three difficult ones, and I'm sure you would too!

What does a Practical exam consist of?

It's a short visit to an exam centre, just 15 minutes at the lower Grades!

- You'll play 3 pieces you've chosen from a set-list and prepared over the previous 3-6 months
- You'll play the examiner's choice of some scales and arpeggios on the set-list which you need to have memorised
- You'll do a piece of sight-reading to show that you don't just play guitar parrot-fashion
- You'll listen to some snippets of music played on a piano and answer questions on what you've heard
- And some time later you'll receive your marks and a report

If someone wants to do exams with me, I teach to the Associated Board syllabus, as I like their emphasis on musicality and not just technique...

- If a player is musical, they'll hear and repair technical problems.
- If a player is just a technician, they'll manage the notes, but miss the music

Associated Board have a website at www.abrsm.org

How fast is fast?

A lot of guitarists get a bit over-obsessed with the need for speed.

For many guitarists, a better question is...

How fast is too fast?

If a piece of music is played too quickly, it's nothing more than a gabble. At the novice and intermediate stage of learning, pieces are often short, meaning that a fast performance achieves little than a sense of disatisfaction that the piece was "over before it started".

There are other factors that make a piece sound too fast...

- As one's speed increases, the notes become shorter, and the imperceptible gaps between the notes start to become a larger percentage of the total sound - the music starts to sound rough round the edges
- At the limits of one's fluency, certain passages will cross the threshold into "I can't quite manage this"

There's a pertinent quotation going around...
"Back off a little from what your fastest tempo is so the listeners don't have to be nervous for you."

What speed is the right speed?

If you're playing for an audience, they may well know the piece. If they have an expectation that this piece goes at a certain speed, that's the right speed for it to go at!

What's the right speed for me?

A few years back, Associated Board (the exam board ABRSM) published a table of speeds they felt were appropriate for the scales in their graded exams.

For those unfamiliar with their concept of grades, each Grade represents, at least for an adult, where you could expect to be after another year's progress with guitar.

Grade	Years of playing	Notes / second	Notes / minute	Notes / second	Notes / minute
1	1	~1.5	88	~1.6	96
2	2	2	120	1.9	112
3	3	~2.5	152	2.2	132
4	4	~3	184	~2.7	160
5	5	4	240	3.2	196
6	6	~4.5	264	~3.7	224
7	7	~4.9	290	4.2	252
8	8	5.3	320	4.8	288

These figures are the speeds at which the music should still sound relaxed!
Who said that exams are getting easier?

Remember that a well-learned scale with familiar patterns is much easier to present smoothly than a piece containing bespoke, unfamiliar, shapes.

See also the Speed - How To Play Quickly article

High Position Work

Why go up the neck?

As we play higher up the neck, we don't only gain new, higher notes, and lose a corresponding number of deep bass notes... notes of the same pitch are found on different, thicker strings. The combination of extra thickness and reduced length changes the note appreciably, giving it a much warmer sound, with a reduced harmonic content and a less pungent "attack".

But there are other gains and losses too - let's explore some of them.

On the upside

- Vibrato is much easier to effect - as we near the centre of the string, it is easier to make longitudinal movements of the fingers and easier to take the string with the finger, giving a true vibrato in which the pitch variation above and below the note are essentially equal.
- Reach is smaller and it's easy to "borrow" a finger outside the position to find those elusive few notes that are missing from each position on the guitar - an advantage that's particularly powerful if the music is rich in incidental sharps and flats.
- Tone is altogether more liquid (though the open strings present a tone that's markedly different and harder to incorporate seamlessly).
- The lesser reach reduces tension in the left hand and makes it much easier to be agile up the neck.

On the downside

- A high action (and action always will be higher further up the neck) can make it cumbersome to get the fingers placed properly, and can make it difficult to mix fretted notes (depressed quite some way down) with open strings (vibrating some distance above the frets). Good guitars have a lower action, partly because they are inherently louder and don't need a high action, and partly that the curvature of the neck is spot on along the whole length (there is no need to raise the action to defeat persistent buzzes at certain areas of the neck).
- It is easier to deform the string laterally with a finger that does not descend vertically, making it very easy to sharpen perhaps one note in a "difficult" chord.
- It is also easier to deform the string longitudinally, so that a big stretch of 5 or 6 frets can see the high note pulled sharp and the low note tugged flat.
- The gap between strings 2 and 3 is a semitone less than all the other strings, and up the neck it's quite easy to find a "familiar" fingering - (for example in VII position, the bottom string yields D under the 4th finger, in exactly the same way as in II position, the 5th string yields D under the same finger. However, as the scale is traversed, the notes affected by the 3rd string will be at a different point in the scale. This feeling that "I know how it goes but it's gone wrong" is easily overcome in time, but in the early stages of going up the neck can cause all sorts of errors that are quite unsettling, as familiar fingerings no longer "work" quite as they used to.

Somewhere else

- Sometimes a plus, sometimes a minus... the crossover between nylon and wound strings is at a different point in the scale. The crossover point marks a real difference in tone between the thickest, stiffest string and the thinnest, brightest one. Sometimes a careful choice of position can give exactly the right result. Sometimes we have to make do (and playing the 4th string with the flesh of the thumb instead of the nail can help minimise the difference.

What position should I be in?

Now if we knew the answer to that, fingering a guitar piece would be so easy we wouldn't need editors!

Certainly, some positions suit some keys - in the IX position, every diatonic note in the key of D is under the fingers.

Yet curiously, VII position is often used for D - the top octave is under the fingers, but the bottom octave is less so.

As you can see, it's not obvious! A little experimentation, however, will soon show whether, for example, the position you've chosen requires lots of low notes with the 4th finger (not the easiest finger to reach a long way with), or whether the "strong" fingers take the lion's share of the work.

One thing is clear - facility all over the neck opens up a greater palette of tone and, indirectly, lyricism. Just as a cook can serve one type of meat in many ways, so we, by position work, can serve up a phrase in an almost infinite variety of colour...

See also the Seventh Position article.

Intervals

What are "Intervals"?

They're the way we name the jumps that a melody takes as it progresses.

Ever listen to someone whistling a well-known tune?
Did they know what key the original was in, and what key they're whistling in? No!
Does it matter? No!

All that matters is whether the next note of the tune goes up or down, and by how much.
As long as you move around the piece by the correct amount relative to the previous note it doesn't matter what the starting note is.

Naming notes relative to other notes

There are two issues in describing a tune's next note relative to the previous note.

- How to name a jump up or down the scale in relative terms - that's this sheet
- How to name the note we've landed on in relative terms - see my Degrees of the Scale sheet.

The two parts to an interval name

An interval is the gap (in pitch, not time) between 2 notes. There are two parts to an interval name:

1. The first part says how many note names separate the 2 notes
   Note - we count both the notes as well as those in between, so C to E is a third
2. The second part says whether the gap is large or small
   Example - A to C is a third, but is 3 frets. C to E is a third but is 4 frets
   We don't specify the actual number of frets of separation, we simply say whether it's a large gap or a small one

Types of interval

- For most intervals, we describe the gap with one of 4 qualifiers (you'll find these names applying to chords too!) Diminished, Minor, Major & Augmented - Minor is small, Major is large, Diminished is very small, Augmented is very large
- For the 4th and 5th (eg Tonic to Subdominant or Dominant) there is only one spacing that sounds "good"; we use Diminished, Perfect and Augmented - Perfect sounds good, the others sound "strained"

A convenient way to think of this (although there is an exception to the "rule" I'm about to give) is that Major, Minor & Perfect intervals relate to the gaps we find between any two notes of a scale, and that Diminished & Augmented intervals relate to gaps when one or both notes is altered by an accidental.

The exception to this "rule" in the key of C, for example, is the interval between F and B, which is an augmented 4th, and between B and F, which is a diminished 5th.

A table of interval names

Interval Name	Here are the Interval Names (from low to high note) *The interval name is the same, even if the notes are sharp or flat*						
Unison	C-C	D-D	E-E	F-F	G-G	A-A	B-B
2nd	C-D	D-E	E-F	F-G	G-A	A-B	B-C
3rd	C-E	D-F	E-G	F-A	G-B	A-C	B-D
4th	C-F	D-G	E-A	F-B	G-C	A-D	B-E
5th	C-G	D-A	E-B	F-C	G-D	A-E	B-F
6th	C-A	D-B(*)	E-C	F-D	G-E	A-F	B-G
7th	C-B	D-C	E-D	F-E	G-F	A-G	B-A
Octave	C-C	D-D	E-E	F-F	G-G	A-A	B-B

* Example : The interval from the Open D string to the Open B string is found in the table on the row marked "6ths" - it's a 6th.

The next table shows how to work out if it's a Minor 6th or a Major 6th.

Note : When we name intervals, we include the notes at either end. When we count the gap, we count the frets in the normal way (eg C-D is 2 frets)

Note: Intervals larger than an octave (such as a 9th) is also called a compound interval (a 9th is a compound 2nd)

A table of intervals

Interval/no of frets	0	1	2	3	4	5	6	7	8	9	10	11	12
Unison	Uni	Aug1											
2nd	dim2	min2	Maj2	Aug2									
3rd			dim3	min3	Maj3	Aug3							
4th					dim4	Per4	Aug4						
5th							dim5	Per5	Aug5				
6th								dim6	min6	Maj6	Aug6		
7th										dim7	min7	Maj7	Aug7
Octave												dim8	8va

Key (larger intervals are capitalised)
dim = diminished, min = minor, Maj = major, Aug = augmented
Per = perfect, Uni = unison, 8va = Octave

* Example : The interval from the Open D string to the Open B string is 9 frets.

Combining this with the result from the previous table, we see the interval is a Major 6th.

Inversions

These tables name the interval assuming that the lower note is first.

"Inverting an interval" means putting the lower note on top.

When we invert an interval, several things happen...

- The Interval Name becomes (9-The Interval Name)
- Augmented becomes Diminished and vice versa
- Major becomes Minor and vice versa
- Perfect stays perfect

Example : D to B is a Major 6th. B to D is Minor 3rd

This "swapping over" is much like the "swapping over" that happens in the order sharps and flats get added to a Key Signature

Why bother understanding inversions?

Recognising intervals helps with recognising chords, and, like intervals, chords are frequently inverted too; feeling at ease with groups of notes on the score is a powerful step towards being at ease with them on the fingerboard.

See also my Key Signatures sheet.

Italian Terms

What are they?

Music Notation is a universal language, understood by flautists, cellists, pianists and more. In fact, apart from a few guitarists' obsession with reading nothing but tablature or tab, it's pretty much totally universal. Unlike tab, it tells you what you must achieve, not how you must achieve it, and it leaves sufficient room for the player to consider alternative fingerings, for example.

But whilst it expresses pretty concisely the pitch and relative lengths of all the notes, it gives little clue whether the music is fast and furious, or slow and gentle. It gives few indications about how to shape the music.

"Italian Terms" is a catch-all name for the narrative or descriptive mark-ups that express, in plain language, how to shape the piece. Italian is used simply because it provides a standard vocabulary that, once learned, is understood the world over.

This article defines some of the more common terms.

Accelerando or Accel .....Becoming gradually faster
Ad lib or Ad Libitum .....At (the performer's) pleasure
Adagio .....Slow and leisurely
Affetuoso .....Tenderly
Affretando .....Hurrying, pressing onwards
Agitato .....Agitated
Allargando .....Broadening out, often with an increase in tone
Allegretto .....Slightly less than Allegro ("A little allegro")
Allegro .....Lively, reasonably fast
Amoroso .....Loving
Andante .....Literally Walking - at a moderate pace
Andantino .....Usually a little faster than Andante. Can sometimes mean the opposite!
Animato .....Animated
A piacere .....At pleasure
Appassionato .....Passionately
Assai .....Very
A tempo .....Become normal speed after a diversion
Attacca .....Go on straight away

Ben, bene .....Well (Ben Marcato : Well marked)
Bis .....Twice
Brillante .....Sparkling, brilliant
Brio .....Vigour. (Con Brio : With Vigour)

Calando .....Decreasing tone and speed
Cantabile or Cantando .....In a singing style
Capo .....The beginning (literally, the head)
Capriccio .....A caprice - a piece in light-hearted style
Coda .....(Literally tail) - a passage to conclude a piece or movement
Col, colla .....With the
Come .....As (Come Prima : As At First) (Come Sopra : As Above)
Comodo .....Convenient (usually in the sense of "at a convenient pace")
Con .....With (Con Moto : With Movement)
Crescendo or cresc .....Getting louder

Da .....From, of
Da Capo or D C .....From the beginning
Dal Segno or D § .....From the sign (§)
Deciso .....Decisively, firmly
Decrescendo .....Becoming gradually softer
Delicato .....Delicately
Diminuendo or dim .....Becoming gradually softer
Dolce .....Sweetly
Dolore .....Grief, sorrow

En dehors (Fr) .....Prominently or emphasised
Energico .....With energy
Espressivo or Espress .....With expression, with feeling
Estinto .....As quiet as possible (literally extinguished)

Felice .....Happy
Feroce .....Fierce
Fine .....The end. DC Al Fine - back to the start, end at Fine
Forte or *f* .....Loud
Fortissimo or *ff* .....Very Loud
Forzando or *fz* or *sfz* .....With a strong accent (literally forced)
Fuoco .....Fire
Furioso .....Furiously

Giocoso .....Gay, merry
Giusto .....Strict, exact (Giusto tempo : In strict time)
Grandioso .....Grandly
Grave .....Very Slow
Grazioso .....Gracefully

Impetuoso .....Impetuously
Incalzando .....Increasing speed, with an implication of increasing thickness of sound

Lacrimoso .....Sadly (literally tearfully)
Langsam (Ger) .....Slow
Largo .....Slow and stately, broad
Larghetto .....Less slow than Largo
Legato .....Smoothly
Leggerio .....Lightly
Lento .....Slowly
Loco .....(Literally place or in place) - restore normal pitch after 8va

Ma .....But (Ma non troppo : But not too much)
Maestoso .....Majestically
Mancando .....Dying away
Marcato .....Marked, accented
Marcia .....A march
Marziale .....Martial (not to be confused with marital!)
Meno .....Less (Meno Mosso : Less Movement)
Mesto .....Sadly
Mezzo forte or *mf* .....Moderately Loud
Mezzo piano or *mp* .....Moderately Soft
Misterioso .....Mysteriously
Moderato .....Moderately (applied to tempo)
Molto .....Much
Morendo .....Dying away
Mosso .....Movement
Moto .....Movement

Non troppo .....Not too much

Obbligato .....Cannot be omitted
Op. or Opus .....Work (a published composition)
Ossia .....Or (denoting a choice)

Passionato .....Passionately
Patetico .....With feeling or pathos
Perdendosi .....Dying away
Pesante .....Heavily
Piacevole .....Pleasingly
Piangevole .....Plaintively
Pianissimo or *pp* .....Very soft
Piano or *p* .....Soft
Piu .....More (Piu Mosso : More movement)
Pizzicato or *pizz* .....Literally plucked (but on the guitar, deliberately damped)
Pochettino .....Rather little
Pochissimo .....Very little
Poco .....A little (Poco a poco : Little by little or gradually)
Precipitato, Precipitoso .....Impetuously
Presto .....Very quick
Prestissimo .....As fast as possible
Primo .....First

Quasi .....As if, almost

Rallentando or Rall.....Becoming gradually slower
Rinforzando.....Reinforcing
Risoluto .....Boldly
Ritardando or Ritard .....Becoming gradually slower
Ritenuto or Rit.....Held back (Slower at once)
Ritmico.....Rhythmically
Rubato .....Robbed, stolen - making a note or notes longer at the expense of others

Scherzo.....A Joke
Scherzando .....Playfully
Sec, Secco .....Detached (literally dry)
Segno.....A § sign (See D §)
Semplice.....Simple
Sempre .....Always
Senza .....Without
Sforzando or *sf* or *sfz*.....With a sudden accent
Simile .....In a similar manner
Slargando/Slentando .....Gradually slower
Smorzando .....Dying away
Soave .....Gentle, smooth
Sopra .....Above
Spiritoso .....Spirited
Staccato or stacc .....Short, detached
Strepitoso .....Noisy, boisterous
Stringendo .....Gradually faster
Subito or Sub.....Suddenly

Tacet (Lat) .....It is silent
Tempo.....The speed of the music
Tempo di gavotta.....In the time (and style) of a gavotte
Tempo Primo or Tempo I .....Resume the original speed
Teneramente .....Tenderly
Tenuto or ten .....Held
Tranquillo.....Quietly
Troppo .....Too much. (Ma non troppo - but not too much)

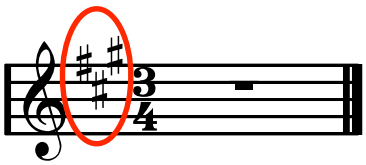
Vivace.....Lively, Quick
Volante .....Flying
VS (Volti Subito).....Turn the page quickly

There is a page of humorous definitions at www.derek-hasted.co.uk/definitions/

Key Signatures

What is a key signature?

The most straightforward definition is that it's the group of sharps or flats just after the clef on every line in a piece.



More accurately, you should regard the signature and the clef together as defining the pitch of the notes on the stave and defining which of the 7 notes that we use are sharp (or flat) notes.

Some facts

- A key signature can have up to 7 flats or up to 7 sharps
- A key signature will never contain both sharps and flats
- There is only one signature that has 'n' sharps - there's a table below
- Each signature has the effect of pushing one or more notes up or down a semitone, moving them closer to one neighbouring note, and further from the other. *For example F# is closer to G than F is, but it's further from E.*

Why do we need a key signature?

If we play a scale of C, going through all the letters of the alphabet, we produce a "major scale of C"; the jump in frets between notes is 2,2,1,2,2,2 and finally 1. You can even play the scale starting on fret 3 of string 5 and going up the string, rather than across the fingerboard. You'll play frets 3,5,7,8,10,12,14,15. It's cumbersome, but this is about understanding, not performing.

If you try the same scale starting on the G that is on fret 3 of string 6, going up via the same frets, you'll discover that the penultimate note you play is not F, but rather it is F#. We have just seen that the key of G requires one sharp and it's F.

You can start on any fret and any string and play any major scale, simply by going up the string 2,2,1,2,2,2,1 frets and discovering the notes you've landed on. When there is ambiguity (the note is G# or Ab, for example), pick the choice that gives you one of each letter name.

Minor scales

Ever wondered why the key signature with no sharps is C, and not the first letter of the alphabet? Read on

Once the music theoreticians got their hands on the minor scales, things became mucky, but to understand key signatures, we define the "natural minor scale" as the scale that you get when you play all the letter names starting on A with no key signature (which gives us a sequence that goes up 2,1,2,2,1,2,2). The natural minor scale has a modal, folk-like character redolent of traditional western music. "A" is therefore a relevant base from which to begin, and the minor scale is the natural (pardon the pun) starting point.

If we take a different starting note but follow the same "recipe", we generate a natural minor scale in any key. As we go ascend, we discover which notes are sharp or flat, and therefore what key signature we need for that starting note. We find

Signature	Which notes?	Major key	Minor Key
7b	B E A D G C F	Cb	Abm
6b	B E A D G C	Gb	Ebm
5b	B E A D G	Db	Bbm
4b	B E A D	Ab	Fm
3b	B E A	Eb	Cm
2b	B E	Bb	Gm
1b	B	F	Dm
none	-	C	Am
1#	F	G	Em
2#	F C	D	Bm
3#	F C G	A	F#m
4#	F C G D	E	C#m
5#	F C G D A	B	G#m
6#	F C G D A E	F#	D#m
7#	F C G D A E B	C#	A#m

the grouping of sharps or flats looks familiar - the fifteen different key signatures have the same collection of sharps or flats as in the major keys and we can summarise it all in a little table.

The patterns are not easy to find at first, but look at the order notes go sharp - the opposite order to which they go flat. And the list of keys going down the page has the same sequence of letters as the removal of the flats and the addition of the sharps. Each pattern contains the letters of the alphabet in two interlocking ribbons - every second letter is in alphabetical order.

A mnemonic

We add sharps in this order... Father Christmas Gave Dad An Electric Blanket

And flats go in this order... Blanket Exploded And Dad Got Cold Feet

But what about Major and Minor?

Every Key Signature defines exactly one major key and one minor key. Unsure whether it's major or minor? Happy pieces are Major.

Still unsure? Have a look at the last bass note - it's 99% sure to be the key of the piece.

Hang on 12 doesn't equal 15!

We have 15 Key Signatures (7 flats down to none, up to 7 sharps), but there are only 12 semitones in an octave. What is happening?

That's because C# and A#m at the bottom of the table are the same notes as Db and Bbm at the top - the top 3 entries and the bottom 3 entries are duplicates of each other.

There's too much to learn!

Signature	Which notes?	Major key	Minor Key
1b	B	F	Dm
none	-	C	Am
1#	F	G	Em
2#	F C	D	Bm
3#	F C G	A	F#m
4#	F C G D	E	C#m

As guitarists, we seldom play in more than one flat, or more than 4 sharps. The table we really need to be at ease with is a lot smaller...

In fact, as music readers, as opposed to music *writers*, we don't actually have to learn anything - every time we see a piece of music it will fit the same pattern, and we soon learn the pattern by repetition - the written music actually reinforces the rule, rather than requiring us to know the rule.

See also my Time Signatures article.

Modulation

What is it?

Modulation is a posh word to denote “going to a new key”.

- Sometimes it’s a large scale change to a piece, and there will be a double bar line and a new key signature that heralds a passage in a new key.
- Sometimes it’s a temporary change and there will be some incidental sharps or flats (characteristic of the new, temporary key) that introduce a cadence in the new key, before the music returns to the "home key".

Typical modulations

Nothing is typical, of course, and some of the greatest composers have enjoyed parading their talent by weaving a melody that seamlessly takes the listener to a key that's totally unexpected - the musical equivalent of driving round a corner to see an unanticipated vista.

But expecting the expected will help you read more accurately and position the hands more appropriately.

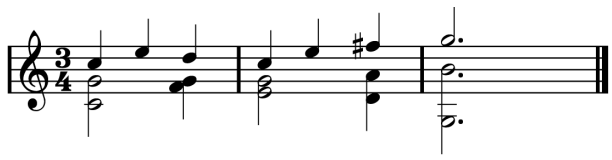
Here are the most common modulations...

- From tonic to dominant (see my Degrees of the scale article) - “going to one more sharp/one less flat”
  Example - going from C (no sharps) to G (one sharp)
- From tonic to subdominant (or from dominant to tonic) - “going to one less sharp/one more flat”
  Example - going from A (3 sharps) to D (2 sharps)
- From relative major to relative minor (see my Key Signatures article) - “signature stays the same”
  Example - going from C to Am
- From relative minor to relative major - “signature stays the same”
  Example - going from Em to G

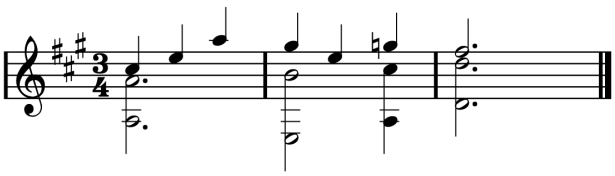
Playable examples

Here are some *really* cut-down examples so that guitarists of any ability can try out the common modulations…

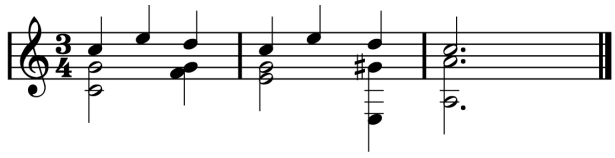
From C to G
An extra sharp appears



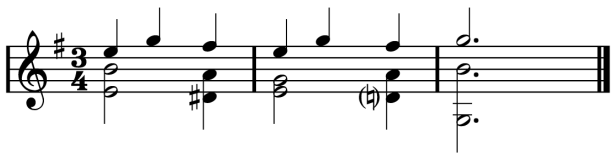
From A to D
The “highest” sharp in the signature is removed



From C to Am
The minor’s leading note is sharpened



From Em to G
The minor’s leading note is naturalised



Musical Devices

No, not in the sense of instruments or physical equipment!

This mini-masterclass is about the facets of music we can use to turn a score from "a pile of notes" into "a piece of music".

Every single note and every phrase made up of a sequence of notes has features that we as musicians, and that we as guitarists, can alter to improve the musicality…

Each note has pitch, length, volume and tone

These four characteristics place the note uniquely in the sound-canvas you are creating...

- The pitch - how high you place the note on the canvas - the height
- The length - how long the note resides in the piece - the breadth
- The volume - how "in your face" the note is - the distance or depth
- The tone - how the note is wrapped up - its appearance

And we, as players, can tailor these a little...

For individual notes…

Pitch - we can add vibrato to long notes to make them sound more compelling - *see my Vibrato teach-in*

Length - we can shorten notes or make them smoother via snaps & hammers - *see my Articulation teach-in*

Volume - we can accent individual notes

Tone - unlike most other instruments we can
Vary our tone (pianos can't for example)
Vary it independently of volume (most wind instruments can't) by moving the right hand to the bridge or fingerboard

For phrases...

Pitch - not much we can change here - pitch defines the melody - but we can *gliss* between notes

Length - we can change the speed of a phrase - stepwise or gradually faster or slower - *see my Italian Terms teach-in*

Volume - we can change the volume of a piece stepwise or gradually louder or quieter

Tone - we can alter the tone - especially effective to delineate a repeat

As musicians, rather than technicians, we try to add these devices to every piece we play…

Here's our toolkit

Per note…	Sudden changes…	Gradual changes...
Pitch *vib* - vibrato	**Step changes in pitch** We can connect 2 notes with a glissando or slide. Not really a step change, but it's used suddenly for effect, not all the time	
Length *staccato* or a . - shorter *legato* or a slur - longer	**Step changes in speed** MM (Metronome Mark) or an Italian word such as *Largo*, *Presto*	**Gradual changes in speed** *accel* (accelerando) - getting faster *rall* (rallentando) - getting slower
Volume > - accent	**Step changes in volume** *pp* - pianissimo *p* - piano *mp* - mezzo piano *mf* - mezzo forte *f* - forte *ff* - fortissimo	**Gradual changes in volume** *cresc* (crescendo) or opening hairpin - getting louder *dim* (diminuendo) or closing hairpin - getting quieter
Tone *Apoyando* - for strong notes *Tirando* - for arpeggios	**Step changes in tone** Sul ponti - near the bridge Sul tasto - over the fingerboard	

There are other devices too (like pizzicato for length) that are more rarely used.

Phrasing

Phrasing

Phrasing in instrumental music is akin to phrasing in singing, although singers have the additional incentive that they really must stop and draw breath from time to time. The presence of "space" in song, where the singer can breathe, is also found in instrumental music.

It is the act of finding the phrases, respecting them and shaping them that has the umbrella term "phrasing".

A rule (or not)

Always beware a rule that begins "generally speaking"...
However, generally speaking, phrases in folk music and songs are often 8 or 16 bars long, regardless of whether the bars have 2,3 4 or more beats. More mature classical music has what is called "the long line" - a melody that carries on and evolves and which is passed from instrument to instrument as it is developed.

Whichever style of music one is playing, the audience will enjoy it so much more if it is sensitively phrased.

It's not the destination it's the journey

How true that is for so many aspects of life, but here in the world of music, the converse is almost as true for some pieces (for example Hampshire Guitar Orchestra's popular version of Palladio), where the final cadences are obviously all about "where we're going" and not about "where we are right now". Other pieces, (for example HAGO's version of Moulin Rouge) are more about the glorious undulations that permeate the whole piece.

How to phrase

Phrasing is an art not a science and no amount of prescriptive rules will make someone a "natural" at phrasing. But there is a toolkit of techniques that you should experiment with…

- Repeats often benefit from mellowing of tone and/or volume
- Phrase ends often benefit from a slight pause or "breath"
- A breath can be executed as a lengthening of the last note of the phrase, (slowing the pace of the piece), or by shortening the last note (to create a gap without losing momentum)
- Rubato is often effective when the phrase climbs to its highest notes (creating a sort of roller-coaster ride through the phrase)
- Vibrato on the longer notes can create a more lyrical phrase - see my Vibrato teach-in
- Articulating the notes in a phrase by staccato or legato playing can heighten the mood - see my Articulation teach-in
- Allowing the volume to rise and fall a little with the notes can increase the lyricism
- Taking a phrase in a different position on the neck can provide a welcome contrast - see my Seventh Position teach-in

Phrasing in ensemble

In many respects, phrasing is easier in ensemble because we all have fewer notes to worry about and more choices about how and where to play them.

But remember that if you're playing an inner part that is providing harmonic substance to the overall sound, it might not have a shape of its own that is obvious how to phrase. It is obviously not good practice to phrase an inner part with no appreciation of the tune, because phrasing needs coordination (especially phrasing based on rubato!)

Restringing a classical guitar

Guitar strings are a bit like bicycle tyres - they wear out and have to be replaced.

In fact they are more than a bit like bicycle tyres - there's the guitar equivalent of a puncture - an infrequent, but sudden and premature failure of a string, usually mid-piece!

Guitars aren't as greasy as bicycles, so it's well worth getting the hang of changing strings yourself rather than taking the guitar to a music shop. But that first time of restringing can be a nightmare that seems to require you to have the dexterity of a brain surgeon. And three hands.

Here are photos to guide you through the process.

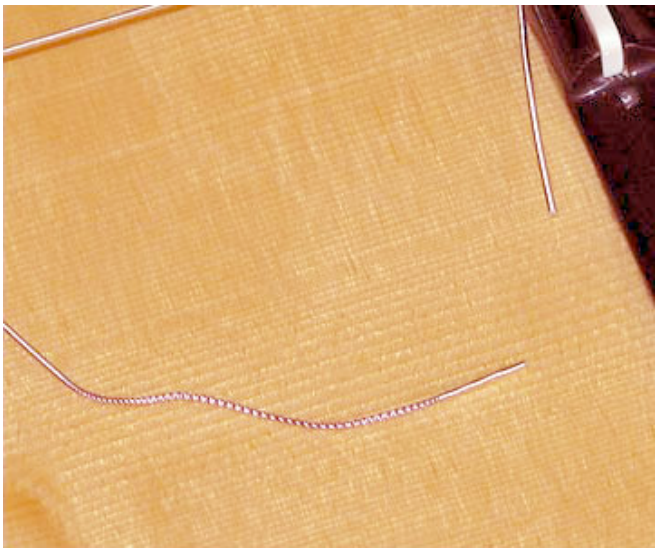
So *when* do you restring?

See my "When to Restring" article

Knot a lot...

There are, of course, several ways to restring a guitar, and one or two enthusiasts will have their own style of knotting that gives their guitar an individual appearance. But here's my take on tying those knots...

Let's start at the bridge end



I change one string at once *(in the photos I've removed other strings so you can see what's going on more easily).*

I start with the bottom string - it settles fastest; by the time we replace the top string, we have a "good" string to tune to without needing electronic tuners or tuning forks all the time.

Some overwound strings have a "good end" and a "bad end" (with a sparse winding) - it's not a manufacturing fault.

If we tie the bad end at the bridge and part of the "sparse winding" extends onto the vibrating length of the string, the string will sound "out".

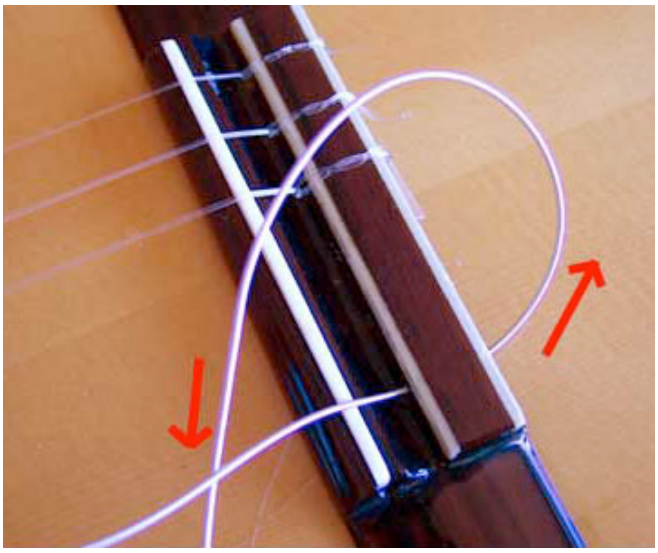
So I'll tie the knot using the end of the string that's at the top of the picture.

Lay the guitar on your lap, and sit well away from objects like tables, because the first time you do this, the guitar may slide around like a freshly-caught eel!

Pass the good end through the hole and leave yourself enough to work with. You can cut off any spare string later.

Don't go mad though - the strings are only so long!

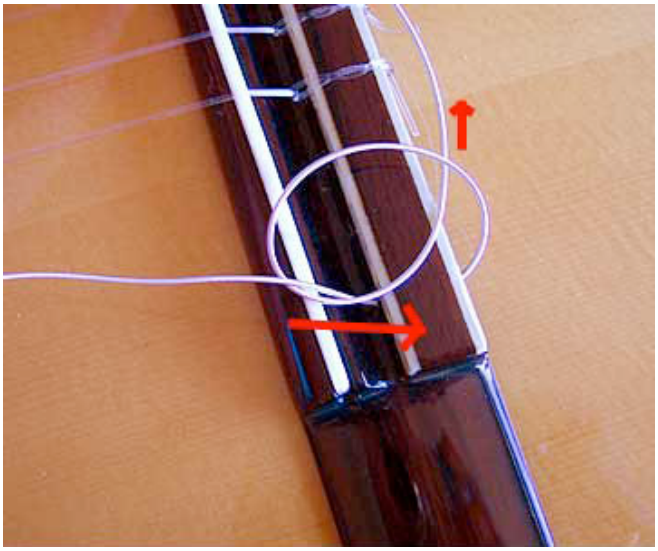
As you get more skilled, you'll be able to judge exactly how much string to use.



As you feed the string through in the direction of the red arrow, take the good end and pass it under the string.

In the photo, I've made a larger loop than we need, simply so you can see it more clearly.

If you are left handed, you might want to do the mirror image of this - indeed, if you look at the photo, the top strings (which I haven't replaced yet) are a mirror image of the knot I'm about to tie.

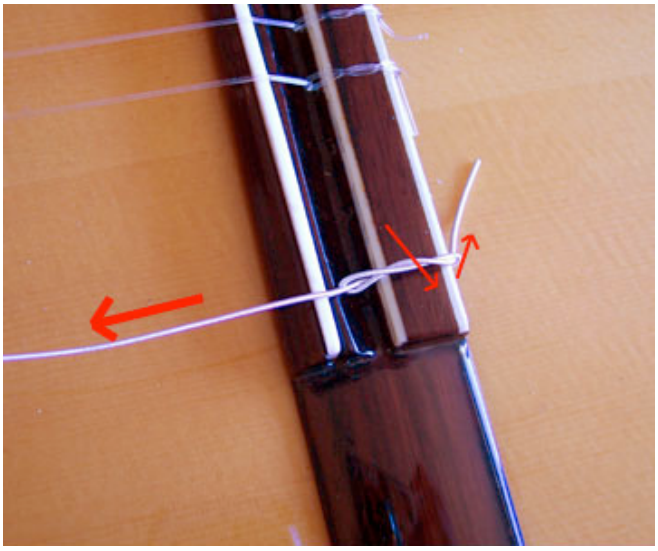


Take the free end in your right hand and tuck it under the string following the arrows in the photos.

In *this* photo it's gone under the string once.

In the *next* one I've gone under again - take the free end, pull it towards you, and thread it back under the the string, just to the right of where it goes under here. See the arrows in the next photo, but *that* photo is after the knot is tightened.

HINT : The monofilament strings are very slippery - loop round 3 times, rather than 2 - then you can be sure they will never slip.



HINT : When you have looped it, trap the free end at the back of the bridge, as shown here - it is more secure!

Pull gently on the vibrating part of the string to tighten the knot, but don't overdo it - let the knot seat itself under tension.

If you lever the knot really tight, you will put a sharp kink in the string as it passes from the bridge saddle to the hole in the tie-block.

A gentle kink is fine - it shows the knot is holding. A severe kink stretches the fibres in the taut portion of the string unevenly - some will snap, leading to the eventual failure of the string where the knot is tied.

Now to the other end…

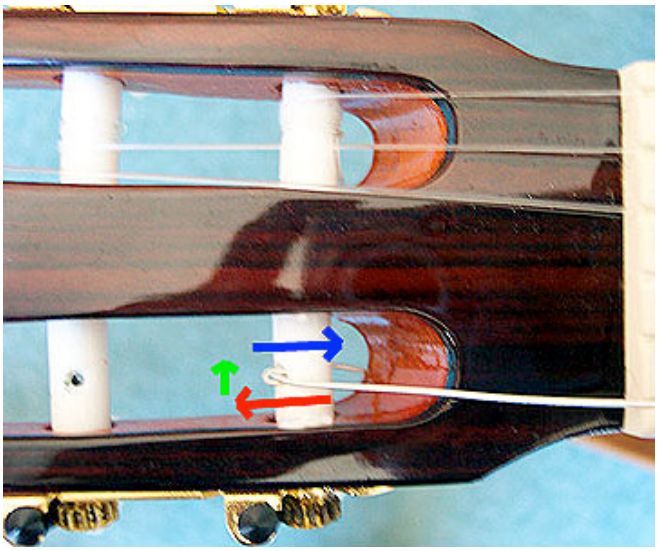
At the tuning peg end, rotate the appropriate roller (arrowed) so that the hole is aligned as shown.

Drape the string over the roller.

From the underside of the roller, bring the string through the hole.

Many guitarists believe that the more windings there are on the roller, the more the string misbehaves when there are changes in temperature.

To minimise the wrap, pull all the string through, seating the string in the nut slot as you do so.



I’ve turned the peg a bit now so that you can see the arrows more easily, but there is no need to do so.

In the last step, you passed the string through the hole and pulled it tight (the red arrow).

Now take the free end over the string (green arrow) and back through the hole (blue arrow).

It’s as if you've stapled the string down!

Wind the string, ensuring that successive windings are adjacent, and on the side of the bobbin hole that's nearer the nut slot.

If you let the windings stray all over the bobbin, they may reach the sides; further turns of the peg wedge the string into an ever decreasing gap, jamming the bobbin. If you apply more force on the peg, you might crack it (I've seen that done!)

Because I pulled the string tight before I stapled it, there are only a couple of turns on the bobbin (the photo shows the string up to pitch).

Don't worry about the string straying on the bobbin once it's up to pitch - the amount of adjustment you'll make is tiny.

And finally…

The last job is to trim the ends of the strings back.

CAUTION : A long string tail at the bridge will reach the front of the guitar and can be the source of hard-to-find buzzes!

The more often you can tune the guitar back to pitch in the first few days, the faster it will settle down.

The Seventh Position

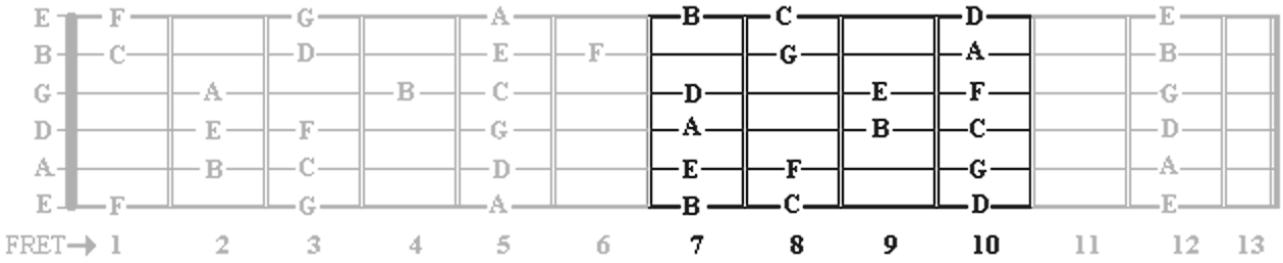
I write a lot of ensemble music, and as soon as the music extends beyond three parts, it's necessary to ensure that each part has a suitable margin between the parts above and below. And that means that it becomes essential that the tune moves further up the neck of the guitar.

The seventh position is excellent when playing in the keys of C, G and D, the simpler keys.

A "position" is numbered from one upwards, and the basic definition is that the n'th position is when the left hand first finger is on fret n, and so in the n'th position frets n .. n+3 are available under fingers 1 .. 4

What's where?

VII posn encompasses frets 7, 8, 9 and 10, and takes us as high as top D.



In many respects VII posn feels like II posn. For example

- In II posn, fingers 1,2 and 4 give you F#, G and A on the top string
  In VII posn, the same fingers give you the same notes but on the second string
- In II posn, fingers 1,3 and 4 give you A, B and C on the third string
  In VII posn, the same fingers give you the same notes but on the fourth string

Broadly speaking, the same notes are under the same fingers in II and VII, (but on the next string down in VII posn).

- There are new notes on the first string
- We lose some of the bass notes

However, because the gap between the 2nd and 3rd strings is different to all the other strings, it means that the notes on the second string in II posn aren't quite in the same place on the third string in VII posn. You won't believe me when I say you soon get used to this, but you do!

Learning how to play up the neck

Classical Guitarists are about as far from jazz players as it's possible to get!

- Classical players often learn music slavishly, working out where every note is then trying to remember what *finger* goes where, instead of what *note* is where
- Tab players are worse - they just do what it says and don't even know what notes are where!
- Jazz players, on the other hand, have an intuitive feel for notes and the degrees of the scale - given a note, they can easily find the notes around it

Most classical tutor books will give you a diagram like the one above, and then a piece to be played up the neck. That will get you playing up the neck, but not really learning the neck intuitively. It's having the intuitive feel that means that new pieces come good quickly, that memory is more reliable, that playing is more fun

Here's a better idea - armed with some simple tunes in simple keys (elementary recorder, violin and flute books are ideal), attempt to play them in VII posn. There's only one way to understand the neck, and that's to see what you can do with it!

What VII can't do

A look at the chart above will show you that in VII, Bb is not available on the top string, nor on the second string, so VII is not suitable for F Major or D Minor.

In the same way, G# is not available between the fourth and fifth string, and so not all pieces in A Major or F# Minor will be under the fingers.

In the higher positions, however, it becomes much easier for the first or fourth finger to reach one extra fret and pick up all the missing notes.

Speed - How to Play Quickly

I want to play faster

Don't we all!

Remember that in an ensemble, we may produce an impressive performance from harmonic complexity or rhythmic complexity without necessarily having raw speed, so good music and fast music are not necessarily one and the same.

But if you can play at speed with neatness and precision, you have more control and legato that you can bring to slow pieces as well.

How do I play faster?

It's tempting to say "practise more", and that, of course, is part of the solution. But if you play badly at speed and you practise a lot, you simply learn how to play badly at speed with less effort. Playing with mistakes simply reinforces how to play badly.

So the most important point of all is to play for perfection and then to increase speed, not the other way round.

Why does it go wrong?

The Guitar is a cumbersome instrument - it takes two (different) actions in the two hands to make each note. If the right hand plucks before the left hand has made the note, there will be a wrong note (left hand not in position) or a muffled note (left hand in the act of pressing the string down). And so, in normal playing, the left hand arrives marginally before the right. This cuts the previous note very slightly short and follows it with a tiny period of silence until the string is plucked.

It's this tiny period of silence - imperceptible in slow playing - that becomes significant when the notes are very short.

Playing fast is all about minimising this silence.

Start slowly

If slow runs are not perfect, fast ones cannot possibly be. Slow runs give you time to hear what is not right - intelligent and conscientious listening can root out problems that are harder to diagnose at speed. It's easier to hear detail if you record yourself and listen to the recording, so that you are not concentrating on "doing" at the same time as listening.

Left hand

Human musculature is such that force and control are not natural bedmates.
Minimising the effort expended will result in much better control...

- Use less pressure - most people press far harder than is needed
- Use the right hand edge of the fret to help minimise the pressure needed and to get tactile feedback from the fretwire about where your finger really is
- Keep the fingers low - it takes time to move a finger a long way, and a lot of force to do it quickly
- Keep the fingers spread - a finger that hovers over "its fret" has to move less far than if the hand closes up when "resting"

Right hand

- Attention to the right hand nails will mean that all the fingers react equally and there is not a maverick which plucks slightly early or late
- "Planting" or feeling for the string introduces another period of silence - the fingers need to reach the string on the move
  - Think of a young child kicking a football coming towards them - they trap the ball and then kick it
  - A more experienced footballer kicks the ball while it's in motion

Brain

- The brain is very good at controlling short bursts at speed, but longer bursts require more conscious thought which disrupts the playing.
- Learning fast passages by heart can cure this.
- Many learners actually play fast notes faster than is needed because they tense up as "the hard bit" arrives - a metronome can be effective, and is a good way to chart progress from week to week.
- Before performing, practise at a slightly higher tempo than the piece requires. A 5% drop in tempo at performance seems to generate 10% more time!

Versatility

- Although it's cost-effective on your time to practise playing fast just on the notes required, that is fine for "this" piece but no help for "next time"
- Better is to dig out those old scale books and rattle through the common patterns
- Most tonal melody is scale-based, at least in the small, so rehearsing the common finger patterns produces a good pay-back in the future

Sustain

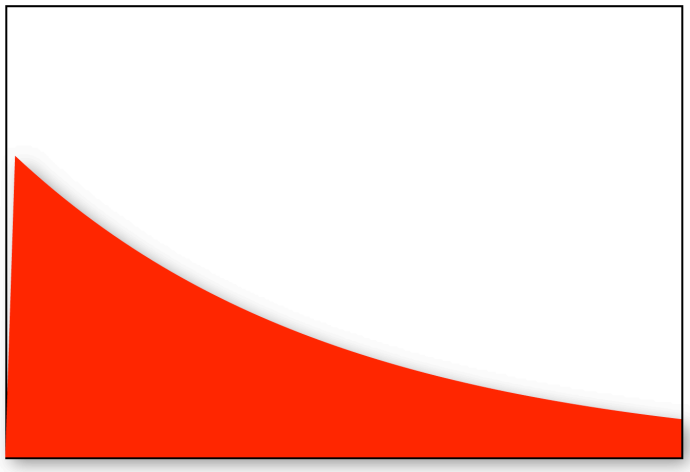
Sustain is that glorious constancy of texture, that smoothness of progression, that effortless music-making - that perfect antidote to plinky-plunky playing.

The guitar isn't a sustaining instrument - unlike orchestral instruments, all our notes die away as soon as they are sounded. But there are one or two little tricks up our sleeves that can give an ensemble the illusion of sustain. This teach-in introduces a few of the obvious and not so obvious ones.

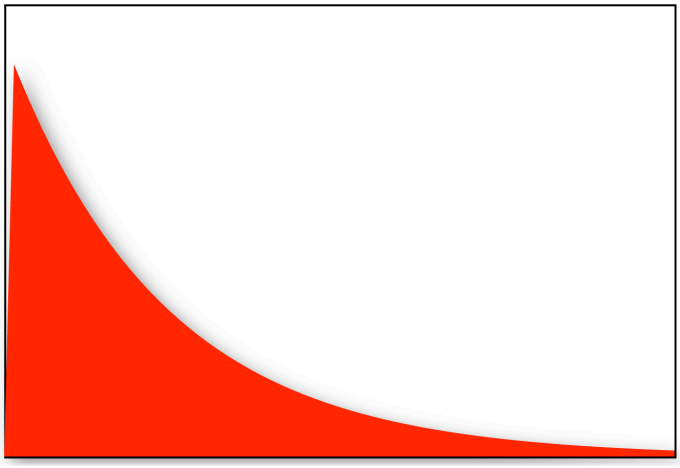
The guitar

You can't get more energy out (as sound) than you put into the string when you stretch it to one side. But as you might guess, an expensive guitar is more efficient at turning the string vibration into sound.

There is an aside - some loud guitars achieve their volume by taking the energy out of the string more rapidly, as these graphs show, which plot volume (up) against time (to the right)



Good sustain - sound dies away slowly



Loud guitar but at the expense of sustain

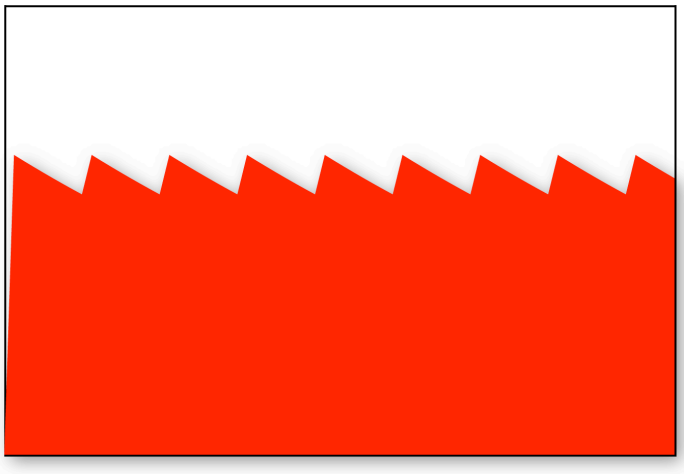
A banjo is a fine example of taking a lot of energy from the string very quickly - it's loud with minimal sustain. An electric guitar is the opposite - massive sustain because virtually no acoustic energy is being radiated. Somewhere in the middle is the classical guitar, and it's certainly true that some guitars have more sustain than others.

And here's a tip - you may well find that the 4th string has a lot more sustain than the third string, and in ensemble you might do well to take a mid-register melody up the neck to get onto the 4th string and away from the third.

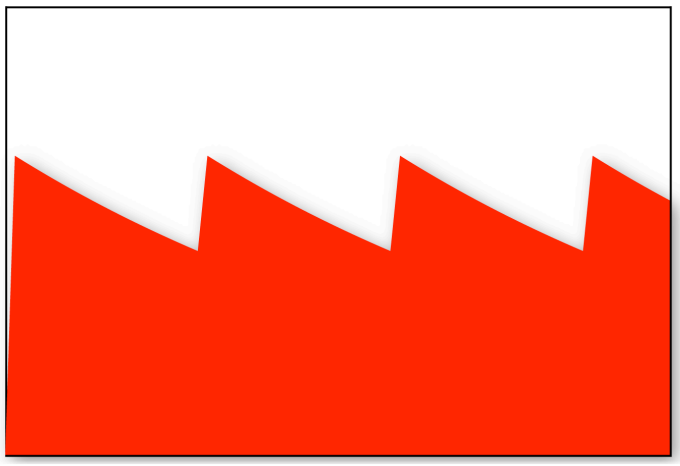
The exact opposite often applies to the 3rd string - up the neck it is gutless and muffled (because it is so thick and short). Here, you'll get more sustain if you move to the thinner, longer second string, or you can try fitting one of the more modern 3rd strings - a D'Addario composite or a Savarez carbon string.

Playing faster

Because every note dies away, the faster a piece is played, the less each note dies away before another takes its place. The effect is that each note hardly changes volume. As well as increasing the illusion of sustain, it also increases the average volume of the music, as the graphs below show.



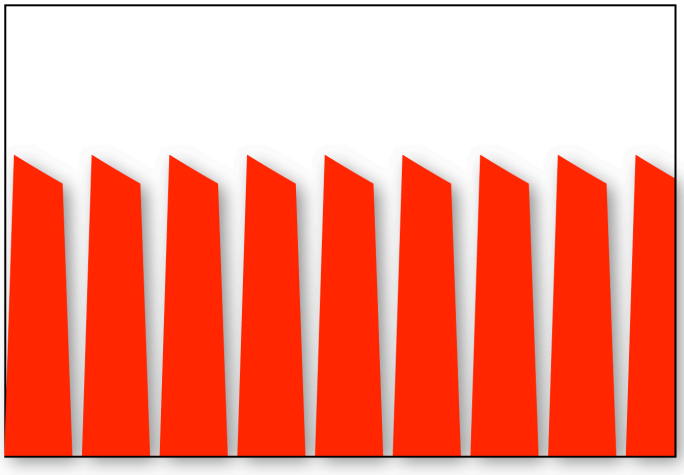
Fast playing - sound stays loud



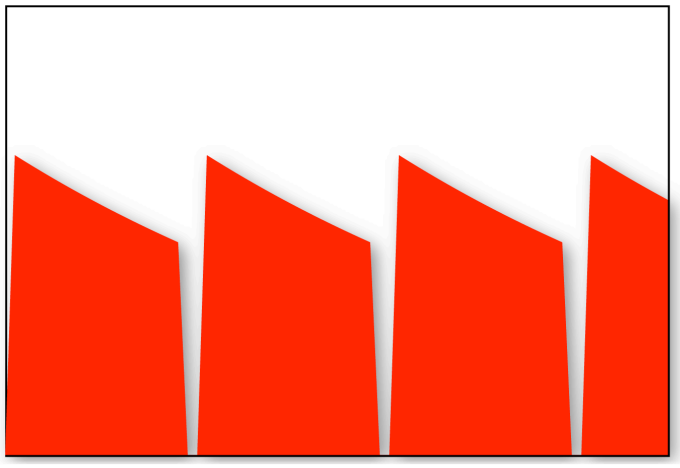
Slow playing - sound dies away

Playing slower

Now this has got to be a leg-pull surely? If playing faster increases the illusion of sustain, how can playing slowly increase it too? Well, between each pair of plucked notes on the same string there is a small silence as the new note is fingered and then sounded. When novices play, this “dead space” can be noticeable. It tends to be a fixed overhead, and so when playing short notes, the amount of dead space can significant, and makes the melody sound very staccato. Slowing down slightly improves this, as the next graphs below show.



Poor technique trying to play slightly too fast



Poor technique seems smoother when slow

Ligados

The ligado or slur, by definition, removes the gap between adjacent notes, and this can enhance the illusion of sustain, removing all the gaps in the graphs above.

Sympathetic writing

Sometimes it is possible to layer an ensemble so that different parts are plucked on different beats, or so that the lower parts move more slowly. In each case, the overall sound then has no periods of total silence and sustain is assured.

Vibrato

Vibrato is a technique that adds interest to solo lines - flute or voice, for example. Adding interest can also create the illusion of adding sustain.

The ear is not a good listener, and the brain tends only to react to changes of sound. We're all familiar with “noticing that the washing machine has finished”, and this is simply that the brain has “switched off” to the constant drone of the wash-cycle, but reacts to the change when the machine switches off.

In the same way, the ear soon ignores plain tones, and they drop from the listener’s attention. A little vibrato, however, keeps the ear interested, and the listener will consciously track the note for a lot longer. It’s an illusion of sustain, but it’s a very workable one.

The Three Chord Trick

What is it?

A lot of guitarists, particularly those from the world of Rock, Folk and Country & Western will tell you that all sorts of straightforward songs can be harmonised with just three chords. A bit of an over-generalisation, but not as much as one might imagine.

How can that over-generalisation be of any use to a Classical Guitarist?

Much of the more playable repertoire in the world of Classical Guitar is based around arpeggios, rather than polyphonic (choral) writing, and an arpeggio is a disembowelled chord.

If you can understand the key of the piece and if you look into each bar of music, you may find that some, or even all, of each bar is based on a chord shape.

This article will show you how to recognise the key, and what chords are likely to be found in the piece as a result.

Recognising the key

My "Key Signature" article will reduce the key signature to a choice of two keys. If the music has occasional accidentals - sharps throughout the piece - it is probably in the minor key, not the major, but in the unlikely event that you get the initial analysis wrong, it will get discovered when you start fitting chords.

What chords?

The three chords in the 3-chord trick are the chords on the tonic, the dominant (5 notes up) and the subdominant (5 notes down). These terms are explained in my "Degrees of the Scale" article.

How does the trick work?

The trick only really works when the music is made up primarily of the diatonic notes of the scale. Music that's chromatic or that changes key won't let the trick work.

Here's an explanation for the key of C, and the chords on the tonic (C), the dominant (G) and the subdominant (F).

These chords contain the following notes...

C : C E G G : G B D F(*) F : F A C

(*) The F is the seventh degree of the scale, and so the chord is the Dominant Seventh (in this case G^7)

Between them, these 3 chords are consonant with any note in the scale of C (every note in the key of C is in one or two of those chords), and any note in the piece that's not a chromatic note will be harmonised by one or two of the above chords.

There is a pleasing symmetry, because the actual notes of the Tonic, Subdominant and Dominant figure in two chords each, and all other notes figure once. I'll present a more detailed description further down the page.

The inventory of chords for the common Major Keys

Key Signature	Key	The Three Chords	Subdominant Chord	Tonic Chord	Dominant 7th Chord
1b	F	Bb F C	Bb - BbD F	F - F A C	C - C E G Bb
none	C	F C G	F - F A C	C - C E G	G - G B D F
1#	G	C G D	C - C E G	G - G B D	D - D F# A C
2#	D	G D A	G - G B D	D - D F# A	A - A C# E G
3#	A	D A E	D - D F# A	A - A C# E	E - E G# B D
4#	E	A E B	A - A C# E	E - E G# B	B - B D# F# A

The inventory of chords for the common Minor Keys

Key Signature	Key	The Three Chords	Subdominant Chord	Tonic Chord	Dominant 7th Chord
1b	Dm	Gm Dm A	Gm - G Bb D	Dm - D F A	A - A C# E G
none	Am	Dm Am E	Dm - D F A	Am - A C E	E - E G# B D
1#	Em	Am Em B	Am - A C E	Em - E G B	B - B D# F# A
2#	Bm	Em Bm F#	Em - E G B	Bm - B D F#	F# - F# A# C# E
3#	F#m	Bm F#m C#	Bm - B D F#	F#m - F# A C#	C# - C# E# G# B

There are patterns in these tables...

- See how descending the table (adding a sharp) keeps two of the chords and replaces the third
- See how the chords in the Major key table (look at column 3) appear in the same order as the sharps in a key signature.

Working the trick

Suppose that we have a piece in the key of 1# and that we have determined that it is in the key of G major, rather than E minor (* - see below)

Suppose that we have a bar that reads G B D.
Looking at the 1# row in the first table, we can see that this is a perfect match for the chord of G.
There is a good chance that the whole bar, tune, bass and accompaniment, can be accomplished with minimal left hand fingering changes.

Suppose we have a bar that reads E D C.
In the 1# row there is no perfect match, but the C chord hits the spot in two out of three notes. This, then, is likely to be the building block for this bar, and the D is a passing note.
There is a good chance that we'll start and end the bar in a familiar shape. Some finger movement will be needed during the bar, though the basic shape may have a familiar feel.

Suppose we have a bar that reads C E B D.
Here, there is no good match, but the first part of the bar is a good match for the chord of C, and the second part for the chord of G.

There is a good chance that we need a substantial change of hand position halfway through the bar.

(*) Some double checks

Nothing is certain except death and taxes, but there is a very high probability that the last notes in a piece will be based around notes in the chord of the dominant followed by notes in chord of the tonic (the perfect cadence), and there is a high (but not quite as high) probability that the last note will be the tonic.

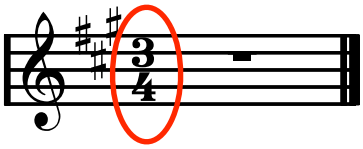
But what's the point?

What does this tell us as classical guitarists? As you grow your experience, you will realise that bars based on the chords above are built out of a few basic shapes. These shapes are tailored as the bar progresses to include passing notes. A little knowledge of the musical intent of the composer will help you read more accurately and help you get the right fingers in the right places.

See also my Cadence article, my Degrees of the Scale article and my Key Signature article

Time Signatures

What is a time signature?



The most straightforward definition is that it tells you how many beats in the bar (bar is "measure" in some countries).

But what does that mean?

Primitive music includes a lot of untuned percussion, and it's the beat or the pulse as we sometimes call it, that defines the character of the music. A slow beat is relaxing. A fast beat is exciting.

But the grouping of the beats also defines something about the music - let's make some categories of music - it's not an exhaustive list, but it will get us started.

- The March - Left-Right-Left-Right - the theme from Indiana Jones for example
- The Waltz - think of “The Blue Danube” for example
- The Jig - curiously, a fine example is the Carol “We Three Kings”, though there is no biblical evidence that the camels actually danced... Or the nursery rhyme “Pop Goes the Weasel”
- Irregular - everything that doesn't seem to fit these categories

The bar lines show where each March, Waltz or Jig step recurs.

Why do we need a time signature?

Arguably the regular occurrence of bar lines is enough to show where the steps recur, but there is the matter of how notes are grouped inside each bar.

The format of the time signature

As with so many logical systems, there are some illogical warts on the smooth and clear surface, but let’s deal with the basics...

- The top number is the number of beats in the bar - for beat read “step” in the examples above.
- The bottom number says what those beats “are”…
  2 = minim or half-note, 4 = crotchet or quarter-note, 8 = quaver or eighth-note

It’s the bottom number that lets the confusion well up, and it’s the bottom number where the first illogical things start to happen.

Some posh words

Let’s take a leaf out of my “Degrees of the scale” article and try to define our categories of beat using different words...

First, let's make a distinction between “Simple” - the steady feel of a March or Waltz - and “Compound” - the skip or jig-step which gives the music an underlying “long-short-long-short” feel.

- A March is “Simple Duple” or “Simple Quadruple” (when you first learn music, the distinction is unclear and it’s not wrong to lump them together for now)
- A Waltz is “Simple Triple”
- A Jig is “Compound Duple” or “Compound Quadruple”

So what is “Compound Triple”? It’s rare, that’s what it is! The Irish know it as a “slip-jig”, but little famous music is in Compound Triple.

A simple beat is actually nothing more than a beat that breaks into two halves, four quarters or a mix thereof.

A compound beat, though, breaks into three equal units. Think of the word “evenly”. A skip is a compound beat that is broken into a long piece (2 units) and a short piece (1 unit).

Some examples

2/2 is Simple Duple - take a march step every minim.

3/4 is Simple Triple - take a complete waltz step every bar.

4/4 is Simple Quadruple - any bar of 4/4 looks like a bar of 2/2 and *vice versa* (because 4 crotchets or their equivalent adds up to the same amount of music - a semibreve - as 2 minims or their equivalent), but 4/4 has four steps per bar and 2/2 has two steps.

A common misconception

A common misconception is that all time signatures with an 8 at the bottom are compound.
But no, the definition of a compound time is that the top number is divisible by 3.

It just so happens that the common signatures with an 8 underneath - the ones you nearly always *see* - are 6/8, 9/8 & 12/8.

A table of common time signatures

Signature	Counting Minims	Counting Crotchets	Counting Quavers
Simple Duple	2/2	2/4	-
Simple Triple	3/2	3/4	3/8
Simple Quadruple	4/2	4/4	4/8
Compound Duple	-	6/4	6/8
Compound Triple	-	-	9/8
Compound Quadruple	-	-	12/8
Irregular	virtually all others	virtually all others	virtually all others

Signatures marked "-" are not illegal, they are simply rare.

A point of confusion

So is 3/8 a waltz step (3 beats in the bar), or a jig step (1 compound beat in the bar)?

- Given that any piece in 6/8 can be turned into 3/8 by adding extra bar-lines, it's clearly a jig
- Given that any piece in 3/4 can be turned into 3/8 by halving the note lengths, it's clearly a waltz

The distinction between jig and waltz is actually one of tempo…

Usually a bar in 3/4 is slower than a bar in 3/8, but it is not always the case.

So usually, 3/4 is the waltz and 3/8 the jig. But not always.

See also my Key Signatures Article and my Degrees of the Scale Article

Tone Production

Terminology

A string vibrates at a rate we call its frequency - for example the open A string vibrates 110 times a second - 110Hz.

But in addition to this fundamental, the vibration contains a mix of the individual harmonics or overtones that we can find over the 12th, 7th, 5th (and more) frets. For a string vibrating at 100Hz, the harmonics are 200, 300, 400... Hz.

Because of the logarithmic way that frequencies work, the harmonic sequence is a set of consonant tones, each higher than the previous by an octave, then a fifth, a fourth, a third... becoming ever closer, like the notes on a bugle.

We can't hear the harmonics, but their total blend is what makes a guitar

- strident & metallic (*many harmonics*)
- mellow & sweet (*few harmonics*)

One way to change the harmonic content

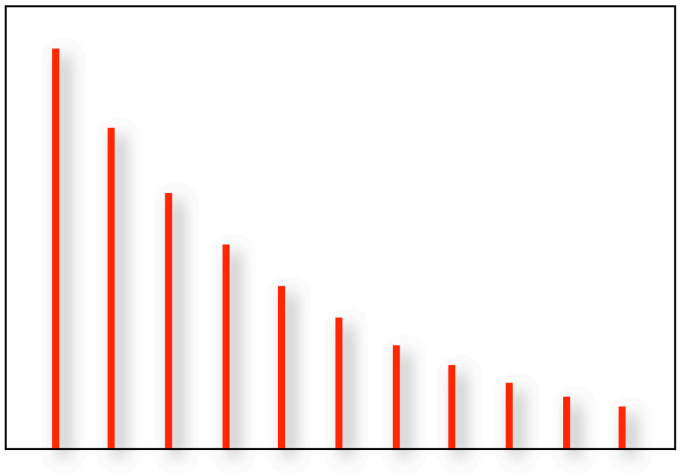
- Plucking near the bridge (*sul ponti*) gives the string an angular, asymmetrical shape when it is released - this promotes lots of harmonics
- Plucking nearer the fingerboard (*sul tasto*) gives the string a gentle shape when it is released and this produces a smaller harmonic content
- Plucking right in the centre suppresses all the even harmonics, making the sound sweet and “hollow”, like a clarinet

Another way to change the harmonic content is to change how the string is actually plucked - more later!

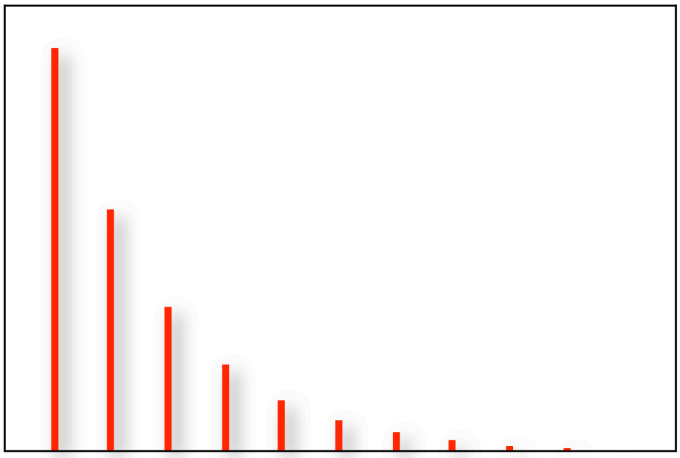
A picture’s worth a thousand words

Here's a graphical representation (exaggerated for clarity) showing the fundamental & overtones for both a mellow and metallic sound.

The graphs show volume (*upwards*) against pitch (*to the right*)



Metallic sound



Mellow sound

Unlike orchestral instruments, a guitar is not a sustaining instrument - every note dies away. The higher harmonics tend to die away faster, but it’s a well-known phenomenon that it’s the start of a note - the *“transient”* - that defines the character of the note. A note with high harmonic content can seem more “punchy” - a stronger start and (apparently) a faster decay, as the harmonics die away. A rounded sound has a less imposing start but can seem more sustained, as it does not evolve much as it decays.

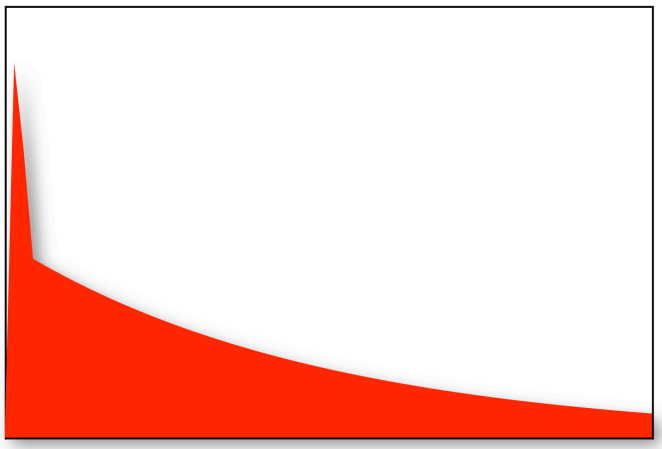
Tone and Timing

In an orchestra, every instrument except harp & percussion has a soft start. The guitar, by contrast, has a percussive start. We’ve seen that a metallic tone makes the sound even more percussive.

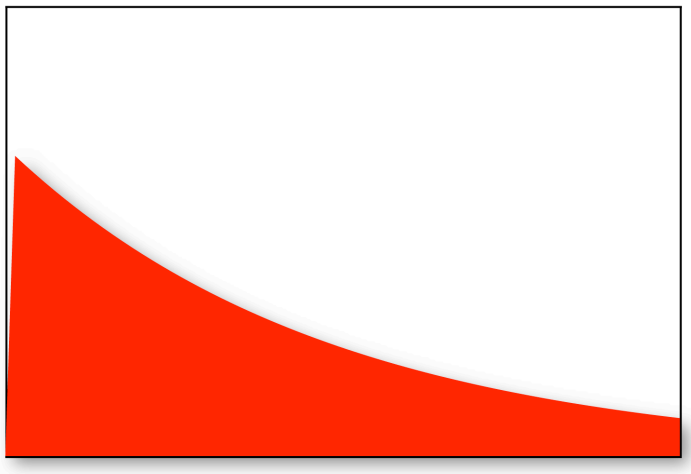
Now let's see how it is affected by the tightness of an ensemble’s timing.

Let's look at two graphs

The graphs show volume (*upwards*) against time (*to the right*)



Metallic sound
Most of the energy is dissipated quickly - the note doesn't carry

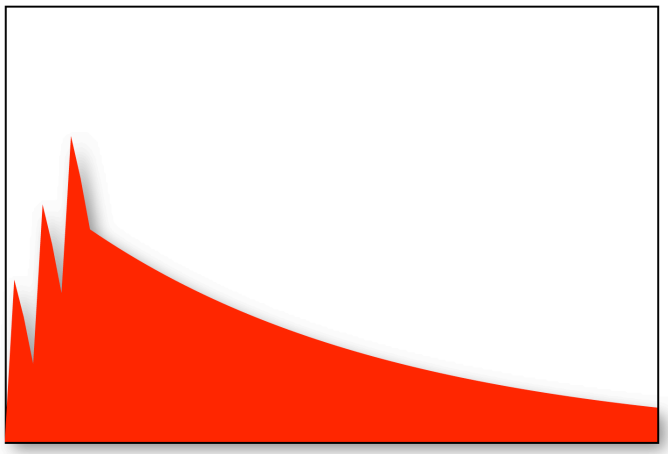


Mellow sound
The energy is released more evenly for a pleasing sound

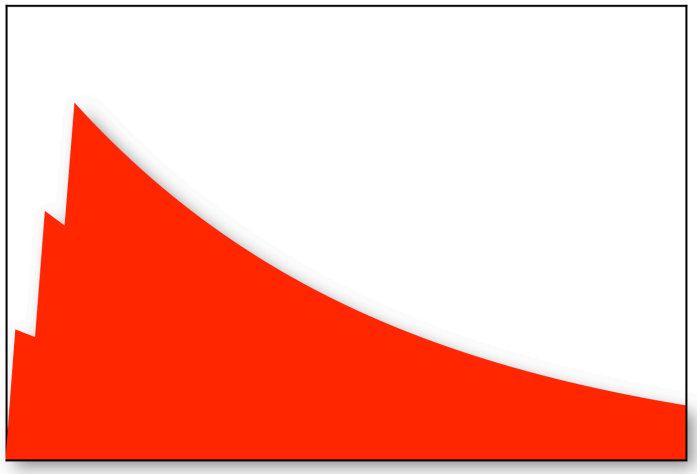
The metallic sound has a forceful beginning. It also has an unsatisfying "thinness" that permeates the whole sound. Because of the way the human ear reacts to different frequencies, a metallic sound can seem louder, but it is tiring to listen to in quantity.

Timing issues

Now see what happens if 3 players play the same note, but they are not quite "together"...



Metallic sound - 3 players playing not quite together
Timing problems (like those here) really notice!



Mellow sound - 3 players playing not quite together
The total sound builds & decays pleasantly - the glitches don't notice

Tone and Tuning

When two guitars are out of tune (or playing in unison, as the old joke goes), the two notes beat against each other.

If one player is playing a note at 200Hz and his partner's string vibrates at 200.5 Hz, there will be a beat note (the difference between the two fundamentals) of 0.5Hz - once every 2 seconds. In music of a moderate tempo, notes will be despatched much faster than this, and the tuning problem will not be heard.

However, if the two notes have a metallic sound (because they have a rich harmonic content) then the harmonics will beat against each other as well. The 800Hz harmonics, for example will beat twice a second, and this will be much more apparent.

Furthermore, metallic notes that are slightly out of tune have a "honky-tonk" sound that's even more apparent than the beating sensation.

In ensemble, in particular, a more rounded tone will not only conceal any beat notes, but kills off any tendency for the overall sound to have a honky-tonk quality that sounds so amateurish.

Tone and Texture

This is where things get more complicated and a little more controversial, and this page definitely skates round some of the real issues in a Niibori orchestra.

For example, I don't talk about thickening the bass line by doubling it an octave up, which deliberately adds extra harmonics.

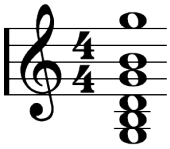
Clarity

What makes for a glorious listening experience is when an ensemble has that clarity that lets you hear each and every line weaving amongst the others. How can we achieve that?

Take note

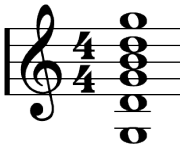
Many guitarists are familiar with the concept of spacing the notes in a chord so that the bass notes are more widely spread than the top.

Here are two chords - play them and hear how "close bass notes and spaced treble" notes sounds gruff and hollow, and how "spaced bass notes and close treble notes" sounds full and satisfying...



A gruff chord

CIII

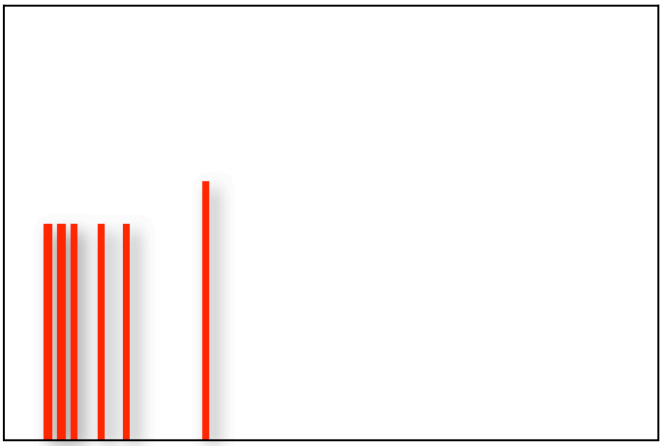


A clearer sounding chord

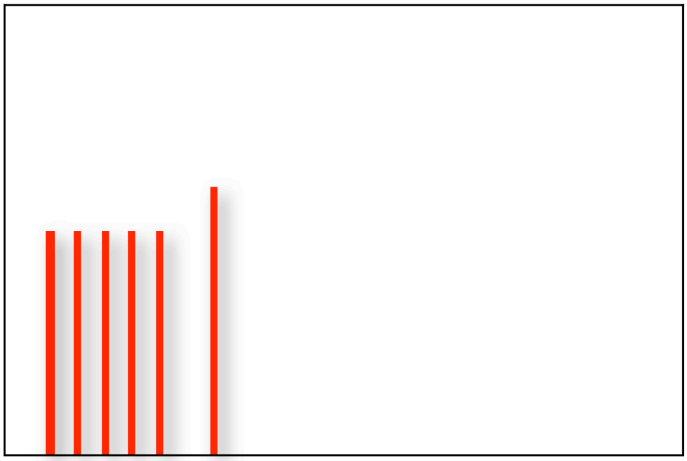
Don't worry about the barré in the second example - in the world of ensemble guitar, we share out the hard bits!

The soundscape

Here are the frequencies that make up the chords - high notes to the right. It's an exaggerated picture and I have emphasised the tune note a little.



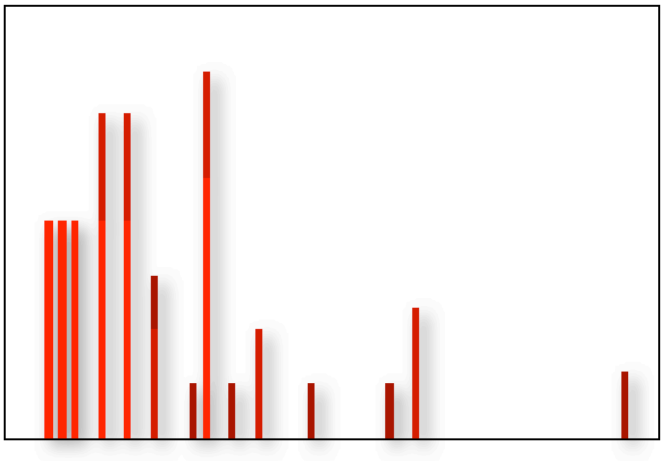
A gruff chord



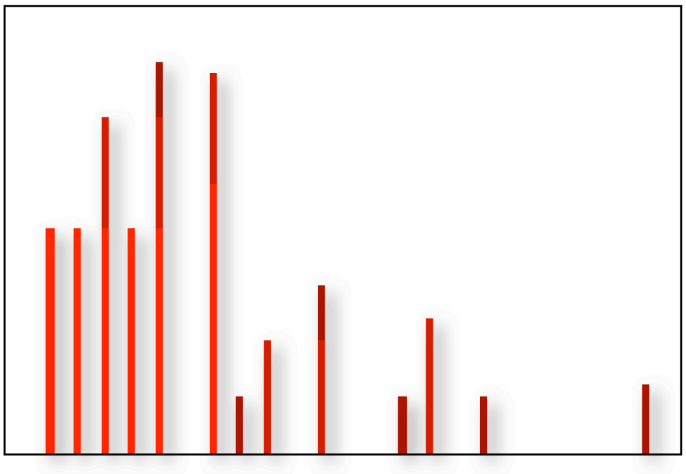
A clearer sounding chord

A metallic sound...

Because every note has harmonics, we need to add them into the picture as well. And here they are, added in.



A gruff chord with a metallic sound
The tune note is still clearly audible

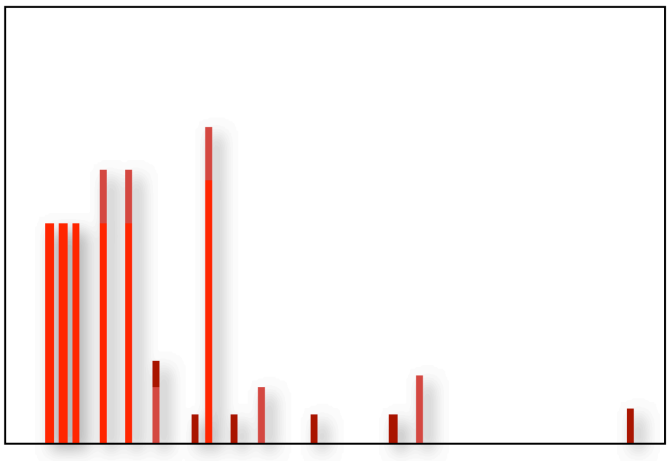


A clearer sounding chord with a metallic sound
The tune note is no longer loudest

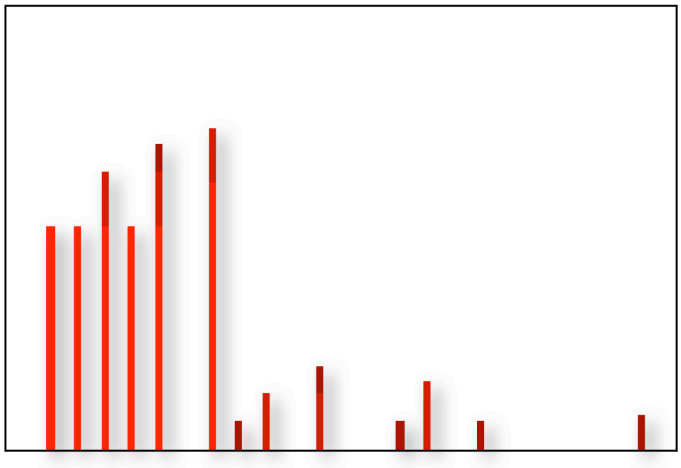
You can see that what was a clean sound, easy on the ear, is gaining a complexity that makes it hard to pick out which are notes “inside” the chord and which is the tune note.

A mellow sound

Here’s the same picture but with a rounded tone - so much easier to hear all the notes. In an ensemble, each note is a part, and so a rounded tone makes it easier to hear all the parts. It gives the orchestra clarity of sound.



A gruff chord with a mellow sound
The tune note is still clearly audible



A clearer sounding chord with a mellow sound
The tune note is still the loudest

Tone and Technique

Onto the final section in this little teach-in on tone production.

We have seen that playing away from the bridge will give a rounded tone, and that it is important not to seek volume at the expense of tone.

There are 2 more aspects of technique that will ensure a rounded tone.

Plucking Angle

The first applies particularly if you have slender fingers and nails, as opposed to broad fingers and nails. If the finger is applied to the string exactly at right angles (pointing towards your nose), then as the finger starts to pluck, the string will leave the tip and roll into the gap between tip and nail, giving a spurious click just as the string departs. This, coupled with the tiny plucking surface afforded by the tip of the nail, gives a high harmonic content to the sound.

- This is the metallic sound we're trying to avoid

By contrast, if the wrist follows the line of the forearm, the fingers will point towards the right shoulder. As the stroke is made, the string cannot roll into the gap between finger and nail, because the finger is angled. There is no click and the string is released by sliding from the nail, not by jumping over the tip of it.

Provided the nails are rounded and polished, the string will release cleanly and without trauma.

- This is the rounded sound we're trying to achieve

String Release

The second is to understand that the front of the guitar works by pumping air in and out of the guitar, and therefore the bridge moves in and out too.

That means that the direction of vibration of the string that couples most effectively to the bridge will be the one where the string vibrates (at least initially) towards and away from the soundhole.

When the string moves in this direction, the fundamental will be louder and the harmonics less so.

- This is the rounded sound we're trying to achieve

This can be achieved simply by pushing the strings into the soundhole as part of the plucking stroke, instead of just dragging them towards the next lower string. As the string is released, it has a large vertical component of vibration, making the sound rounded and considerably louder at the same time.

And so...

We've seen how a rounded tone is a real boon to any ensemble, concealing timing and tuning issues and promoting clarity and sustain.

Time to go and put all this into practice...

Tuning Problems

There won't be a guitarist who hasn't sat in a guitar concert in which there has been endless fiddling with the tuning pegs.

There will be quite a lot, and I'm one of them, who's sat in a guitar concert and positively willed the performer to stop and tune up!

One of the emphases of these teach-ins is to include ensemble playing, and one of the most debilitating problems to affect any large ensemble is that of keeping in tune.

Why does it notice?

In any consonant chord, there is a very simple relationship between the frequencies of the component notes. For example, notes an octave apart vibrate at nHz and 2nHz. Notes a perfect fifth apart vibrate at nHz and 1.5nHz (yes, I know that equi-temperament corrects the latter a tiny bit, but the correction is tiny). If this exact relationship is broken by more than a minute margin, the effects become very audible and very uncomfortable on the ear.

Why does it notice so much?

On a solo guitar, one string can sometimes be a long way out before tuning problems notice. Try a chord of E on a well-tuned guitar, and then see just how far flat you can tune the G string and it still seems fine.

By contrast, in an ensemble, 2 unison strings on different guitars have to be very accurately in tune for them not to sound "honky-tonk".

Does an electronic tuner help?

Yes it does, but it only tells you what is wrong if you use it! It doesn't replace a musical ear, which will tell you what is wrong *during* the piece - a tuner tells you afterwards...

Why is it hard to tune by ear in an ensemble?

When two guitars in unison have a tuning problem, it's much harder than on a solo to determine what is wrong - the fault may be on "the other" guitar, or "this" guitar, or both can be out in opposite directions.

I vividly remember a (nameless) professional trio tuning frantically to each other and often correcting the wrong guitar, so that as the evening wore on, the guitars got lower and lower in pitch!

I recommend Intellitouch electronic tuners so that players can retune at the same time. I use them in the Hampshire Guitar Orchestra, and the different tuners on different guitars are always dead in step.

Why does a string go "out"?

Variations of pitch with temperature are well-known, and so is the drooping of pitch on new strings. But there are factors that make different guitars drift in different ways.

1. Makes of string
   I prefer D'Addario, which are very stable under changes of temperature. Other strings I've tried, such as La Bella, have a more "open" tone but require constant attention.
2. The state of the nut
   Rough nuts, pardon the expression, make wound strings jump suddenly in pitch as they re-seat. Graphite from a pencil improves this, and ensures all the wound strings on all the guitars change smoothly with temperature.
3. The amount of string on the peg-box rollers.
   Minimising the amount of string here will improve tuning stability under changes of temperature. See a neat knot to help with this in my Restringing article.

Why do strings go out more often in a guitar orchestra?

They probably don't, but it's easier to hear tuning problems because a guitar orchestra has different sizes of guitar. Different sizes of guitar have the same note on different strings - a note on the G string (notoriously difficult to tune - see below) of a prime will be on the D string of an alto (much more stable) - changes in temperature affect one more than the other, leading to that honky-tonk sound again.

A perennial problem

It's quite common for guitarists to have particular problems tuning the G string and there are a couple of reasons why ...

1. A lot of guitarists check their tuning by playing the chords of C and E. A guitar that is perfectly in tune will not sound "out" playing the E chord, even if the G string is flattened a massive amount. But a flattened G string will sound dreadful playing the C chord. Playing two chords is not enough to check that a guitar is in tune.
   Some professionals find that playing D and A is a good way to check string 3 (A) against string 4 (D) and string 1 (A)
2. In most string sets, the G string is one of the least taut strings, as well as being the least flexible. These two attributes combine to make the G string go sharper and sharper the higher up the neck one plays, because the edge effects of a stiff, thick string, get larger (in proportion to the active length of the string) higher up, making the active part of the string disproportionally short.

More recent string sets, such as the D'Addario Composite set, have a high-tech G string that is thinner and tauter, and the problem is not only solved but there is often a greater stability against changes in temperature too.

See also my Equal Temperament article

Vibrato

What is it?

It's a wavering of pitch, brought about as follows...

Play the note high up the neck
Take the left-hand thumb off the back of the neck
Keeping the finger-tip anchored on the string, wiggle the hand up and down the length of the neck a little
This wiggling tightens and slackens the vibrating half of the string a tiny bit
You'll find that when you're doing it properly, the wrist and the elbow go in opposite directions, so it's as if your arm is swivelling back and forth and there's a spot in your forearm that's staying still

Don't go too fast - your guitar will sound like Edit Piaf!

What is it for?

It will add life to an otherwise plain note.

The ear is equipped to detect change - we are all aware, perhaps, of when the washing machine finishes. The ear starts to ignore constant noise and only perks up when there are changes - it's not suprising, because in primitive times a change of noise often heralded danger.

Vibrato creates the illusion of extra sustain because the constant change keeps the ear interested for longer.

How do I start practising it?

Vibrato is easiest up the neck - from frets 7 to 12.

The fingertip doesn't move on the string, but by moving the hand along the line of the neck, using the finger as a pivot, lateral forces are transmitted through the finger to the string that alter its tension enough to create vibrato.

"But I can't do it in lower positions"

Low down the neck, it's not possible to do vibrato effectively, because the two "halves" of the string are very different lengths and the short half resists, rather than helps, the finger change the tension of the long (sounding) half.

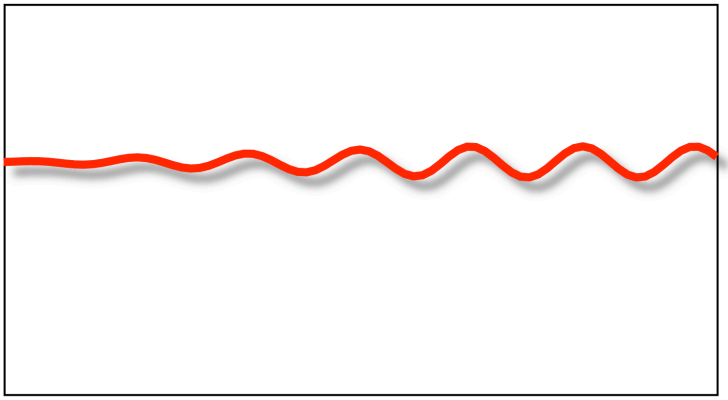
That's because the change in pitch is caused by changing the tension of the string (the vibrating length is fixed by the fret wire).

In the centre region of the string, it's easy to pull the string tighter, because the non-vibrating half helps you.

Down near the first first fret, as soon as you pull the string a little tighter, the non-vibrating part loses tension. As soon as you try to push the string towards the bridge to lower its tension, the tiny non-vibrating part is having none of it - it can't stretch by enough millimetres.

For a nice touch...

For classy vibrato, start it just after the note sounds and build it up, like a flute player or singer does on a long note



We can still do vibrato though...

- On a note low down the neck, wiggle the finger side to side (pull the string towards the higher string, and push towards the lower one)
- Don't overdo it (especially on steel strings)
- This type of vibrato raises the pitch both ways (you're stretching the string whether you push or pull), and so if done to excess, it creates the illusion the entire note is slightly sharp

A word of caution

If you're nervous and it's a hot day, watch out - the 4th string will require some intense "digging in" to make the vibrato sing, and if you're not careful, then the first note you attempt on the 3rd (monofilament) string will be greeted with a very slippery string. You might find your finger actually sliding and possibly missing the fret.

When to restring

So when's a good time to replace strings?

That's actually two questions in one...

- When do they need replacing?
- When's the best time to replace them so they're OK to perform on them?

When do they need replacing?

Beginners don't want the expense of changing strings that are still doing their job. The tell-tale sign that strings have to be replaced is when the D string shows distress at fret 2, so much so that the metal winding might cut through, leaving the string unprotected and days away from snapping.

A more seasoned guitarist knows that the bass strings go "woolly" - the higher harmonics disappear and the sound lacks volume and sustain. The degradation is caused by

- Corrosion
  D'Addario use "Corrosion Intercept Technology" packaging (it's a plastic bag!) to ensure strings are still "new" when fitted)
- The accumulation of detritus in the windings - natural greases from the fingers, hand cream, skin cells and other unpleasantries.

For a performer, it's obvious when the sound has lost its punch.

So how long do strings last?

It's like asking how long car tyres last - with average mileage, perhaps 2 years. On a Formula 1 race car, just one race. A beginner might not care about the woolly sound - his strings will last a year. A professional might change the strings on his practice guitar more often than once a month.

But surely the top strings last forever?

Well, they do outlast the basses. I find that D'Addario composites can tolerate 3 sets of basses per set of tops, so the tops last 9-12 weeks and the basses 3-4 weeks. Although the top strings don't seem to degrade, the impact on the frets stresses the strings and they may stretch non-uniformly, bringing poor intonation.

When's the best time to replace them so they're OK to perform on them?

Top strings settle the slowest (D'Addario's composite 3rd is a notable exception). When I change strings, I do it about 12 days before a concert (a week if only the basses are changed) so that the guitar needs only one tune-up in a concert (any more is distracting for the audience). Other makes of string need different times - the Hampshire Guitar Orchestra's alto guitar strings are a real nuisance, for example - the top string takes about 6 weeks to settle enough to be reliable in concert, but hago's alto players practise mostly on a prime guitar as it's less stress to the nails, so the strings stay bright for that length of time.

The secret of getting strings to settle isn't magic, and it isn't overtightening them or pulling them away from the front of the guitar. It's much more simple - tune the guitar before breakfast, after breakfast, when you get in from work, after you've eaten and before you go to bed. By keeping the strings at the right tension, they settle faster.

And some more questions…
What's the best make of string?

That's purely personal. I love D'Addario for their intonation and life, but I used to use Hannabach on my alto guitar. The D'Addario present a slightly cloudy treble, and there are other strings (e.g. La Bella) that have a much clearer sound, but it's at the expense of stability over temperature - some strings seem to require endless tuning.

How often do strings break?

"Only once" is the humorous answer, but the real answer is about as often as a car tyre punctures. If you're unlucky, once in the life of the car; if you're lucky, once in 20 years. It's true that rough edges on the nut or bridge bone can cause failure, but the most common causes of broken strings are

- Mechanical wear (for example at fret 2 of string 4)
- Overtightening the knot at the bridge.

A string breakage is a sign that something's wrong or worn-out, it's not simply bad luck.

See also my How to Restring article