Complex Chords

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Introduction

This tutorial is for those who want to go beyond simple chords and are interested in the jazz, fusion or progressive rock genres. It is an extension of the material covered in the three other music theory books available on this site. As the title implies, this tutorial focuses entirely on chords.

The material presented here is not for beginners. You need to have a basic knowledge of music theory in order to be able to fully comprehend this material. I will briefly review the basics of triad formation, and then move on to four note chords and beyond. In the appendix, you will find an additional review of intervals and other stuff discussed in detail in the three theory tutorials available on this site.

Brief Recap

Triads

As the name suggests, triads are three note chords. Like all chords, triads are built by stacking up intervals of thirds. Since a third can be major or minor, there are only four different types of triads:

- (Root, M3, m3) -> major triad; e.g. (C, E, G) = C
- (Root, M3, M3) -> augmented triad; e.g. (C, E, G#) = Caug
- (Root, m3, M3) -> minor triad; e.g. (C, Eb, G) = Cm
- (Root, m3, m3) -> semi-diminished triad; e.g. (C, Eb, Gb) = Cm(b5)

In all these formulas, the resulting chord is said to be in root position because the root of the chord is the bass note (lowest note). These positions can be "inverted" by placing one of the other constituent notes at the bass by means of cyclic permutations (see further on).

The chord formulas above can be rewritten by expressing the constituent notes as intervals with respect to the root; this results in the following equivalent formulas:

- Major chord = (1, 3, 5)
- Augmented chord = (1, 3, #5)
- Minor chord = (1, b3, 5)
- Semi-diminished chord = (1, b3, b5)

Other useful chords do not consist exclusively of stacked thirds but they can usually be linked back to a (possibly degenerated) fundamental form. For example, the chord (C, D, F), consisting of a root, a second and a fourth can be considered to be the third inversion of (D, F, C), which is Dm7 without fifth. We will get back to this.

It is possible to build a triad upon each degree of any scale and choose the constituent notes so that they all belong to the scale; this results in the so-called

harmonized scale. The types of chords in the harmonized scale of course depend on the type of scale being harmonized.
Given the major scale:

      1   2   3   4   5   6   7

The harmonization is as follows:

      I   ii   iii   IV   V   vi   vii(b5)

Uppercase roman numerals indicate major chords while lower case numerals indicate minor chords (please refer to *Music Theory – Basic Level* for a detailed explanation of the conventional Roman numeral notation).

Four note chords

Four note chords are build the same way as triads, but they contain one more (major or minor) third, and therefore there are twice as much possible combinations as for triads. Not all these possible combinations are really useful in practice; in fact, some chords that do not consist exclusively of intervals of thirds are used more often than some "pure" thirds based chords.
The most important types of four note chords are:

- *Maj7 chord*: a major triad with an additional major third. The topmost note is located a major 7th above the root, hence the name. Example: Cmaj7 = (C, E, G, B). This is sometimes written as CM7.

- *Major 6th chord*: a major triad with a major 2nd. The topmost note is located a major 6th above the root, hence the name. Example: C6 = (C, E, G, A). Although this chord is not made of thirds only, it can be considered the first inversion of Am7 = (A, C, E, G), which *is* made of triads only (see below for a discussion of inversions). Whether you call this is 6th or a m7 chord depends on the harmonic context.

- *Dominant 7th chord (7)*: a major triad with an additional minor third. The topmost note is located a minor 7th above the root. Example: G7 = (G, B, D, F).

- *7sus4 chord*: a dominant 7th chord in which the third degree is replaced by the fourth degree – as if the third was "suspended". Example: G7sus4 = (G, C, D, F).

- *Augmented 7th chord (aug7)*: a dominant 7th chord in which the 5th has been raised by a half tone. Example: Gaug7 = (G, B, D#, F)

- *Minor 7th chord (m7)*: a minor triad with an additional minor third. Example: Em7 = (E, G, B, D)

- *Minor 6th chord (m6)*: a minor triad with an additional major 2nd. Example: Cm6 = (C, Eb, G, A).

- *Min7(b5) chord*: a minor 7th with a flatted fifth. Example: Cm7(b5) = (C, Eb, Gb, Bb). (This chord is different from the diminished 7th chord where the minor seventh is flatted an additional half tone: Cdim7 = (C, Eb, Gb, Bbb), although you will often find it called this way).

It is convenient to consider 4-note chords as "spiced up" versions of their basic triad counterparts. In other words, they are functionally equivalent to and can be used exactly as triads.

The harmonization of the major scale in 4 note chords is as follows:

$$Imaj7 \quad ii7 \quad iii7 \quad IVmaj7 \quad V7 \quad vi7 \quad vii7(b5)$$

Chord Tensions

Although 4-note chords are already more complex than triads, they are rarely played as such in jazz, progressive rock or even classic. The basic tones 1, 3, 5 and 7 are often <u>replaced by</u> or <u>enriched with</u> additional tones. These notes, called *harmonic tensions*, make the chord progression more dynamic and the chords themselves much denser. Sometimes, these tension notes actually belong to the melody; in that case they are called melodic tensions, but you still need to take them into consideration in the harmonic analysis (please remember: a note is a tension only if it lasts at least a quarter note in a 4/4 meter; otherwise it is a passing note).

Each type of chord has its own set of valid tensions. When the tension is diatonic to the key it is called a *natural tension*; when it is not, it is called an *altered tension*, and the chord is also considered altered. The table below summarizes the valid tensions for the most important types of chords that were defined previously.

Chord Type	Valid Tensions
Maj7	9, #11, 13
Major6	7, 9, #11
Dom7	B9, 9, #9, 11, #11, b13, 13
7sus4	9, 11
Aug7	9, 11
Min7	9, 11
Min6	7, 9, 11
Min7(b5)	9, 11, b13

Maj7 chords

The valid tensions are the 9th, #11th and 13th.

For example Cmaj7(9) is (C, E, G, B, D) while Cmaj7(#11) is (C, E, G, B, F#). Please note the weird #11 (F#). This note is of course not part of the key of C, but we cannot use the 11th (F) on this chord, because that would transform it into a subdominant chord (please refer to *Intermediate Theory*).

Pitch-wise, tensions don't need to be such large intervals; it is ok to use the 2nd, #4th and 6th to enrich the chord instead of the 9th, #11th and 13th, as long as the sound doesn't get muddy. Let you ear decide!

Maj6 chords

These are triads with a major sixth; e.g. C6 = (C, E, G, A).
The valid tensions are the 7th, 9th and #11th.

Dom7 chords

The well known dom7 chord is very interesting because it supports a large number of tensions: b9, 9, #9, 11, #11, b13 and 13.
For example, G7(9) = G9 = (G, B, D, F, A); G7(#9) = (G, B, D, F, A#).
When the tension is not diatonic to the key the dom7 chord belongs to, the chord is said to be *altered*.

7sus4 chords

These are dom7 chords in which the 3rd has been replaced by the 4th; e.g. G7sus4 = (G, C, D, F).
These chords allow the 9th and the 11th as valid tensions. For example, G7sus4(9) = (G, C, D, F, A).

Aug7 chords

These are dom7 chords with an #5. The valid tensions are the 9th and #11th.

Min7 chords

Valid tensions on these chords are the 9th and the 11th. However, bear in mind that the 9th is NOT a valid tension if the chord is iii7. Take for example Em7 (E, G, B, D) in C major; this is the iii7, and the 9th would be the F note, which would clash horribly with the root and would also transform this chord into a dominant chord since it would contain the tritone F - B.

Min6 chords

Valid tensions are the 7th, 9th and 11th. E.g. Am6(11) = (A, C, E, F#, D). This chord contains the tritone (C – F#) and is therefore functionally equivalent to (i.e; requires the same resolution as) D7, which contains the same tritone.

Min7(b5) chords

Valid tensions are the 9th, 11th and b13^{th}. However, the 9th will only be valid if it is <u>diatonic to the key</u>.
For example, suppose we are in Bb major, and in the progression there is a foreign chord Dm7(b9). For this chord, the 9th is E which is not diatonic to Bb so you can't use it as a tension.

Voicings and Drop Positions

Any chord can be played in a variety of ways, depending on the position of the constituent notes in the chord. In practice, chords don't have to be played according to the theoretical formula. Take for example a D triad: the theoretical chord formation is (D, F#, A). However, the standard beginner's way to play that chord on the guitar is to play it close to the nut as follows: (D, A, D, F#) if you omit the two bottom strings, or (A, D, A, D, F#) if you only omit the low E string, or (F#, A, D, A, D, F#) if you fret the low E string at the 2nd fret. None of these correspond to the theoretical formula, since the order of the notes is not the same as the canonical one, and because some notes are repeated.

The specific way you decide to play a chord is called a *voicing*, and you already know by experience that not all voicings sound equally well. What we will discuss here is a practical technique for systematically identifying all the voicings that sound well for any chord. After that we will discuss how to actually <u>play</u> those chords on a guitar.

Inversions

We have already mentioned inversions a few times. Let's look at it now.

When the root of the chord is the bottom note, the chord is said to be in root position. When the bottom note is not the root, the chord is said to be inverted. Inversions don't change the harmonic identity and function of the chord (but they do change the way it sounds!).

Let's look at Cmaj7 = (C, E, G, B). This chord is in root position, and it has three possible inversions: (E, G, B, C), (G, B, C, E) and (B, C, E, G).
As you can see, inversions are obtained by means of <u>cyclic permutations</u> of the order of the constituent notes.
However, in the key of C major, all these inversions remain Imaj7.

Similarly, the chord C6 (C, E, G, A) has the following inversions: (E, G, A, C), (G, A, C, E) and (A, C, E, G).

The latter chord can also be viewed as Am7. It is the harmonic context that will decide what function the chord assumes.

In any chord voicing, we call "first note" the highest note in the formation, "second note" the one immediately under the first note, "third note" the one under the second note, etc.
For example, in (C, E, G, B) the first note is B, the second note is G and the third note is E.

Drop positions

Starting from any inversion:
- You obtain the so called "drop 2" position for that inversion by dropping the second note one octave, and place it at the bass.
- Similarly, you obtain the so called "drop 3" position by dropping the third note one octave and place it at the bass.

For example: Cmaj7
1: Root position: (C, E, G, B)
2: First inversion: (E, G, B, C)
3: Second inversion: (G, B, C, E)
4: Third inversion: (B, C, E, G)

5: Root drop 2: (G, C, E, B)
6: First inversion drop 2: (B, E, G, C)
7: Second inversion drop 2: (C, G, B, E)
8: Third inversion drop 2: (E, B, C, G)

9: Root drop 3: (E, C, G, B)
10: First inversion drop 3: (G, E, B, C)
11: Second inversion drop 3: (B, G, C, E)
12: Third inversion: drop 3: (C, B, E, G)

Of these twelve positions we need to avoid those presenting an interval of a m2 between the top two voices (position 2 and position 10 in this case), as well as those presenting an interval of a m9 between any two voices (position 6 and position 11).

This empirical rule is valid for any voicing, and will guarantee that the voicing remains balanced.

This leaves you with the following acceptable voicings for Cmaj7:
(C, E, G, B) (G, B, C, E) (B, C, E, G) (G, C, E, B) (C, G, B, E) (E, B, C, G) (E, C, G, B) (C, B, E, G)

Similarly, let us consider G7 = (G, B, D, F)
1: Root position = (G, B, D, F)

2: First inversion = (B, D, F, G)
3: Second inversion = (D, F, G, B)
4: Third inversion = (F, G, B, D)

5: Root drop 2 = (D, G, B, F)
6: First inversion drop 2 = (F, B, D, G)
7: Second inversion drop 2 = (G, D, F, B)
8: Third inversion drop 2 = (B, F, G, D)

9: Root drop 3 = (B, G, D, F)
10: First inversion drop 3 = (D, B, F, G)
11: Second inversion drop 3 = (F, D, G, B)
12: Third inversion drop 3 = (G, F, B, D)

Since the G7 chord doesn't contain any halftone interval, all these positions are acceptable - the dominant 7th chord will always have more voicings than the Imaj7 chord!

Fingering Chords

Base tones

Chords consisting of five or more notes are usually too complex to be played as such on a guitar. In those cases, you will typically have to reduce the chord to a 4-note chord, which will force you to make a choice as to what notes you want to keep.

Each type of chord has a minimum set of notes called *base tones* that uniquely distinguishes it from other types; the table below summarizes that:

Maj7	6	M triad	m triad	Dom7	7sus4	m7(b5)	Aug7
1, 3, 7	1, 3, 6	1, 3, 5	1, b3, 5	3, b7	4, b7	b3, b5, b7	3, #5, b7

As you can see, the fifth is never considered a base tone (except in triads). Even the root of the chord can be omitted from the voicing and delegated to the bassist if there is one (or even dropped altogether if there is no bassist). This is because the conjunction of the base tones is enough to imply the bass. Put differently: when the listener hears that particular combination of tones in the given harmonic context, she will be able to supply the missing bass.

The strategy to make a complex chord playable on a guitar can then be summarized as follows:
1. Identify the base notes for the type of chord, and include them
2. Identify the extension(s) that you want to keep, and include them
3. Identify all possible voicings by identifying all the inversions and drops

Example: you want to play G13(b9)

The full chord contains the following notes: G, B, D, F, Ab, E and is unplayable as such on a guitar.

1. Since this chord is essentially a dom7 chord with added b9 and 13, we need to keep the 3 and the b7 (D and F), which are the base tones of a dom7 type chord.
2. Since we want a 13 and a b9, we need to keep the E and the Ab

The chord will therefore consist of the following notes: (G) **B** (D) **F Ab E**
The 5th (D) will certainly be omitted, and the root (G) may also be omitted or delegated to the bassist. This leaves you with (B, F Ab, E).

You can now identify all possible inversions and drops as we did previously, and decide how to voice that chord. Good luck!

Substitutions

Chord substitutions are extremely important in jazz, fusion, progressive rock and even classic. As the name suggests, a chord substitution is the replacement of a given chord by another chord which has *some sort of internal relationship with the original chord, without breaking the harmonic logic of the chord progression*.

Substitutions are often frightening and they can indeed be complex to comprehend without a minimum of theoretical background. On the other hand, they are essential to get that jazz feeling in the music.
In this section, we will look in detail at two broad categories of substitutions:
- Diatonic substitutions
- Tritone substitutions

Diatonic Substitutions

In *Intermediate Theory* we have classified the chords in three basic groups:
- The *tonic group*, consisting of chords which contain neither the subdominant nor the subtonic
- The *subdominant group*, consisting of chords which contain the subdominant but not the subtonic
- The *dominant group*, consisting of chords which contain the subdominant and the subtonic (i.e. they contain the tritone)

As you probably remember, chords belonging to a given group are functionally completely equivalent and can be freely substituted for one another. Referring to the harmonization of the major scale, the tonic group happens to contain the chords I, iii and vi; the subdominant group contains the chords ii and IV, and the dominant group contains the chords V and vii(b5).
When the harmonization is done with 4-note chords, the equivalence between these chords becomes immediately apparent; let's take C major as example:
- Tonic Group:

- o Imaj7 = Cmaj7 = (C, E, G, B) contains (E, G, B) which is Em which is iii; conversely, iii = (E, G, B) can be considered a Imaj7 chord without root.
  - o vi7 = Am7 = (A, C, E, G) contains (C, E, G) which is C or I; moreover, the first inversion of vi7 = (A, C, E, G) is (C, E, G, A) which is I6.
- Subdominant Group:
  - o ii7 = Dm7 = (D, F, A, C) contains (F, A, C) which is F or IV

The equivalence between the V7 and the vii(b5) is more interesting and will already open up a can full of possibilities. To explain that, let us consider the A harmonic minor scale:

A   B   C   D   E   F   G#   A

This is the natural minor scale in which the seventh degree has been altered to provide the melodic leading tone to tonic progression, and allow for a V7 -> i harmonic progression.
The V7 chord is E7 (E, G#, B, D) which is often extended in jazz with a b9 to become E7(b9) = (E, G#, B, D, F). Because it contains the tritone (G# - D), this chord calls for the tritone resolution on the tonic chord Am through the V – i cadence. So far, so good.

Now consider the vii7(b5) chord G#m(b5) consisting of the notes (G#, B, D, F); this chord is identical to the upper four notes of E7(b9) and has therefore a very strong affinity with it. So, if you omit the tonic of the V7(b9) chord, you obtain a vii7(b5) chord and these chords can therefore be substituted to one another.

Tritone Substitution
The vii7(b5) chord has one particularity: it consists only of minor thirds which means that all its constituent notes are at an equal intervallic distance of each other. Consequently, inverting that chord does not in fact change it in any respect!
As a result, G#m7(b5) = Bm7(b5) = Dm7(b5) = Fm7(b5).

In turn, as we have just discussed, each of these four (equivalent) chords has a strong affinity with (and can be substituted by) a V7(b9) chord, as follows:

G#m7(b5)	Bm7(b5)	Dm7(b5)	Fm7(b5)
E7(b9)	G7(b9)	Bb7(b9)	Db7(b9)

In the table above, the equivalence is both horizontal and vertical; for example Bm7(b5) = G#m7(b5) = Dm7(b5) (horizontal equivalence), but Bm7(b5) = G7(b9) (vertical equivalence), and then G7(b9) = E7(b9) = Bb7(b9).
In other words, it is valid to play E7b(9) instead of Bm7(b5)!

In fact, any of these chords can be used in place of any other chord, depending on the context and preferences!

The tritone substitution principle states that:
- **any** V7 chord can **always** be substituted by another V7 chord located a tritone above or below it.
- in addition, according to the principle of functional substitution, that V7 chord can be substituted by the vii7(b5) of the same tonality

So for example, the following ii – V – I progression in C major:

      Dm7 / G7 / Cmaj7

will often be rewritten:

      Dm7 / Db7 / Cmaj7

In which Db7 has been substituted to G7.
A "jazzified" rendering of that progression might then be:

      Dm7(9) / Db9 / Cmaj7(9)

Another situation where tritone substitution applies is when a chord of a progression is preceded by its own V7 chord (not diatonic to the key) called extended dominant. For example, in C major, we may have:

      Cmaj7 / E7 / Am7 /

The E7 chord is the V7 of Am in the A harmonic minor scale. That V7 chord is again subject to potential tritone substitution, e.g.:

      Cmaj7 / G#m7(b5) / Am7

Appendix 1

Intervals

The following table lists the most important intervals, their equivalent names, and an example of each (W = whole tone, H = half tone)

Name	Definition	Symbol	Equivalent Symbol	Example
Minor Second	H	m2	b2	C – Db
Major Second	W	M2	2	C – D
Minor Third	W + H	m3	b3	C – Eb
Major Third	2W	M3	3	C – E
Perfect Fourth	2W + H	P4	4	C – F
Augmented Fourth	3W	4+	#4	C – F#
Diminished Fifth	3W	5-	b5	C – Gb
Perfect Fifth	3W + H	P5	5	C – G
Minor Sixth	4W	M6	b6	C – Ab
Major Sixth	4W + H	M6	6	C – A
Minor Seventh	5W	M7	b7	C – Bb
Major Seventh	5W + H	M7	7	C – B
Octave	6W	8	8	C – C

Remarks:
- in this table, the half steps are all supposed to be diatonic (e.g. D – Eb) as opposed to chromatic (e.g. D – D#); in a diatonic half-step interval, the names of the constituent notes change, whereas they don't in a chromatic interval.
- With chromatic half-steps, most intervals can be augmented or diminished. An augmented interval results when an additional chromatic half tone is added (e.g. C – G# is an augmented fifth and C – A# is an augmented sixth), while a diminished interval results when an additional chromatic half tone is subtracted from the end note of the interval (e.g. C – Bbb is a diminished seventh).
- Intervals can be ascending (as in the definitions above) or descending (e.g. C – F is a descending fifth if the target F note is below the starting C note).

Intervals can be larger than octaves and in jazz, fusion and progressive rock some of these larger intervals are used extensively:

Name	Definition	Symbol	Equivalent Symbol	Example

Minor Ninth	6W + H	m9	b9	C – Db
Major Ninth	7W	M9	9	C – D
Perfect Eleventh	8W + H	P11	11	C – F
Augmented Eleventh	9W	11+	#11	C – F#
Minor Thirteenth	10W	m13	b13	C – Ab
Major Thirteenth	10W + H	M13	13	C – A

Scales and Tonal Functions

In any scale:
- The first degree (first note) is called the "tonic"
- The second degree (second note) is called the "supertonic"
- The third degree (third note) is called the "mediant"
- The fourth degree (fourth note) is called the "subdominant"
- The fifth degree (fifth note) is called the "dominant"
- The sixth degree (sixth note) is called the "superdominant"
- The seventh degree (seventh note) is called the "subtonic"

Tonal music associates a well-defined *function* to each degree, but more specifically to the1st, 3rd, 5th and 7th degrees of the scale:
- The tonic is the home note, around which all the other notes revolve; the tonic indicates the tonality.
- The mediant is the tone that indicates whether the mode is major or minor; if the mediant is located a major third above the tonic the mode is major, otherwise it is minor.
- The descending movement from the dominant towards the tonic is essential in affirming the tonality; this movement is called a "perfect cadence" and is usually referred to as "V – I".
- The subdominant and the subtonic (of the major, harmonic minor and melodic minor scales) are separated by the very unstable tritone interval (i.e. an augmented fourth), which needs to be resolved by letting the subdominant move down towards the mediant and the subtonic move up towards the tonic. This combined movement is called *tritone resolution*.

The 1st, 3rd, 5th and 7th degrees of the scale are separated by intervals of thirds, and this is why this interval plays such an important role in tonal music. In particular, the interval of a third is the essential constituent of chords: chords are build by piling up intervals of thirds.