The 11 Chords of Barbershop

Simon Rylander (simon.rylander@gmail.com)

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Abstract

In contestable Barbershop singing, only a particular set of chords are allowed, while other chords are against the rules. There are four voices, and with these, you can only form a limited number of chords. That means that you can't make any changes to your contestable arrangements without being extremely aware of what the result will be. That also means that if you want to become a Barbershop arranger, you have to know a lot of harmony theory to be able to understand what you're doing, and why.

1 Introduction

So what is it that makes certain chords more appropriate than others? It's probably better to ask the question: What is a 'chord'? Are all possible four-key combinations on a piano called a chord? If you ask a jazz musician, he will probably answer yes, but in Barbershop singing it's different. A barbershop chord is a combination of frequencies with a mathematical relation. When you sing two notes that has frequencies with a mathematical relation, you will experience the "lock n' ring" phenomenon between them since they will amplify the same overtones. If you for example sing a note with a certain frequency X, and then add another voice singing a note with the double frequency $2X$, he will sing what we call an octave to the first note. To shape a chord with four unique notes, all notes must have different frequencies between $1X$ and $2X$ where the frequency X is the frequency of the root (this explanation is simplified to only cover one octave, but in theory you can double/half the frequency of any of the notes to the octave of choice). After reading this, some people might even have discovered the simplest of all mathematic relations between four notes in an octave, and that is $1X$, $1.25X$, $1.5X$ and $1.75X$, and these four notes make the Barbershop seventh.

The ear experiences sound in a logarithmic scale in relation to its frequency. That means that the frequency interval between semi notes is different depending on how high the semi notes are. The higher the note, the bigger the frequency difference between that note and the semi note closest to it. For example, in the Barbershop seventh, we know that the semi note interval between the root and the third is four semi notes, while between the seventh and the octave there are only two. But according to the explanation above, we can see that the frequency difference is exactly the same ($1X - 1.25X$ and $1.75X - 2X$), even though the human ear (and brain) experiences it differently. This fact has a lot of consequences such as the fact that it's impossible to tune a piano perfectly according to this sort of tuning. It would mean that if you tried to do it, you could only play one single chord. If you would try to play another chord, the frequencies wouldn't match up mathematically, hence no locking. A piano is therefore tuned even-tempered, which means that the interval is approximated to be as good as possible with all chords. That's why it isn't possible for a piano to create the ringing that you can experience in Barbershop, and that's what makes Barbershop unique.

2 The Chords

So what are the allowed chords? And why them? There are three categories of chords, Major chords, Minor chords and Symmetric chords. Below follows a complete list of chords, what frequency structure they have along with the reason why that chord is allowed. The frequency for each tone is explained with a ratio compared to the frequency of the root, e.g a tone's *frequency notation* (f.not) 3/2 is a tone with 3/2 times the corresponding root's frequency.

2.1 Major chords

The most common and most ringing chord of all chords. The chord consists of a root (f.not 4/4), a third (f.not 5/4) and a fifth (f.not 6/4). Since these chords only have three unique notes, one of them must be doubled (most often the root, but in some cases the fifth. To double the third is considered an ugly solution). 99% of all Barbershop arrangements end with a major chord.

2.2 Barbershop sevenths

A seventh (or a Barbershop seventh) is the most common chord in Barbershop. There are even rules on how many sevenths you have to include in your contestable arrangements, and it's the most ringing of all chords with four unique notes. The chord consists of all the three notes in the Major chord, plus a fourth note, the seventh (f.not 7/4) As you can see, this chord consists of a linear row of notes (linear in the matter of frequencies), and that's why this chord creates such strong overtones. Please note that this chord isn't the same as a Dominant seventh since the seventh note is about a third of a semi note flat in the Barbershop seventh.

2.3 Major sevenths

The major seventh chord is the ONLY allowed chord that has notes with only one semi note between them. This is according to many the most difficult chord to tune properly due to its close harmonies. The chord consists of the three notes in the Major chord plus one major seventh (f.not 15/8). It might seem weird why this chord qualifies as an allowed chord in Barbershop, but the fact that the major seventh forms a perfect fifth with the third (f.not $5/4 = 10/8$ gives a $15/10 = 3/2$ ratio with the major seventh) gives this chord a sweet sound when done properly.

2.4 Add nines

This chord also categorizes as one of the most ringing chords of Barbershop, and it's according to many the most beautiful chord of them all. The chord is built on a Major chord with an added ninth (f.not 9/8), just like the name of the chord implies. The ninth (that's usually done an octave up, giving the 18/8 ratio to the root) forms a perfect fifth with the fifth of the chord (f.not $3/2 = 12/8$ gives a $18/12 = 3/2$ ratio with the fifth), which will enhance many of the overtones more widely than the regular major chord.

2.5 Major sixths

The sixth chord is a little more uncommon than the previously discussed chords, and it's most of the times just used as a transition chord. The chord is naturally built upon a Major chord and with an added sixth (f.not 5/3). This might seem like a weird way of tuning that note, but if you look at it again, you will see that this tuning forms a perfect fifth with the third (unlike the Major seventh chord, the third is posing as the fifth instead of the root), which - if sung an octave up - is noted with a $10/4 = 30/12$ ratio. Compare this to the $5/3 = 20/12$ ratio and you get a $30/20 = 3/2$ relation. To sum all this up, let's just say that there's a really easy way to lock this chord and do it nicely, but it's got a very jazzy touch, therefore it isn't as common as it might seem to be.

2.6 Dominant ninths

This chord is the only chord allowed in barbershop that has five unique notes. The chord consists of all notes in a Barbershop seventh (please note that in Barbershop, this chord doesn't contain a dominant seventh note, but a barbershop seventh) plus an added ninth. So obviously, one note has to be left out (and of course there are rules about which one). Normally in Barbershop, you leave out the fifth (since it exists as a strong overtone) but leaving out the root would also be allowed (but that will actually form another chord, a minor sixth with the exact same tuning, so that will be discussed below). The frequency notation for all the notes are the same as discussed above, which actually means combining two of the most ringing Barbershop chords into one. The chord is very common, and it has a very nice sound and a good ring.

2.7 Minor chords

This chord can be interpreted as a sad version of the major chord. The chord consists of the same notes as the major chord, but the third is a so-called *minor third* (f.not 6/5). This means in reality that you take it down approximately a half step. The result of that change is that the relation between the root and the minor third becomes EXACTLY as big as the relation between major third and fifth. The same goes for the relationship between the minor third and the fifth versus the root and the major third. There is however, another way of tuning the minor third, which is used when there is a fourth note added to the minor chord, and that tuning is slightly flatter than the original tuning (f.not 7/6).

2.8 Minor sixths

These are basically the minor versions of the Barbershop sevenths in terms of usage frequency and ringing. The chord consists of a minor chord (with the flatter third) along with a sixth (f.not 5/3). This is another example of a chord that doesn't look like it has any close mathematical similarities, but yet again, having another look will clear out the problem. All the note frequency notations have a common denominator, six. The third is 7/6, the fifth is 9/6 and the sixth is 10/6. And as you can see, this chord is four out of five of the notes in a dominant ninth (as mentioned above), which we know has a good ring.

2.9 Minor sevenths

The Minor seventh chords are actually the same as the Barbershop seventh chord, but with a minor (flat) third. Although this seems very much similar to the Barbershop seventh, it resembles the Major seventh more in ringing and commonness. The flat minor third forms a perfect fifth with the barbershop seventh in this chord ($7/6 = 14/12$ as the root and $7/4 = 21/12$ as the fifth gives a $21/14 = 3/2$ ratio), just like the major third and the major seventh, and the chord is pretty common as a transition chord rather than a chord used in a long "juicy" section of a song. Now, some of you might have noticed that a Minor seventh chord actually contains the same notes as a Major sixth chord, assuming that the third in the Minor seventh would pose as the root in the Major sixth. There is however, a very significant difference when it comes to micro tuning. If a Minor seventh chord constellation would be tuned as a Major sixth, it would mean that the minor third would have a 6/5 ratio and the seventh would have a 9/5 ratio. Of course this would lock, but it wouldn't be a proper Minor seventh.

2.10 Diminished chords

This chord is one of the two symmetric chords in Barbershop. That means that the semi note interval between all notes in this chord is the same (three semi notes between each note in the chord). That means that this chord contains a root, a minor third, a *diminished fifth* (a fifth that's one semi note flat) and a sixth. The meaning of this chord is purely for transition purposes only, since there is no real way of locking this chord. There isn't even any standard way of tuning this chord perfectly, but one theory is to simply tune the notes as they're tuned in other chords, e.g the minor third with f.not 6/5, the diminished fifth with f.not 7/5 and the sixth with f.not 5/3. There aren't any perfect-fifth-connections in this chord, and the smallest common denominator is 15, so that means it's extremely hard to lock, and it won't ring. However, there's one fact that makes this chord very useful, and that is the fact that you can move any of the notes in this chord up OR down a semi note without reaching an unallowed chord. If you move one down, you will make a Barbershop seventh, with the one you moved as the new root, and if you move one up, you will create a Minor sixth with the one you moved as the fifth (both of these cases might require some re-micro tuning of the other three notes).

2.11 Augmented chords

This is the second of the two symmetric chords in Barbershop, and definitely the most rare chord. This chord contains only three notes, a root, a major third and an *augmented fifth* (a fifth that's one semi note sharp) and the symmetry is four semi notes between each note. The root in this chord is simply defined by what note is doubled (please note that adding any other note than one of the three already sung means that you're creating an unallowed chord). The tuning for the augmented fifth is f.not 25/16 which might be considered as an inaccurate number, but after further analysis we can see that it's simply another perfect third, but to the third of the chord. However, since root-third-relations don't enhance much ringing, this type of chord isn't very optimal at all. This is a last-solution chord, and should only be used when no other option is available, such as when the melody goes up to the augmented fifth (can also be called the *minor sixth*) without the music changing the chord of the song.

3 Conclusion

So the reason why a chord is included is either the nice ringing (the low common denominator between the notes and/or the number of root-fifth relations) or - in some cases - the practicality of having it. Barbershop harmony has also focused on having chords with four or less unique notes (with one exception), which means basically almost all of the most common chords are included. As you can see, there is a connection to how common the chord is in Barbershop - the lower the least common denominator is between the four notes, the more common the chord is. The Major chord and the Barbershop seventh have 4 as the least common denominator, the Minor chord and the Minor sixth have 6. After those, the least common denominator is growing quickly, and it's getting more and more important to consider what octave to have the tricky notes (the higher they are, the more pure the chord becomes).

There are also entire lores behind how the micro tuning differs in relation to the even tempered piano tuning, and how different chord constellations affect the ringing of the chord, but we'll save that for another time!!!

