

## Response Issues on the Bassoon: Cracking Low Notes, Cracking High Notes, Bocal Flex - Voicing - Foghorn Effect

By: Michael J. Burns

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**\*\*\*Note: Figures may be missing from this format of the document**

The bassoon is a unique instrument with a characteristically quirky and idiosyncratic sound. In terms of modern instrument development it also is something of a dinosaur, lagging behind the other woodwinds in acoustical developments by centuries in certain aspects. Therefore, the bassoon has some intrinsic issues associated with its acoustical design that lead to response issues. A common term for one form of response issue is "cracking" and that is what I would like to deal with in this article.

"Cracking", a definition - my definition of cracking on the bassoon is: When an extraneous or non-musical sound is created when attempting to execute a note on the bassoon.

Which notes can "crack" on the bassoon?

There are some who might answer 'all of them' and any note on the bassoon can be mishandled in such a way that an extraneous noise is produced but I believe that the answer can be narrowed down further and categorized as follows:

- **1/2 hole notes:** [F#, G, and Ab at the top of the bass clef and G and Ab an octave higher (also the F# in the higher octave with some fingerings)]
- **Flicking register notes:** the notes at the top of the and immediately above it that overblow an octave to the first harmonic partial-A, Bb, B, C, D—not C# in this register for reasons that will be explained later
- **High register notes:** from F above middle C and up. These notes all tend to be produced with a fingering which derives a higher harmonic partial.
- **Low register notes:** those notes in the range extending from low E down to low Bb. These are definitely fundamental pitches.

What does "cracking" sound like?

There are many variants to the sounds and it depends on which register is being attempted, but it may be a growl, squeak, grunt, cough, croak, multiphonic, split-octave, incorrect partial (another actual note), howl, etc. Often it occurs just at the beginning of a note and then disappears (see below for a possible explanation) but sometimes it lasts the duration of the note.

What causes "cracking?"

Here is where the categorization from above becomes useful. These different registers may each have different causes of notes that may crack.



- **In the 1/2 holing register**, players must adjust and pivot the left hand index finger to create three different sized ‘½ holes.’ The F# requires the largest opening with about 2/3 to 3/4 of the hole uncovered. G is more or less a true ½ hole while Ab requires a much smaller opening and I describe it as a ¼ hole. Incidentally, I also use the same size openings for the octave higher G and Ab respectively. A couple of distinct types of “cracking” can occur when a ½ hole note is mishandled: When the opening is not large enough a low pitch usually will ensue—a growl, split octave, or if you are lucky just the correct note an octave low. When too much of the hole is uncovered a high pitch results creating a squeak or multiphonic. This tends to happen mostly on the Ab and G as the F# hole size is already so large.
- **In the flicking register**, notes crack because the desired first harmonic partial is not sounding correctly. Debate continues in the bassoon world about how best to address this issue. Some mandate speaker key usage either by touching and releasing a speaker key at the start of each relevant note (this is often referred to as ‘flicking’), or by holding the speaker key for the duration of the note (sometimes called ‘venting’); others advocate no flicking or venting as they feel that they can potentially alter the tone and intonation of the notes in question in an undesirable way and instead advocate altering the equipment setup (reed, bocal, instrument) or the player’s execution (see ‘voicing’ below);

**Arthur Weisberg**, a bassoon professor at Indiana University in Bloomington has been developing over the past several years the ‘flick system bassoon’ which can be read about and ordered from his website [www.futurebassoon.com](http://www.futurebassoon.com). It consists of a somewhat complicated mechanism to automatically vent these notes with newly drilled holes and an automatic octave system.

C# is generally not included as a flicking or venting note as the C# key employed whether using a ‘long’ (fingerings including both left and right hand) or ‘short’ (left hand only) fingering itself acts in a similar manner to a vent key. The note is therefore usually stable enough to not require flicking and also the left thumb is already occupied anyway!

- **High register notes** tend to crack because a lower partial sounds instead of the desired one, usually at the beginning of the note only but sometimes for the duration. Therefore, the sound is most often a lower than desired pitch and may sound like a grunt or growl. To address this I advocate “**bocal flex**”—see below.
- **Low register notes** tend to crack because a higher partial sounds instead of the desired fundamental, usually at the beginning of the note only but sometimes for the duration. Therefore the sound is most often a higher sound. I also address this by learning about and using “**bocal flex**.” In the low register this means ensuring that the bocal is NOT flexed upwards.

**How do you prevent “cracking” on the bassoon?** Again, it depends on what caused it and therefore to a large extent, which register is being attempted.

- **In the 1/2 holing register**, care must be taken to learn and use the correct 1/2 hole size for each respective pitch. I strongly advocate learning to pivot or roll the index finger to create the opening rather than sliding the finger. By pivoting, the player can learn to control the angle that the finger makes at the first knuckle and can recreate the perfect 1/2 hole size more readily time after time.
- **In the flicking register**, I advocate learning to flick or vent for all of my students but must admit that I do not use these techniques exclusively. I like to address equipment possibilities, especially reed setup and another technique that I strongly advocate is learning to correctly “voice” the pitches.

By **voicing** I mean a couple of related things: 1. manipulating the size and shape of the opening in the oral cavity (particularly tongue position) by creating different vowel sounds. This can influence response, tone, and intonation in various ways. 2. actually moving the vocal chord apparatus in a way similar to (perhaps even the same as) when singing different pitches. I can demonstrate this. If I sing an A in the bass clef and then an octave higher A, there is some sort of motion inside my throat (presumably the vocal chords?) in a distinct upward manner and to a definite location, the location for the A is one place, a Bb, Ab or any other note all have different (but distinct) locations. This motion is also somewhat visible externally because of the motion of my Adam’s apple. Now, when I play those same octave A’s on the bassoon when I play them properly seemingly the exact same motion occurs and I feel that my vocal chords are traveling to that same distinct location as where I sang the upper A.

When I execute this properly on my regular bassoon setup I can get the note to sound clearly without any cracking. Likewise with the Bb and the other notes in the flicking register. Therefore, I feel it would be hypocritical to require my students to flick or vent exclusively when I may not always do so myself. Instead I have a rule for them. They are NOT allowed to crack but how they prevent it is their business. Most of them still need to flick or vent to be sure of the notes, but some can occasionally only voice the note (without flicking) and still be certain of its clean response.

One more word about voicing, I have found with students that if their voice range does **not** coincide with the instrument (for example a natural soprano) that octave displacement of this technique seems to work. If they voice A octaves ascending within their own vocal range the principle still seems to hold true to make the voicing work on the bassoon for playing A octaves even though the range is different between the voicing and the instrument.

- **In the High register**, most fingerings are producing overblown high harmonic partials. As mentioned above, cracking occurs when a lower partial sounds instead of the one desired. Sometimes this can be fixed by changing to a different fingering and there are a myriad of options in the high register with some notes having a dozen or more fingering possibilities. See the Cooper/Toplansky *Bassoon Technique*, or the IDRS Bassoon Family Fingering Companion at <http://idrs.colorado.edu/bsnfing/finghome.htm> for more information.

Aside from fingering adjustments, my primary remedy for this is to use a technique I call **Bocal Flex**. Bocal Flex, as the name suggests, involves very slight flexing of the bocal in an upwards direction to achieve higher partials and can be demonstrated by doing the following: Play a low C and deliberately pull slightly upward with the lower jaw while not pinching down with the upper lip and jaw. Keep the embouchure relaxed and let the upper jaw and lip just rest on top of the reed as you would for the low

C. You should be able to produce harmonic partials above the fundamental C. The first partial is an octave C, the second a 12th G, etc. You are making the bassoon act in the way that a brass instrument must which is to produce multiple harmonic pitches from a single fingering based on an embouchure change. Now, the control is most likely not there to accurately play specific harmonic partials and either random partials or multiple partials simultaneously (multiphonics) may be produced at first but with practice it is possible to play 'bugle calls' on the bassoon by fingering a single low note and adjusting the amount of bocal flex and/or embouchure aperture and pressure. This element of the technique will be discussed further again below when dealing with low register issues but I now want to move the demonstration up to a higher pitch.

Begin with the F third space above the bass clef staff. Fingering this note deliberately allow the lower jaw to drop down as if playing a low register note (like the C from earlier) the bocal should essentially un-flex and lower down also and one of two sounds will result: a multiphonic, or, when you have lowered the jaw sufficiently an e in the staff with a slightly strange timbre. With practice, one can go back and forth between the 'e' and the f or even hold on the intervening multiphonic.

How does this help, you may wonder? To explain I need to give a little history. My first exposure to this technique was as a student of **William Winstead's**. I was working on the *Rite of Spring* beginning solo and having difficulty consistently getting the first note to respond in time, in tune, and with an acceptable tone. One of the things he had me do was come up with a good fingering, have the tongue on the reed and prepare the airstream and "*pull up on the bocal until you feel it rise.*" When he told me this I at first thought it was one of the oddest things I had ever heard and also thought that I would damage my precious bocal for sure. But, I tried it and, of course, it helps tremendously and my bocal is still going strong over a decade later with no signs of mistreatment.

Now, fast-forward several years and I was in my current position as the bassoon professor at the University of North Carolina at Greensboro. One particular week one of those odd coincidences that seem to occur occasionally in teaching happened where several different students all seemed to be suffering from a similar ailment. They all were playing pieces that involved some kind of exposed entrance on the F above the staff (e.g. Weber *Concerto* first movement, first bassoon entrance) and all were 'cracking' the f with a grunt or multiphonic sounding at the beginning of the note in a most audible way. I was puzzled as to the cause. I tried their bassoons and reeds and all was fine, I checked their fingerings, had them play on my bassoon and/or reeds, checked the shape of their embouchures all to no avail. The problem persisted. Now, one of my favorite teaching techniques is to learn to emulate a student's problem so that I can then determine what causes it and how it can be addressed and fixed.

So I set to trying to learn how to create this problem with the F. At first I was unsuccessful and could not get the note to crack but eventually I lowered the lower jaw experimentally and successfully recreated the problem, producing the multiphonic or the lower e. It was then that Winstead's technique from the *Rite of Spring* came back to me and I decided to apply it in this other context. I also eventually came up with the term bocal flex for it both because it fairly accurately describes what we are doing and because it sounds like the name of a product being sold on a late night infomercial, which appeals to my sense of humor.

By introducing this concept to all of the students concerned, I was able to get them to eliminate the cracking on the f and we also learned to apply it to several other high register notes. Now part of the

trick is to NOT bite. You lift up SLIGHTLY on the bottom of the reed with the lower jaw but do NOT clamp down with the upper jaw. Instead it sort of rides upwards slightly also, maintaining the correct aperture size as opposed to narrowing it, but slightly compressing the bottom blade of the reed and flexing the bocal upwards gradually and gently.

Another element that I find essential to this discussion is that one has to learn to separate the bocal flex and associated jaw position and aperture between the teeth from what happens behind it in the oral cavity. For many high register notes one must combine bocal flex and a somewhat narrow aperture with an open oral cavity and low tongue position in order for it to come out but with low enough pitch.

I now maintain that I cannot correctly play the F (or perhaps any other higher register note above it) without using at least some bocal flex and that I probably had been using it all along without realizing it. I dare say that many (most? All?) other bassoonists probably do likewise.

Bocal flex has now become an essential part of my teaching technique and seems to bring much better success and consistency to my students. When I have presented the technique in a masterclass situation it often merits raised eyebrows and looks of skepticism from participants, listeners, students, and teachers and I remember my own first response to Winstead's suggestion but I encourage you to try it out for yourselves. I really think that it works.

- **In the Low Register**, again several factors can lead to low notes cracking: A fingering issue may lead to a tonehole being uncovered and creating a leak; the instrument may be out of adjustment and either have pads not covering or the link between the low C and D key may not be engaging properly; reed problems can certainly play havoc either from a leak, or just poor response from scraping issues, etc., the student may not be putting enough air into the horn, etc.

However, all things being equal I find that again bocal flex can be a major issue but this time at the other end of the spectrum. In the demonstration on the low C described above one could produce 'bugle calls' or harmonic partials above a fundamental while fingering the low C. Some cracking in the low register is caused by exactly that. The player is inadvertently flexing the bocal upwards, at least at the beginning of the note so that a harmonic partial, or perhaps several (the multiphonic again) sound at the beginning of the note instead of the fundamental.

To illustrate this I can again emulate the problem by deliberately allowing my lower jaw to be too high at the beginning of a low register note and then drop it down into place. If I do this quickly at first and then slower and slower it becomes obvious that the note is doing what the brass players might call a "splee-ah" with a multiphonic or harmonic sound beginning followed closely by a fundamental. Then I use an analogy (yet another of my favorite teaching techniques) this one I call "**training the puppy.**"

I ask the student having the cracking problem in the low register to imagine that they are training a puppy to "stay." At first the puppy doesn't understand and wants to go everywhere that the master goes but with some dedication and patience one can teach it to stay on command. Now let's think of the lower jaw as the puppy and the tongue as the master. At first the 'puppy' (lower jaw) is untrained and wants to follow everywhere the 'master' (tongue) goes. When the tongue comes up to the reed, the lower jaw follows and rises up also. This motion is fairly common in activities outside of bassoon playing, when chewing, the tongue moves in tandem with the jaw and also in some speech, etc.

Now back to the bassoon. In many registers it will not affect the note too adversely if the lower jaw follows the tongue upwards as the tongue moves up to the reed, but in the lower register it becomes more noticeable and more problematic as it often results in an incorrect partial sounding instead of the fundamental at the beginning of the note (splee-ah.) To address this then I suggest the student teach the 'puppy' (lower jaw) to 'stay.' They need to send a message from the brain to the lower jaw to find and hold the correct lower position so that the fundamental will result while the tongue independently moves up to the reed. This is easiest to achieve when playing repeated notes in the low register (see the **Foghorn** exercise below) but eventually needs to be addressed for a note beginning.

When starting a note in this manner the player fingers it correctly (of course), brings the tongue up to the reed **WHILE MAINTAINING THE CORRECT LOW FUNDAMENTAL POSITION** of the lower jaw, sets the airstream and, on command, releases the tongue to begin a note that should sound as a fundamental from the outset. Another exercise that can prove useful in diagnosing and fixing low register issues I call the **Foghorn**. This gets its descriptive name because it sounds, well, like a foghorn!

The exercise has two parts. The first is to play a nice strong low E with the thumb 'hovering' over the cluster of keys on the long joint (bass joint) then drop down the thumb to simultaneously cover all of the keys necessary to play a low Bb. The exercise can show if the player's embouchure and air are working correctly to produce the Bb. Also many students inadvertently pull one of their fingers of the tone holes (especially the third or lowest finger on the wing joint) when reaching the thumb over to the low Bb key creating a 1/2 hole or leak which makes the low note response tenuous.

By starting on the low E with no left thumb, the player can ensure that the tone holes are covering completely and I usually then have them move and rotate the thumb in multiple directions while maintaining contact with the tone holes on the wing joint to demonstrate that the thumb's mobility is not dependent upon pulling the fingers on the tone holes out of position before finally dropping the thumb into place onto the Bb key and C-D cluster.

Once the player can execute a lovely solid slur from the low E down a tri-tone to the Bb then we move on to part two of the exercise which is to add an articulation element. It begins the same with the slur from E-Bb but once a good Bb is established then the player tongues slowly but repeatedly on the Bb while maintaining the same open lower jaw position. The tongue should be the only thing in motion and the Bbs should speak easily and evenly. Many players will try to bounce or "chew" with the jaw when moving the tongue and this must be eliminated. Once consistent clean attacks can be implemented on the low Bb after slurring down from the E then the player should try to **begin** on the Bb but setting the same jaw position, open throat, tongue position, voicing, etc. If all elements are successfully accounted for and executed then the response on the low Bb should be just as good from the first note as it was during the string of articulated notes following the E-Bb slur of the foghorn.

I hope that some or all of these suggestions prove helpful in reducing the incidence of cracking for some of you. Bassoon tones that are unmarred by cracking can be enjoyed more by all.