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Fine-tuning a Reed

We've all had reeds that *will* play, they just lack the response, pitch, or tone that we want from a reed that other people will hear us play. This document outlines my approach to systematically testing a reed on the instrument in different ways to narrow down the specific area that needs work, rather than blindly attacking it with a reed knife.

As is my habit, this document will have a lot of text! The goal is to fully explain *why* each test is necessary and *how* it works so that while you are improving your reeds, you are also learning more about the forces at work in all reeds. I'll provide a more concise document in chart form for quick reference once the theory behind each test is understood.

Some initial thoughts-

The reed is your instrument, the bassoon is just an amplification device. The crow is *usually* an excellent preview of how the reed will sound on the bassoon. While I've had reeds that sound great on the instrument and have "bad" crows, I've yet to have a reed with a good crow that didn't also sound good on the instrument. Rather than worrying about specific pitches, I'm looking for a crow that has a rich array of highs and lows, and most importantly can be made to crow from pianissimo through fortissimo—this is an indicator that the reed will have a full tone across the entire dynamic spectrum.

Reeds balance aspects of strength with aspects of weakness. Consider two reeds, one with a thin but open tip and one with a thick but closed tip. They might have equivalent resistances. But one will sound a lot better! In this example it should be obvious that the thin but open tip is preferable, its thinness will allow it to make pianissimo entrances, while the openness insures that it will be able to accept a full airstream. The other arrangement might feel similar but it won't be responsive in soft dynamics, nor will it take a full airstream, nor will it be in tune and resonant.

For most reed styles, a reed will play in tune with easy response across the range of the instrument if it is symmetrical in all four quadrants, has an even taper from collar to tip, has a spine in the middle, channels on either side of that spine that are thinner, and rails on the edges of the blades that are thicker than the channels, but not so thick as the spine. The reed will also have a thumbnail shape at the tip, where the tip and corners are lighter and gradually darken into the center of the cane. All of these areas should be blended into one another so that there are no bumps or sudden changes in thickness to disrupt vibrations. If the reed isn't balanced, your first goal is to get it balanced. If it is, keep it that way!

1. Check the shape of the wires and the tip opening

A very common trap to fall into on a new reed is to close down the tip opening so that it is playable before it is fully scraped. This commonly manifests as a stuffy, sharp sound, often with an unpleasant edge to the sound. Sometimes when a reed is first clipped open, the tip opening is far too open, this could be because of the wires being opened too much during forming, being oversoaked, the amount of beveling. It is fine to close it down to a more normal tip opening (especially if being so open is placing stress on the blades) but it should be reassessed as the reed matures.

Generally, the third wire, the one that is under the wrapping, is perfectly round. The first wire, near the collar, is ovalar. The second wire is somewhere in between the two. The tip opening can be affected by squeezing the first or second wires. Squeezing the first wire primarily affects the tip of the reed, but it also affects the throat opening to a lesser degree, squeezing the second wire mostly affects the throat, but it also affects the tip opening to a lesser degree. The first wire acts as a fulcrum, reversing the effects of squeezing the second wire, so that squeezing the second wire from the sides (rounding out the tube) closes the tip and throat, while squeezing it from the top and bottom (flattening the tube) opens the tip and throat.

I start with my wires in a default position where the first wire is an oval, the third wire is perfectly round, and the second wire is somewhere in between. Then I make slight adjustments from there, either opening it up to accept more of an airstream, or closing it down if the tip is too open for nuanced playing.

2. Checking the Spine

This is best done with a dial indicator, it's the most accurate way to take measurements on the blades and isn't affected by the wire opening (like looking at it from the side) or inconsistencies in the color of the cane (like under a light). It's helpful measure your good reeds to get a feel for what settings work best for you, what's most important at this point is that the thickness of each part of the spine matches the same place on the other blade. Also attempt to have an even taper from collar to tip, without bumps or reverses in taper. My dial indicator "needle" is rounded so I like to move the reed forward and back on the pin, without raising the needle, watching the rate at which the thickness changes. If your dial indicator has a pointed needle that might gouge the cane if you move the reed without lifting the needle, you can still get a good feel for the smoothness of the taper by sight and by careful measuring.

3. Checking the Channels

I use three tests for checking the channels, if you look at each channel and divide it roughly into thirds from the tip to the collar, each test helps you find what part of the channel is interrupting the transfer of vibrations from the tip (thin so it can be made to vibrate with only a little air) to the back (thick so that it can stand up to a fortissimo airstream).

These tests assume that all four quadrants of the reed are even, so that even if they are too thick, they are at least equally too thick. It's helpful to start by evaluating the reed under a light and correcting any obvious problems. This can also manifest in a "smirking" tip opening, where it appears asymmetrical because one side is thicker than the other. In this case, the culprit is whichever side appears rounder, that means that it is too strong and is forcing the opposite side to flatness. Correct any issues of asymmetry before proceeding to channel tests. Once the reed is symmetrical, keep it that way!

Each test basically has you play something and evaluate whether the sound produced is sharp or stuffy. If so, the proper part of the channel can be thinned in all four quadrants to get it in tune. However, all of these tests can be overdone, if you thin the channels to the extent that the test becomes not just in tune, but flat, that part of the channel is probably too thin.

While working the channels, especially on the side of the reed that is less comfortable for you to work on, pay great attention to the angle of the knife. The angle should be such that cane is only removed from the channel, not tilting onto the rails or onto the spine. Be especially careful on the side of the reed that is less comfortable for you to work.

First Third Test: E to E-flat

On the instrument, slowly play E to E-flat, with a short E-flat fingering (so just adding the third finger of the left hand, not the resonance key, or anything from the right hand). Be careful not to help the reed by voicing lower for the

Often, the “E-flat” will sound like a slightly muffled, slightly flat E. If that’s the case, proceed with thinning the first third of each channel. Be as consistent as possible, counting strokes, or scraping in an even rhythm and counting “beats.” Repeat the same amount of scraping in each quadrant.

For scraping the first third of the channel, I balance between straight strokes perpendicular to the tip (moving all the way across the tip so as not to form a bump) with angled strokes toward the corner. The goal of developing the channels is blending between areas, the first part of the channels must blend directly into the tip, as well as into the corner.

Repeat the test often on the bassoon until the E-flat sounds at least close to a full half-step and has a clear tone.

Second Third Test: G3 with and without the Resonance Key

For this test, play middle G with and without the resonance (low E-flat) key. On many reeds the reason this fails will be obvious. The G without the resonance key will be very high in pitch and have a very unattractive timbre. This is why your teachers have always told you to use the resonance key for your Gs, once your middle channels are balanced, it will be less of an issue if the resonance key is left off of technical passages, but more importantly it will help the pitch and color of other notes (particularly F-sharp³ that is eternally high for bassoonists).

To correct the test, thin the channels in the middle third of the reed, making sure to blend into the first third of the channel without continuing to thin it. As always, frequently test the reed on the instrument, proceed to the next test once the two Gs are close in pitch/timbre.

Third Third Test: Descending C Scale

For the final channel test we’re trying to ascertain whether the back of the reed is too thick. This is a test to be especially careful with, but illustrates an important concept when designing reeds for specific purposes. If the back of the reed is too thick, the low register will be sharp, stuffy, and unresponsive. If it’s too thin, the low register will be rich, in tune, and easily responsive (great for Tchaikovsky's 6th or the Brahms violin concerto) at the expense of the high range (good bye Rite of Spring and Bolero). So tread carefully, and test both the lower and upper registers to find your preferred balance for an omnireed, or skew it in one direction to create a special purpose reed.

For this test, play a slow, slurred C major scale from C3 in the staff to C2 under the staff without adjusting your voicing or adding the low D-flat key to the E. If the scale gets sharp and stuffy as it descends, especially on the E, D, and C, thin the channels in the back third of the reed. Test on the bassoon often.

Preserving thickness in the rails and spine in the back of the reed will continue to support the upper register, while thinning the channels will open up the low register.

4. Tapering the Tip

Once all of these other tests are going well, the final area that I almost always have to adjust is the very tip. Often, the tip is clearly defined under the light and well blended into the channels and spine

behind it without a bump, and the rest of the reed is balanced and passes these playing tests, yet it remains overly difficult to make a pianissimo entrance, or staccato attacks tend to crack. When this happens, I suspect that the extreme tip, which is only visible when you look at the reed tip opening directly is still slightly too thick.

To thin this area without affecting the cane behind the tip, I place a strip of sandpaper flat on my reed desk and draw the reed tip across it at about a 30° angle, pulling the reed butt first with one finger bracing the upward facing blade. Be gentle! The idea here is to put a “chisel edge” on the tip of the reed which makes it thinner without requiring further blending. If the angle at which you hold the reed is too small, the sandpaper will affect more than just the tip, if the angle is too big, it will put too much stress on this very thin area. Give each side of the reed a few gentle pulls across the sandpaper and then retry it on the instrument.

Before starting the final step, revisit each previous test to be sure that they all still pass and haven't been affected by the changes of the other tests. Once the reed officially passes all the tests, proceed with the final step:

5. Blend whole reed with sandpaper

Smooth the entire surface of the reed with fine grit sandpaper, preferably once with a 600 or so grit, and once with a very high grit sandpaper like 1600 grit (found in auto parts stores, it's designed for touching up car paint). If you don't have very high grit sandpaper, you can make do by not blowing off the dust from the 600 grit and then polishing it with the paper side of that sandpaper.

Once that's done, let the reed dry and rest for a day to incorporate all of the changes you've subjected it to! It's always helpful to revisit these steps throughout a reed's life, particularly if there are significant changes in weather or elevation.