



Midwest International Band and Orchestra Clinic
68th Annual Conference

McCormick Place West, Chicago, IL

**“Why Does the Clarinet Squeak?”
Building a Confident Clarinet Section**

Wednesday, December 17, 4:00 PM - 5:00 PM, Meeting Room W186

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Introduction

The clarinet is the only instrument to reward its' player with a loud, shrill, and embarrassing squeak if there is some mistake of technique. Often our first reaction to making a squeak is to back off on the air support. And while it is true that backing off on the air mostly stops squeaking, it is a similar logic to cutting off your head in order to cure your acne: the solution creates more problems than it solves.

As a clarinet teacher, I find that much of my work with a new student centers around helping them find the courage to truly support the air. Without a column of well-supported air, the clarinet will not function at its best. Many students have developed an unconscious habit of backing off on the air support every time they squeak. If we as teachers don't give students a way to fix the typical clarinet squeak, they will find a way to do it themselves. And the usual solution is to back off on the air support. If we don't support the air properly on the clarinet, it causes a host of other problems of tone, intonation, articulation and even finger technique.

I'd like to begin this clinic by giving you my solution to this problem, and then spend the remainder of our time discussing the principals involved, and applying them to some common clarinet excerpts. One of the things I like most about teaching these concepts is that the students don't necessarily need to know the physics involved to get a lot of benefit from the exercises. Much like one doesn't need to know how an internal combustion engine works in order to drive a car, if the students just do the harmonic exercises, they can often find it by feel.

Here is the solution to squeaking: If you have a student that is chronically squeaking, ask them to play the passage again, and squeak on purpose. The majority of students can't make the clarinet squeak deliberately in the same place, which says something about the psychological aspect of squeaking. The reason that students usually can't make the clarinet squeak on command at first is a lack of muscle control and physical awareness. Most students don't have a well-enough developed awareness of the shape of their oral cavity or of the position of the lower lip. But, with a little trying, most students can figure out what to change in order to get the clarinet to squeak again. This is a good sign; it indicates an increase in awareness and control. The last step is to have them hold the squeak and make a change (either of bottom lip position and/or oral cavity shape) until they get the desired pitch. This marks the development of our muscular memory: if I go here I get one pitch, but if I move here I get a different pitch. Through this simple exercise students learn that you don't fix a squeak by backing off on the air, you fix it by a subtle shift in embouchure. Like many things in life, if you confront it directly, it becomes much less daunting.

The next phase is to develop a better understanding of the physics involved in making the clarinet squeak. If students understand just a few basic principles of how the clarinet functions acoustically, it will be much easier for them to control the instrument, and they will no longer fear the squeak.

Basic Principles of Clarinet Harmonics

The clarinet functions much like a brass instrument, in that from any one fingering we can produce a variety of pitches by overblowing the fundamental. Unlike a brass instrument, the clarinet overblows only the odd numbered partials (for a variety of fascinating acoustical reasons that are beyond the scope of this lecture). This gives the clarinet tone a square wave shape and contributes to its characteristically beautiful tone. So, a trumpet harmonic exercise might go 1st, 2nd, 3rd, 2nd, 1st, while a clarinet harmonic exercise would go 1st, 3rd, 5th, 3rd, 1st.

Brass players do not have the luxury of adding a register key or opening a tone hole to help them change pitches, so they have to learn to do it mostly with the muscles of their face (loose lips will give a lower pitch, tighter lips will give a higher pitch) and their airspeed (slower air gives lower notes, faster air gives higher notes). They practice exercises such as lip slurs to help them develop their **muscular memory**. With sufficient practice, the body learns what amount of lip tension and

air speed is required to play 4th partial rather than 3rd or 2nd on any given fundamental.

This is where we clarinetists should take a page from the brass players' book. We need to develop our own kinds of lip slurs (let's call them harmonic exercises) to help develop our muscular memory. Why do we need to develop this muscular memory? Trumpet players have to do this kind of exercise because they don't have register keys to pop the note into the right partial, while the clarinet does have register keys. The reason for that is that our register keys do not work very effectively.

Structural Problems

The need for some kind of harmonic exercise practice is compounded by the fact that the clarinet has two register keys, neither of which work very well. The left hand thumb register key that takes the student from 1st to 3rd partial is too big to be a good register key, and in the wrong place for most notes. In order to be a perfect register key, it would have to be in a slightly different place for every pitch. Each note would have to have its own register key. A mechanism like that would be so complex as to be unusable. So, most clarinet makers aim for the middle of 3rd partial (F5/G5). The register key works relatively well for those pitches, but gets worse the further away you move from them. It also has to serve as the throat Bb key. Much like a Swiss army knife, it does several things, none of them well. Too big to be a good register key, too small to be a good throat Bb. The left hand index finger functions as your register key from 3rd to 5th partial. It is also too big to be a good register key, which is why we use the half-hole technique. From 5th partial up, you have no register key, and are forced to produce the notes with voicing alone.

Since we cannot rely on our register keys, we have to learn to produce different pitches using our bottom lip and oral cavity.

Harmonic Exercises

Due to the fact that we can't rely on pushing down a key to produce the desired pitch, we have to learn how to get the notes out using mostly our embouchure and oral cavity shape. As I mentioned earlier, one of the things I like most about teaching these exercises to students is that you can do them at most any level of development, and a student doesn't have to know all of the physics involved to get a lot out of them. Often when I first start teaching these, I will just have the student echo me without a lot of preamble. You can start with something easy and fun like bugle calls. Loosely block the bell with a swab or against the calf muscle and overblow the fundamental. The harmonic series is the same as you'd find on a bugle. That will allow you to play some simple bugle tunes. Most students can make the corrections just by following my example. Once they can feel it, then I might explain some of the principals involved.

There are two main protagonists involved in getting the clarinet to produce the different partials; one is the oral cavity shape, the other is the position of the bottom lip.

Oral Cavity Shaping

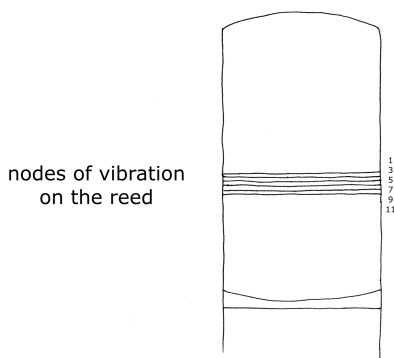
Due to the unique acoustic properties of the clarinet, the oral cavity becomes an important resonating part of the instrument, much like the body of the violin determines the richness of its' tone. The oral cavity has a much greater effect on a clarinet players' tone than the outer embouchure. What we want to do with the oral cavity and vocal tract is to create a standing wave that is a multiple of the partial we are trying to get the clarinet to produce. This is very similar to what Jew's harp players or overtone singers do. The vibrating source (vocal chords or the vibrating metal tongue of the Jew's harp) creates a fundamental rich in overtones, and then the oral cavity and vocal tract are made larger and smaller to make the right size to create a standing wave that emphasizes a certain harmonic of that fundamental. You can demonstrate this for your students in a lesson by placing a sound source like an electronic tuner near your mouth, and try to

bring out different partials of the sounding fundamental. This is done mostly by raising and lowering the middle of the tongue.

Bottom Lip Position

In combination with the oral cavity shape, we need to place the bottom lip on a node on the reed to help excite it into another mode of vibration. A node is a point along a standing wave where the wave has minimum amplitude. In a vibrating string, the ends of the string are nodes. By changing the position of the end node with our fingers, we change the effective length of the vibrating string and thereby the note played. Here we can take a page from the string player's book. String players produce harmonics by lightly placing the finger on the string at some exact multiple of its length and plucking. By lightly touching a string say at its center, you can trick the string into thinking it is half as long as it is and it will sound one octave higher.

We need to do a similar thing with the clarinet reed. The player needs to move their bottom lip up and down the reed looking for the proper node of vibration for the harmonic they are trying to produce. Usually, as you go higher in partials, you go lower on the reed. We end up playing the reed with the bottom lip like a tiny violin. By placing your lip on the correct node of vibration, you can more easily get the reed to play in that partial. So, if a student is playing a 7th partial note, they must place their bottom lip on the 7th partial node on the reed. Note that for higher partials, there is more than one node to choose from.



You can demonstrate this by running your finger up and down a piano string (lower strings work better) while striking it's key. When you feel a node with your finger (the spot where the string isn't vibrating), you can feel certain spots will produce loud harmonics that ring like a bell. Other spots produce nothing or muffled tones. We need to develop a similar kind of sensitivity in the bottom lip.

Putting It All Together

All of this detail may seem a little overwhelming at first. So remember that it is not necessary for a student to understand all of this before they begin. Most important is just to include some small amount of harmonic exercise practice in their daily routine. Start with some simple bugle calls with the bell covered by the calf muscle, then move on to a simple harmonic exercise (example attached).

The basic rule of voicing is this: **you have to voice the partial you are fingering**, e.g., when you finger a 3rd partial note, you must voice 3rd partial, when you finger a 7th partial note, you must voice 7th partial, etc. A major source of clarinet players' playing difficulties is that they are simply not voicing the partial they are fingering. If a player fingers a 3rd partial note, but voices 1st partial, they will get a "grunt" (a partial too low). If a player fingers a 3rd partial note, but voices a 5th partial, they will get a "squeak" (a partial too high).

Here are some ways to fold these techniques into your teaching and practice:

1. Harmonic long tones with swab lightly stuffed in bell
2. Bugle calls with calf on leg or swab lightly stuffed in bell
3. Demonstrate the effect of oral cavity shaping with tuner near mouth
4. Demonstrate the effect of bottom lip placement with finger on piano string
5. Whistle first four notes of "Joy to the World" to show roughly the feeling of 7th, 5th, 3rd and 1st partials

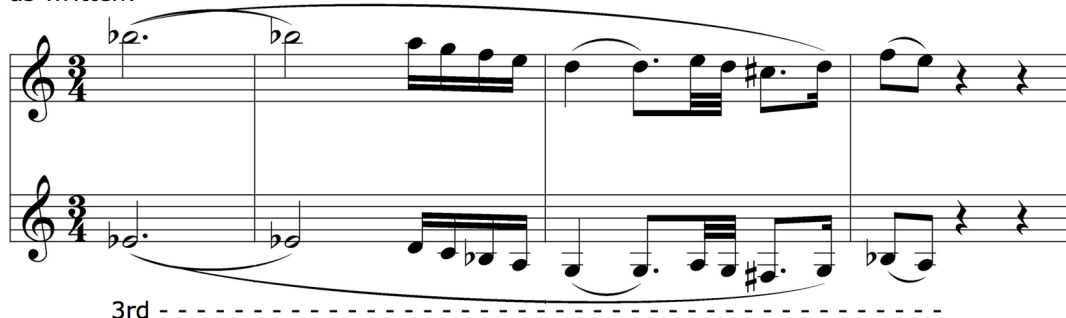
Applying These Principals to Music

As students get a feel for this way of playing and thinking, they can apply it in a more specific way to their practice. Here are some excerpts from the clarinet repertoire made considerably easier with an understanding of the partials involved. I would have the student figure out the fundamental fingering each note is derived from, and what partial it is, and write them both out on a piece of staff paper (as below):

C. M. von Weber - *Concertino in Eb, Op. 26*

meas. 10

as written:



without register keys:

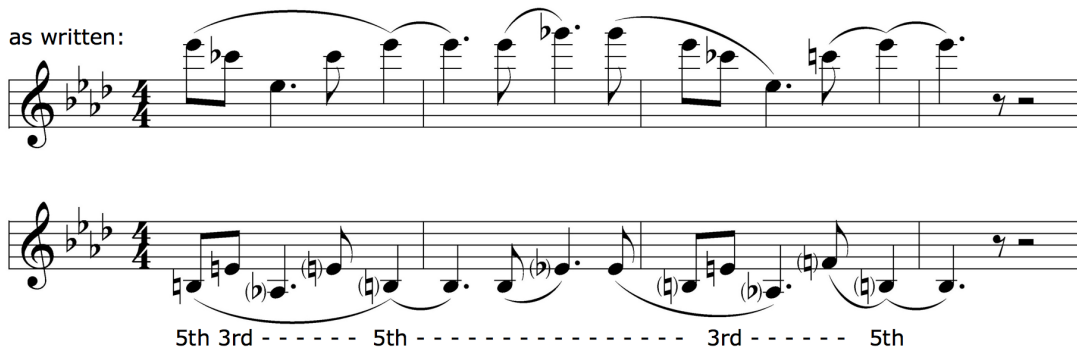
In this example from Weber, most young students will make a "grunt" on the first entrance. That is caused by the fact that they are fingering a 3rd partial note, but voicing a 1st partial. The grunt is the clarinet's way of saying to you "you are fingering 3rd, but voicing 1st; I don't know which one you want, so I'll give you both!" Consequently, I would have the students play the fundamental pitches and voice the clarinet up into 3rd partial without relying on the register key. Once they get that, I will ask them to describe what they did to get the partial to come out. They will often use phrases like faster air, higher tongue, or lower lip.

In the below passage from Debussy Rhapsody, we can see the student has to go smoothly back and forth between 3rd and 5th partial:

Claude Debussy - *Première Rhapsody*

meas. 58

as written:



without register keys:

Going downward from 5th to 3rd usually involves a feeling of “ee to “eh” and perhaps a relaxing of air speed. Going up from 3rd to 5th is usually the opposite feeling, a movement from “eh” to “ee” and a speeding up of the air. If the student knows which is which, they can consciously decide where to raise and where to lower the tongue. If they don’t have a clear understanding of what partial they are coming from or going to, they will be fumbling in the dark.

The following Stravinsky excerpt contains even more rapid switching:

Igor Stravinsky - *Three Pieces for Clarinet Solo*

movement II, system 7

as written:



without register keys:

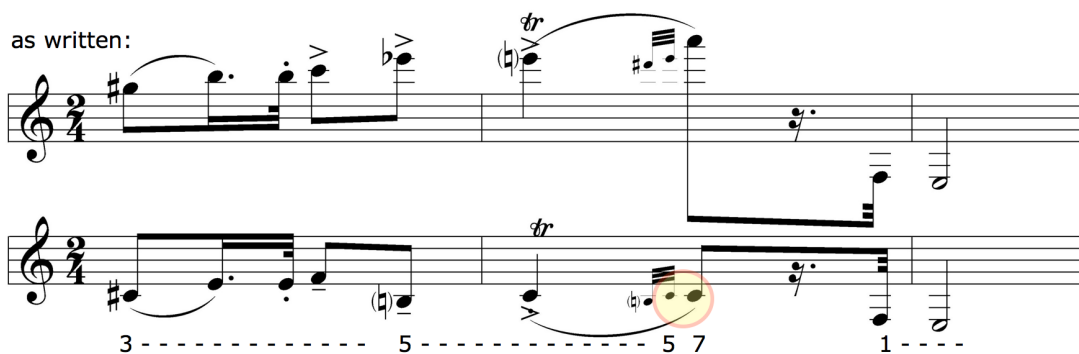
The rapid and irregular alternation back and forth between 3rd and 5th partials is smoothed by trying to find a voicing right in the middle, that can more easily accommodate both partials with minimal movement.

This climactic moment in the second movement of Weber’s Clarinet Quintet points directly to why harmonic exercise practice is so necessary:

C. M. von Weber - *Quintet, Op. 34,*

movement II. (Fantasia), m. 57

as written:



without register keys:

Notice the circled notes. Here the clarinet needs to leap from E6 to A6, a 5th partial note to a 7th partial note. The interesting point being that the fingering for both of those pitches is precisely the same. The player is forced to produce the high A solely through the agency of their voicing, with no fingers to assist. This is very much what brass players experience all the time.

Lastly, an excerpt from Copland's Clarinet Concerto:

A. Copland - *Concerto for Clarinet and String Orchestra*
meas. 13 of the cadenza

as written:



without register keys:

At first glance this is a very daunting lick for most clarinet students. But if a student takes a moment to break it down into partials, they will very quickly develop the right feel to enable each note to ring like a bell.

When practicing harmonic exercises, encourage the students to use lots of air and listen for that characteristic clarinet ping and ring and focus. Once a student hears and feels it, it becomes truly addictive, and you start to look for that kind of focus all the time. Once they can do that, they can truly say that they no longer squeak, they just occasionally choose the wrong partial!

If you have any further questions, please feel free to email me at: rfaria@ithaca.edu. Thanks so much for attending my presentation today.

Harmonic Exercises

No register key for these exercises!

#1

1X tongued, 2X slurred

#2

etc, chromatically, to:

#3

etc, chromatically, to:

#4

etc, chromatically, to:

#5

etc, chromatically, to:

- Finger the open notes, but make the clarinet sound the filled in notes.
- Use your oral cavity shape, not extra jaw pressure. Back of the tongue relaxed, middle high, tip low.
- Let your bottom jaw getly roll up and down on the reed to find the appropriate node of vibration for each partial.
- Do all exercises articulated with good air support, and a clear, clean "tee"
- Listen for that characteristic clarinet ping and focus, tone should ring like a bell