

Saxophone Vibrato

One Technique

Two Worlds.®

A Discussion
And
Guide
to
Learning and Using Saxophone Vibrato
by
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A Warning

- This presentation deals with a lot more than Saxophone vibrato.
- We will cover the Why, What, Who, Where, When, and How of Vibrato.
- Practical side effects of Vibrato.
- History and Design of the Saxophone
- Sound creation on the Sax, and “Neck Alone”
- Embouchure – Thin V/S Thick
- Tendency Tones, And then
- Sax Vibrato Confusion, Clarification & Conquered.

Why Vibrato?

- Vibrato is a psychoacoustic musical effect which is created by a periodic change of intonation on a single pitch.
- There is a lot of philosophical debate as to why we like it, but the fact remains that vibrato is pleasing to human kind.
- My pet theory is that human speech does not phonate on a single pitch. So hearing a “straight” tone does not sound as natural as a tone with vibrato.
- Just imagine being in church where the preacher intones on a single pitch. It would be so uninteresting. Good thing it never happens!

What Is and Is Not Vibrato?

- Vibrato is created by a periodic change of the intonation of a single pitch, somewhere between a $\frac{1}{4}$ step and a $\frac{1}{2}$ step, which is happening faster than 3-4 pulses a second.
- Anything slower than this speed, the brain resolves the pitch changes into individual notes, and notices the “out of tune-ness” that is being created.
- At this speed and faster, the brain resolves the pitch changes into a “wider” pitch center. The pitch is still changing $\frac{1}{4}$ to $\frac{1}{2}$ step, and because these are actual pitches, vibrato is effective anywhere the instrument can be heard.
- Volume changes are called Tremolo.
- Tonal / color changes are called Timbre change.
- Both Tremolo and Timber changes are present in Vibrato, but are much softer side effects, and, as such, do not have the physical strength to travel very far.
- (Law of inverse proportions. Double the distance – 6db)

Who, Where and When Vibrato?

- Almost every instrument and/or ensemble uses vibrato to some extent.
- Style and tradition dictates that on some instruments, such as the Horn and the Clarinet, vibrato is used sparingly.
- Certain musical styles use vibrato continuously, others use it selectively as a phrasing effect. (Classical v/s Jazz)
- But, it is almost always used.

How is Vibrato Created?

- Voice: Vocal folds change physical shape, and can go sharp(+) and flat(-).
- Strings: Change physical length of the string. Violin family can go (+) & (-). Instruments with frets can only go (+).
- Wind instruments: Wide variety of techniques.
- Air pressure, jaw motion, slide position can all provide (+) & (-), but each technique is very instrument specific.
- Saxophone is limited on the (+) side, but is very effective in changing pitch on the (-) side

Practical side effects of Vibrato

- There are very practical side effects to vibrato besides the “beauty” and “style” it adds to music.
- Two instruments playing unison must have perfect intonation.
- With vibrato the pitch is changing anywhere between $\frac{1}{4}$ to $\frac{1}{2}$ step, creating a wider “pitch window”, which makes it easier to tune 2 performers, as unison notes now don’t have to be precisely unison.
- **A-440. $\frac{1}{4}$ step sharp (+50¢) = A-450ish. $\frac{1}{4}$ step flat (-50¢)=A-430ish**
- Vibrato assists with the psychoacoustic “Chorus Effect”. When three or more instruments play in unison, the brain has trouble resolving the slight out-of-tuneness of those pitches, also creating a wider “pitch window”, which creates the same effect as vibrato.
- Combine them both, and your section will sound more in tune faster. (a lot closer anyways.)

Saxophone, A Little History

- The Belgian musical instrument maker and inventor, Adolphe Sax (1814-1894), was the originator of the saxophone as well as other musical instruments, including the predecessor of the modern flugelhorn and euphonium, the Saxhorn; and the Saxtuba, an early Sousaphone.
- Sax, the son of musical instrument making parents, set out to create a woodwind instrument that had the technical flexibility a woodwind instrument, the rich overtones of the conical bore and the power of a brass instrument.
- Sax hoped this unique combination would provide an acoustical bridge between the different instrumental sections of the orchestra and initially hoped it would be used to reinforce the cellos.
- In 1842, the saxophone was presented to Hector Berlioz, who became a champion of this instrument. The saxophone family rapidly became popular in European military bands, and was introduced to the United States around 1880.
- In 1889 military saxophone bandsmen returning from the Spanish-American War, especially to New Orleans, popularized the sax. The rest is Jazz history!

Saxophone Design Considerations

- Sax blended the practical advantages from all the wind instruments of his day;
- The conical bore and modified fingering system from the oboe. *(there is a story that Sax 1st offered his simpler fingering system and single reed idea to the oboe world, who were too true to form to accept his innovations.)*
- From the clarinet, an easy to use, single reed mouthpiece which, on a conical bore, provides greater pitch stability and simpler reed replacements.
- From the flute, the adjustable tubular tuning system (head joint) which, importantly, he placed inside the mouthpiece.
- *No matter how little or how much the saxophone is inserted into the mouthpiece, the length of the cone is never altered, making tuning the overall length of the saxophone simple and effective without changing the bore.*
- To realize the volume Sax had in mind, he increased the size of the bore and especially the flare of the bell, considerably larger than any woodwind. It is more in keeping with the flare of his Saxtuba.
- Sax was wildly successful. The saxophone, along with the guitar, is relatively easy for beginners to start and to achieve characteristic tone and technical success.

SOUND CREATION

Sound is created by blowing air into the reed/mouthpiece. The air forces the tip of the reed to close, then the natural spring action of the cane (plus a few other acoustic forces) causes the tip to pop open again. The repetition of this cycle of opening and closing creates the sound.

The mouthpiece/reed combo is an independent musical instrument, and depending where and how the embouchure is placed, will create predictable results. Learning to control the mouthpiece's range will make playing the sax in it's various ranges much simpler.

If the tip "miss-fires" and does not close each cycle, then excess air enters the instrument, creating a "fuzzy" tone. This can happen if the reed is too hard, the reed is chipped, or if the mouthpiece has some sort of a void on the plateau.

If the reed is cracked, it creates a squeak, which is a small portion of the reed acting as an independent and annoying musical instrument.

FULL SPECTRUM SOUND

- A full spectrum sound from a saxophone will have a fundamental pitch that is considerably stronger than it's overtones, generating a sound from the instrument that is "darker" and easier to blend.
- Unfortunately, this "darker" sound is not automatically produced. Instead, a sound is often produced that is overabundant with higher partial overtones, creating a tone that is incapable of blending.
- This is a problem of both reed and embouchure placement. Too weak (thin) of a reed will not provide a strong fundamental, and a reed that is too far in the mouth, although providing a fundamental, also provides an overabundance of high partials, which are out of tune with their neighboring overtones.

FULL SPECTRUM SOUND, cont.

- Differing styles of mouthpieces can contour the frequency content. That is not what I am describing. I am describing a distorted, harsh tone caused by no control of the reed. The oboe description for this is a “crow”. There is no equivalent sax name, so I’m calling it a crow too.
- The solution to this tone problem is straightforward; damping the reed by covering more of the tip of the reed and allowing the student to blow fairly hard will produce a more characteristic and blending tone.

THE EMBOUCHURE, THIN or THICK?

- The Embouchure's primary purpose is to create an air seal around the mouthpiece/reed, and to create a minimally flexible *lip pad/pallet* that dampens reed vibrations.
- There are two lip pad styles. **THIN and THICK.**
- **THIN** is identical to a Clarinet Embouchure , with lip corners stretched back into the smile position. This creates a THIN firm lip and skin covering of the front and top of the teeth.
- At first considerations, this would seem correct. After all, Sax borrowed the mouthpiece/reed idea from the Clarinet. **HOWEVER**, the Clarinet mouthpiece **DOES NOT** go straight into the mouth. The reed lays across the front of the teeth, so a large portion of the clarinet reed *is damped by skin as well as lip*.
- The Saxophone mouthpiece/reed does not lay across the front of the teeth, rather it goes almost directly into the mouth.
- If the **THIN** pallet is used, a sizable portion of the reed will not be controlled by the embouchure. Exposing this much reed without lip damping creates a tone that is very rich in high frequency overtones. *Translate that into "Bright Sound"*.
- *Additionally, there is the potential for causing major nerve damage to the bottom lip, as this embouchure uses skin rather than muscle. If a student has grooves inside their bottom lip, they are well on the way to damage.*

THE EMBOUCHURE, THICK!

- The THICK embouchure places the lip sitting on top of and slightly forward of the teeth, *NOT BEHIND THE TEETH / WITHIN THE MOUTH*. To allow the mouthpiece and lip to fit between the teeth the jaw will be quite open. This embouchure is identical to the double reed embouchure, but we are utilizing only the bottom ½.
- A thick, firm (bunched) lip pad is used to *GRIP* the reed with the corners of the mouth pushing *INWARD* and the lips thrusting *FORWARD*, as if attempting to push the reed out of the mouth, as the reed is attempting to push the lip into the mouth.
- As humans, we tend to mirror our top and bottom lips. Although only the bottom lip has any effect on the reed, allowing the top lip to grip the mouthpiece (hardly any teeth pressure) will assist the bottom lip's formation.
- NOTE: I have required sax students to play with a true double embouchure, top lip over the teeth too, usually to correct biting issues. Some have found it so comfortable they use it all the time. **Be warned, marching with a true double embouchure can be dangerous.**

MOUTHPIECE / REED PLACEMENT AND THE “NECK ALONE”.

- *BEFORE AN EMBOUCHURE IS MADE*, the TIP of the reed should be located in the center and middle of the bottom lip, on the "wet" line.
- The mouthpiece is then rolled into the mouth, keeping the tip of the reed on the wet line. Then the top lip/teeth close down on the mouthpiece. During the formation of the embouchure and during playing, the mouthpiece should be *GRIPED* firmly by the lips and not be allowed to slip between the lips. Students occasionally need to dry their lips and reed.
- NOTE: The center of the embouchure ***is not placed*** where the reed joins the mouthpiece, it is about ½ way between the tip and the touching spot.
- NOTE: The teeth can lightly rest on the mouthpiece, but should not dig into the mouthpiece.
- For beginners, playing the mouthpiece alone can be quite unstable, so I recommend playing it on the mouthpiece/neck combo.
- Correct placement should create an Ab(--) (very flat) on the Alto neck.
- I call this technique “Neck Alone”, although it is really the Mouthpiece/Reed/Neck combo.

TONE On THE NECK

- The ideal tone and the sonic goal for beginners is a PURE TONE on a SINGLE PITCH. Initially, very firm air pressure will be needed to remove "fuzz" from the tone. If a double or triple pitched tone (**the CROW**) is encountered, there is too much reed in the mouth. (YES, saxophones do Crow, the same as a DR!)
- With a novice, the sound of the Neck Alone will be fairly loud and may have a bright quality. **This is what we want to hear!** As the lip muscles get stronger and are able to exert greater controlling forces over the REED, the tone will become progressively more "mellow" and less air pressure will be needed.

NECK ALONE: RANGE AND INTONATION

- The range of the Neck Alone is variable and should be practiced. To make the pitch higher, the reed is moved into the mouth, to lower the pitch the reed must be moved out of the mouth. On the Alto neck/mouthpiece combo, the pitch varies between a G and an Ab.
- During this entire process, **THE TIP OF THE REED MUST STAY IN CONTACT WITH THE SAME PORTION OF THE EMBOUCHURE**, and must not be allowed to slide between the Lips. When the reed is moved into the mouth the lip will be stretched thinner, and there is a natural tendency to pull the corners back during this exercise. The student must be reminded to still focus the lips inward and resist this "smiling" effect.

RANGE AND INTONATION, cont.

- **RANGE:** The lower the pitch on the Neck Alone corresponds to lower notes on the Sax. Playing high notes is the inverse. For the very high palm key notes, the embouchure is now over the reed/mouthpiece joining position. There is about ½” of motion on the Alto mouthpiece between the practical extremes of G-Ab.
- *NOTE: This can be done on the mouthpiece alone, and a range of over an octave will be produced. However, the mouthpiece by itself is very unstable, and for a beginner it will only produce massive squeaks. Very frustrating and annoying.*
- **INTONATION:** Intonation is adjusted by the conservative application of this same motion. A slight inward motion will raise the pitch, and an equally slight outward motion will lower the pitch.

TENDENCY TONES

- If the **Thick** embouchure technique is used, the throat tones on the Saxophone will be predictably flat. A to C on the Saxophone, especially in the second octave.
- Typically, the higher you finger a pitch in the throat area, the flatter that pitch will be. The solution is to roll incrementally in for throat tones, and progressively in for higher octaves.
- *NOTE: Be aware that if a student is consistently sharp on these notes, especially in the middle register, they are using the Thin embouchure and are biting on the reed. There is no easy solution to this sharpness.*

TONGUING

- The basic technique of tonguing is identical for starting and stopping a sound.
- The tongue acts as a plug and should touch both the tips of the mouthpiece and the reed. The first step is to plug the mouthpiece with the tongue, then air pressure is applied. Finally the tongue is removed from the tip, which releases the reed to start vibrating. Stopping the sound is achieved by plugging up the tip of the reed with the length of the note being varied by how long the tongue is left off of the reed.
- **DURING THIS ENTIRE PROCEDURE, AIR PRESSURE, MOUTHPIECE PLACEMENT AND EMBOSURE CONTROL ARE NOT VARIED.**
- There are many artistic tonguing variations available, such as an air attack, an air stop and the legato tongue, but these should be considered musical effects and be taught later, after the basic technique is functional.

Saxophone Vibrato Confusion!

- Teaching beginners the saxophone vibrato is jumbled mess, due to the seemingly contradictory musical worlds the saxophone participates in. Do we want Classical vibrato, French, Belgium or American (Rascher, Rousseau, Pittel)
- Rock or Jazz? (20's, 30's, 40's, 50's, contemporary big band) or Desmond, Coltrane, Boots or Lenny Pickett, or ???!!!!
- This instrument can be and has been so individualized that the sonic choices are endless!
- These *unlimited* style / personality uses seemingly suggests that there should also be unlimited and differing techniques for vibrato.
- Also confusing the process is an incomplete understanding of the physical operating process required to create a vibrato; is it JAW or AIR or BOTH!

Saxophone Vibrato Clarified!

- Vibrato is an integral part of the tone and should be taught right away. Saxophone vibrato is typically a jaw vibrato, with the pitch dropping anywhere from a 1/4 step to a 1/2 step. In fact, the pitch can drop considerably more than a 1/2 step, making it ideal for dramatic jazz and pop musical effects.
- The motion of the jaw is like chewing, only we are PULLING the jaw away from the reed, causing the pitch to drop.
- *Chewing is a poor description, as when we chew, we bite **Inward** to crush our lunch. Saxophone vibrato is an “open jaw, return to normal, open jaw, return to normal” motion. The distance traveled is close to nothing.*
- If a player bites inward, closing the reed, there can only be a slight pitch change, as the reed will quite quickly clamp shut. There will also be slight tremolo and timbral effects, and this might seem like vibrato to a young player, but those effect will not travel much further than the instrumentalist’s ears, and the tone projected to an audience will be carry no noticeable vibrato.
- **Warning! There is a down side to dropping the jaw!** As the jaw drops, lip control is removed from the reed, changing the tone. This is acceptable, even desirable, as an effect for Jazz and Pop, but is not ideal for classical sounds.

Saxophone Vibrato Conquered!

- Then is the solution for classical saxophone vibrato an **air vibrato**? Air vibrato is used on flute, the double reeds and some brass instruments, as the abdomen muscles, gradually fluctuating the support generates an under pressure, over pressure vibrato.
- Unfortunately, THIS WILL NOT WORK! Remember that Sax chose the single reed concept, which features an inherently more stable tone generator. Under/over pressure will change the dynamics (tremolo) considerably without effecting the pitch at all.
- **SO, WHAT TO DO? USE BOTH!!**
- For classical vibrato, a combination of air and jaw works very effectively. As the jaw drops, changing the pitch and tone, you blow a little harder, which restores the tone.
- The combining of air and jaw amplifies each other's effect, making the necessary motions quite small.
- This might seem a challenge, but is quite natural to change air pressure as you move your jaw. Something to do with yawning. And, unlike high pressure instruments, it is quite easy to increase the speed of your air vibrato on the saxophone.
- **WARNING:** *At faster speeds, the vibrato might cause the larynx area to vibrate sympathetically, but this action should only be in tandem with and caused by the motion of the abdomen. The term throat vibrato should never be suggested to a student, as they will might attempt to produce a "nanny goat" sound, which is caused by glottal stops.*

Saxophone Vibrato Summarized

- 1. Saxophone vibrato is a jaw dropping vibrato, at least a 1/4 tone, for ALL styles of saxophone performance.
- 2. However, jaw vibrato changes the tone, and this is unacceptable for classical tone.
- 3. Increasing air pressure in tandem with jaw vibrato fixes the tonal issues for classical saxophonists.
- 4. Classical vibrato is constant and between 5-6 pulses per second. The higher the note, the faster the vibrato. Occasionally a composer might wish a classical saxophonist to play a differing style. “Senza Vibrato” or “In a Jazz style” are some of the cues provided.
- 5. Jazz/Pop/Whatever uses vibrato as a musical phrasing effect. There is no standard speed or usage for vibrato in popular music. It can be pretty much whenever and wherever you wish, except continuous, which will suddenly sound classical, no matter how big and bold your tone might be.