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Trumpet Mechanics

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Prologue

The trumpet is like a beautiful sports car. You can take it out when all parts function properly, the gas tank is not empty, and you actually know how to drive.

This essay -- summarizing the findings of half a lifetime of being a “motorist” -- is created for those, eager to look at each bolt in the engine independently, discuss different gasoline grades, and talk shop about spoiler types.

Big fun! Nevertheless, this is a dangerous game: All of these components form a system that functions as a whole, and its function can’t be fully understood solely in terms of the individual parts.

So -- when you work on the art of “driving” the trumpet, don’t get hung up on one particular aspect forever and a day; you want to shift your attention to various factors, round-robin style, while paying close attention to them when they are “on.”

Over time -- as your unconscious muscle memory improves -- you will develop a sense of how everything comes together, working in sync with the natural tendencies of the human body.

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Section 1
Wind

Premise

- Without wind the trumpet is just a piece of tube.

General Considerations

- Posture: Unlock your knees, relax your shoulders, arms and butt cheeks. Now, imagine there is a string pulling you up, lifting your ribcage and correcting the position of your head to be in alignment with your straightened spine. Never slump; the ribcage should be high at all times.

- When breathing in, the muscles responsible for breathing out should relax and vice versa.

- Never hold your breath while playing. Breathing in to breathing out should be one fluid motion.

Breathing In

- While keeping a “ready to play” tongue level, breathe in through the mouth corners; take air in from the bottom of your belly to the top while maintaining relaxed abdominal muscles and an open throat. See also: Section 2.

- Don’t inhale before the mouthpiece has been placed upon the lips. The sequence always is: place-inhale-play.

- The closer one gets to empty, the harder it is to get air out of the lungs. This is why I advocate:

1) Taking in a relaxed full breath (breathing in to approximately three-quarters of your capacity) all the time while you are in a creative musical situation that requires flexibility, and

2) Not using up all the air until the last drop. Instead, take in a fresh breath before running out of air whenever the music allows it.

- When you play written music, always breathe in more air than needed for the upcoming musical phrase to allow the exhalation muscles to stay in their comfort zone as long as possible.

- Be aware though that overbreathing is a danger, too. Our goal should always be to have a balanced breathing strategy that is highly flexible.

Breathing Out

- A lot of methods emphasize abdominal muscle support when fueling the trumpet with needed air supply. Rightly so! Nevertheless, I strongly advocate the image of simply blowing wind through your lips. The impulse of blowing triggers the abdominal muscles, not the other way around.

The idea is to *avoid* applying abdominal muscle support the way we do in everyday situations (which leads to throat tightening and compressing the butt cheeks), since we don't want to hamper air flow. See also: Throat.

Instead we should focus on the aperture, the "air hole" in the center of the embouchure[1] in *conjunction* with the abdominal muscles. The goal is maintaining an open throat and relaxed butt cheeks while blowing. See also: Section 3.

- That said, let's take a matter-of-fact look at the issue at hand:
We need a consistent airstream to energize our instrument. That's why trumpet playing requires *active exhalation,* generated by blowing wind and simultaneously pressing the abdominal muscles *up-* and *inwards*. Additionally, pressing the internal and innermost intercostals (the muscles between the ribs) *inwards, sideways and downwards* boosts air compression even further. Again, remember to maintain an open throat and relaxed butt cheeks at all times.

- Active exhalation is used whenever and whatever we play. The mental image is that of a one-way street -- the intensity increases as long as we breathe out.

- There has to be a perfect synchronization between the initial impulse of blowing and the articulation of the initial attack of a musical phrase.

- Each partial of the overtone series and each dynamic level has its own specific air pressure[2] and air quantity[3] requirements.

- When playing a musical phrase with detached notes using one single breath, don't loosen the abdominal tension in between but keep the tension until the end of the phrase, always maintain an open throat.

- A common pitfall when descending: Don't weaken the air flow while releasing part of the tongue/lip compression. See also: Sections 2 and 3.

[1] The term *embouchure* refers to all things "bouche" (the French word for mouth) in regard to playing a wind instrument: The use of lips, mouth corners, chin muscles, teeth and jaw.

[2] The term *air pressure* indicates the amount of blowing resistance that the performer encounters during the playing of the instrument. Low notes need less air pressure than high notes.

[3] The term *air quantity* represents the actual amount of air consumed. Low notes need more air quantity than high notes, loud notes more than soft ones.

Throat

- Abdominal muscle support triggers the throat to tighten when used in everyday situations because air as pressure uses the same musculature as air as wind. With wind there is always air pressure. With air pressure, there isn't always wind. An example for illustration: defecation. A lot of air pressure is used, but no air is moving beyond the larynx because the epiglottis, the throat gatekeeper, closes the glottis to deliver the required downward pressure. The scientific term for the closing of the glottis is *Valsalva Maneuver*.

The above example is the reason why we should *never* compress the butt cheeks when playing the trumpet. It should be quite the opposite: Always relax the muscles of the butt cheeks, particularly when approaching the top notes.

- Experiencing unwanted throat noises while playing is an indication of insufficient air flow. Among the many possible causes are:

1) Your tongue arch is appropriate for the desired pitch but you experience an imbalance between the resistance of the tongue and the efforts of the wind. Remedy: Focus on moving wind through the aperture. See also: Section 2.

2) There is a lot of effort from the abdominal region but the glottis is fully or partially closed (see above). Remedy: Focus on moving wind through the aperture and relax your butt.

3) Your tongue arch is too high for the desired frequency. See also: Section 2.

4) The lips are too closed. See also: Section 3.

- One more detail: Yes, the throat should always be open, but the opening isn't static since it is functioning like a valve (dependent on the pressure/quantity of air needed).

Section 2
Tongue

Premise

- The tongue is multitasking -- articulating and altering pitches by manipulating the size of the oral cavity (aka tongue arching).

Part 1: Articulation

- Articulation can be done two ways:

1) *With the tip of the tongue behind the top teeth, where the teeth and the soft palate meet.*

The advantage of this strategy is the similarity to our approach of speaking our mother tongue, resulting in precise, unrestricted attacks.

The disadvantages: One is that articulation and arching are separated movements (which hampers the reliability of the top notes); the other is that this strategy requires a different setup for slurring and tonguing.

2) *With the dorsum, the top surface of the tongue.*

The advantages of this strategy are its efficiency because it combines articulating and arching into one movement, and slurring and articulating are done with essentially the same setup.

The disadvantages are that this method might have a negative impact on the accuracy of attacks, might hamper the dexterity of articulating and might limit the variety of tone colors.

- That said, there are four valid concepts to choose from now (I favor strategy No. 2 for my own playing):

1) Employing Both Worlds, Version 1: Tip tonguing behind the top teeth in the low, middle and high register; switching to dorsal tonguing for the top notes, or

2) Employing Both Worlds, Version 2: Depending on the musical requirements either tip tonguing behind the top teeth *or* dorsal tonguing in the low, middle and high register; switching to dorsal tonguing for the top notes, or

3) Tip tonguing over the entire range to have a consistent approach, or

4) Dorsal tonguing over the entire range to have a consistent approach.

Recommended Articulation Syllables

- "T" for accented notes

- "D" for soft notes

- "D" and "Q" for multiple tonguing

Part 2: Manipulating the Size of the Oral Cavity

Before We Get Started: A Word on Phonetics

- Articulatory phonetics (from the Greek *phōnē* for “sound”) is a branch of linguistics that comprises the study of the production of human speech sounds: The position, shape, and movement of the lips, tongue, and vocal cords.

- By taking advantage of part of these studies for our purposes, we are able to classify tongue shapes and their relative distance to the palate, the roof of the oral cavity, thus resembling resistance-requirements for different registers.

- The idea is linking vowels and consonants to pitch regions.

- Bear in mind that these are approximations (the compression requirements inside the mouth are higher when playing the trumpet than when speaking) and that every trumpet player has a different tongue length/shape and oral cavity size.

- Most trumpeters apply these concepts -- commonly known as *tongue arching* -- the way they speak their original language: Moving the tongue up and down and back and forth when going through the registers. However, a more efficient approach to changing tongue shapes when playing a brass instrument, and therefore the ultimate goal for all register changes (except for the low register), is via lateral (sideways) tongue movement.

The Low Register

- This subchapter is divided into three parts:
Overview; Description of Pitch Regions; A Few More Considerations

Overview

- We are looking at two different pitch regions in the low register:
C1 down to F# and G1 down to C#1.

- Both of these region's tongue shapes are represented by the same vowel position but by different jaw positions. That's why the low register does not require tongue arching.

- Each region's vowel/jaw position works with a full set of valve combinations from 0 to 2 to 1 to 1/2 to 2/3 to 1/3 to 1/2/3.

Description of Pitch Regions

- The region from C1 down to F# incorporates a tongue shape resembling the low front unrounded vowel position ⟨a⟩ (like in the English word "st**u**ck"), requiring a broad, "rolled out" tongue, sitting low and effortlessly within the mouth in conjunction with a *very open jaw* to allow for the appropriate oral cavity size.

- The region from G1 down to C#1 is the most easily accessible one on the Bb-trumpet. It employs the same low front unrounded vowel position ⟨a⟩ as the adjacent lower pitch region but without the exaggeratedly open jaw.

A Few More Considerations

- The notes below C1 -- regardless of your preference for tip tonguing or dorsal tonguing -- might be articulated between the teeth as a result of opening the jaw.

- After articulating in the low register the tongue tip rests at the base of the palate (if we play a note long enough to allow for this procedure).

- Be aware: The word examples that illustrate tongue positions can be pronounced different ways. I recommend looking up the "IPA vowels chart" on the internet and listening to acoustic examples of the vowels mentioned here.

The Middle Register

- This subchapter is divided into three parts:
Overview; Description of Pitch Regions; A Few More Considerations

Overview

- In comparison to the low register, as the pitch increases for the following registers, so does the tongue-arch generated air resistance in the oral cavity.

- We are looking at three overlapping pitch regions in the middle register:
C2 down to F#1, E2 down to Bb1 and G2 down to C#2.

- Each vowel position works with a full set of valve combinations from 0 to 2 to 1 to 1/2 to 2/3 to 1/3 to 1/2/3.

Description of Pitch Regions

- The region from C2 down to F#1 requires a tongue shape that resembles the low-mid front unrounded vowel of ⟨ɛ⟩ (like in the English word “b**e**d”) so that the arch occurs in the *front* of the tongue. Alternatively, this region can also be approached via the low-mid central unrounded vowel of ⟨ɜ⟩ (again, like in the English word “b**e**d,” but the vowel articulated further back than common, using the center of the tongue) so that the arch occurs in the *middle* of the tongue. Doing so creates a darker sound and might improve overall tongue flexibility.

- The region from E2 down to Bb1 requires a tongue shape that resembles the mid back rounded vowel ⟨o⟩ (like in the English word “c**oa**t”) so that the arch occurs in the *back* of the tongue.

- The region from G2 down to C#2 requires a tongue shape that resembles the high-mid front rounded vowel of ⟨ø⟩ (like in the French word “p**eu**”) so that the arch occurs in the *front* of the tongue. Alternatively, this region can also be approached via the high-mid central rounded vowel of ⟨ɵ⟩ (like in the Dutch word “h**u**t”) so that the arch occurs in the *middle* of the tongue. Doing so creates a darker sound and might improve overall tongue flexibility.

A Few More Considerations

- On overlapping pitch regions: Since the pitches in the middle register belong in more than one pitch region, they can be approached from different “angles.” Once the described concepts are internalized, intuition should take over.
The same principles also apply for the high register and the top notes.

- When applying dorsal tonguing, “articulation contact points” are shifting according to the relative arch positions. The tongue tip rests on top of the lower teeth. The same principles also apply for the high register and the top notes.

The High Register

- This subchapter is divided into three parts:
Overview; Description of Pitch Regions; A Few More Considerations

Overview

- We are looking at four overlapping pitch regions in the high register:
Bb2 down to E2, C3 down to F#2, D3 down to Ab2 and E3 to Bb2.

- Each vowel position works with a full set of valve combinations from 0 to 2 to 1 to 1/2 to 2/3 to 1/3 to 1/2/3.

Description of Pitch Regions

- The region from Bb2 down to E2 requires a tongue shape that resembles the high back rounded vowel of ⟨u⟩ (like in the English word “b**oo**t”) so that the arch occurs in the *back* of the tongue.

- The region from C3 down to F#2 requires a tongue shape that resembles the high central rounded vowel of ⟨ʉ⟩ (like in the Swedish word “f**u**l”) so that the arch occurs in the *middle* of the tongue.

- The region from D3 down to Ab2 requires a tongue shape that resembles the high front rounded vowel of ⟨y⟩ (like in the German word “**ü**ber”) so that the arch occurs in the *front* of the tongue.

- The region from E3 down to Bb2 requires a tongue shape that resembles the high front unrounded vowel of ⟨i⟩ (like in the English word “fr**ee**”) so that the arch occurs in the *very front* of the tongue.

A Few More Considerations

- Don’t overarch when approaching ⟨ʉ⟩, ⟨y⟩ and ⟨i⟩; all regions in the high register make use of the same relative distance to the palate.

- Shifting the high register tongue arch from the back to the middle and finally to the front of the tongue implies dropping the back of the tongue slightly when applying the ⟨ʉ⟩, ⟨y⟩ and ⟨i⟩ positions.

The Top Notes Territory (aka TNT)

- This subchapter is divided into two parts:
Overview; Description of Pitch Regions

Overview

- The strategy of employing different vowels to facilitate the production of different pitch regions only goes so far. In order to reach the top notes we have to employ the fricative consonant[4] [ç] and the sibilant fricative consonant[5] [s].

- Both consonants have to be articulated very forward and "up" in the mouth and require a very narrow, compressed tongue shape that is generated via lateral movement.

- We are looking at two overlapping pitch regions in the top notes territory (from here on referred to as TNT): G3 down to C#3 and C4 down to F#3.

- Each consonant position works with a full set of valve combinations from 0 to 2 to 1 to 1/2 to 2/3 to 1/3 to 1/2/3.

Description of Pitch Regions

- The region from G3 down to C#3 requires a tongue shape that resembles the fricative consonant [ç] (like in the English word "**h**uge" -- the "**h**" articulated uncommonly forward in the mouth) so that the arch occurs in the *very front* of the tongue/oral cavity.

- The region from C4 down to F#3 requires a tongue shape that resembles the sibilant fricative consonant [s] (like in the English word "**s**in" -- the "**s**" articulated uncommonly forward in the mouth) so that the arch occurs in the *very, very front* of the tongue/oral cavity.

[4] Fricative consonants are produced by forcing air through a narrow channel made by placing two articulators (e.g., the back of the tongue and the soft palate) close together. The turbulent airflow is called frication.

[5] A particular subset of fricatives is the sibilants: In addition to forcing air through a narrow channel, the tongue is forming a groove to further increase the intensity of the air stream.

Section 3

Embouchure

Premise

- The embouchure allows the lips to

1) Set the compressed wind into motion, and

2) Function as a secondary air valve.

Components

- Two opposing muscle contractions work in conjunction to create the tension necessary for lip vibration: The circular muscle around the mouth and a combination of the muscles of the mouth corners and chin.

- Additionally, jaw position is vital to proper embouchure formation.

Lips

- The lips should always be flexible and moist to move freely in the mouthpiece.

- The *Orbicularis Oris* -- the circular muscle around the mouth -- is the basic ingredient of the aperture. When ascending it slowly activates, incorporating mostly the lower lip at first (being the more accessible one) and both lips in the high register/TNT, and gradually relaxes when descending. An essential part of successful trumpet playing, the movements of the *Orbicularis Oris* are very subtle and work hand in hand with the efforts of the tongue.

- Some players use additional lip compression settings, sometimes referred to as *closed embouchures*, to increase air resistance by *rolling in* the upper lip (in some cases both lips) when approaching the high register/TNT. Be aware though, that many symphony and jazz players dismiss these methods since they tend to have a negative impact on sound quality. That said, I do advise practicing rolling the lips in and out and learn to play with a *closed embouchure* setting as a useful *flexibility exercise* that will raise awareness of lip movements and will help you activate the *Orbicularis Oris* when playing with your regular embouchure.

- In the low register both lips vibrate. In the middle register the upper lip vibrates more than the lower lip. In the high register/TNT, it's mostly the upper lip that vibrates. Therefore: Beware of excessive mouthpiece pressure toward the upper lip in the high register/TNT. Mouthpiece pressure should always be minimized to the amount necessary to seal the lips.

Mouth Corners & Chin

- Several muscle groups surrounding the *Orbicularis Oris* accompany its efforts:

1) The two *Buccinators*. Attached directly to the *Orbicularis Oris* on both sides of the face, their functions are pulling back the mouth corners and compressing the cheeks against the teeth when blowing.

The *Buccinators'* responsibilities in the trumpet universe are helping to keep the *Orbicularis Oris* in place and making sure there is no unintentional cheek puffing.

2) The *Depressor Labii Inferioris.* Attached directly to the *Orbicularis Oris,* its function is to draw the lower lip down and flatten the chin.

Brass playing demands a powerful *Depressor Labii Inferioris,* because otherwise it will interfere with the actions of the *Orbicularis Oris* as it tires.

Teeth & Jaw

- The teeth rows have to be vertically aligned to maintain the seal of the lips. You do this by:

1) Opening the jaw[6], and

2) Using the appropriate mouthpiece/instrument angle for your teeth configuration.

- Be aware: The movements of the tongue have to be independent from the jaw. I recommend doing exercises away from the instrument, incorporating a mirror.

[6] Actively opening the jaw has further advantages: Increasing the size of the oral cavity allows for a bigger, more resonant sound. Also -- particularly in the low and high register -- opening the jaw helps maintain the necessary air flow (lots of air [quantity] in the low register; fast air [pressure] in the high register). See also: Section 1.

Section 4

Arms & Hands

- Activating abdominal support generates tension in the torso. Nevertheless, make sure that it doesn't invade your shoulders, arms and hands; they should always stay as relaxed as possible.

Arms

- The forearms should form a ninety-degree angle to each other, allowing for free and unrestricted breathing.

Left Hand

- The left hand grip determines the angle of pressure from the mouthpiece to the lips when *gently* pulling the valve cluster toward you in order to maintain the seal of the lips. The grip of your choice should:

1) Apply any pressure mainly to the lower lip.

2) Not hamper the dexterity of the right hand valve actions.

3) Allow free access to the valve slides.

- To avoid distorting the embouchure, allow the instrument to gently move when changing partials. Depending on your teeth formation, you have to find your combination of angle (left to right) and pivot (up to down).

Right Hand

- The right hand's primary function is to operate the valves.

- The three valve fingers should be slightly curved and their tips should be placed on top of the valve buttons.

- The ring finger is especially stubborn. It needs extra attention.

- Keep the pinky finger on top of the pinky ring, unless you need to free your left hand.

- Place the thumb under the lead-pipe either around the first valve casing or between the first and second valves.

Section 5

The Daily Show

Warm-up, Routine, Practice, Play

- We are looking at four very different scenarios here that should not get mixed up with one another. Ideally your daily trumpet workout should deal with all these components.

1) Warm up: Preparing the body for playing. (E.g.: Focusing your attention on the breathing apparatus; increasing blood flow in the embouchure area [fluttering, free buzzing]; warming the trumpet to body temperature...)

2) Routine: A set of exercises for maintenance purposes.

3) Practice: Exercises that deal with problem areas to work on (as opposed to areas that you are good at).

4) Play: Literally what the term suggests…

General Workout Strategies

- If you want to systematically improve your range, endurance and technique over a period of time, it isn't only important to practice regularly but it is also important how you practice.

- Trumpet playing relies on unconscious muscle memory. The way you build this is by lots of repetition. But it is essential that your form be right, so that the repetition is setting good and efficient habits.

- Most method books move way too fast into the stratosphere and most études address ten technical problems in four bars. Don't waste time with this stuff.

- Start creating your own exercises as soon as possible. Try to isolate a technical issue and come up with a short exercise that can be repeated many times without totally tiring you out.

- Ninety percent of your practice should be done in a range that is comfortable. Trying to hit high/top notes over and over isn't helpful. The high register/TNT needs time to develop. You develop by building a solid foundation in the low and middle register.

Specific Workout Strategies

- Strength: Do isometric lip exercises (aka long notes, played softly and in a most comfortable pitch zone). Isometric lip exercises away from the instrument are also useful.

- Flexibility: Do range of motion lip exercises (aka lip slurs). Be aware that the lips, tongue and wind work hand in hand when doing them.

- Articulation: Practice single tonguing (staccato, portato and tenuto) and multiple tonguing (double and triple) with a metronome daily, also tons of breath attacks, "Q"-tongue attacks and flutter-tonguing. If you can't do these articulations cleanly, you don't yet play efficiently.

- Dynamics: Work on crescendos, decrescendos and different dynamic levels; besides the obvious benefits of improving these, you will also increase air flow awareness.

Some More Thoughts and Suggestions

- When your embouchure is tired, rest!

- Ice cubes held against the inside of the upper lip help reduce swelling when you have overdone it.

- Make sure to stay hydrated at all times, and be reasonable with spicy food and salt, particularly before a performance.

- Do mild forms of exercise like jogging or bicycle riding regularly.

- I also recommend tai chi and yoga (to make sure that you stay flexible) and Alexander technique (for good posture).

Section 6

Prescriptions (Don't OD!)

Circular Breathing

- This technique allows you to expand your breathing-out cycle beyond the natural limitations of your lung capacity. After the initial air intake through the mouth, subsequent breathing in is done through the nose.

- Three preparatory exercises:

1) Fill your mouth and cheeks with water and push a stream of water out using your tongue and cheek muscles.

2) Do the same thing while breathing in through your nose.

3) Use air instead of water.

- Be aware that playing with puffed cheeks demands increased lip compression.

- Always remember to relax your abdominal muscles when taking a breath.

Didgeridoo

- The didgeridoo is the predecessor of the trumpet, introduced a couple of thousand years ago.

- Using very slow lip vibrations (compared to the trumpet), playing the didgeridoo is great for embouchure relaxation after a tiresome workout.

- Circular breathing on the didgeridoo requires more air quantity than on the trumpet.

Double Pedal Tones

- Practicing double pedal tones is helpful in many ways: softening the center, increasing the ability to vibrate, improving the ability to seal the lips, preparing to incorporate a more rolled-out lower lip in the embouchure setting, learning to be flexible with the lower jaw opening, etc.

Flageolets

- The siblings of the pedal tones and the oral cavity tones, flageolets help fine-tune the upper lip for very high frequency production.

- They are produced without support from the abdominal muscles.

- Flageolets are generated by switching to an embouchure setting that incorporates only the upper lip in the mouthpiece.

Free Buzzing

- Free buzzing without the mouthpiece requires the lips to be considerably closer together to create the vibration than when playing the instrument. Contrary to popular belief, the vibrating surfaces of the lips do not touch while playing the trumpet. The surfaces vibrate concurrently but separately. Bottom line: The buzz might be beneficial in the warm-up procedure, but should not be mistaken as similar to the vibrations needed when playing the trumpet.

Lip Bends

- Lip bends are done by holding a note, lipping down to the note half a step lower (or more) without changing fingerings, then returning to the original pitch. You can also lip up, which is even more demanding.

- Be aware though that the tongue and the lips work hand in hand here.

- This method, used to play melodies on natural trumpets before valves were invented, forces you to overcome the physics of the overtone series.

- You not only gain more lip flexibility doing this but will increase tongue strength and control, too. Furthermore you will work toward a more efficient lower lip position in the embouchure setting (and therefore a better lip seal). Last but not least, practicing lip bends helps locate the true center of the original pitch.

Mouthpiece Buzzing

- Mouthpiece buzzing helps accustom the player to using more air. The greater airflow allows the lips to relax and vibrate more freely, producing a more resonant sound.

- Since buzzing while holding the mouthpiece in your hand can lead to alterations of posture, using a buzzing device such as "The Berp" attached to your trumpet might be to your advantage.

Mouthpiece Buzzing (Continued)

- Do slow glissandos up and down, and make sure to produce continuous, smooth tongue movements.

- Using breath attacks instead of tongue attacks help develop lip responsiveness.

- Lip vibration is supported by the feedback of the instrument while playing. This means that mouthpiece buzzing is more demanding than regular playing.

Oral Cavity Tones

- Oral cavity tones are good for figuring out your tonguing strategies because they demand a very efficient tongue/aperture configuration. That's why practicing them increases the reliability of your embouchure.

- Oral cavity tones are generated by using only the air in the oral cavity without abdominal muscle support.

Split Tones

- During regular playing, the upper and lower lips vibrate at the same speed. If, however, the lips are set to vibrate at different speeds, two pitches may be perceived. When done intentionally, this multiphonic effect is referred to as split tones.

- Split tones are generated by aiming for the higher note, pushing the lower jaw a bit forward and pursing the lips a little more than normal. From the higher note a second, lower note should come out simultaneously. Be aware: Both notes are initiated by the embouchure here (unlike "growling," where an additional pitch is produced by the throat).

- When *not* done intentionally, split tones are indicated as "double buzzing," a consequence of fatigue.

Whistling

- Whistling is helpful for improving independence of the tongue movements from the jaw.

- Practice slow glissandos and tongue trills in front of a mirror and make sure the jaw is kept stationary.

Epilogue

Although it is very helpful to look at trumpet mechanics from an analytical angle, you shouldn't get obsessed with the methodology.

This is particularly important when in a performance situation: Don't analyze yourself and your playing in front of an audience. In this case, you are asking questions rather than issuing statements.

Be aware: Making music is an entirely different animal than what I have been talking about in this essay!

When you practice, this is the time to condition reflexes through repetition to form good playing habits.

When you perform in public you have to focus entirely on being a storyteller of sound.

Appendix 1: Mouthpiece Components and Choice

The Four Main Mouthpiece Components
(taken from the *Bach Mouthpiece Manual*)

1) Rim
- Wide: Increases endurance.
- Narrow: Improves flexibility, range.
- Round: Improves comfort.
- Sharp: Increases brilliance, precision of attack.

2) Cup Diameter
- Large: Increases volume, control.
- Small: Relieves fatigue, weakness.

3) Cup Depth
- Deep: Darkens tone, especially in the low register.
- Shallow: Brightens tone, improves response, especially in the high register.

4) Throat
- Large: Increases blowing freedom, volume, tone; sharpens high register.
- Small: Increases resistance, endurance, brilliance; flattens high register.

Mouthpiece Choice

- Symphonic mouthpieces are mainly about sound quality and flexibility. Select the largest size (deep cup, large cup diameter and large throat) that you can get away with.

- Lead mouthpieces are mainly about an easy upper register while still offering an acceptable sound and some flexibility. Select the smallest size (shallow cup, small cup diameter and small throat) that you can get away with.

- Jazz mouthpieces tend to fall somewhere in between.

Mouthpiece Placement

- You'll want to place the inner rim of the mouthpiece just above the vermilion border, where the red of the upper lip and the skin meet.

The Bent Mouthpiece

- If you have a *severe* overbite consider purchasing a bent mouthpiece. The advantage is improved sound projection and lesser pressure on the upper lip.

Appendix 2: Recommended Reading

- Arnold Jacobs: *Song and Wind*

- David R. Hickman: *Trumpet Pedagogy*

- Donald Reinhardt: *Encyclopedia of the Pivot System*

- Frank Gabriel Campos: *Trumpet Technique*

- Herbert L. Clarke: *Clarke Studies*

- James Thompson: *The Buzzing Book*

- Jeanne G. Pocius: *Trumpeting by Nature*

- Jeff Smiley: *The Balanced Embouchure*

- John Haynie: *Inside John Haynie's Studio*

- Malte Burba: *Brass Masterclass*

- Roger Ingram: *Clinical Notes on Trumpet Playing*

- Sam Pilafian and Patrick Sheridan: *The Breathing Gym*

- William A. Thiecke: *The Art of Trumpet Playing*