

Brass Instruments: General Topics

“Universal” Technical Issues

- The embouchure/lip vibration. The sound on a brass instrument is produced when air passes through the lips, creating a lip vibration. The most efficient embouchure formation closely resembles the resting position of the mouth. As air is blown through the lips and they begin to vibrate, a small opening produced by the air passing through the lips, called the aperture, is formed. The rate of vibration, determined by the velocity of the air passing through the lips, determines the level (high or low) of the pitch, with faster air being used to create a higher pitch, and vice versa. Students should be discouraged from trying to consciously manipulate the aperture using the embouchure muscles.
- Volume. Louder dynamics are created by passing a greater volume of air through the instrument, and vice versa. The aperture will be somewhat larger for a given note at a louder volume than at a softer one. Again, though, do not give too much thought to the aperture.
- (It should be noted that the effects of air velocity and air volume on the sound produced are more complex than the above statements imply. The above is an oversimplification, but tends to work “in practice.”)
- Mouthpiece placement. For essentially all the brass instruments the vertical placement of the mouthpiece on the lips varies between 1/2 upper lip—1/2 lower lip and 2/3 upper lip—1/3 lower lip. The horn is an exception to this, with the predominantly upper lip placement being largely preferred. Predominantly lower lip placements can cause difficulties for all of the brasses, and are not recommended.
- The oral cavity. The size and shape of the oral cavity is vitally important in determining both pitch and quality of tone. Regarding pitch, the shape or “syllable” used can easily manipulate the velocity of the air and, consequently, the pitch. A closed syllable, like “ee,” will cause a fast air speed and, consequently, a higher pitch. A more open one, like “oh” or “aw,” will cause a slower airspeed and, consequently, a lower pitch. “Ah” seems to be a good, “middle of the road syllable.” Additionally, having as open an oral cavity as possible for a given pitch allows for the most resonant tone possible—excess tension will result in a tense, unpleasant sound, while being too open will cause the sound to become “woofy.” Creating and maintaining an open oral cavity can occur quite efficiently with correct breathing.
- The breath. The breath must be as full, yet as relaxed as possible. Regarding the oral cavity, breathing with an open mouth is the most efficient means of creating that condition inside the mouth; after that one only needs to bring the lips together and blow. An elaborate “ritual” of “setting” the embouchure, while practiced by many players, is unnecessary and counterproductive. Regarding the amount of air taken in, the typical adult can take in 5-6 liters of air, if they fill up completely. I do not advocate attempting to take in one’s full capacity, as this creates a great deal of tension. Instead, I advocate pushing forward with the abdomen slightly to allow the diaphragm to descend, and breathing in, expanding primarily in the lower chest and abdomen, and very little in the upper chest. This only allows one to take in 80-85% of his or her full capacity, but it keeps any tension low in the body, and out of the upper chest and throat where it might cause problems with tone quality. Additionally, I advocate breathing in continuously until beginning the note, as holding the air creates tension, and usually results in an explosive attack.
- Articulation. “Tonguing” occurs when the tip of the tongue briefly interrupts the outward airflow, causing a “t” “attack” on the beginning of a note. For the basic articulation on a brass instrument, the tongue strikes near where the upper teeth meet the gum, as when one says “tah.” This can be modified to “tee,” “toh,” etc. as the needs for oral cavity size necessitate. Some also advocate “dah” – this is sometimes helpful, but the “d” is not appreciably different from the “t,” in my opinion (the tongue strikes in essentially the same place). A harder articulation can be achieved by allowing the tongue to remain “planted” somewhat longer, causing an air buildup; softer by allowing the tongue to only briefly graze the gum.
 - Legato vs. Staccato. This is an area in which there is more misinformation than information among brass players. The difference between staccato and legato lies primarily in the nature of the END of the note (is it connected to the beginning of the next note, or separated from it?). Now, what does this have to do with how hard or soft a note is articulated? Almost nothing. Young trombonists especially are frequently taught to “tongue softly for legato.” No good teacher will say “tongue hard for staccato,” but this is what students assume when taught that “legato = soft tonguing.” The difference between staccato and legato lies not in how hard or soft the attack is, but in whether or not the end of one note is connected to the beginning of the next note by means of CONTINUOUS AIRFLOW. This concept, by the way, also aids in slurring on valved instruments and woodwinds – often we learn that slurring is “the absence of tonguing,” without coupling that with continuous air. Focus on keeping the air steady as you slur – I promise it will make a huge difference!
 - Multiple tonguing. Obviously, one can only say “tah” repeatedly up to a certain rate of speed; eventually one can go no faster. We use what is called “multiple tonguing” to allow for faster articulation. This is achieved by interjecting a “kah” syllable in the articulation pattern, using patterns such as “ta-ka” for double-tonguing and “ta-ta-ka” or “ta-ka-ta” for triple-tonguing.
 - Acoustics and Intonation. Brass instruments are constructed so that they operate on a certain harmonic series. Trombones and three-valve brasses, for example, have seven fundamental pitches (extra valves add more of them); other pitches are produced

by “overblowing” to the different overtones or “partials” of these pitches. These partials each have certain intonation tendencies, as indicated in the overtone charts available online.

- Slide position length/fingering problems. The lower one goes, the more distance is required to move from one fundamental to the next. Because of this, each successive trombone slide position is increasingly farther from the previous one, and when valves are added, this difference is even greater. Because these corrections can't be made as efficiently on valved instruments, any valve combination will have inherent pitch problems (usually sharpness). Extending/pulling slides and compensating systems alleviate this somewhat.
- Temperature has an effect on brass instrument intonation, as well. Cold weather causes flatness, and hot weather causes sharpness.
- The Mouthpiece. The effects of certain mouthpiece dimensions are as follows:
 - Cup diameter. Typically, an individual with thick, fleshy lips should choose a mouthpiece with a wide diameter, and vice versa. One that is too wide will cause upper register problems with a woofy lower register. One that is too narrow will eliminate the lower register and MIGHT help the upper register to a point, but tends to stifle playing altogether.
 - Cup shape. A bowl shape will tend toward a brighter sound, a funnel shape will be a bit darker. Many mouthpieces try to achieve a combination of these two shapes.
 - Rim Shape/Size. A narrow rim tends to enhance flexibility, but limit endurance, and vice versa.
 - Bite. Sharp bites enhance accuracy, but reduces flexibility and endurance, and vice versa.
 - Cup Depth. Deeper improves low range, hinders upper range and tone in upper register. Shallower enhances upper register, but brightens sound, especially in lower register.
 - Throat. Large throats allow for greater volume, but require more air and make control difficult because of lack of resistance. Smaller throats limit volume, but are easier to control.
 - Back bore. Differences similar to those of throat – quick opening allows greater volume, darker sound, if you can control it. Gradual opening causes more centered, but softer and sometimes brighter sound.
- Vibrato. On brass instruments vibrato should normally be executed by oscillating with the lip and jaw, i.e. saying “yah-yah-yah.” In some (usually popular) genres, slide vibrato is acceptable on the trombone. Diaphragm vibrato, which is executed by manipulating the airstream, is commonly practiced by flautists but is not advisable for brass instruments.

Choosing and Starting on Instruments

- Before starting on instruments, spend a few weeks teaching basic music fundamentals (finding the beat, hearing pitch, notation, etc.). This will save you difficulties later.
- When auditioning students on different instruments, have them buzz the mouthpieces only first, then the instruments themselves. See the individual instrument readings for suggestions on choosing players for each instrument. Give the students the opportunity to try every instrument in which they are interested, and while you should try to “nudge” them toward the instruments that they play best (and/or that you need the most), give them the final choice whenever possible. Students will be more likely to excel and continue on instruments that they actually like.
- When students finally do get instruments, conduct your first “playing day” as follows:
 - Before students get anything out, have them do simple breathing exercises to give their breathing apparatuses a bit of work AND emphasize that breathing to play is different (in some ways) than breathing normally. Make sure that they breathe deeply “like swallowing a basketball,” and don't raise the shoulders. This should be a part of your daily routine.
 - Next, have them match pitches with you on the mouthpiece only. Doing a bit of mouthpiece buzzing each day strengthens the lips and the ear.
 - Now, the warm-up. Teach notes/slide positions/fingerings for exercise number 1 “by rote” first, then show them what they've played. Ideally, they will have studied notes, etc. a bit prior to this. You want to get ALL the slide positions and fingerings, as well as notes for at least one octave, covered from day one. After they've been through the exercise “by rote” once, have them do it afterwards while reading from the sheet, so that they begin to associate written notes with fingerings and sounds.
 - If you still have time on that first day, continue through some of the other exercises.
 - Scales – if you have that one octave range, and have taught fundamentals a bit already, why not go ahead and learn the concert B-flat scale (or maybe the concert F scale for horn)? This probably won't happen the first day, but could be done within the first couple of weeks. Add scales as often as you can – they CAN learn them! You may want to even supplement your beginner band book with additional materials in other keys.