Your Throat, Sinus and Mouth Resonances: Friends or Foes?

by Roger Mather

You may not realize that the air vibrations that produce your flute sound also cause vibrations of the air in your throat, sinuses and mouth (and also in your lungs, but that is a subject not covered here). These body cavities act as resonators, like an empty pop bottle when you blow into it.

The air in these spaces resonates whether or not you want it to. Your job is to adjust the size of the spaces so that their pitch is as close as possible to the pitch you're playing. This strengthens and focuses the sound. It improves the quality, the purity (for more attractiveness), and the intensity (for greater expression and projection). The flute responds faster. You seem more committed, more personally involved—as you literally are!—So that your playing is more expressive. The audience feels they're listening to a human being, not a metal pipe.

Many experienced players use some of these methods in their playing, after experimenting—perhaps unconsciously—over the years with various ways to obtain the effects they want. But most players are not especially aware of the parts of the body involved, and so may not realize how important they are for good flute playing. As a result, the methods are not widely taught.

The resonances help or hinder the playing of all the woodwinds and brasses, though their effect is greater with the flute because its own sound is usually weaker than the others'. But the wind players who have tried these techniques report they assist in turning good playing into great.

The resonances work independently of one another. So you can learn one technique at a time, postponing the next until you are comfortable with the previous ones. If you find you are not helped by a certain technique, you may not be doing it quite right (perhaps you need more development of the muscles and their control); or you may unconsciously be doing it already; or it may not be suited to the shape and size of those parts of your body.

THE SINUSES

Small muscles on each side of your nose enable you to open your sinuses for greater enjoyment of a pleasant scent. The more you open the sinuses, the more your sound improves. The sound becomes smoother and more agreeable, in both tongued and slurred passages. To cultivate these resonances, pretend you are holding a beautiful rose just below your nose and slowly inhaling its perfume; then keep that feeling while you play.

THE NOSTRILS

Flaring your nostrils adds a little edge (high overtones) to your sound, which may improve your low notes but make the high ones "edgy" (like an edgy

voice). When well developed, the flaring is automatically accompanied by a downward movement of the upper lip. This helps you direct the air more downward, especially if your upper lip is short.

THE ADAM'S APPLE

Keeping your Adam's apple (larynx) as low as possible adds depth to your flute sound in all three octaves and particularly in the bottom and middle ones. If at first you can't lower it, try yawning with your mouth closed, dropping your jaw, and/or lowering the back of your tongue.

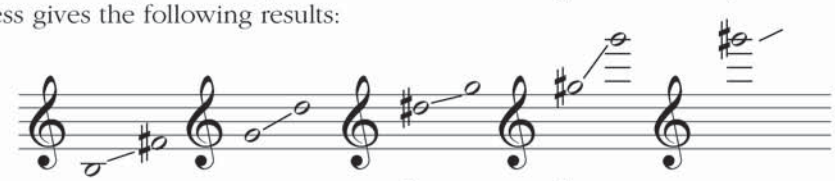
SILENT SINGING

Silent singing tunes the folds of the vocal cords to the pitch you're playing. You pretend to sing the pitches, without making any actual sound. Aim to sing the octave you're playing. When this is outside the range of your voice, use whichever octave is most comfortable. To learn this technique, first sing the passage aloud without the flute, then silently while you play.

THE VOWEL SERIES

Your playing is further helped by shaping your mouth for the vowel best suited to that pitch and dynamic level. The vowels are pure, and you sustain them: *oo* (as in "too"), *oh* ("foe"), *ah* ("ma"), *ay* ("day") and *ee* ("bee"). In playing as in speaking, the series *oo-oh-ah-ay-ee* moves from the sounds with the fewest overtones to those with the most, and from the strongest fundamentals to the weakest. If you want to write the vowels above your music, you may abbreviate them to u-o-a-e-i.

Low notes require strong fundamentals and so are best produced by the vowels at the start of the series (*oo-oh*). The fundamentals of notes above the bottom octave are themselves overtones and so are produced more readily by the later vowels (*ah-ay*). Loud notes generally have enough overtones, so the early vowels are well suited to them. For projection, soft notes need the increased overtones provided by the late ones. Combining the effects of pitch and loudness gives the following results:



fff–ff	oo	oo	oh	ah	ay
f–mf	oo	oh	ah	ay	ee
mp–p	oh	ah	ay	ee	ee
pp–ppp	ah	ay	ee	ee	ee

THE MOUTH AND THROAT

To shape your mouth for the best results on each pitch and dynamic, it helps to understand that the mouth acts as a cavity (Helmholtz)[1] resonator such as an empty pop bottle. This kind of resonator is fairly wide compared with its length, in contrast to the flute and other wind instruments, whose length is many times their diameter.

The pitch of a cavity resonator falls as the area of its opening decreases and/or its volume increases. Try blowing across the top of an empty pop bottle. You can hear the pitch fall if you partly cover the opening of the bottle with tape. You can hear the pitch rise as you gradually fill the bottle with water to decrease the volume of the air cavity. What counts is the relationship between the volume of the cavity and the area of the opening, not their actual measurements. In contrast, the pitch of wind instruments depends only on the length of the tube between the embouchure and first open hole (aside from playing harmonics).

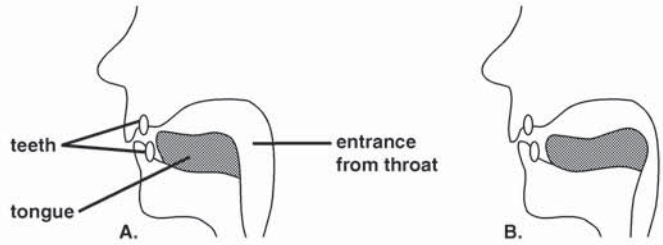
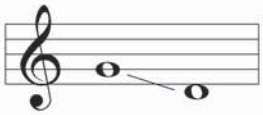


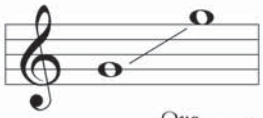
Figure 1: *Positions of the tongue A. forward; B. back*

For flutists, the mouth cavity opening that counts is the one leading to the throat, because the lip opening is too small to have an effect. You reduce your throat opening by moving the rear of your tongue back (see Fig. 1). Vice versa to enlarge the opening. The positions for the rear of your tongue are, approximately:

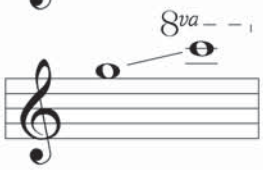
- Below G^1: gradually farther back as you go down the scale; all the way back by D^1;



- G^1–G^2: no effort to open or close;



- Above G^2: gradually further forward as you go up the scale; all the way forward by C^4.



The volume of the cavity is controlled by 1) how close the top of the tongue is to the hard (front) palate, 2) raising and lowering the soft palate and 3) the inflation (if any) of the cheeks. Always keep your throat as large as possible just below the throat opening, to make the lung resonances more effective.

Adjusting the positions of the middle and tip of your tongue improves the strength and attractiveness of your sound as you change the dynamic level. Place the middle high and the tip forward to increase the overtones for focusing soft notes; place the middle low and the tip back to decrease the overtones for loud ones, since they may otherwise be too strong. For a loud high note, bunch up the tongue so that the rear is forward and the tip back. A low soft note requires the tongue to be elongated. Among the vital differences between a fortissimo high G and a pianissimo low D are the positions of the rear, middle and tip of the tongue, even though the best vowel for both notes is probably *ah*.

The following three sections show how you can move various parts of your mouth to change the pitch of its resonance.

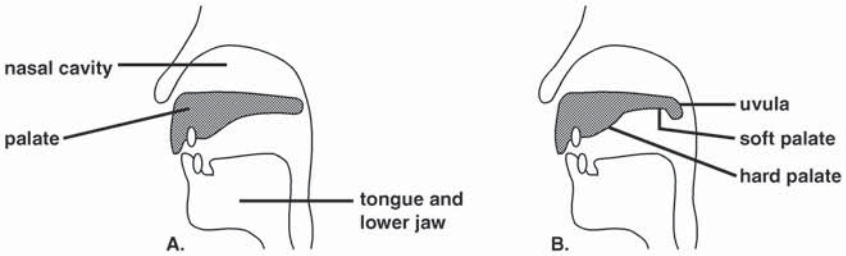


Figure 2: *Positions of the soft palate a. raised; b. lowered*

THE SOFT PALATE

You can raise and lower the soft area (velum) toward the rear of the palate, which ends in the uvula (see Fig.2). Raising the soft palate enlarges the opening at the back of the mouth, which helps high notes but weakens low ones.

Raising the soft palate blocks the passage from the mouth to the sinuses; opening the sinuses then has no effect. On high notes, experiment to find whether raising the soft palate or opening the sinuses gives you better results.

THE JAW

Dropping your jaw tends to lower the middle of your tongue and draws back its tip. (The rear of the tongue is close to the jaw hinge and so hardly rises or falls.) Therefore dropping the jaw increases the volume of your mouth without altering the area of the opening to your throat. The result is to lower the pitch of the resonance to favor low and loud notes. Dropping the jaw also directs the air jet more downward, which further helps low notes. Raising the jaw reduces the volume of your oral cavity, which improves high and soft notes.

Notice that your jaw moves back a little as you drop it, and vice versa. You may want to move backward and forward deliberately to adjust your embouchure for different registers. Most players find it best to keep the jaw fairly far back while advancing the lips, to assist both the embouchure (in blowing down enough) and the mouth resonance. The best jaw position varies with the pitch and dynamic level: forward and up for high and soft notes, back and down for low and loud ones.

Check your jaw hinges occasionally to be sure they stay relaxed. This is one of the first areas to tighten when you have negative feelings. Relaxing the hinges requires you to push the flute no harder onto your chin than absolutely necessary. It also requires you to tense the jaw-closing muscles only just enough to support the weight of the flute. The jaw-opening muscles should stay completely relaxed.

THE CHEEKS

Relaxing your cheeks completely lets the air pressure inflate them like a balloon. This enlarges the oral cavity, rather like lowering the middle of the tongue and dropping the jaw, to help loud and low notes. If you find that inflating the cheeks changes your embouchure, firm up the cheeks and/or the embouchure.

TIMING THE CHANGES

Just how a note is started conveys much of its feeling. Therefore for a large interval, whether tongued or slurred, start changing your resonances (as well as your embouchure) toward the end of the first note. That way you start the second one with the proper pitch, loudness and sound quality with everything fully in place. If you wait until the first note has completely ended—the natural tendency, unfortunately—the start of the second will be off pitch, weak or blurred.

For the same reasons, when playing a scale or arpeggio up or down, aim to make the changes a note or two ahead. At the end of a note not followed immediately by another note, keep the proper resonances operating until *after* the sound has stopped.

Yes, it's a certain amount of work to make these resonances work for you, to climb to the higher plateaus of playing they provide. But once you're there, you'll probably be quite surprised how enjoyable, expressive, effortless and effective your flute playing has become.

CREDITS

This article is excerpted from: Roger Mather, *The Art of Playing the Flute*, Romney Press, Iowa City, 1989, Volume III, 41-53. The material was also presented in workshops at the NFA Convention in New Orleans, 1989.

ENDNOTE

[1] Helmholtz (1821-1894) was a German physicist and physician credited with many discoveries. His name is often used for cavity resonators because of his pioneer work with them.

ABOUT THE AUTHOR

ROGER MATHER shared the teaching of flute majors with his wife, Betty Bang Mather, as Adjunct Professor at The University of Iowa from 1973 until their retirement in 1996. He has served on many panels and given many workshops and master classes regionally, nationally and abroad. In addition to the three volumes of *The Art of Playing the Flute*, he has published numerous articles on flutes and flute playing. He is a member of the NFA Editorial Board. His main teachers were Georges Laurent, Principal, Boston Symphony; James Pappoutsakis, Boston Symphony; Fernand Caratgé, Principal, Paris Opéra Comique and Lamoureaux Orchestra, Paris; and Lucien Lavaillotte, Principal, Paris Opéra. He studied piccolo chiefly with George Madsen, Boston Symphony; Ben Gaskins, New York Philharmonic, NBC and Chicago Symphonies; and John Krell, Philadelphia Orchestra.