

# Arnold Jacobs Masterclass to the International Trumpet Guild, *University of Wisconsin, 1978\**

*Note - The following transcript was done by an unidentified source and edited by Brian Frederiksen. While there is no identification of when this masterclass was given, it has been identified to be from the International Trumpet Guild, University of Wisconsin, in 1978. Graphs inserted are from Arnold Jacobs: Song and Wind. Subject headings have been added for convenience. This has been copyrighted to protect the usage content. - Brian Frederiksen*

## *Introduction*

Mr. Jacobs ...

I see many familiar faces out there and I am just wondering how I should conduct this clinic. A good portion of you have been in my studio at sometime or other. All those who have, will you just raise your hand. Thank you.

Usually you start a clinic with a question and answer series. I know that there is a trumpet symposium here and it should be dominant. May I ask are there any other brass players here?

This is supposed to be an hour and a half get together and we are going into a topic which can be handled in several different ways.

When people talk about respiration and its application to brass instrument playing, they are primarily interested in practical application, something that might be helpful and maybe enlarge their understanding of what we do.

As a teacher I am frequently called on to explain a great deal about it which would include anatomy and includes many types of topics which I do not think the average musician is really interested in or even able to receive without a diagram and in a short period of time. I thought that to be of some potential use to you folks I would kind of go a little bit easy on the potential aspects and see if we could govern the practical grounds as to how we apply these to trumpet playing and other brass instruments.

## *Vibration of Woodwind, Brass & Vocal*

I want to bring off something in a sense that the woodwind player has to take a breath, he has to have air. He acquires himself to his instrument, actually the pressure of the mouthpiece I suspect, has to do with some of the ligaturing aspect. I do not know these instruments well, I am used to listening to them but I do not play them.

I have to be a little vague about this but I note that pressure seems to go along with the ligaturing aspect of the reed or clarinet. It has to do with some of the pressure aspect for the ovalness but mainly he blows to vibrate a wooden reed.

As brass players, we blow to vibrate the flesh and blood part of ourselves and there is really a very definite and very important difference in the psychology in what you do. As an illustration, we belong to the vocalist in our musical application in a sense of physical application. The musicianship of the woodwinds has to be every bit as good and in many cases they are probably much better than that of a brass player. In a sense of a tuba versus somebody like Ray Still on oboe, the potential is to acquire this first grade.

What I am trying to indicate right at the start of this lecture, is that the woodwind player applies himself to his reed through his breath. He blows to vibrate a piece of wood if that reed is not responsive, usually, he will take a little knife out and shave it down and work with it a bit, if its no good then he throws it away. You can't very well do that with your embouchure so there is a difference.

Now, the vocalist is another story, I did a study voice for many years myself. A vocalist has vocal chords, has various aspects of resonance, uses his breath, and does it in very much of a subconscious manner in terms of air. The feedback mechanism to the brain will not deliver much in the way of awareness of actual breath, in the sense of certain pressures, many things can be sensed but even more cannot be sensed.

He has thoughts in his brain that have to do with pitch, song, emotions, a message to an audience and in this he will establish, based on psycho-motor activity, a thought process that will initiate at this co-response, at a conscious level.

He will bring this response of his anatomy that he can know nothing about in terms of consciousness. For this reason he may be functioning with the reason I stress, the brass player actually is closer to the singer in terms of application of the thought process. The physical proficiencies are not the same but very, very close, much more than the woodwind instrument. We have certain requirements to sum up: there has to always be a motor source, a vibrate source and a source of resonance.

In the brass instrument, two of these belong, the source of vibration and pitch. The motor functions, the breath, are all part of the individual. I think you can see, obviously, the woodwind player, the string family, the vibratory source is not part of their own anatomy controlled by their thought processes. Their neuro-muscular arrangements as a result their problems usually are very great but their problems are different than a brass player.

I want to stress this tremendously because in the brass player the breath becomes full, it is something to be used up, something you do not have to use up in terms of great volumes. It has to be used in the prime result in order to bring about the tonal result.

Your lip does not have to respond merely because you blow, you can blow air from now to doomsday and not have an embouchure respond. You can have an embouchure that looks perfectly and responds to all sorts of external measurements and be completely unproductive, usually because its not receiving a signal from the brain.

Like the vocalist, the signal from the brain usually is what we promote. It is an art form that demands communication from others, that means the brain has to have a message that you deliver to somebody else. This is very important for the motor systems of the body to have some stimuli.

Just like when I speak to you I am using words, they are being formed by many of the parts of me that would be forming my tuba playing functions. I am using vocal chords instead of embouchure - I am using respiration phenomena - the phonation is involved.

Many complex things are happening that I know nothing about. I do know a great deal about my message but we have reflex response to stimuli. Some of our neurologists do not write in the term reflex but prefer general condition response to stimuli the habit patterns that are involved with learning speech at a child's imitation - that you have tools that you can express yourself with the dominant factor in playing a brass instrument.

When I go into the study of respiration I want you to realize that we are dealing with a segment aspect of a subject which really cannot be taken out of context or studied by itself. The needs of the embouchure set up the requirement actually for the breath. You just do not blow for an embouchure, you have to sing and the singing is with the lips, its not done by knowledge of musculature or measurements, its done very much by the knowledge of sound, by concept of tone.

There is a great deal of trial and error procedure involved in a student but the main thing I am so afraid of is when I get onto a subject of this kind that a person becomes fascinated with the subject and then they start to work on the breath and forget about the message that they are trying to deliver - you can't do this. To be successful with a brass instrument you must be very much like that singer, you must be in an art form of communication and really it should be for somebody else and not yourself.

## *Brain and Nerves*

The part of the brain that asks the question is the same part that issues the statement when we communicate to others. We have to make sure our thoughts are valid within the art form and if you get tied up into some specific analysis, for example the meaning the body or the kinetics of the body, the brain, at that time, is asking you a question when it really should have been issuing a statement.

I just want to make sure that when I go into respiration that its understood that it is a fuel, it is not a piece of gut, it is not a wooden reed and as a result the prospective must not change. We still must be making music and we must do it without the wide knowledge of how we are doing it. You do not have a nervous system in a embouchure to carry proper messages that you can be aware of. You function through a motor nerve that is a cranial nerve - it carries a message of function. If I want to scratch my head, my arm moves to my finger, touches my nose, but, this is all done through a movement system that permits me to impose my external environment one way or another.

Motor nerves are specific and they carry messages in one direction only, they carry from within, from the brain and the spinal cord, through the effectors, through the muscles. They are going to start an activity.

Sensory nerves are entirely different. Somebody touches you, you feel through the sensory nerves, you hear it with the auditory senses. You smell, you do all sorts of things with sensory nerves. In the sensory phenomena you are gathering information with the external environment one way or another.

Speech is done through the motor nerves not the sensory nerves, these are facts and so forth and are on a subconscious level. I am giving you this to state it is very important that you stay within the art form.

## *Breathing and Vital Capacity*

As we go into the study of the breath and recognize it for what it is, it is fuel and it can be quite complicated due to the function of the breath but at the sane time you will not be able to overcome it by the study of the breath.

There are physical differences between all of us. I am looking around the audience and I see that there are some that I've not met before. I see some young ladies in the audience. I see some very large people. I see some rather short individuals. The fact that there are physical differences between all of us here, some similarities, some dissimilarities and find out just what that means to us in just a moment.

I have equipment at home for measuring the lungs and bodies of the individual and there is an importance to this because the use of the breath, actually the ease of emission of the breath is not the same.

This is a report from a spirometer of a youngster of about 12 years of age. This young man was sent to me because he was having trouble in tone production and one of the first things I do with any new student is to measure the lung volumes. In this particular instance the young man was in trouble because the teacher would play a phrase and the youngster would try to duplicate that phrase. The amount of air this youngster had was 2-1/3 liters and he was competing with a teacher who actually had. 6-2/3 liters of air.

Using a spirometer, you put a tube in the mouth and blow your breath as rapidly and as completely as you can, it has a revolving drum and as you blow, the interior of this unit raises up due to the air pressure going in. The pen moves up and moves down and writes on the revolving drum - so we measure the quantity and the velocity of the air and the velocity is imparted to show the state of the airways and how much air could be used in playing the instrument and particularly the high flow instruments like the trombone and tuba and moderately for the trumpet.

Anyway, here is a little fellow with a tiny lung capacity taught by a fellow with a huge lung capacity. This youngster could not begin to sustain like the teacher because he has not old enough - it would be a physical impossibility. If this youngster were taught to play with the same qualities of tone but with short phrases as he has a little fuel tank, he can refill his tank instead of trying to make it last. It would be a very healthy situation, even at an early age, he can come to a fine quality of tone but he just cannot make it last very long. He should be taught phrasing but he should not have to do the complete phrase of the adult because of not having a large fuel tank of air, he has a very tiny one. Now, here is a youngster with 2-1/3 liters and a teacher with 6-2/3 liters of air.

I have students here from all over, I won't mention their names. There is one, the former first trumpet player of the Minneapolis Symphony, Steve Chenette who has 7 liters of air. I couldn't measure all of his vital capacity - actually, it was beyond the equipment I was using!

This is an important subject for one reason and one reason only. I want to explain when you breath in there is always an enlargement - it's like a bellows, a rather simple process when you think of it in terms of human effort. When you yawn, you are just simply taking in large volumes of air. Nature is wonderful, it is just a fabulous thing in a sense that we have parts of our body that can expand no matter what position we are in.

It causes trouble for brass players occasionally. I had one student on horn that came to me with a respiratory problem. This student put the horn tight into the rib cage and the bell against the ribs. I found one lung functioning and one lung not functioning - who on earth can play with just the one lung in a sense that this was a small individual. As a result, there was an inadequate ventilation of the lung, there was an inadequate fuel supply because the ribs could not raise up and enlarge.

The diaphragm already had a very considerable pressure in this alignment - a tilt to the right and a rib being stuck to the bell in the ribs with the respiratory activity all on one side. This is a very severe problem in a small individual. A very large person with 6 liters could get by, a small one with 5-1/2 to 4 liters would not get by because it would be half of that figure.

I have another very good friend, a trombone player - and in playing a trombone I see this most frequently, not so much in trumpets, but the weight of the trombone gets a little heavy. The first thing the left elbow is digging into the side, you watch the inhalation one side and no movement, nothing is happening. One side there is considerable ventilation

of the lung going on but again this student was throwing away, maybe, 40% of his usable lung power capacity, merely because of crowding of the rib cage. The tilting upsetting the diaphragmatic activity, a malfunction caused primarily by postural defects. If there are short phrases and you do not require great amount of lung volume, it makes no difference, you'll get by very nicely but if you had to tax yourself, then, you might really miss that extra 40% of lung volume that you would of had.

We are structured so that no matter what position we are in we can take enough air to survive.

(Mr. Jacobs asks for a person to lie flat on their back as an illustration for the development of diaphragmatic breathing.)

At that time there is a pressure on the back of the ribs, where on a hard surface for instance, you will find that the ribs actually are not very maneuverable, they are already in the expanded position. They are already in a somewhat enlarged position as you lie on the back and about the only reason that you have the respiration, is the diaphragm.

As the diaphragm descends you will always see the abdominal rising - there is maximum of efficiency. If you immobilize the ribs, the average individual will move about 45% of his total lung volume of usable air. That leaves 55 % of which he is not using, which could be activated, with the use of the rib cage.

They use the illustration of diaphragmatic breathing for the new born child. When the child is first born, he is born at right angles to the spine. He is born with his chest in the enlarged position and all he has to breathe with is the diaphragm and there is nothing else. It is a small breath compared to the full.

As a child assumes the upright position by the age of 2 or 3, the ribs begin to move down and begin to have the mobility, but, the first year they do not have it, it is diaphragmatic breathing only.

The diaphragm, is responsible for 45% of the breath in some individuals, 40% in others and can be as high as 50%, depending on the body type of that individual. If you are standing up, we will say you're reaching back in the center and your chest is expanded. In stretching upward you must breathe with the diaphragm in that position because your chest is already enlarged it cannot move. You have enough air to sustain life. If you bent way over to the right, this way, in exaggeration of the horn, you still have mobility of function on the left side.

You can take air to sustain life as you only need a half of liter to a liter of air in what we call residual air. Breathing for just whatever you are doing as long as it is not massive physical labor. But anytime you maneuver, you are cutting out part of the respiratory system to bring air in. In the upright position you can bring all facets of your lung volume because there is always some parts of you that can expand for taking parts of breath. But

to take in quantitative breath you must be in the upright position to take the full potential that we would measure in the type of testing that I am doing.

The reason that I think it is terribly important so many of you have been involved in sports, those of you that are trained well in sports will realize that there is a phenomena for following through. In bowling, which I do very poorly, you just do not throw the ball at the pins you bring your hands out in a certain position. I talked to many golfers, they must know where their clubs are, they know where the ball is, they also know what happens after they hit the ball, where they follow through with the club. The follow through is very important. With the organization of the body, we go to the fact of the motor involvement to bring in the efficiency of the motor systems in the body, we need to study the follow through.

You have the same thing in the respiratory activity - from full to empty back to full. What it involves the brain below the level of consciousness where you would begin to try to control the very parts of you, that you bring it into a unit activity by merely taking in a massive yawn. It is one of the simplest motions if you get out of the way of the breaching of the brain that retards it. It is done not by how you expand but by embouchure, there are guiding levels of our brain.

There is one level I will not go into, a very complex subject, but it has very much to do with what happens in the organizing of the body to carry out any order you wish to give. It permits you to stand, play, golf, run, or jump. It is like a marvelous computer system and it gives wonderful results if you get out of its way. You must motivate what you are trying to accomplish.

In respiration the ability to take a breath in is a very, very simple thing, there is a sound phenomena which is so important to understand because it becomes the way you order the body to give you what you want. If you take a breath that is noisy and has a sense of friction you might hear that.

(This is where he takes a breath of this type. He inhales with a small opening to the mouth).

I do not know, many of you have experienced it, but it's a sound of friction, but there is very little product in the way of fuel. You take a breath, wherever there is a reduced part (hiss), there again, we have a. a lot of friction. When I set up equipment for measuring it we find a very small amount of air, enough for low flow rates but not much quantity - just enough for the oboist.

A comfortable breath, of course, is a yawn. This young man is doing it very well. There is a procedure here which I want to indicate to you as you inhale. There is very little sound up close that we will hear, this type of sound is the sound of wind, not the sound of friction. There is a large volume of air like forming a mathematical equation. If you can produce enough air moving at a given velocity, through a given space you will have a given sound. A sound of that type, most of you that are close by can hear, would be a

large volume of air, not say, some friction but moving freely into the airways, into the lungs. I am adding that by not any awareness of my body but by tremendous awareness of the breath, not as air effort but actual air in terms of quantity.

We have various senses that can tell when we have large volumes of air going to the lungs. There are stretch receptors in the lungs. We have tools, but they are basically subconscious. They are not tools that you can go ahead and read meters out with, although we can do it on that level with other equipment.

The reason I mentioned this is that no matter what your body type is or whether you are small and have a small capacity or large with large capacity, there are potentials of very usable air that can be applied to your instrumental playing that can look very different to the teacher in relation to the student.

There may be startling differences and yet there might be very valid functional aspects to the breath depending on body type (Nathan, stand up) - I'm going to have this young man stand up. This young man has enormous lung capacity. He has a very long torso, a very long rib cage, very narrow. The rate of expansion, the potential is very good. He is a very long person - you are never going to see much diaphragmatic expansion.

I will tell you part of my problem, I am overweight. When the diaphragm, with the liver attached to the underside of the stomach and attached to the underside of the diaphragm, when it moves down it crowds the internal parts, the intestines, etc; You get a massive protrusion but you see I have a short rib cage. At the end of my ribs is the 10th rib, the 11th and 12th ribs, are to figure into the respiratory activity. You figure them as part of the expiratory ground. Figuring the 10th rib as part of my inspiratory system you can see right away that there is quite a difference between his rib set up and mine. He has 6-1/2 liters of air, I have approximately 4 liters. I would like to transplant (laughter). I could use it and I have other students that have even more or less liters.

Generally speaking, once you are familiar with the subject you can almost tell by looking at a person what the lung capacity will be. There are formulas you follow for the surface area, mathematically you compute it with the equipment. Anyway, this is one place where the teacher, teaching diaphragmatic breathing, would get into trouble very quickly because the diaphragm would move less than mine even though I have a much smaller lung capacity to begin with.

But this gentleman will actually produce less movement of air with his enormous long chest. This is a very flexible chest - there is huge enlargement, he has this enormous lung problem (laughter). Now, in most cases a small individual will not have those. In other words, 6' 4" is one thing, 5' 4" is something else again.

In our orchestra, our trumpet player is only 5 ft 7 in, he has the same lung capacity of a taller man. This gentleman but he has a long body - that is what it takes - and a very flexible rib cage, very flexible musculatures and that these potential of enlargement, very great. It has to do with what happens when we take large volumes of air into the lungs.



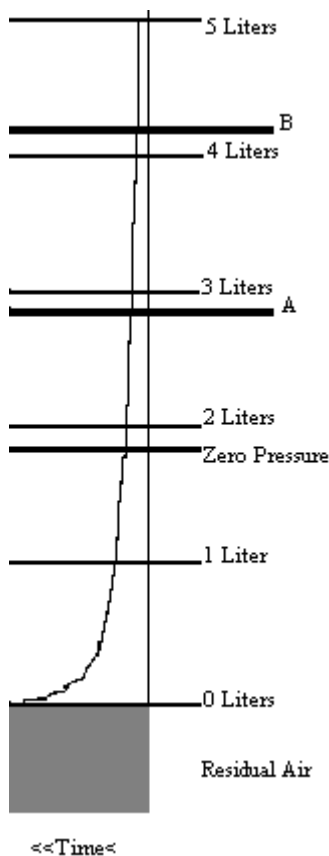
We actually have tissues that are stretched as we breath in, like rubber bands. There is a work potential as you breath in, you pull a rubber band out, you let it go, it snaps back.

## *Relaxation Pressure Curve*

We have a working potential in the tissue of our own musculature. As we expand there is a gradual increasing resistance that comes in and it can cause, you might say, a work potential in the relaxation state.

I want to go into this - I have to draw - and my art work is not great - I'd much rather play Tuba.

Spirometric test: A person puts a tube in his mouth and blows into it as rapidly but completely as he can. It might take seven seconds to take the useable part of air out of the lungs. I say useable because we have residual air which cannot be removed from the lungs by anything you can do. I know there are teachers who teach residual air when actually their thoughts are right but their terminology is wrong.



Residual air is the old legal test in medicine to find out whether a child was born alive or dead. If there is an insurance problem and a child is newly born and there is a doubt as to whether the child was born alive or dead. They remove the lungs in the dead child and if the lungs sink to the bottom a bucket of water, that child has never drawn a breath, if they float he has drawn his first breath as there is always a certain amount of air that stays in the lungs that you cannot get out by blowing - no matter how hard and completely you blow.

You start blowing the air out at high velocity and no matter how hard you blow it starts to slow up and in some individuals it will slow up drastically. In the healthy young male you figure 80% of the air can be removed in one second and in three seconds later he can remove the rest of the useable air.

I had a trumpet player come to see me in very severe distress, tonguing, which happens often, and did not think because of a tonguing problem that it necessarily will be what I am describing now. But this man had a pulmonary disease and when he was blowing his breath out he got about 4% - about this much in one second and from there on he had would be blowing over 19 seconds later. I voided the test because he had to re-breathe as he was already developing so much

carbon dioxide and so much discomfort he had to stop the test to take air in and he still had not emptied his lungs - this was a medical case and I sent him to a physician.

In many of these professional players you will find that as a man grows older his expiratory reserve begins to get a little smaller. I am going to designate this on a chart and this is not an easy subject for me to express to you and for you to understand. It is very important which is the reason I am going to talk about it. It has a great deal to do with many of the problems of the brass player - those who are not physical but psychologically we have a whole set of other ones that are terrific.

When a person sleeps at night, you have 5 liters of lung capacity or so with full inflation down to zero. There is always some there, you could blow out without breathing in. At this point, we would have a rest position of the respiratory muscles that would be about roughly 1/4 to 1/3 filled without taking a breath or blowing out. In a fresh cadaver you would have enough air that if you pushed down on the abdomen and chest you could measure the air coming out.

By taking the arms and move them back or put them in a vacuum, there would be a certain amount of air there regardless, unless you deliberately remove it at the rest position without active contractions of muscles. You will have anywhere from a 1/4 to 1/3 of your vital capacity which could be a higher amount which could be moved in or out in one breath.

One of the problems when you take a large breath, you move further and further into this curve. As you go further there is a constant increasing in the elasticity of the work effort. The elasticity - in a large man like me - may be as high as 3/4 of a pound of air pressure just by a sigh. If we measure that sigh, he would start out anywhere from a 1/2 to 3/4 of a pound of pressure and it would fall rapidly to the zero phenomena. But it could easily be as high as 3/4 of a pound of positive pressure, it falls gradually but constantly all the way down to the zero and now here we have the symptoms in reverse, the negative curve which is doing exactly 10% the opposite.

At this point, the elasticity here that is helping the air get out of the lungs, this elasticity is doing the very opposite. You have to overcome it in order to get air out of the lungs. It would help to get air in but makes it harder to get it out - and during this negative curve we have some unpleasant things happening. One of them is the interformonic pressure - here you have to push much harder to get the air out.

What you do with an embouchure just to get working potentials in the breath, you have a resistance in the embouchure, but some of this is very helpful. You go too far there are certain other problems, but this could be applied in a plus way against whatever resistance you are doing. You have an internal resistance that must be overcome before you ever do anything with the lips. This constantly increases this curve - it can get quite large. Unfortunately, as you grow older this curve becomes larger and larger, and this one smaller and smaller.

What I want to get across here, there some of the unpleasant consequences of this, as you increase your pressure you begin to collapse the air ways. You actually begin to collapse the small tubes in the lungs, it's a cycling phenomena, each thing tends to make it harder

to get the air out and also, to get the next breath. The problem is that with empty lungs, if you take a limited breath, we'll say you take a diaphragmatic breath with moderately low ribs, you take a 50% inhalation from empty, you start out in the plus curve very comfortably but within a matter of a couple of seconds, your sections are entering the negative curve. You may start out and have half a breath we'll say and it takes you half way very quickly if you have any kind of a phrase at all. You are entering a region where it gets harder and harder to get the air out of the lungs.

You will not sense it that way because the brain does not pickup these signals, you will feel it as stiff lips, sluggish tonguing, a little throat involvement, and sometimes irritation in the larynx. You get many signals which can indicate this but unless you are familiar with the subject it might be a little difficult for the individual to find. I will find it very quickly because I am very used to it and I have the material to analyze it and also the knowledge to analyze it.

This curve here is a source of great problems, but as I say, it comes near the end of the breath. There is another problem on an instrument like the trumpet. Many players pre-compress the air and then blow it. If you have very full lungs you are pre-compressing the air but you have already all sorts of air pressure. It would be when you add your own pressure to that, it could really cause spasms of the throat, you could start choking, you could be very, very uncomfortable.

There is a way of getting around it, it is very simple, it is like a study of a jar. When you take a large breath it is like having a big fruit jar or a gallon jug. You are full of air but the throat is open at atmospheric pressure internally the same thing happens. Blow all you want, gently, powerfully, whatever you want but you have to first find that zero phenomena which takes a little researching of yourself. One of the best ways to do this is to start counting one, two, three and using no air blow very simply. You are still in the plus curve and this energy is actually being applied to the breath when you need it, a very definite sense of energy.

This curve is a constant variable. If you are sustaining a note, you will find that if you go into muscle psychology and into studies of all sorts of electronic equipment which you do not need to know. Simply let me put it this way as simply as I can, your body is reacting differently every instant of this curve. When an artist learns to hold a sustained note, it is like a computer, it is adjusting how many fibers have to contract in the body.

As you are holding this sustained note, the body will show under investigation all sorts of change if you play by feel - you cannot do it because feel phenomena is a constant variable. If you crowd it out by just plain tension then this is not a very productive thing for the art form and really not productive for the movements of air.

If you sustain and learn your phrase and your qualities of tone, these are handled through a level of the brain alone. The brain stem is fairly new knowledge but nevertheless we have a marvelously efficient portion of the brain that will fire up the mechanism as needed. When you get out of its way you do it by studying music - you do not do it by

studying body. You can study breath but not breath apparatus, you may find that you have substituted all sorts of stretch, shape, change and not have the breath at all.

The reason that I stress this curve is because it is truly one of the important reasons you must stick to the art form. You cannot handle the bellows systems as if you were handling them by hand, only as some unit that you could have sensory feed back during awareness. It is one constant variable.

As a teacher, one of my big problems is that as a person gets older there is always a change in the vital capacity, there is a lowering of it with age and no matter what you do this still takes place. By the time you are in your forties to fifties, it becomes quite apparent that the six liter capacity of a 20 year old man - it is usually maximum at age 21 and begins to taper off and by the time you are in your forties, the six liters may be down to five. In the case of a person with four liters, it may be down closer to three. Capacity begins to move down and the habits, you take care of - in a certain way - and move it out - in a certain way, does not change just because you have less lung compliance and lung volumes to work with and the throat becomes more and more involved. There is much more strain in the playing, some might recognize it, if you are old enough, some won't. It can be overcome if you can go far enough in this curve.

To me, a healthy way of playing any instrument is not to go to capacity, it is not good, but pump comfortably into the large plus sign and only moderately into the negative.

I run so often into the very opposite where a player sets just a little air and then goes toward empty and is always in a great state of tension. One of the biggest things I had to combat is isometric contraction of the entire respiratory system.

I use an instrument in my analytical work and I may find a player playing moving out air and his bellows is getting smaller and smaller as he is moving it out, depending on the flow rate but somewhere he gets smaller wherever he uses air.

I had a student who swears he is blowing, you see a bulging neck, it could be behind the tongue, it could be behind the larynx but it could be a blow that could be so minimal and based on the pressures rather than the flow of air. It is interesting to try to get the air out in this negative curve.

## *Air Pressure*

Having taught many persons, many of them in this room, in the various parts of the country, working with many trumpeters, tuba players and trombones, one of my big problems is simply, that for the professional musician, usually the art form is there, the thoughts of communication is there but very frequently we run into a problem where they will block the air from the lips and not know it. They are taught "Tee" as the mediant from moving from a lower to a higher note. Now, with "tee", these vowels are fine, a pure

"ee" and "ah" sings it. But a student will, very frequently, move to the sibilant "S" that he says with the breath.

Now, "S" is very frequently substituting for "ee" in the mind of the student and without consciousness of it, he thinks of a reduced airway. When you go too far into this reduced airway you actually rob the embouchure of air. It is just robbing the embouchure of the fuel it needs. Unfortunately, the student will feel it as resistance in the lips. Neurologically, it is like taking pins and putting them in the back where the nerves are separated. You may get two pins and only feel one because of the separation of the nerve ending.

You will not isolate the sense of resistance of the air at the tongue - it will be at the lip. "Ee" will not do that, a consonant "e" - there is sufficient volume of air in the high register that can move. But the sibilant "ss", there - if you could hear in the back of the throat. Again, the pure "e", there is an airway that can be utilized by the player as far as the movements of air but we run into Boyle's law which has to do with what happens to air under pressure.

Air under pressure is stored in a smaller volume of space. The law has to do with pressures under given temperatures but because it is internal, we can forget about its moisture saturation of the air and we can forget about the temperature and just say what happens to it under pressure.

Do not think for a moment that because you have air under pressure that it has to move, it does not. Air pressure is used in child birth. The study of pelvic pressure is bowel movement, etc. It is a reinforcement phenomena for activities within the body and the brain is fully adjusted to it. But it is a reinforcement phenomena, like a hiccup. There is air pressure and also sorts of inspiratory muscles and expiratory muscles in isometric conflict. The potential for movement is not there unless some muscles let go you do not use dimension, it is that simple.

This can happen very easily if you trigger the biological phenomena that controls the body. Our bodies are not made for trumpet playing or tuba playing, they are made for survival on this planet and there are syndrome that involve respiration. One has to do with the supportive phenomena where the pelvic pressure syndrome, the other has to do with the supportive phenomena where stabilizing the abdominal wall and combat, so do not injure yourself.

You have the stabilization of the ribs so when you do chin-ups, you pull towards the muscles attached to the shoulder girdles. They are pulled to the ribs, not the ribs to the shoulder, so we always have biological factors. You do not have to consider there will be pressure, we measure pressure. But, if you work for pressure, you may not have movement. Do you see what I am driving at? The psychology of it is very simple, you have to blow but a person who works hard is not necessarily blowing - he is tapped into one of the other syndromes and he will be working hard.

When you blow a trumpet very loud you are going to feel a legitimate work effort but it is resistance against the embouchure. It is resistance against the vibrating source. You could have the same feeling of resistance without any movement of air, just like if I pick up a weight and you will feel a very definite contraction in the biceps. The triceps will be relaxed but if I want to simulate it. When you feel the biceps, you contract the triceps and they are both contracted. One of my problems as a teacher is that I constantly run into the state of massive contraction simultaneously with the movement of air to the point where we have isometrics.

These people invariably can only play two or three seconds then they start having tongue or choking problems, all sorts of problems that register in this area and it is simply that the bellows cannot reduce. Again, the psychology of it is to blow out. Blow through the instrument, you can use all sorts of psychological meters. You have a match, you pretend to blow the match. As you blow you have to sing the tone, mentally of course, so the end product of air is outside the body, not in anybody's cavity. If it is in a body cavity the brains can interpret it as pressure. Psychologically you are moving it out from some phenomena of life. This is sort of a bridging type of thought just to merely get it going.

If you blow a balloon, match or whatever it is you blow through, outside the body you have movement. If something gets in the way you still have the imagination that you are trying to blow that way, the danger is that you set up the syndrome which the brain will know full well.

Now that air is not going anywhere, if I keep talking, I can not continue talking because there is no further reduction - it is a simple physical principal. To have movement there must be movement in the complex bellow system. The change in the trumpet, which is a high flow rate instrument, compared to a tuba, a low flow rate instrument, there must be movement the stabilization in the lower abdominal tract.

You can have all sorts of movement without blowing. I am not blowing, not breathing, not doing anything. But, when I blow I can have it without blowing. I can have a stimulation, the ability of the body to lie to you through enormous though stretch phenomena. However, there is a very simple approach, if you want to take a breath, you breathe, there will be resultant change. If you want to blow, you blow, there will be resultant change. When you study human engineering, you find that through enlargement you lower the pressure, according to Boyle's law - you get larger, you take the air in and through lowered pressure. We expand and this is inhalation, you reduce and decrease the pressure to an open airway and move it out. This is 100% right in engineering but it is 100% wrong for the live person.

You cannot by pass your brain. According to the brain, you expand for the air itself instead of expanding to breathe. You breathe to expand and I know it is taught the other way because it is absolutely right if you are going to make a model of a human being then you go to the engineering principal. But because you are a line and various levels of your cortex already learned on the laws that govern stimuli and conditioned response, natural reflex. There are various duties already assigned in the brain and you have to tap into

these and then have this wonderful efficiency. But, the simplicity of taking a breath, is the study the sounds of air you inhale. You want to blow, you blow. You want to work your body, you take a breath. How would you know which you are doing. How would you know, you might or might not be doing it or you substitute friction maybe on pressure instruments when you realize what we are.

Here is a bony structure, now here is a flexible structure, the diaphragm is in between which is a partition between the chest and abdominal cavities. It is a partition which is at rest in a high position and contracts down to the low position, relaxes to a high, contracts down to a low.

When you are dealing in high pressure, you have to be able to stabilize, in a sense, to have air come off the top. The ability to create pressure is to any part of you that has enlarged must get smaller.

If you did not have a massive contraction, in other words one of the techniques would be by moving the abdominal wall in. You move the diaphragm to a higher position and due to a moderate contraction of the diaphragm and this contraction of the abdominal wall you would have increased the pressure within the abdomen.

It is like a hydrostatic principal, you would have created higher pressure in the abdomen that would be in the chest and then air, as further emptied, further applied from the sternum and upper ribs would be moving out this way. If you did not have firmness, the pressure would be greater than the resistance at the diaphragm and would merely push the diaphragm downward.

The faulty aspect of this is that whenever you push out the only way is to lower the diaphragm. Anytime you lower the diaphragm, any air that was taken in can come out again. This becomes a completely unusable part of your respiratory system that throws additional change on the upper respiratory tract.

If the player has not burst through that then he is good for two or three seconds of playing and that is all he can play, a couple of screech notes under great pressure and he must stop because he has either got to get smaller or he cannot finish the fuel that was taken in. The principal of it is simply that to get great pressures you either have to stabilize here and have change in the upper respiratory tract which if you watch a trumpet player playing an extremely high range.

I realize this frequently with the equipment that I have, you will find that under great pressure they stabilize and change. In order to do that they must have first taken air in. If they do not then very quickly they are in a throat problem and tongue problem. It could be done in a different way, you could have a nice breath and through reduction wherever you enlarged. If you reduce on a general basis you will overcome it in a different way.

I measured the first trumpet player in the Chicago Orchestra playing F above high C, fortissimo. I measured out a specific decibel while measuring the inter oral pressure and

he played. This note at a given decibel at a 114 millimeters of mercury which is slightly in excess of 2-1/8 lbs. I had a trumpet player come in from a dance band, played the same note at the same level and got 170 millimeters of mercury. The efficiency was not there, some of it was fighting to get past his tongue.

Some was the fact with the second player was that the embouchure was resisting and it took a much greater amount of fuel to get the vibration going compared to the first trumpet player. In both cases there was one thing that, at these pressures the first player pulled in his lower abdomen and then stabilized and there was considerable reduction. The other man did not pull in, he just stabilized and blew like hell, it was good, after all this other man was also a great artist.

Anyway, the difference would be that if a person did not first have the inhalation and attempted to blow without first inhaling, he has nothing to send out. There is air here but the storage in the upper lobes of the lung is not great, it is not great at all. There is potency there and there is air and it useable air but, under great pressure you will have a flexible interior.

You must always have greater pressure under than over, this is a rule now that can be achieved. One more thing that you do not do is just simply going into blind strength in the contraction because you are dealing with 2 lbs of pressure and yet you go into pressure where it could be measured as a 150 lbs. Many of you have seen a man who lies flat on their back and another man will stand on their chest and abdomen. That is the respiratory muscles in isometric contraction support 150 pounds. Nothing sitting up with bar bells that the primary, the expiratory group that permits the sit ups. The massive contraction for strength sake is only going to give you a hernia or some hemorrhoids.

It doesn't make any sense - it is not applied to what you have to do. The average trumpeter will be playing 1/2 pound of pressure up to usually hardly over two pounds. Once in a while in the screech it could go up to three pounds But, the average individual can't blow more than five pounds. If one of you who thinks he can blow hard wants to come up and see what his pressure is, I have all sorts of equipment I haven't brought out to use - I will gladly run a test on it.

(A person comes up).

I gave him this tube to blow in. You blow as hard as you can, do not let those people out there slow you down.

Have you hernia?

No.

Give it everything you have.

You reached the top 110 millimeters slightly over two pounds blowing very hard.



Let's start again - now, that's more like it 220 millimeters - very massive, this is unusually high, some of it was oral pressure - this is very good. If he is playing a note that involves a 150 millimeter of pressure, we will say that orally he certainly has it.

I have people that come, one of the men was a big man of muscle. I gave him this tube to blow on, he actually got to 1-1/2 lbs. pressure. I expected him to ruin the equipment. He blew as hard as he could and it went up to 80 millimeters, about 1-1/2 lbs. I have little girls who went up to 110. What he was doing was isometric contraction. How much weight could you lift if you merely contracted your arm to isometric contraction.

Many players I give this test to substitute sometimes for blowing function and, the reason I give the test is that I want to get an insight into what they are like because everyone of us you see is in normal health. When you cough you create a condition of spasm where you could easily generate six or seven pounds of pressure in a severe coughing spell, done as spasm, at the subconscious level. But, using the identical musculatures, but in nature's own way, which is a direct application through pressure and removing all respiratory aspects, suddenly and you get this massive generation of power.

If you could use that power of expiratory muscles to generate for breath you would kill yourself. If you could take these reduction phenomena and put them into their massive use, you have a reflex of each lung which will not permit that. When you call for a powerful contraction in order to blow powerfully the brain immediately sends a signal to the lung, due to a powerful contraction of the inspiratory group. If they closed in on the lungs you would be dead.

## *Range*

Question: Range

Answer: As the embouchure gets smaller - you have to let the lips go into amplitude of vibration and resistance and of course is going to increase tremendously. I am speaking about a fortissimo high. I am not speaking about the baroque trumpeter. But in terms of volume a very small embouchure can vibrate fast.

There is a tension phenomena, size phenomena and it is a small embouchure. As a result the air packs up behind it and there has to be a vigorous maneuver of that air in order to give those tissues amplitudes. It is all air and the higher you go the smaller the embouchure becomes. You are going to find that in the normal dynamics it is not a severe proposition at all. In fact, if you develop a pianissimo in a high range and develop the musical characteristics and then later go to the fortissimo, it is a much healthier way of approaching it.

In the normal sense you never segment into any unit of air or anything you sing. So that the horn is a mirror your habit pattern that air is supposed to take over. You should be,

when you are breathing in, not a musician, you are a person taking in air. You are only a musician when it goes out, in a sense of creating sound. That inhalation should be in sufficient quantity so you breathe for the ends of your phrases, to be comfortable at the end of a phrase unless it is impossible. You try to be comfortable at the end as well as the beginning but particularly at the end because of the involvement of the negative curve. If you are undergoing a phenomena where there has been a severe problem in tongue or throat then very definitely there should be an awareness.

30% of the intellect can be used as long as 70% is still storyteller. I do not mind 30% awareness of any isolated function that you want to be aware of. I would always be aware of air as air but not as an air apparatus.

Complications? Very much?

## *Asthma*

Answer: I know I have asthma - I know quite a bit about it. In the high flow rate instruments, it is beneficial. Actually, its not going to harm the player because high flow always involves low pressure. It stimulates some of the treatment for it is not bad for persons to be playing brass instruments with asthma. It is not practical to play beyond the point where the air can come out whatever velocity it has to come out, because the players will become involved.

We'll say a baritone player or a bass trombone, if he has small lung volume and if he has only three liters of usable air may not be enough, he may need four or five - that person would be in considerable trouble. In fact you will find he is not able to play with a volume level that he should, he won't be able to tongue as he should. His air will be slowing up and you will hear the difference in tone every time he does.

They can treat this. As a rule there is various potential and you can get a certain amount of relief for a person playing that way. That is what I am doing and there are pollutants and so forth that are becoming a rather severe problem and more and more people are coming to my studio with distress of this type. I wouldn't take them off of a brass instrument as long as they have enough to get by with as this is actually good for them.

Question: Yes sir - air problem?

## *Capacity and Phrase*

Answer: I have them do a certain amount of work away from the instrument each day where they do take a deep breath.

Question: Depending on the length of the phrase?

Answer: Very much, if the man has a small lung capacity, he has to be taking a full breath most of the time. If he has 6 ½ liters, then obviously he doesn't need the full breath all the time but he should not go too far into this negative curve, no matter what he does. The negative curve where the air is slowing up. You have to make sure he is moderately comfortable at the end of his phrase.

If it is an emergency situation and you have to go on, there should be a slightly increased time for inhalation so that he does not carry tension in the inhalation. We do not want a conflict no matter how tightened up you are at the end of expiration as you should immediately let go so the inspiration is free.

There is a wonderful thing the way the brain works with our bodies. That is a positive movement in one direction and then the other. The brain is an amazing study in neurology but you have inner relation to move the arm this way. When it flexes, because it extends, you will have a cancellation of the innovation, where the signal even flounders and disappears from the opposite function - the key in respiration. There is a training you have to go through but there is a release if you find it. It is so easy to take your breath if you remain still, but the key to taking it in is very, very simple.

There are little studies that a person should do in a practical sense.

To start off you may take three breaths as smoothly as you can - let me see one of my tubes I will demonstrate.

If you are a teacher and you have a student where they can't practice. Usually, what you see is a person with habits. Where they have habits, these habits reside in the level of the brain where the student cannot possibly be aware of the conditioning and the automatic response - it is such a hostile you have a withdrawal phenomena without thought.

When you play a brass instrument it is very much the same, many physical phenomena will be involved in playing, not at the conscious level. They have reached the state where you must alter the stimuli. If you want to alter the response pattern, introduction of a tube of this type, you find breath flow and all the rest.

Suddenly just put the tube into the mouth and breathe into it. Your student was trying all sorts of muscular and stretch phenomena and trying so hard to cooperate with the instructions, you merely put a tube in his mouth and have him breathe through it and it is amazing how suddenly you find he is breathing freely and comfortably.

With this simple procedure you take three big breaths and blow into the tube. You do not set rules, allow the shoulders to move, allow anything - the feel will come later, you might say the finished product we reserve for later. Let them do what they want, get the air in and out, increase the sense you might say of mobility, almost the sense of

weakness, so that we get away from the potentials of strength. Like a bull, you have a powerful aim for weight lifting or push up.

You do not want that power for the movement of the breath, we are not dealing with a work horse, we must get rid of the work of the contractions we must get rid of strength. We have come down to ounces, not pounds of energy. We learn about air and air movement primarily by this phenomena.

You should focus the mind on the air itself frequently. I use a bag on the end which, instead of buying a spirometer you can get a paper bag and do the same thing. You can watch it get small or get large as you take air out or blow air in. Hopeful you will not hyperventilate. If you take more than three big breaths and blow through the tube into the paper bag rapidly, you will actually lower the carbon dioxide level and as you lower them you are going to get symptoms, you are going to get dizzy, possibly headache.

For these bags are respiration bags, actually this one is used for medical purposes and of course with some special equipment and it holds 6 liters of air. I am going to let him blow this up and see if he can do it.

He is blowing it up - he did 6 liters of air. If I gave it to a young lady (over here) you wouldn't see much change, open with blowing it up you won't see anything like that.

(Jacobs tried to fill the bag up and everyone laughed - he only filled it up a little.)

You can see when I blew it up it didn't get very large. The bag has a capacity of 6 liters, I have a working breath of a little over 3 liters and a capacity breath of close to 4 liters maximum. You won't see much. If you wanted to see it, I would merely roll up the bag quite a bit - yea, I cheat a little that way.

The main thing is with a bag you have the psychological attitude of (say) you stripped and got in front of a mirror. As you blow out you see the bag enlarged obviously the lungs are empty for you have to let air in the bag and when you are taking the air out of the bag, it is smaller, your chest, your thorax generator gets larger

You validate the respiratory maneuver by the use of equipment. In this way there is a training which tends to get away from the brain trying to analyze the sensory nerves. The thorax speratic nerves are not going to give you any real information about your respiratory patterns. Nerves from the interior of your body do not carry messages to the brain like they tell you when your arms are extended.

Exactly what is happening is in these musculatures, you do not know about your heart, you do not know what is going on inside your body. Your diaphragm has no sensory nerves other than pain group physicians sense.

None of these do so when you try to be knowledgeable by feel phenomena, you are only kidding yourself just like in embouchure. The cranial nerve really carries very little

information of what is going on in the embouchure to the brain. The seventh cranial nerve is the motor nerve carries a message to the lips just like vocal chords.

The feel phenomena only gives the generalized statement without the specific details but with the use of equipment like this for the training of respiration functions, it is really practical. Some of it could be done without a bag so that when you hear the sound, you sense the volumes of air in transit where it can be felt in the mouth. You cannot feel air above the larynx, if you have an irritated region in the trachea. You will feel a temperature change but you cannot feel the transit of air below the larynx.

If you want to know about air you work with, air where it can be felt as it enters the mouth. When you blow it is very wise to do a little blowing away horn in your music practice. Blow against the hand - matches, balloon or through the horn. You always do it, not from where you send the air out, like photography goes out of focus, in the interior of anybody's cavity go into focus, some go into focus somewhere exterior to the body cavity.

You will find that as soon as you do it that the brain cooperates with you, it begins to be antagonistic musculatures. The big hang-up in respiration is isometrics, breathing in which blowing out and blowing out while breathing in cancellations. As soon as you begin the positive maneuvering of inhalation, taking of air, blowing of air, the brain always will cooperate. It is a wonderful thing because if you only learn to order your body right you can do anything you want for you. But you have to learn the key which is communication.

## *Air Blockage*

This gentleman has a question?

Blockage of Air?

Answer: One of the problems, as a teacher I often get closures from students in the strangest places. There are many areas where you can provide friction for air. One of them is where the larynx comes up under the epiglottis. If you are swallowing food, one of the principals to keep you alive is that you close the windpipe so the food pipe can receive the food. This is done automatically, you do not do it consciously. The larynx comes up under a lid and it closes that region off and the (apposite) receives the food.

This is one of the problems that I face in people who do not have reduction phenomena. They will block the air either with the front of the tongue. We clear up the front, it moves to the back, we clear up the back, it moves down to the larynx, then at the glottis region and each one gets a little harder to correct.

It is very simple to bypass the whole phenomena simply by blowing out. Even when you cannot get the air out you have imagination. Imagination is one of the ways you program the brain for function. You merely create a situation where if the air were moving it would be effecting something external to the body, not internal.

Do not sell imagination short, it is a wonderful tool for programming the brain. Whether it is in speech or it is in what you are going to do in sports. The ability to conceive is invaluable with this and that is how one level of the brain will influence other levels of the cortex.

Question: In what way?

Answer: As a teacher I often get closures from students in the strangest places. The embouchure only sets up the need for air unlike the woodwind player, in a sense that you blow to vibrate that reed a certain way, because the lip is flesh and blood. I have found measuring devices in my studio and many times when they play loud I see the sound getting softer. If they actually are playing louder there is going to be a much larger use of air but it is based on getting a louder sound which is simply more amplitude in the vibrating source. The lip has to have more amplitude of vibrations and we have a resonance.

Question: What happens to the pressure inside the mouth?

Answer: As the pressure increases, we will say the pressures at six liters was about four ounces of interoral pressure. She would have reached about 16 oz. The pressure was quite high, not like a high C or anything but like you were playing comfortably in the mid range, pretty loud. Pressure for a flow rate at that time was quite large. I have these figures with me somewhere, it takes time to look them up.

Question: Breathing exercise? For me, personally?

Answer: Playing tuba is for me personally. All I need. I use breathing exercise as a teacher in assignment because I recognize when that trumpet is in position there is a powerful stimuli for that brain gives all sorts of habits.

One of the frustrating things a teacher has to tell a student is - this is wrong, this should be right. The student cannot cooperate because this is hostile and is causing an automatic reaction. The nervous system is still sending out a group of signals to the various system that is still sending out a group of signals to the various muscles but, he may understand intellectually.

## *Buzzing and Exercises*

The physical application he cannot cope with, now you build certain things away. I use tools, mouthpiece playing without the instrument. The purpose is there are thoughts, one, you connect thought and tissue in response, in other words, it becomes a voice.

The main purpose is the very strangeness of it. You are involving everything that is involved in playing a trumpet or a trombone, except the right hand and the acoustical law of the instrument. But you are definitely involved in recalled concept tissue response isolation through the mouthpiece. Much of it remains and much of it is removed, but the strangeness of it as I channel the student. I never, never, let them play exercise on the mouthpiece. I challenge them immediately with music. I start off with silly things like "Pop Goes the Weasel" - if I cannot think of anything else, I make them play the "Star Spangled Banner."

Somewhere they have to have something in mind but I make them play and entertain an audience psychologically with that equipment. As they do that there is an immediate strangeness in the brain. As I challenge them as a musician, I keep directly the focus always in the musical aspect. Many things begin to change the student is not at all aware of the change. I am aware of the things because I am hoping he will change but his intonations begin to alter. Sometimes the angle of the mouthpiece is changing on the lips and what will be better for that individual and we go into rather advanced playing.

We might have to play a concerto or some jazz, Dixieland or some very difficult things. But it is still an art form approach. I do not let him do it as buzzing or experiments. I keep always the programming but, with that strangeness, with a few weeks it becomes fairly efficient. As I say, repeat the entertainment values of it, there are all sorts of changes, it is the closest thing I know of to a short cut in bringing those things about.

If we are dealing in respiration that instrument, when you play and you go to take a breath you may have a "hic" because you have always had it, you cannot because I tell you what is right and what is should be. You cannot cooperate with that unless you are able to intervene, one part of the brain to the part where you have your habits stored and it is a very simple thing you change motivation.

I always have a student work a few weeks on a given topic away from the instrument so there is no relation to the instrument at all. We may work with gauges, we may work in all sorts of apparatus. But work with outward motivation, that is primary to us. We work with specific movements of air but we give it a chance to grow to become a tradition factor in itself and then we apply it back to the instrument if you go right to the instrument you frustrate the student, you frustrate yourself.

Exercises like I mentioned a moment ago about simple inhalations are the start. You want to learn to take a fast inhalation, you create situations, fast inhalations. Always insist that the student watch his motivations. We never motivate time in inhalation as the big factor. Time is not a biological stimuli which would organize the respiratory system, quantity is whether it is small, middle or large quantity doesn't matter. Quantity is a biological communication for your tissues, time is not, it is a secondary factor.

We learn about quantity through the slow breath then we take a study of this type, maybe take a study in 5/4 time where I exhale for four counts and I replace the quantity I use in the fifth count. I am adding time but the quantity is dominant. I must replace what was used within that time factor but the quantity is the dominant factor, time is the secondary phenomena. Then I take the air in, maybe in a faster note, maybe 1/8 note, time value.

There again I am replacing whatever quantity was used for the quantity within time is the motivation. Time could be anything for it has nothing to do with quantity, so the legitimate signal has to be quantity and the time is the secondary phenomena. But we do this away from the instrument.

At first, when we do this the player will be able to go back to the instrument for a few moments and under certain conditions translate it right through the horn but he will lose it within a few moments. However, you do this on a time period, you do it for several weeks and then you do it, maybe two or three times, in your practice. You stop and do that same particular maneuver then you take a study and you mark where you are going to breathe. The main thing is that you do not surprise yourself. Then you surprise yourself before you are trained you find that your expiratory muscles are still blowing while the inspiratory ones are trying to take the breath in and all you do is get sort of a "hic" like a restriction in the throat.

If you mark where you know you are going to breathe and one instant before you get to this point you are ready psychologically to inhale. I like to tie it into a mental block.

I use the syllable "hoe" because "h" is an aspirate which opens the vocal holes, "o" shapes the pharyngeal region as well as the oral space. I think "hoe" right before I breathe and everything is open instead of "hic" where you get effort instead of a volume of air.

## *Hyperventilation*

Question: Hyperventilation

Answer: I think hyperventilation on a trumpet is sometimes achieved. Most trumpet players when they think of hyperventilation are tending to confuse that with the symptoms that come from inter phenomena pressure.

Jacobs: Are you thinking of high register?

Student: I'm thinking of high and loud.

Jacobs: This is what I thought.

You see, hyperventilation which comes with only massive movements of air but the trumpet player will sometimes confuse this, the symptoms are very similar. But when you



get excited and play high and loud, very frequently you will find the inter phenomena pressure is exceeding the pressure of the circulatory system and you are collapsing the vessels that have to return the blood from the brain. At that time you will find the trumpet player's blackout can come on because of the lack of circulation in the brain and it comes to part of an inter phenomena pressure.

Hyperventilation is another subject that comes from the large movements of air, not the pressure, the large movements which lower the carbon dioxide level in the blood stream. It is not too much oxygen that brings on the symptoms, it is too little carbon dioxide and when a person merely holds their breath after that for a few moments the tissues are always throwing off carbon dioxide into the blood stream and the brain returns to normal very quickly.

## *Doubling*

Question: Can one double on trombone or trumpet?

Answer: I do not think it hurts a bit, I think it is actually kind of good for you. I play trumpet to trombone to tuba. I think you should specialize in one. But for a person who has restriction in the breath and wants to experience a more massive maneuver, it is beneficial. There are other ways of going about it but you could have fun doing that.

## *Mouthpiece Pressure*

Question: How much tension should there be in the embouchure?

Answer: There is no such thing as a fine trumpet embouchure without having tension. In vibrating surfaces, you do not have fine vibration in relaxed surfaces. If you examine a brass players face on any instrument you will invariably find contraction, we call it a dead pan expression and this contraction state I think you will find generally in most fine brass players.

You have so many variables, you can have a puffed cheek (he points) and you can have a fine embouchure (points to lips). Where the muscles at the side of the face interdiagnulate at the corners, there are several groups that crossover at this point and they are isolated. Most of them move into the lip area from the jaw and actually there is an isolation factor. It does not give embouchure when these are contracted, you wouldn't believe it, they can be held with no embouchure at that time.

It does immobilize some of the phenomena that exists in the external regions and it permits functions internally to take place. You can still have this same function and even

an unorthodox looking appearance. If your embouchure is off center you may not have the same appearance, you may have a contraction in the lip musculature under the mouthpiece rim. You are doing practically the same thing plus a moderate contraction. I think what you are describing is several things, one is a bulging of the neck and as well as the tension in the facial musculatures. The bulging of the neck has to do very much as to whether or not you are going to meet with the sibilant when you try to play loud, the requirement of movement, moving air between the lips we will say at one pound.

If you reduce the airways sufficiently behind it at whatever meter you choose. You may have to go to 2-1/2 pounds of pressure to have one at the lips. You will drive harder and harder that is how you get the broken connected tissue to where you may actually have a huge bulge as some trumpet players have, but it is simply trying to drive air, pass an obstruction.

Actually, some people have a huge potential of pressure but if the lip isn't getting it, your judgment is always based on what it takes to vibrate the lips and if an obstruction is put in the way then you are going to blow awfully hard or you will not have any vibration. So, I would say in answer to the question, my thoughts on this are again where there is a problem of this sort. With a student you have two choices or with yourself the quickest way I know of as a teacher of wide experience is to put the trumpet down and just take the mouthpiece and start making music on it. The strangeness of it is such that if you are musically motivated you suddenly find you can play, you suddenly find that you have lost much of the bulge.

It is very difficult to play on the mouthpiece, compared you might say in certain aspects to the trumpet. As you play on the mouthpiece you may find, particularly if you get up and walk around the room, that you get away from the excessive pressure as you get away from the music. In slurring a great deal rather than tonguing to get the obstruction out of the way.

I would go to the slur on the trumpet as a dominating factor for quite a while and I would go to the lower range quite a while. The region where the malfunction is greatest, I would temporarily abandon.

I have always believed in taking a problem that exists and finding the back door and not the front door, you sneak up on it. You find something good and you work on it and then transfer back rather than confronting it.

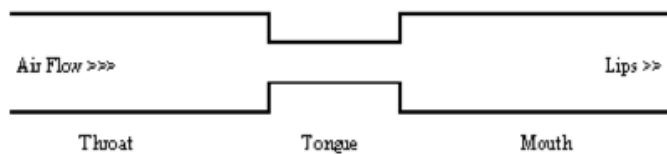
It is just like learning to come in on a high C or any high note as an attack. I listen to players who want to just attack and attack. They are trying to approve the attack on the high note. One part of the brain that doesn't judge right from wrong but just judges repetition is learning how to give a very bad attack. While one part of the brain says, "I need this, I need that," another part just says, "well you are doing this all the time, it must be what you want."

There is a much better way and that is simply no matter how bad it starts you sustain and as you sustain you put the vibrato, you put the statistics of your heart. At first it may not be so great but you always do it from the sustained note, you do it from the slur, you learn how to come from sound into a successful sound. You do not just keep trying to start a note with an unsuccessful procedure, the repetition of it is very damaging, then you find where the note sounds good.

You hold it, you learn about the note and then you come back into it. You see what I am driving at, it is sort of a back door approach, you do not confront the problem head on. I would say if I had to pick the two most damaging phenomena that I know of for a brass player, the first is isometrics, inadequate ventilation of the lungs and the inability to have a blow that moves. A blow that plants this is number one because it initiates problems.

Number two is the reduction in the airway beyond a point. We run into a problem but I am going to draw something for you.

I am going to have to use your imagination a little bit. I am going to draw some tubing.



Here is a pipe.

Now I am going to draw a smaller pipe.

Finally, I am going to draw a larger pipe.

When I send a column of air here, it must come out here. Now, we have a large area, and small areas.

A large area is part of a physical principal, but what is involved in this. I often ask my students where they find the minimum pressure, in the large, small or large pipe. It is so often they will say the center pipe because it is small. But the maximum pressure is in the large pipe because the air moving packs up and tries to get into the small pipe.

There is a rather drastic drop in the small tube and a still further drop on this (second large) tube. If we think of this as airways we find tongue, if the tongue goes moderately into reduction there is no harm done, it could be beneficial. But, we will say, if the embouchure on this end (second large pipe), if you put the lips here (small pipe), you have a massive build up of pressure (first large pipe). You are able to move a small volume of air on this side and there is going to be a differential pressure behind the

embouchure (first large pipe). There is going to be a lack of air volume compared to what is behind the tongue with a sibilant "S."

This is what I am describing, anyway what happens (first large pipe) is one of my big enemies as a teacher. I will so often find this, it can come from the tongue being too far forward, in the sibilant "S." If you go far enough forward no air can come out at all - it stops.

When you go to the sibilant "S", as if you say "yellow," then again the potential of reduction is quite extreme. If you go "eee" in the back, now pure "eee," there is plenty of room. Where she goes into almost closure you have this massive drop on the other side of it. At that point the brain at the front of the tongue signals as a stiff lip. Invariably as a question students all say the lip is stiff and will not respond. As I check - I have tools for checking these things. I find that there is no air and lips have to have fuel, no matter how you slice it. There has to be fuel to go between air packed up inside the mouth. It doesn't mean a thing, it is what is measured on this side that has done work. What you sense is in terms of air pressure in the mouth. It is nothing unless it is in motion, that is my enemy.

The other enemy is the bellows system where the muscles are working to enlarge and reduce at the same time and nothing is happening. With my students, with my special equipment, I find three areas of nothing, no change. The pressure which will permit a second or two of moderate maneuver and then nothing. You continue to watch a player and you see they gradually get smaller. If he doesn't get smaller he has a problem. Air has to come out, it doesn't come out by magic, you know, it does by air pressure.

We are structured for survival on this planet and we are not structured for trumpet playing. We have syndromes that the brain knows full well and we utilize these into our art form. We cannot fight nature, we must go right along with it. One of the things involved is simply that first of all to play the trumpet, we have to have a trumpet in the head, and a trumpet in the hand. It is very important not to fight that piece of brass, you cannot win.

Now you recognize the power of closure in the lips, you close your lips even where you cannot possibly squeeze any air out even with four pounds of pressure. It's an unequal contest, the power of the lips in closure through the breath power in push.

As soon as they begin to push powerfully you will get all sorts of visual signs like we did in this young man. That was a beautiful test, I congratulate you but, obviously nobody should work that hard in an art form. What I am trying to indicate, if we signal the art of communication there is the trial and error procedures through the programming of the young brain by listening to fine players just like a child learning to speak by listening to his parent - nobody is teaching that child. He is listening, his little ears soaking it up like a sponge by imitation and so forth. One part of the brain is being programmed and the motor systems are beginning to carry it out and learn there fast. In music it is the same way.

I love to start an elementary trumpeter off by - you say, I take a young boy who has never played before and I will take the mouthpiece and I will play something silly on it, like "Pop Goes the Weasel" or a little song, something that I think he knows. I will say "take it home and buzz it for a while, do anything you want and usually he comes back with some slight semblance of something. From that point on I work with his brain - I do not work with his body, I work with his mind. I take his trumpet and his mouthpiece, the only variable is the player. I will play one note, I make him listen to that one note. I have him close his eyes and listen but I make him think about it and ask, "can you hear that note" in the silence after playing.

We take that brain just like he was learning language from his parents by imitation. I make him imitate, he wants to know how do I do this, how do I do that, always asking questions. You do not have to answer those questions. Here is how you have to sound. When you go home to your daddy, when he listens to you play has to think, Mr. Jacobs is playing, but you are going to fool him.

I play with his mouthpiece and his trumpet. I am a lousy trumpet player but I am better than him. I had an experience with this one youngster. For this boy, I played a G as rotten as I could, which was very bad. Then I played it as good as I could and it was better than his, and so forth - something for him to shoot for. I made him aware of the difference and I put it into a little song. Anyway, I had his mind clearly focused on imitating a quality, not just pitch it, it was a very minimal requirement. It was only one note but I had him play three or four but based on this same psychology.

I had him go home and the next week he came back. Those notes were not bad. We gradually extended range and his band master within three months called me and said, "I do not know what you have done with this boy but he sounds like a pro, he can't play very much, he can't read worth a darn, he has only an actual range but he said those notes sure sound good."

What is involved is he would not have to learn to take his notes and later revive everything. Take patterns already formed and try to substitute new ones. He was already on the right path so he could concentrate on music, not simple tone production. What I am trying to indicate very strongly is you read on embouchure, you read back on procedures segmentation in the parts.

I want to tell you quite frankly that most of the players who write the books never learned by the books. They listened to others play, they were required to play songs, lots of them were jobbing. The written word, even when it is right, is not for the performing arts where you hear with a communication to others. It is like being an actor, if you want to learn to perform, that is fine but if you try to learn in order to express range, what muscles must contract to express range, how do you raise your blood pressure, what do you do to do that, you'll never be an actor.

You have to learn the emotions, the message and in our art form we must let our minds with sound, we must recognize that we play with a condition response to stimuli and our

thoughts must go on to the stimuli as we overcome the challenges of music we are learning the physical phenomena of the playing. If you try to learn to play the trumpet, to learn to play music forget it, you learn to play music and as you learn the music you are learning the trumpet. I'll be happy to debate this with anyone.

Now, with that belligerent note, I thank you, you have been a fine audience, I've enjoyed your questions.

Thank you

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