

VOICE PRODUCTION IN RELATION TO THE LAND SURVEYOR

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Voice plays a very important part in the life of a Land Surveyor, whether in the field, on the public platform, in ordinary conversation or in song, it is being continually used and possibly through lack of knowledge of how and where it is produced we may not get the best results obtainable. It is possible, and very probable that the statement made by a great authority may be true when he said the "public seldom did know much about the things which most deeply concerned them". The human voice is the supreme and particular gift of man, and the gift of speech is what raises him above the brute creation. We all know the existing orthodox theory of voice production. The authorities tell us that when we wish to produce vocal sound whether in speech or song, the pitch of the note is registered on the brain, the brain then sends a message to the vocal cords to set themselves at the tension required to produce that note, then the breath in passing the vocal cords causes them to vibrate thereby creating sound.

At this point it may be advisable to investigate the peculiarities of sound. Sound is merely a sensation. Some object is by some agency thrown into a state of vibration, it communicates its vibrations to the surrounding air, the vibrations impinge upon the ear drum and sets up a nervous disturbance which we call sound, so it is quite evident where there are no ears sound is an impossibility. To illustrate this point supposing a mechanical player piano was playing in a house in the middle of a ten acre field with no person in or near the house, the piano would produce absolutely no sound. As we all know by experience sound vibrations are capable of being returned from a reflecting surface, this is the explana-

tion of the phenomenon of echo. It is possible for a curved surface to reflect the same sound from several parts of its surface in such a way that the lines of vibration of the reflection coverage to a focus and when this happens what is heard at that focus (being the sum of many echoes) may be louder than the original sound. This is the explanation of the well known whispering galleries, the whisper is reflected and reflected from segment to segment of the curve and if the listener stands at the exact focus he will hear a considerable sound. It is, therefore, quite evident that curved spaces behind a public platform are bad, because by the principle of focus, they produce freakish intensification in particular parts of the auditorium, any reflection surfaces behind a platform should be flat, so as to distribute the echoes equally instead of concentrating them. The parabolic back of a bandstand is absurdly unsuitable for the purpose for which it was built. This statement has been proved by the acoustic monstrosity recently built at the Toronto Exhibition grounds.

Now the art of speaking and singing which affects every human being is still in Egyptian darkness. There has been more rubbish written by the medical and music profession about the larynx and vocal cords than any other part of our anatomy. Authorities disagree upon the subject and quarrel like two halves of a seidletz powder, for instance one specialist says that a certain muscle in the larynx is used to tighten the vocal cords and another says it is used to loosen them, what chance has the student if the authorities so widely disagree.

The present orthodox theory of vocal cord production was given to the world



VOICE cont'd

by Galen 1700 years ago. Up until this time Aristotle's theory was that the voice proceeded from the heart.

Galen was a Greek physician and wrote about 200 volumes on medical matters but much of his reasoning has been found to be false, so it is indeed strange that his vocal cord theories have stood until the present time. About the year 1900 Ernest G. White of London England, whose name will go down in history as one of the great men of the present age, discovered and has proved conclusively that the voice is not produced in the larynx, but is actually made in the sinus cavities of the head.

Mr. White had a very promising voice, so he was sent to study singing at one of the principal London schools of music. The result of his tuition was that he not only could not sing but he lost even his speaking voice. He was 3 years under the treatment of doctors without getting any permanent relief from his throat troubles. This experience started him thinking that the existing theory and method of teaching was not all it should be. After 40 years of study and research he has just published his last and final book on the revolutionary theory of Sinus Tone Production.

Assuming that the larynx is not the seat of sound, we have to determine how and where it is produced.

The breath coming up the windpipe passes the larynx, after which it may be directed out of the mouth as in or the mouth may be closed and the breath directed past the pharynx and then through the nose, or we can voluntarily direct the breath so that it travels via the sinuses and then down through the nose. At this point it may be well to direct our attention to the fact that a well produced voice whether in speech or song will send more breath through the nose than out of the mouth. It is only a matter of sensation when we think all the breath comes out of the mouth. A cold mirror held under the nostrils will convince one of the correctness of this statement.

There are 4 sets of sinuses (or cavities) which are found on each side of the head, namely, the Frontal

Sinuses situated just above the eyes, where the high notes are produced, just a trifle lower and a little farther back are the Anterior Ethmoid and Posterior Ethmoid cells, where the middle notes are made, and a little farther back and also lower are the Sphenoid Sinuses, where the low notes and most of the speaking voice is produced.

As might be expected, the sinuses and cells show in different people an infinite variety in size, shape and number, this accounts for the different shades of tone and timbre which make individuality.

It is interesting to note, that with the aboriginal Australians the Frontal Sinuses are seldom developed and travellers have often remarked upon the extremely flat character of the voice in these native tribes. The same thing applies when a person has a severe cold in the head, the cavities being more or less congested sufficient air cannot enter to make the normal tone, consequently the voice is dull and lifeless.

One often hears the remark what a wonderful throat that singer has, but the expression should be what wonderful cavities in the head he or she has. The difference between the vocal cords of one who can produce beautiful tone and one who cannot is so infinitesimal that common sense tells us that the cords have very little to do with the quality of ones voice. The medical profession can give no satisfactory reason for the existence of the Sphenoid Sinus, the only explanation given by them is that the cavity was made to lighten the skull.

This supposition is hardly good enough for we do know that natives carry 30 or 40 lbs. of freight on their heads without any inconvenience to them whatsoever.

We have all heard the wind moaning through the keyhole, with the result that one half an octave or more of tone is produced. If then the greater or less pressure of wind passing through a dead keyhole can produce one half an octave of sound, is it a matter for surprise that 2 octaves should be produced by passing living breath through a live head?

The fact that breath when passed through the head and then down the nose will produce sound but if the breath comes directly out of the mouth sound is an impossibility can be plainly shown in the following manner.

Sing the word hush. The tone of course will be held on the vowel sound u. Now attempt to sing on the sound sh and it will be found to be impossible.

If the vocal cords produce tone, they ought to produce equally good tone on sh as on u, for in each case it is quite evident that the breath is passing the vocal cords. The important point for our consideration is the fact that in singing the vowel sound u the breath is going into the head but as soon as the breath alters its course and comes directly out of the mouth sound is an impossibility. But the skeptic will say but we do not sing on consonants, of course not and that illustration shows us very clearly why we don't.

The importance of Mr. White's discovery not only affects the singer and speaker but the beneficial results accruing therefrom may be shared by all of us. Naturally strong opposition in the form of silent indifference has developed from the medical profession as a body, although individual members have for many years been sending their incurable patients to Mr. White to be cured.

But the medical profession has made many serious mistakes in the past when dealing with new discoveries. When Dr. Harvey, in the year 1628, published his book on the true theory of the circulation of the blood, he was considered a crank by his fellow physicians, whilst doctors of the late forties ridiculed James Simpson when he discovered the value of chloroform and it was only when Queen Victoria submitted to an anaesthetic that the prejudice against it disappeared. A few years later Dr. Lister came along with his discovery of antiseptic surgery which has saved millions of lives, yet it was seven years before his methods were even tried by the London physicians, when during this period thousands of lives perished on the altar of stupidity.

VOICE cont'd

Now a woman's vocal cords are about one half inch in length, whilst the cords of a man are about three quarters of an inch.

It is the law of vibrating strings that the tension increases in proportion to the square of the vibrations. For each octave higher of tone the vibrations are double in number. If then the lowest note of ones compass be taken as 1, the octave above would be 2, the next octave 4 and the next 8.

But the tension increases as the square of the vibrations, so that, if the tension of the lowest note is 1, the next octave higher would be $2^2=4$, the next octave $4^2=16$, and the next $8^2=64$.

In other words a soprano who can sing 3 octaves would put 64 times more tension on her vocal cords for the top note than for the low one.

As a matter of fact a well trained soprano will produce those extremely high notes much easier than the low ones, because we know it takes less breath to fill a small cavity than it would to fill a larger one.

The smallest pipe in a pipe organ is about 3 inches in length, whereas the largest in a very large organ is forty feet high and two feet in diameter. We can very well imagine what would happen to the small pipe if it received as much air and pressure as the large one. When singing our top notes it would be advisable to remember this analogy, for any singer who uses more breath pressure for the high notes than for the low ones is most certainly headed for disaster.

The aforementioned law of vibrating strings must be carried out if the vocal cords produce the sound, but experiment has shown that if the cords were so strained, they would without a doubt pull themselves away from the cartilages on which they rest and move. Another important point is that a cord to produce sound must be hard and dry, whereas the vocal cords are folds of wet membranous tissue and to make sure they do not get dry nature has given them special means for lubrication.

Now a certain professor lays down as a first step in scientific procedure, that all science begins with measure-

ments, he also states that the fundamental postulate of science is the uniformity of nature, but apparently the measurements of the vocal cords means very little to those who tell us that they produce sound, for there is nothing in the world which with only a length of one half an inch can produce 2 or 3 octaves of sound. Yet we are asked to believe that nature inside our body works differently than it does outside. When singing a note softly the vocal cords are close together, if the volume of tone is increased the vocal cords are more in the shape of a curve, but both ends being fixed it must follow that the tension on the cords must be greater, yet the same note is being produced, this paradox seems to be contrary to both nature and science. A well known surgeon to the throat and nose department of St. Batholomews Hospital in a report gives instances of patients who have had the vocal cords removed and in the majority of cases they could still speak and sing. Other cases are on record where the whole larynx has been removed and the persons could still speak and sing, and still we are asked to have faith in Mr. Galen of the 2nd century. Let us now turn to the lower animals. The snake has no head sinuses and we all know that the only sound it can make is a slight hiss. The sheep and cow have practically no vocal cords, but they can make a considerable sound. The giraffe is dumb because the entrance to its sinus cavities is in such a position that it is impossible to get the breath into them, hence no sound.

It would be interesting to get the answer to 4 questions which Mr. White has been asking for 30 years, namely,

How can 1/2" of wet membranous tissue produce 2 or more octaves of tone?

On what law if any do the vocal cords act when they keep the same pitch with varying tension?

What satisfactory reason can be given for the existence of the Sphenoid Sinus if it is not used for singing and speaking?

How is it people can still speak and sing when not only the vocal cords, but

the whole of the larynx has been removed?

In the larynx around the vocal cords are very delicate muscles which if strained too much through speaking or singing incorrectly break down and give considerable trouble and quite often sends the person to the throat specialist. The doctor not knowing of the great benefits of Sinus Tone Production prescribes a gargle and complete rest. If the damage is not too great the patient will recover and do the same thing over again, but if this merry go round business goes on too long, the time will come when a gargle and rest will not be sufficient to effect a relief.

Sir J. Milson Rees one of the greatest voice specialists, states that practically all of the great singers of his day, have been to him for treatment. It is well known the life of a professional singer (as a singer) is very short, the strain on the throat through wrong teaching and thinking is too great.

Our public speakers suffer also, it is well known that Snowden held the record for inaudibility, whilst the voice of Lloyd George gave out completely in one of his budget speeches. I may state here that many of the Clergy and public speakers in the old land are giving vociferous praise to Mr. White for curing them of their throat troubles and setting them on the right path. Galen said that nature had not provided any organ for ventilating or draining the frontal sinus cavities, but Ernest G. White has proved conclusively that they can be drained and ventilated by doing a little practice in the so called falsetto voice. The false theories of Galen are probably responsible for the lack of interest (at least until quite recently) shown by the authorities in the sinus cavities.

Nearly 600 anatomical drawings by that great scientist and artist of the 15th century, Leonardo du Vinci are extant, but not one of these show any of the sinus cavities. About 1906 an authority examined the skulls in the Museum of the Royal College of surgeons, and out of hundreds of skulls he could find only 6 so cut that the size and

position of the cavities could be obtained. Thus it is only very recently that this important part of our anatomy has had even the smallest consideration, and it is only now that the immense importance of bringing them into action is beginning to dawn on the medical profession.

In a book published by Dr. Watson Williams he informs us that infected sinuses may cause lumbago, arthritis, exema, appendicitis, eye affections, insanity, and many other diseases. Dr. Frank Novak made a statement in Washington recently that the main cause of sinus trouble and diseases leading therefrom was inadequate ventilation and drainage. Dr. D. H. Shannon director of the X-ray department of St. Michaels Hospital says that most people, as proved by X-ray have had sinus trouble at some period of their lives. Incidentally he decries the radical operations which he says often makes the person a patient for the rest of his or her life.

Knowledge and use of the sinus theory has cured deafness, asthma, bronchitis, growth on the vocal cords, laryngitis, aphonia, and other kindred complaints, and no doubt prevented many of the serious complications arising from diseased sinus cavities.

The medical profession as a body in spite of the overwhelming scientific and practical evidence now available, irrespective of the praise of the theory by individual doctors, scientists, members of the clergy and hundreds of laymen who have been helped when acquainted with the theory, in spite of the cures which have been made of cases which physicians had treated and pronounced incurable, in spite of the fact that the medical profession is entirely baffled by the sinus cavities of the head, up to the present they have refused to even investigate the theory.

One would assume they would clutch at the proverbial last straw. Now we may possibly say to ourselves this is more or less interesting but it doesn't apply to me, and even if it did what can I do about it anyway. To answer that I

would like to give the result of a practical test. Aman was selected and taken on a survey to ascertain how far his voice would carry in the open air, 300 feet was about the maximum. The new theory was explained to him and a few simple rules were given. At the end of 6 months he was tried out again and his vocal signals were quite distinct at 1,200 feet.

This experiment should prove interesting to the land surveyor, for vocal signals are much speedier than waving ones arms here, there and all over the place. A plumb bob with a white card attached could be used and very quick and accurate line could be given. I may state this experiment took place in the vicinity of Toronto where sound does not carry in the same manner that it does farther north. The rules to acquire more vocal freedom are very simple, but to be of any value we must realize that the voice is produced in the head, we will then consciously direct the breath into the sinus cavities instead of allowing most of it to go to waste by coming directly out of the mouth. The so-called falsetto voice must be used for a few minutes every day by singing a few simple notes. The falsetto voice is produced by directing a very small amount of breath into the frontal sinus cavities.

Does it not seem logical that vibrating fresh air direct from the lungs will not only keep the cavities clean but will either destroy or expel cold or any other germ which may have lodged there. Mucus in the 18 or 20 cavities of the head must be kept moving, for damaged health is most surely the result if it is allowed to accumulate. When a key is offered for use, we should not turn it over and over unable to decide whether it is good metal or base metal. The question be will it unlock the door?

Humming both in the falsetto and natural register is another important rule for both speaker and singer.

In giving vocal signals in the field the voice should lean slightly towards the singing voice, it is easier on the

throat and will travel farther. A few reminders to the public speakers may not be out of place.

The first necessity of a speaker is to be heard distinctly and clearly, in spite of this obvious truth complaints are very frequent that many public speakers can not be heard.

The majority of the English speaking people are both lip and tongue lazy. Many vocal faults in speech can be traced to slovenly articulation. Speakers and singers should be on their guard in articulating the final consonants of words, which are important for the continuous flow of speaking. Lack of inflection and modulation often justifies the criticism of dullness and monotony. The location of the speaker is also relatively important, for quite often the voice will carry much better from one side of the platform than the other. If possible stand on wood, also stand in front of wood whenever possible. Don't stand near a window, avoid heavy curtains and draperies, and if the speech is being read cut the foolscap size in half, the voice will have a better chance, also the subject matter will be continually in the line of vision.

The subject of voice and its effect on the human race is a very large and important one, with the time at our disposal we have merely scratched the surface.

DISCUSSION

Chairman - I am sure I am expressing the thoughts of all of us when I say that is the funniest paper we have had since "The Amateur Assistant on a Survey" - in 1904 I think it was. Thank you very much, Frank, for your very fine paper.

C.F. Aylsworth - I would ask Mr. Mucklestone where he got that thing. If that thing had come out in public when surveys first came out in Ontario, it would have saved a great deal of swearing. So I think it is very important paper to be passed around to the surveyors, and I think it is not too late yet.