CHAPTER SIX

SCIENTIFIC PRINCIPLES TO VARIOUS ASPECTS OF VOCAL TRAINING

1.1 THE EFFECTIVENESS AND USEFULLNESS OF VOICE CULTIVATION

Voice Culture is the process to stretch the capacities of the voice in terms of volume and the dynamic range. Voice Culture is a subject that is applicable to a beginner, a youngster or a newcomer music learner as well as it is beneficial to a trained vocalist also. The effectiveness and usefulness of voice culture is to prepare a voice for singing. A high quality of voice is necessary for every singer in order to produce good music. It is to understand these main aspects of a Voice:

*Voice production*

*Voice mechanisms*

*Control of pitch*

*Voice timbre*

There are a few basic problems we may commit when singing and they are as follows:

1. Singing Out of Tune
2. Running Out of Breathe when Singing
3. Soft or Weak voice
4. Slurry Words When Singing
5. Straining the Throat
6 Locking the Jaw Raising the Head Singing

7 Turtleneck Singing

Many times vocal music students sing out of tune, some even think that they were Tone Deaf and are unable to sing in pitch at all. Being out-of-breathe when singing is one of the common singing problems that the vocal music student may have weak voice, singing like a whisper. There are other few common problems that vocal music student may have. Many students experience certain throat tightness when they sing, especially for the high notes in a song. Singers may start to experience jaw tension as they try to reach higher and higher notes in the song, or even when belting or projecting their voice with an open mouth or lowered jaw. The reason being as we lift our heads when we sing, we are actually straining and stretching the front portion of our throat, as well as pressing down on the back part of our throat. This subjects our throat to additional strain, and activates some of the muscles in our throat, possibly tiring them out unnecessarily. The reason why singers may extend or stick out their neck when they are singing is because we have this false notion that we have more conscious control over our voice whenever we control our throat muscles. Knowing more about the common problems we commit when singing will help to clear up the uncertainty of what is causing us to sing badly. Voice culture will help to show us specifically what we need to work on to improve our singing.

Voice Culture is a subject which covers all the prospective of voice. This is the effectiveness and usefulness of Voice Culture.

Voice Culture is creating awareness in the music learner that the human voice is a singing voice. A person gifted with musical abilities has a naturally gifted voice apparatus and propensities that need to be unlocked, awakened and orchestrated. Understanding and experiencing the distinction between the communicative (speaking), expressive (laughing, crying, hooting), semi-expressive (shouting, calling) and singing voices. Understanding the concept and natural tenets of a collapsed or flaccid vocal apparatus and an erected apparatus ready to sing, distinguishing between the tonal and mechanical dimensions of voice and voice training, understanding and achieving production of tones across the range, including so called chest, mid and head tones, understanding breathing and the relationship between breathing and singing in depth. Achieving
tone production as extensions into phrases and musical lines and passages, songs and
improvisation. Articulation – vowels and consonants – in the realms of speech and song.²

The Indian classical music is based on traditional teaching methods. We can find out the timeless
principles of Indian Vocal music or in the modern term Voice Culture technique from the
analysis of older styles and cultures of singing as available in recordings of the pre-50s era.

Reverse rationalization of existing musical styles and genres with the help of understanding the
vocal hygiene and voice principles. This is especially applicable to classical music where the
voice science enables us to appreciate the dynamics of pre-microphone voice culture – the era
which determined the character of Classical music.

Voice culture has a scientific effect on the voice. A properly-produced voice is the only
foundation on which the super structure of vocal eloquence can be erected. For the incompetency
of ordinary vocal tuition the scientific aspect of genuine voice culture would be recognized
universally. Voice culture would benefit a music learner or a trained vocalist, it is a subject that
isn’t something that is applicable only to beginners or youngsters or newcomer music learner,
and it is for a trained vocalist as well as a beginner.

Voice Culture is all about making correct use of vocal chords, the correct method of breathing,
our diaphragm, and our whole body. Vocal chords are nothing but soft membranous tissues
which are controlled by muscles of the larynx. Just as a table gathers dust if left unclean or
unattended similarly our vocal chords will also cease to function optimally if we do not engage
them with regular singing practice.³

Our voice is often taken for granted when we sing, and we usually focus too much attention on
other components of singing, instead of seeking to strengthen our vocal apparatus in order to
produce great sounds when singing. It helps us to understand the structure of our voice and vocal
cords. It is essential in order to guide us towards adopting beneficial singing habits, as well as
producing sounds that are more relaxed and healthy for us to vocalize. We must recognize at
once the fact that the voice is a natural reporter of the conditions, emotions, thoughts, and
purposes. We can find out the usefulness of Voice Culture in various aspects; Projection of
Voice, using the whole body as a musical instrument, making correct use of the breathing
and voice modulation techniques
Voice Culture can change the whole aspect of a music learner even a trained vocalist can make out the difference in quality of their voice. The effectiveness and usefulness of voice culture is to prepare Voice for singing, to maintain the voice hygiene and to preserve the Voice from voice disorder. We can say that Voice Culture is like a Vocal training which focuses on these very important aspects of Voice. Hence it is absolutely necessary for every singer of classical music.

1.2 CONTROL OF BREATHE

Breathing is probably the most basic aspect of singing, as it provides the energy for singing. Breathing incorrectly can cause tension in the voice box and be a factor in poor tone quality. Voice Culture is a subject where we learn to manage our breathe when we sing because the correct breathing techniques can drastically change the sound of our singing voice. Correct breathing technique is a widely debated topic among Voice Expert, music teachers and scholar everywhere. Singers and scientists all over the world have agreed that the style of breathing determines the quality of the voice to a large extent. Hence correct breathing habits should be well established in the early year’s itself. There are so many different techniques that people are taught, it's difficult to tell which ones are good for our voice, and which ones are harmful. But not knowing how to breathe properly when singing can actually be dangerous to our health also. Everything about singing is based on breathe. The absolute first thing that we need to understand about singing is that if we are not breathing properly, we are not singing properly, and that can lead to some pretty serious problems. Serious enough that we could potentially ruin our singing voice permanently. Disorder in voice production mostly results from incorrect breathing. The type of breathing that ensures the two above mentioned requisites is Diaphragmatic type. An often quoted advice to singers is sing from the diaphragm and not from the throat. The lower back ribs expand more which facilitates a greater amount of descent of the diaphragm. This provides greater expansion of the chest cavity and hence larger amount of air is obtained. The diaphragm descends up to one and half inches. The abdominal wall remains firms. The lower ribs are maintained in the expanded position for the controlled exhalation, holding more control over the diaphragm. A balanced tension on the inhalation and exhalation muscles is kept. Hence very great delicacy in breathe control is achieved. Breathe control implies the ability to control
the emission of breathe by letting it out slowly as the diaphragm relaxes slowly and gradually when the intra- abdominal pressure pushes the diaphragm up. The quality of air is not the only criterion for singers but also the control of the exhaled breathe stream is very important. First of all it's important to understand what happens to our body when we take breathe, and being aware of the process is something that will help us to carry it out more effectively. Breathe starts when we begin to inhale. At the same time as we are inhaling, four other things are going on at exactly the same time.

1. Our diaphragms expand in the front, back and sides so our lungs can properly hold incoming air.

2. Our pelvic muscles naturally lift up to support the expanding diaphragm,

3. Our backs extend downwards,

4. Our hips gently roll forward and pull our gluteus (bum) muscles together.

5. All the while our lungs are filling with air.

6. The amount of breathe used for different pitches has not yet been measured scientifically

7. It is found that the breathe force becomes less when the pitch is increased

8. When the force of the breathe is increased the pitch of the note becomes lowered

9. The opening of the glottis becomes narrow when the pitch is increased

10. The glottis becomes wider when the pitch of the note is lowered

Some singers are so fixated on breathe control that they do not breathe out enough. According to certain methods of teaching proper breathing, being aware of this process is necessary, because it will help us to take what is called a controlled breathe. The bad breathe will make our throat hurt and feel tight while singing. If we are singing with incorrect breathing technique, we will feel a tensed up feeling in our throat. This means that we are putting un-necessary strain on our vocal cords.
Vocal tension and forcing our voice is the single most harmful thing we can do for ourselves. It causes tons of problems such as; Scratchy breaks in our voice, Inability to reach high notes, A weak and powerless vocal sound, Pitch problems like going sharp and flat, Shortness of breath while singing.

Most vocal tension is caused because of core problem of not taking a correct breathe.

Although these problems can be corrected with learning the right breathe control tips and techniques, there is one major problem that should be taken care of. Vocal tension and forcing the voice can eventually lead to vocal nodes forming inside our throat. Basically, nodes are little callus like bumps that form on the vocal cords on the inside of the throat. They cause our voice to be raspy and toneless, and often the only cure is a combination of surgery and vocal therapy. The vocal therapy can involve being ordered not to speak or use our voice for an extended period of time, sometimes months. Even after vocal therapy, many people can't ever sing to the level they once could their ranges are dramatically shortened, their voices break and they have a constant raspy-ness that never goes away.

**There are 4 types of breathing:**

1) **Diaphragmatic** - Diaphragmatic breathing is useful for every singer. Singing requires more air and controlled exhalation for which the diaphragm is made to descend a larger extent. In the diaphragmatic type of breathing the thoracic capacity is increased by the contraction of the diameter in the vertical dimension by the lowering of the diaphragm to a large extent, the transverse diameter is larger by raising of the curved ribs, while the anterior diameter is expanded by the simultaneous movement of the sternum upward and forward. It is said that the most important muscle of breathing is diaphragm. It is dome shaped muscle, which separates the chest from abdomen. Diaphragm also plays an important role in the breathing exercises. In Singing breathing activity becomes less uniform as the inhalation becomes sudden and quick and exhalation is prolonged and very slow as opposed to that of normal breathing

2) **Clavicular (shoulder):**

*Clavicular* breathing is useful to sing very shrill notes. it is used to sing high-pitched notes.
3) **Costal (chest)** in costal breathing we move our rib cage which gives very little space or expansion for breathing. But a very significant reason that diaphragmatic breathing is better, is that it keeps unwanted tension away from the voice box - tension which contributes to poor tone production.

4) **Abdominal.** Abdominal breathing helps to sing the lower notes effectively. It helps a singer to reach the subtler heights of singing. As the costal, clavicular or abdominal types do not provide the control over exhalation, it leads to muscular tension in the larynx and thereby makes the voice throaty and breathy.

Unlike normal breathing, when we sing we need to inhale quickly and exhale slowly, we need to get a full breathe quickly between phrases and then sustain a smooth exhalation while we sing demanding high notes and long slow phrases. Hence eminent singers of Indian Classical Music believe that the diaphragmatic type is best suited to sing classical music.

Voice Culture helps us to learn the correct process of breathing for a singer. To summarize, here it is:

Good breathe control gives the confidence to sing these important things there is specific processes to follow in order to take breathe the right way, and it takes a bit of practice.

1. Able to sing with razor sharp pitch.
2. Produce a powerful, room-filling sound.
3. Explode vocal ranges to new heights and lows.
4. When a singer cultivates correct breathing, unnecessary and unwanted wobbling or shaking of voice can be controlled.
5. If we are not careful, that in it can cause tension in the throat, just by trying to do all of those things at once.
6. We literally have to keep one part of our body strong and firmed up, while keeping the rest of it loose, relaxed and comfortable.
7. What we do not do is take a high, chesty breathe.
8. We have to make sure our shoulders don't rise up and down. Our ribs should expand outward, but our shoulders should never go up and down.

9. We learn how to take a controlled breathe,

10. How to support that breathe,

11. How to keep our throat open and relaxed while doing it.

12. Quick inhalation of large volume of air and,


14. The singer is able to sustain on the Musical Swaras notes for a longer period without any wobble and long Taan (execute long phrases) with continuity.

15. The continuity the musical phrase necessitates the intake of breathes to be less frequent.

16. When a singer cultivates correct breathing, unnecessary and unwanted wobbling or shaking of voice can be controlled.

17. Correct breathing does not cause hyper tension in the muscles involved in vocalization.

18. The control of the breathe is obtained by the strength of the opposing muscular forces

19. The main objects of breathing technique are to produce a powerful Voice

20. Correct breathing helps to execute long musical phrases or Taan

21. To make use of the full vocal range

22. To sustain on any Musical note without any shake

23. The correct type of breathing enables the singer to inhale quickly

24. Correct breathing techniques help in order to interrupt the song as little as possible

25. To have greater capacity of air
26. It provides control to expel the breathe in order to sustain on the Musical swaras steadily for a longer period

27. To execute groups of notes in fast tempo at one stretch

28. To maintain the force and power of the Voice in the long passage up to the end of the musical phrase

29. To maintain the force and power of the voice in the Palta and different types of Taan the long passage up to the end of the musical phrase

30. To have power and wide range of the voice

31. Singer should never sing with the fag end of breathe. The main sources of energy for voice production are the good flow of air provided by breathing, the lungs.

Natural breathing has three stages: breathing-in period, a breathing out period, and a resting or recovery period. Two things a good singer should practice—Regulated exhalation of breathe streams and quick inhalation of large volume of air. There is only one way to sing correctly, and that is to sing naturally, easily, comfortably. The height of vocal art is to have no apparent method, but to be able to sing with perfect facility from one end of the voice to the other, emitting all the notes clearly and yet with power and having each note of the scale sound the same in quality and tonal beauty as the ones before and after.

These are the base components for proper breathing. Disorders in voice production mostly result from incorrect breathing. Proper breathing for singing means we must learn to control how much air we need, at what rate we will breathe in, and at what rate we will breathe out. The rate at which we exhale is important, as this determines how much air we send to our vocal cords and for how long. As we exhale, we must be able to keep our rib cage expanded while using our abdominal muscles to push our diaphragm against our lungs, releasing air in a steady stream to our vocal cords

As a vocalist, engage all areas of our body around our lungs and rib cage in the act of breathing and imagine ourselves breathing with our whole body. We want just the right amount of air that our vocal cords can handle because singing with too much air can produce a sound that is airy
and breathy. A good tone can be produced without much air at all; in fact, using less air will actually make it easier to reach those higher notes.

If we try to hold our breath and sing, it just won't work. We also can't sing loud phrases without having air to exhale. Although breathing is natural, when we sing we need to train our body to breathe efficiently throughout an entire song.

Learning proper breathing for singing will help us sing through all those long phrases in our favorite songs without running out of air. Two things a good singer should practice—Regulated exhalation of breathe streams and quick inhalation of large volume of air.

Voice Culture helps to get control on the basic object of breathing techniques for a vocalist: To produce a powerful voice, to execute long musical phrases, to make use of the full vocal range and to sustain on a note without a shake.

In Indian Classical Music it is important that while singing we breathe from stomach. While practicing Indian Classical Music, Sing each of the Swaras (notes) as long as we can keep our breathe keeping one of our hands on stomach. Keeping our hand on our stomach we should feel that our stomach is retracting inward as we sing the Swara and as we inhale again our stomach is expanding outward.

\[Sa\ Re\ Ga\ Ma\ Pa\ Dha\ Ni\ Sa\]

\[Sa\ Ni\ Dha\ Pa\ Ma\ Ga\ Re\ Sa\]

**Breathing while singing**

In Indian Classical music while singing always in hale using our nose. Inhaling using our mouth affects our voice. We can practice this by consciously inhaling closing our mouth and using our nose, later it will just become part of our singing.

There are a few breathing exercises for a vocalist to get control while singing everyday for 5-10 minutes.
“Shash” or Breathe in

5 seconds (without raising shoulders)

“Breathe out”

4 counts – 8 counts – 12 counts – 16 counts

Warming up of Vocal Cords

1. Start by choosing a “Swara” – the natural “Sa”
2. Perform “Aum” for 5 mins
3. Then sustain each Swara and sing in “Aakar”.10

The correct knowledge of Warm up and cool down before and after singing is vital to preserve a healthy singing voice. It is very important for performing Vocal Music. How we manage our breath when we sing can drastically change the sound of our singing voice. In order to sing well we need to learn proper breathing for singing control of breath is a very important step towards voice culture. If we can master our breath, we can easily master our voice for singing. When a singer cultivates correct breathing, unnecessary and unwanted wobbling or shaking of voice can be controlled. Control of breathe is a very important step towards voice culture. If we can master our breath, we can easily master our voice for singing. Breathe control gives fine-ness, clarity, steadiness and confident phonation to the voice.

1.3 VOCAL PROJECTION

After the Importance of breathing techniques Voice Culture is to help develop powerful vocals or Vocal Projection.
As a vocalist every singer wants that his/her voice should be loud and enough powerful, so that he can reach and connect with the audience. But sometime it comes only by correct and known method. Sometimes it becomes very difficult and by incorrect method the voice can be damaged permanently. In this context Voice Culture gives perfect guidance.

Developing the powerful vocals or singing is based on these things

1) Incorporating diaphragm strength,

2) Vocal cord muscle strength,

3) Using appropriate resonance,

4) As well as jaw and throat relaxation

Voice Culture gives us the correct direction to develop the vocals without any vocal abuse. Strain our throats in order to get a louder singing voice could result in vocal abuse or damage, because many of us may squeeze our vocal cords to get a louder singing voice. Singing power certainly does not mean more strain or tension, but instead it means achieving good vocal placement with a relaxed body, with a strong foundation in breathing and diaphragm support.

Voice projection is the strength of speaking or singing whereby the voice is used loudly and clearly. It is a technique which can be employed to demand respect and attention, such as when a teacher is talking to the class, or simply to be heard clearly, as an actor in a theatre. Breathe technique is essential for proper voice projection.

In singing, voice projection is often equated with resonance, the concentrated pressure through which one produces a focused sound. True resonance will produce the greatest amount of projection available to a voice by utilizing all the key resonators found in the vocal cavity.

We need to achieve is a balanced sound, with a healthy mixture of breathe and voice. In fact, we really need little air when we sing, and using too much air may result in too much tension being exerted on our vocal cords. Control our breathe using our abdominal muscles and our diaphragm, instead of expelling our breathe faster, as we would need to regulate the amount of air we use when we sing loud or project our voices. Placement of our voice in order to achieve a brighter and stronger sound when we sing.
One way to discover good vocal placement is to practice “humming exercises” making sure that when we hum, we feel the resonance and vibrations in our face or near to our nasal area, and also in our lips. To place our voice in a forward position which is more suitable for vocal projection, allowing us to use less force when we sing. We can also imagine that we are throwing our voice across a hallway or room, making it bounce off the wall on the other side and come right back to us.

With a strong foundation in breathe and vocal placement, we would still also need to keep our jaw relaxed and loose when singing,

By treating them as merely a passageway through which our voice is travelling. Practicing some of the exercises will help to achieve a relaxed jaw and throat when singing.

Many singers project their voice by belting, (The term "belt" is sometimes mistakenly described as the use of chest voice in the higher part of the voice. (The chest voice is a very general term for the sound and muscular functions of the speaking voice, singing in the lower range, and the voice used to shout) 

Not to use too much unnecessary force in our throat, jaw or other related muscles whenever we want to sing loud. If we find that our voice or throat starts to hurt during our vocal training sessions, we should stop our vocal exercises and rest our voice immediately. One very common mistake that singers or vocalist may commit is to over blow or force too much air through their vocal cords when trying to increase singing power causing the diaphragm to expel air faster through the vocal cords. This is especially apparent when we are unable to hear ourselves sing, and we try to force our voices to be much louder in order for us to hear ourselves over the noise. The size, shape, and hardness of the resonators all factor into the production of these overtones and ultimately determine the projective capacities of the voice.

It will require the expertise of an experienced voice expert who would be able to help to build up our singing power, and point out the bad singing habits we may have when we sing. Voice Culture helps us to avoid any vocal damage that might occur during our self-practice.

The scientific reason behind a powerful voice:
For a powerful voice we use our vocal physique. The vocal physique is throat, tongue, lips, and jaw. These are the parts that help to shape the sound into words.

1. Air itself makes the voice work.

2. As we exhale, air moves from our lungs through our trachea (or windpipe).

3. It then passes between our vocal folds (also called arytenoids and vocal cords) and brings those muscles together. As they vibrate, sound happens.

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7. We can achieve the ultimate vocal projection by comparing a note of average volume to a note of high volume.

8. Sing a note of average volume the vocal chords will hold back the air for a very brief moment, and then open. The air is then 'let through' the vocal chords at a certain air pressure.

9. For a louder note though, the vocal chords hold back the air for a longer time the air pressure should be higher than for a lower volume note.

10. This higher air pressures a louder note.

11. There is no need more air to sing a louder note.

12. We need to strengthen the muscles.

13. Inside our larynx (your voice box) that hold our vocal chords together when we sing.

14. Power and volume are achieved by the strengthening of these muscles.

15. Hold back air for a longer time, which will create greater air pressure and produce a louder note.
16. No yelling

Yelling is simply not singing. Yelling or, 'forcing the voice' is the cause of vocal nodules. Once this has happened it needs an operation to fix them.

Vocal projection exercises

Vocal projection exercises are going to help us develop power in our voice. Exercises that make our sound literally float out of our head. And not just float a little way. Every singer wants and needs to sing loudly. And with the right training, strength and power is ours. The most effective vocal projection exercises are that train very specific muscles, the correct singing muscles for singing. These are the same muscles that must be strengthened to get maximum volume and strength. They are known as the inner muscles of the larynx. The incorrect singing muscles are the outer muscles of the larynx. Outer muscles of the larynx are the ones that cause vocal strain, make it difficult to hit high notes, and cause every other vocal difficult. The end result is a voice with amazing range, power, and tone. All produced with no vocal strain at all. The end result is a voice with amazing range, power, and tone. All produced with no vocal strain at all. These are the parts that help to shape the sound into words.

Speaking louder doesn’t create a powerful voice. There are few things which help a singer to project his voice. The three key components of a powerful sound are; Personality of a voice, Passion to sing and Strong vocal physique. The first two components are achieved by being ourselves and by being clear about our intention. The third is through awareness and practice.

Personality of a voice

Personality is ‘we’ and the unique gifts we share with our audience. Personality is the unique imprint our thought leaves on our voice, making it distinguishable from other voices and revealing things about our particular experiences and perspective. We cannot escape the revelatory nature of our voice. The essence of who we are is in our voice for all to hear. If we want to be heard, it’s vital that we celebrate our authentic self.
Here we can take example of renowned vocalist *Ustad Bade Gulam Ali Khan*. His presentation of a Raga and the Taan was as powerful as his personality.

**Passion for singing**

Passion is the power of intention aligned with content and personality. We have already covered personality, Content is simply what you have to say. It’s our message, our words, our ideas manifested in spoken form. Intention, on the other hand, is what we have in mind to do or bring about. It is why we are speaking in the first place, why we are standing in front of an audience, what we hope to accomplish. When intention, content and personality align, we have passion. And when there is passion, powerful things happen. For an Indian Classical singer to perform a Raga He/she needs to pour his passion and then they seem authentic and genuine.

**Strong Vocal Physique**

Speaking louder doesn’t create a powerful voice. Strong vocal physique is the ability to produce a vibrantly resonant sound and to have a good command of breathing technique. Because sound travels on air, resonance and air are intimately connected in the voice.

Now we know what voice projection means so we do it right.

Project the voice by allowing it to shine with our personality, and having confidence that we have something unique to deliver. Project the voice with passion for our message by setting a clear intention. Project the voice by developing a resonant sound that is supported with our whole body through air and energy.16

When we will do these things, we will get a powerful voice and will be heard clearly while singing.

1.4 VOCAL RANGE
Our vocal range is our ability to sing comfortably either high or low notes. Usually our range is measured in Saptak or octaves.

The term vocal range ‘refers to the spectrum of notes that a singer’s voice is able to produce, starting from the Mandra Saptak Swara to Taar Saptak Swara. (Bottom most note and reaching to the uppermost note)

In other words Vocal range refers to the distance between the highest and lowest pitches that a singer is able to sing. If we can sing all of the notes one octave below Madhya Sa (middle C) and one octave above middle C Taar Saptak, then we have a three octave range.

Saptak or an octave being eight notes. Starting at Madhya Sa to Taar Sa (middle C up to the next C) is one octave or Saptak. Saptak -Octave (Sapt means seven. Indian music does not count repeated notes as a part of the same octave. But saptak and octave basically imply the same meaning)

1. Our vocal range is the amount of musical notes we can reach normally and comfortably.
2. Vocal Range runs parallel to the range of our normal speaking voice.
3. Our normal speaking voice is usually rooted in the chest area.
4. On average, encompasses eight to twelve musical notes on a Scale.
5. Scale is usually unique to each person's voice and vocal range.
6. Vocal range is quite relative with each and every person.
7. Our voice has a general range of two octaves,
8. Someone else with that same range might end their range either higher or lower than ours.
9. The greater our range, the more versatile our singing can be.

Despite its intuitive clarity, vocal range is not easy to define, nor is it easy to compare the vocal ranges of singers in different genres. The tonal quality of the voice is as important in determining voice type as the range of notes themselves. The possibilities to extend our natural vocal range from one or two octaves. Our vocal range is our ability to sing comfortably either high or low.
notes. Usually our range is measured in octaves, an octave being eight notes. Starting at middle C up to the next C is one octave. The broadest definition of vocal range, given above, is simply the span from the highest to the lowest note a particular voice can produce. This broad definition, however, is quite often not the one meant when someone speaks of "vocal range." This is because some of the notes a voice can produce may not be considered "musically useful" for a particular purpose. Increasing the vocal range is one of the things that allow a singer to be versatile. The greater our range the more songs and we can fit in your repertoire. This is very important if we want to present different Raga because every Raga has its: chalan in different octaves. It is better to have more vocal range rather than less because the greater our range the more versatile our repertoire can be, the most versatile and consequently successful vocalist.  

Comfortable range which will be determined by our Guru and the range in which we sound best is also a factor. By 'best', mean focused, pure-timber and strong. Vocal range basically depends on the style of music also.

**Chest Voice**

Our *chest voice* is usually our speaking voice range. It is natural and transforms to become our vocal range in singing. We can also use our chest voice to reach lower vocal ranges. Most of the resonating or vibrating to create sound is happening in our chest voice.

**Head Voice**

Our *head voice*, on the other hand, will help us resonate sounds that may not be as easily done when we are speaking. When we are singing, our head voice allows us to sing higher, perhaps up to an octave or higher than what our natural chest voice will allow. We can feel our head voice by attempting to move from a low tone to a higher one. As our voice progresses up the scale, we'll notice that our head is becoming a bit lighter. As our voice progresses higher, we have to be sure to focus on the movement and positioning of our lips to help take the strain away from our vocal chords.

**Mixed voice**
A singer who has a wide, powerful voice range, he is using the *mixed voice*. Our body will learn to fade more resonance into the head cavities and out of the chest cavity. This produces what we called a mixed voice. We can improve our vocal range and gain control over our voice.\(^{18}\)

1. At first, we should practice extending from our regular chest voice up into our head voice. This is sometimes referred to as our head register or head cavity.

2. Know the difference between our head voice and our actual voice. Many students think they can sing high but they sing in false signing voice. This is also known as our head voice. We have to practice hearing and then moving our own voice from your regular, comfortable chest voice up into your head.

3. Then the muscle groups and ligaments start work together to help us create a proper, resonating head voice.

4. One of the things we might learn to do is to disengage certain muscles that aren't necessary for singing.

5. Engaging these muscles while simultaneously singing at the very top of our range will cause strain.

6. Have good posture. We have to have our shoulders and back straight and relaxed. Remember not to tilt our head up and stretch our neck when trying to reach a high note.

7. We can also begin experimenting with the lowering of our vocal range too.

8. When we move away from our head voice, should try returning to it and then going one or two tones in pitch than what we are normally used to doing.

9. When we sing from our chest, we have to be sure that we do not strain our neck or chest muscles

10. We keep our chin straight and normal.

11. Any wrong posture could actually induce injury on or strain our vocal chords and surrounding ligaments and muscles.\(^{19}\)
12. The above ideas and exercises should be thought about and completed carefully.

13. As we sing, and as we feel the transition from one range or musical note to another, should try to do it as smoothly as possible, so that the transition is both inaudible and unnoticeable.

One has to learn how to gain access to more notes through correct technique and through regular exercising and using the vocal instrument for singing tasks. Every instrument has its own unique range capabilities an untrained singer typically has a more limited range than a well-trained singer. Human voices may be classified according to their vocal range — the highest and lowest pitches that they can produce. Some voices develop more extensive ranges than others. With the use of special exercises it's possible to sing with a connected voice and also expand the range of notes available. Usefulness with regards to range in classical style singing is defined by consistency of timbre and the ability to project the pitches effectively.

In solo classical music, often only the parts of the range that are considered musically useful are counted as part of the range. Since Indian classical music is based on melody and single drone system, so the uses of two different Pitches are not used. This is not considered part of the vocal range in Indian Classical Music. If any “Pitch” cannot be properly projected (i.e. heard over an instruments without amplification), it is not considered part of the Range.

While a singer may have access to many more musical notes both above and below his or her useful range.

The range of vocal tones that can be rendered with some degree of musicality may also be referred to as sing able compass. (Sing able compass is the range of notes we can sing naturally and project). A certain section of a Vocalist's range, (likely the middle portion madhya saptak), will make up his or her most comfortable and practical range whereas other sections of the same Vocalist's range, (the highest and lowest portions Taar and Madhya), will be available or accessible, but will not necessarily be as strong or as desirable in tone. In choral music, where many Voices are singing in unison, it is somewhat less important for each individual voice to be flawlessly produced or completely audible over the orchestra. 

Therefore, the range that a certain Voice type might be expected to sing in a choir may be a little broader than it would be in opera or in solo performances, (as is suggested in the diagrams
indicating the range for each voice type below). In Contemporary styles of singing, singers typically employ amplification (i.e. microphones, speakers, etc.) when performing, which makes more of their range audible and thus usable. One should go to a Harmonium and play the scales, as we sing the scales listen to when our normal singing voice becomes our head voice. The good thing is that our head voice is a map to how high our normal singing voice can be extended.

Singing consists of using the right muscles the right way. We should be breathing correctly in order to get the best foundation to build on. Learning how to sing correctly will assist us in extending our vocal range. Our posture also plays a big role in how we will sing and the quality of our voice. Always warm up before performing. This helps us stay in tune with our voice and allows us to know where our trouble spots may be. Vocal exercises are compulsory every day. Scales and other vocal acrobats will give us the technique and build the muscles to help us not only extend our vocal range but will cause us to have a more strengthened and a better quality of sound.²¹

**Some Practical exercises for extending the vocal range:**

1. First of all find our range. Play the Madhya Sa (middle C on a keyboard) and match it with our voice. Play and sing the next note down. For example; after Madhya Sa should sing Mandra Ni.

2. Warm up the voice. This is extremely important, especially when singing in the top few musical notes or Swaras of our range.

3. All the great Vocalist of Indian Classical music will have warm-up routines which have been tried and tested on their voices, but some good ones to try are: abdominal pulsing while holding a comfortable note; the one-one-two-one scale (start on madhya Saptak) middle C, working up or down one Octave with each musical note having a different number.²²

4. Learn how to sing properly before attempting to expand. Expanding our range when we aren't comfortable working within our range is a recipe for vocal cord damage. For example, vocal exercises that to "touch" the Swara (notes) at the top and bottom of our range. We should not linger at a note Swara we aren't comfortable with. Focus on keeping our throat relaxed, and on breathing properly.
5. Practice breathing, if we go lie down, relax, and put our hand on our stomach, we will feel our stomach go up and down as we breathe. That is diaphragmatic breathing. That helps us be able to sing longer and control our tone.

6. Sing along to songs that are higher than our vocal range. Singing is like playing an instrument. The more we practice, the better we get, just make sure that we warm up first to avoid damaging our vocal cord.

7. Training our voice by taking Swar abhyas (singing lessons) is a good way of learning how to extend our vocal range.

8. A Guru or a good teacher gives specific (vocal exercises) to help the training of the voice to sing higher and lower over time.

In Indian Classical Music Madhya Saptak or the middle octave consists of the Seven Notes or 7 Swaras, which are sung in normal or one’s comfortable frequency.

\[
\begin{align*}
Sa & \quad Re & \quad Ga & \quad Ma & \quad Pa & \quad Dha & \quad Ni & \quad Sa \\
Sa & \quad Ni & \quad Dha & \quad Pa & \quad Ma & \quad Ga & \quad Re & \quad Sa
\end{align*}
\]

In Indian Classical Music set of Seven Notes or 7 Swaras in lower frequency is called Mandra Saptak, Please note the dot (.) below each “Swara” which is used to denote the lower frequency swaras:

\[
\begin{align*}
Sa & \quad Re & \quad Ga & \quad Ma & \quad Pa & \quad Dha & \quad Ni & \quad Sa \\
. & \quad . & \quad . & \quad . & \quad . & \quad . & \quad . & \quad . \\
Sa & \quad Re & \quad Ga & \quad Ma & \quad Pa & \quad Dha & \quad Ni & \quad Sa
\end{align*}
\]
In order to increase our voice range that is to sing maximum notes in Mandra Saptak and Taar Saptak, we need to practice singing each of the notes in lower and higher frequencies. While practicing Indian Classical Music sing the Swaras of Madhya Saptak and as well keep on adding Swaras from Mandra Saptak and Taar Saptak one by one like: 24

*Murchana Paddhati* is a very good exercise to increase the vocal range. Slowly adding next note to increase the voice to another Octave or Saptak.

Like this we have to add next note slowly and we can stretch our voice up to very high note and also low note. First of all Mandra Saptak, then Madhya Saptak and then Taar Saptak. In this exercise the voice increase the range all the three Octave. This is a useful and traditional exercise for Indian classical vocal music, to increase the vocal range.

### 1.5 VOCAL RESONANCE

*Resonance* is the most important factor in determining if a singer’s voice sounds fabulous or flat. Vocal resonation is the process by which the basic product of phonation is enhanced in timbre and/or intensity by the air-filled cavities through which it passes on its way to the outside air. Various terms related to the resonation process include amplification, enrichment, enlargement, improvement, intensification, and prolongation; although in strictly scientific usage acoustic authorities would question most of them. The main point to be drawn from these terms by a singer or speaker is that the end result of resonation is, or should be, to make a better sound.

There are seven areas that may be listed as possible vocal resonators. In sequence from the lowest within the body to the highest, these areas are the chest, the tracheal tree, the larynx itself, the pharynx, the oral cavity, the nasal cavity, and the sinuses. 25
Resonance is responsible for making the voice easily loud. And it makes the upper range easily accessible. The pharynx is the most important resonator; the oral cavity is the second most effective resonator. The nasal cavity is the third most effective resonator. The sinuses are extremely important to voice modulation. Resonance has been a constant debate as to whether the vocal cord of human beings is a stringed instrument, a reed instrument or a whistle. And without fail the discussions have ended in a draw since everyone seem to agree that the human vocal chords are all these and more besides. It is a unique instrument and far superior and incomparable to any man made instrument. Our vocal chords are far more complex, more capable than any instrument, can imitate nearly every instrument. In comparison, its sound is more beautiful. No instrument can bring as much emotion and feel in a song than a human voice. The vocal chord in singing resonance has three elements in common to all musical instruments. A motor, a vibrator and a resonator, additionally the human vocal chords have one more element which no instrument has and that is an Articulator.

1 **Motor**: Lungs and the respiratory muscles.

2 **Vibrator**: Vocal chords.

3 **Resonator**: Throat, mouth, nasal and head cavities.

4 **Articulator**: Tongue, lips, teeth and palate.²⁶

All these elements are unique to each individual and its size and capacity to perform also varies from person to person.

Each individual’s capacity has a unique beauty of its own. Since each person has a unique set of elements, it falls on him to develop its capabilities to the fullest extent and make use of its potential. Human beings can express feelings such as pleasure, pain, anger, grief, doubt, courage, fear etc with his voice and tonal quality. With the strengthening, developing and modulating of these variables. No instrument on earth can produce such a variety of emotions.

The quality and power of resonance can be explained with the example of a tuning fork. When we vibrate a tuning fork, we can see the vibration but we cannot hear anything if it is held in air.
But if we rest it on a table, or a plate, glass or on the bridge of a violin then the tones of the tuning fork will be distinctly heard to a long distance. Similarly the vocal chords by itself cannot be heard without the aid of the other elements. When the vocal chords vibrate and combines with vibration of the air in the nasal and head cavities which forms the resonance chambers, the sound is formed and heard to the distance it is thrown and in the tonal quality and color it is formed depending on each individual.

Tone is the result of rapid periodic vibration. The pitch of tone depends upon number of vibrations in a given period; loudness of tone depends upon amplitude of the vibrations; quality of tone depends upon form of vibrations; and form of vibrations depends upon the resonator. Resonance is a secondary harmonic pitch produced in the upper cavities of the head. The sound the vocal cords make and the Resonant pitch work harmoniously to produce the full sound of the voice. Without resonance a singer will be told things like, "we need to project more," or "Our voice is very throaty." The reason is that the sound the vocal cords produce on their own is a very small unmusical thing. Without the upper harmonic resonation it's like taking the body away from a violin and just leaving the strings. The strings would make a sound if struck but it would not sound musical at all.

If we are expecting upper harmonic resonance to happen simply because you sing with a relaxed larynx and an open throat, we will never achieve it. To achieve upper resonance in the voice we need to learn how to attack your voice through the mask. 27

Scientific aspect of Resonance

Resonance is one of the properties of sound. Sound is a wave that travels through the air. Resonance is related to frequencies. When sound goes through different mediums such as walls, roofs, glass, wood, metal, water, etc. it amplifies certain frequencies; the high or low frequencies may become more noticeable. When we sing, sound that we produce travels throughout all of our body. Sound does not resonate exactly the same in each part of the body. For example, in our head it would sound different than in our thorax. The best thing is to discover the best resonating parts of our body and use them when we sing to produce the high and low notes well.

Practicing is the best way to expand our vocal register, especially when we are first learning how to sing.
**Vocal Resonance Exercise**-

Exercise to practice resonance.

1. Close our mouth and start to say the letter M like *mmmm* for a few seconds.

2. Try to make it sound only in our throat.

3. Repeat the same sound, but now make the sound between our nose and our mouth.

4. Make the same sound but this time try to make it sound only in the center of our head.

5. We will start to notice that when we make the sound between our nose and our mouth, the high frequencies sound the best.

6. The high sounds sound second best in the center of our head. We will see that the high sounds do not sound as clear when we make them from our throat.

7. If we still cannot seem to note the difference in the quality of the high frequencies, keep practicing until we are able to detect where to locate the best sounding high notes.

8. To broaden our practice, try to make the sound in different keys. We can also use the sound *maaa* while trying to reach higher notes each time within our vocal register.

9. See how each sound resonates and how it sounds as we practice in the different zones and forms that we have mentioned.

10. We recommend using the area that is above our palate, between our mouth and nose, if we want to expand our vocal register, adding more high notes. Opening our mouth more and tensing up our facial muscles will help us reach even higher notes.

11. Once we have practiced and have a good grasp on resonance, we will be able to better control where to send the high and low notes when we are singing.

12. Lower resonances refer to the vibrations that are produced in the chest by the spaces in the chest and throat. Exercises for lower resonance produce a voice that is flexible and has a warm quality. They also prevent muffled singing and/or tightness in the voice. They help the voice to emerge freely from the singer's body, in a sense.
13. Exercises for lower resonance are promoted when the throat is wide open during singing. Get a flashlight, open your mouth wide and say *ah*, while looking at the back of the throat. At the back of your throat you will see a pinkish area with a perpendicular structure hanging down centrally (uvula). These are muscles that need to be relaxed optimally when you are singing.\(^{28}\)

Here are a few simple exercises for lower resonance:

Breathe and softly sing *ah* (mouth open position)

Breathe and sing *ER, OO, KER, and KOO*.

Breathe and sing *zzzz*

Yawn\(^ {29}\)

The importance of Resonance- Resonance is responsible for making the voice easily loud. Missing the resonances would be a problem: they are needed when singing with loud accompaniment, and having a resonance near the frequency of the voice. For singing high notes.

The head Resonance is very important. The voice's resonance needs to be balanced throughout the resonating cavities of the body during singing in order for the voice to produce. Vocal Release shows us this very specifically and directly and with specific easy to reproduce techniques. We are missing a big part of the equation if we don't know how to achieve resonance in our voice how to create and control resonance; it is the most important factor in determining if a singer’s voice sounds fabulous or flat. Resonance is responsible for making the voice easily loud. Resonance makes the upper range easily accessible. It is responsible for harmonic overtones\(^ {30}\). Recognizing resonance in singing is vital since it helps to broaden our vocal register. Some singers do not know what this is, but when we discover it we will realize that it is one of the most important elements of singing.

1.6 VOICE SUSTAIN
Sustaining a Swara has its own charm. The elegance of sustaining a note or any Swara which is completely in tune for various seconds is that the pleasure it provides for the vocalist when reaching the peak of the song is beyond price. This technique is referred to as sustain and is one of the most common elements utilized during a skilled singing concert. We have heard many vocalists singing that have the stamina or command to maintain a Swara or note for a considerable amount of time. It is still yet more amazing when the Swara or note they are singing is high. For this marvelous achievement and singing, we have to utilize the correct breathing management and lots of Riyaz of different Swaras to do and practice a few sustain workouts. Working out to better our breathe control as well as for helping extend the time we sing a note.

In music, sustain is a parameter of musical sound over time. As its name implies, it denotes the period of time during which the sound remains before it becomes inaudible, or silent.

Sustaining different Swaras is very important in Indian Classical music. It is a popular saying among Indian classical musicians that the longer we can sustain and sing a single note, a better Vocalist we are. Even hours of singing complex compositions might not improve our hold on the notes. The best way to gain control over them is by sustaining Musical notes or Swaras.

Sustaining along with a Harmonium can be very helpful and turn into a perfect moment if you can no longer differentiate the sound of the instrument and yours. That means we are resonating with it and that’s what we want. Here it is a fact that sustaining is very important in Hindustani classical music while in Carnatic music sustaining Swaras is not very important. In Hindustani music during voice training to sustain a Swara is an important aspect. In Indian Vocal Music the capacity of sustaining the breath over a slow vocalization is needed. The singer must know the composite nature of musical notes and should be able to sustain on it.

There are many Singing Exercises that target our Vocal Sustain, or our ability to sustain our voice well when we sing, especially at the end of long phrases a useful vocal exercise that we can practice, so that we will be able to sustain our voice well and also produce a great singing tone at the same time.

Before we begin, please make sure we do some basic vocal warm ups before we embark on our vocal exercises, so as to avoid any vocal abuse or harm. We should do some breathing exercises as these will come in handy for our Vocal Sustain Singing Exercises.
Sustaining of the voice depends on a number of things:

*Good Breathe Support*

In order to sustain our voice when we sing, we need to ensure that our voice is well supported by our breath, and that our breath is not shaky or unsteady. If our breath is unsteady, the voice will definitely reflect this and our vocals will be shaky when we are sustaining or singing a long note or word.

*Good Vocal Production*

We need to produce a solid and balanced sound when we sing, so that we are able to sustain the long note or word well. If our voice is too airy, we will be unable to sustain our vocals when we sing because there is too much air rushing out through our vocal cords. By keeping the amount of air passing through our vocal cords at an optimum level, we can create a good balance between Breathe and Voice, and the sound that we produce will be a good and solid one.

The singer's voice should be stable when sustaining the long note, and that the tone using is also bright and solid and not overly airy.

The vowel used here for this exercise is an 'Eh' vowel, and will help you to also place your voice in a more forward position when you sing. 32

The singer's voice should be smooth as he moves from one Swara to another. Swara or note to note in this basic scale consisting of 7 Swaras notes

<table>
<thead>
<tr>
<th>Sa</th>
<th>Re</th>
<th>Ga</th>
<th>Ma</th>
<th>Pa</th>
<th>Dha</th>
<th>Ni</th>
<th>Sa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sa</td>
<td>Ni</td>
<td>Dha</td>
<td>Pa</td>
<td>Ma</td>
<td>Ga</td>
<td>Re</td>
<td>Sa</td>
</tr>
</tbody>
</table>

Try taking in air entirely into the diaphragm zone while expanding our abdomen. Begin by exhaling a very small amount of air constantly; however do not open our lips very much. Imitate the sound of the letters t and s combined, such as tsssss. Try to blow the air come out of our mouth at a slow pace, control our respiration so that all of the air does not escape too fast.

Take account of how long this takes and log results, so one can observe development as one gets more efficient. It does not make a difference if at the start we only last for 10 or 15 seconds.
Little by little we will be able to hold out longer. If we feel fatigued or dizzy when we first start, take time to rest but try to last as much time as we can without feeling dizzy.

This exercise will help us to control our breathing further which will then in turn help us to achieve a longer sustain duration. Try singing a Swara or note that’s simple for us and that is inside our vocal range and that isn’t at the extreme high end or the very low end of our vocal register so as not to push ourselves too much. Begin with the Swara Sa sound using the identical respiration technique and at the same time take account the length of time that we keep the note. When we can continue a bit longer, alter the note and start to sing higher notes each time. When we arrive at the highest notes sing the sounds aah or ooh.33

Constantly lead with some sort of instrument. When we feel that the air is starting to run out in a specific note, stop the sound completely and suddenly without trying to use our very last breathe. The note should end distinctly without being reduced in strength. The Swara or note should constantly be sung clear without changing the tune or volume. As we advance to higher notes it might be more challenging to keep up the note for a longer duration. Try to fixate on the separate resonators in your body whilst you are practicing breathe control.

We ought to observe that when we are singing a Swara or note, our stomach ought to begin deflating little by little. This will display whether or not you are using the accurate respiration method. If we still have sufficient breathe left after the last note, we can proceed on to the next Saptak or octave slowly. This training exercise is truly simple yet very effective for improving our sustain ability.34

The voice sustaining training should take guidance of Guru or any Voice expert. This is especially if we have not developed the ability to listen to ourselves and to know whether we are doing the exercises properly or not. We have to remember that we should continually note the time and the Swara or musical note we are singing; this will help us to see that we have progressed. Sustainability is an important part of voice training in Hindustani music and Voice Culture. Voice culture covers all the aspects to train the voice to sing effectively.

Conclusion
Scientific principles are the correct voice principles which are true. Whatever the style of singing be, the application and usage of a correct technique of voice production is very important—be it breathing, phonation, resonance, articulation etc. These scientific principles conform to natural laws and therefore are most suitable for voice. Scientists and voice experts all over the world agree to these principles.

The following chapter discusses the prevalent approach and aspects of voice training which includes areas such as Yoga, Pranayama, and Psychology, and also looks into various voice disorders and suggested remedies.

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