

A Technical Comparison of Jazz and Carnatic Music

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Introduction

Since the dawn of mankind, humans have turned to music as a form of entertainment, communication, and prayer. Jazz is a form of American folk music that evolved from the communities of New Orleans, Louisiana. Carnatic music is the ethnic classical art form native to Southern India. An unlikely pair, at first sight, these two genres of music appear to be complete opposites of each other. Upon closer inspection, many common intricacies begin to appear. So, let us begin a technical analysis and comparison of the ancient classical art of the Orient and the contemporary folk music of the Occident.

Origin of Carnatic Music

The ethnic classical music of South India is collectively known as Carnatic Music. According to Hindu scriptures, music originated from the ancient chants known as the Vedas. Three of the four Vedas are chanted using only four specific notes. Hindu mythology tells us the story of Daksha, a son of Lord Brahma (the Creator), in a time when only two Vedas existed. Daksha's daughter Sati married Lord Shiva (the Annihilator) against the will of her father. To insult the two, Daksha conducted a yaga (sacred ritual) without inviting his daughter and son-in-law. Ignoring the warnings of her husband, Sati attended the ceremony uninvited, only to be humiliated by her father and immolate herself by jumping into the sacrificial fire. An enraged Shiva created Virabhadra, an embodiment of his wrath, to go and behead Daksha. The priests of the Daksha's yaga pleaded that the ritual could not be completed without him. Moved by their pleas, Daksha was forgiven and brought back to life bearing a goat head. As the ritual continued, Daksha's goat voice was no longer able to sustain the four pitches of the Rig Veda, thus giving birth to the third Veda, Sama Veda. Sama Veda is said to be the earliest form of music in India, from which all other music evolved.

Origin of Jazz

The origins of jazz can be traced back to the slave trade of America. The gospel-like spiritual hymns sung amongst African American plantation workers, combined with the folk music of other ethnic communities in the lower economic strata, to heavily influence the inevitable development of Blues. Around the same time period, a form of piano music called ragtime originated in Chicago and began gaining popularity among the public. The intermingling of these independent art forms served as seeds giving rise to numerous distinct genres, including bebop, rockabilly, and most notably, jazz. Born in Storyville, New Orleans, the big bands of jazz are enjoyed globally today by people of all religions and ethnicities.

Systems of Tuning

Music, in its simplest form, is nothing more than sound which follows a pattern. Let us begin our analytical comparison at the very foundations of music; the framework of frequencies that enable one to create a structured pattern of sounds. Let us begin with the systems of tuning upon which these two musical genres are built. When a given frequency is doubled, the human ears perceive the result as merely the same sound, played at a higher pitch. This phenomenon is interpreted in music as an octave. All systems of tuning consist of a series of mathematical ratios to represent the frequency distribution of notes within one octave.

Western Music can fundamentally be thought of as consisting of seven primary notes, beyond which, the cycle is repeated. Going by Sol-fa notation, these notes are named Do, Re, Mi, Fa, Sol, La, and Ti. The exact frequencies, or pitches, of these notes, were governed by **Pythagorean Tuning**. In his book *How Equal Temperament Ruined Harmony (and Why You Should Care)*, Dr. Ross W. Duffing states that the Greek mathematician Pythagoras calculated the mathematical ratios commonly used in the music of the Middle Ages. This tuning system is characterized by its mathematically simple ratios.

Over time, Pythagorean tuning began posing many practical difficulties. To combat these problems, a new tuning system called **equal temperament** was devised. The twelve equal subdivisions within this system became known as *semitones*. A trademark feature of equal temperament is the presence of the *chromatic scale*. All of modern music is governed by equal temperament and the concept of semitones. Jazz, in particular, relies heavily on the chromatic scale for its use of accidentals. Sol-fa notation is mostly used for educational purposes today, and is rarely ever discussed outside of a pedagogical environment.

Unfortunately, being as ancient as it is, there is no living documentation concerning the derivation of tuning system employed by Carnatic music. Hence, we are forced to restrict ourselves to an analysis of what is, and not what was. Similar to sol-fa notation, Carnatic music is governed by a system of seven *swaras*, or notes. These swaras are named Shadja, Rishabha, Gandhara, Madhyama, Panchama, Dhaivata, and Nishadha. They are often referred to by their abbreviated forms, Sa, Ri, Ga, Ma, Pa, Da, and Ni. Unlike in western music, however, five of these swaras (Ri, Ga, Ma, Da, Ni) do not represent specific frequencies or *srutis*. They are more like placeholders and can refer to one of four different positions, or *sthanas*, as required by the scale in question. Each sthana is but a musical name given to represent a mathematical ratio. Based on this information, a simple calculation reveals that there is a total of 22 different possible srutis within a *sthayi* (octave). This is known as the **Theory of 22 Srutis**.

Many of these srutis bear extreme similarities to the Pythagorean tuning system. As Carnatic music was already in existence during the days of Pythagoras, many speculate that it may have been one of the several systems of music that Pythagoras researched before deriving his ratios. Furthermore, many of these 22 srutis have ratios even smaller than the semitones used in equal temperament. Hence, these subdivisions are termed as *microtones*, and Carnatic music is known as a system of *microtonal music*. However, unlike equal temperament, Carnatic music does not have anything similar to the chromatic scale. This is due to the presence of complex melodic structures and the rules that hold them in place.

Melody

Carnatic music is considered to contain one of the most sophisticated melodic structures ever created: the concept of a *raga*. A raga is akin to a musical scale. In Carnatic music, each raga consists of an ascending section, or *arohana*, and a descending section, or *avarohana*. The arohana and avarohana contain a series of swaras, which define that particular raga. As mentioned earlier, certain swaras may refer to one of many sthanas, thus changing their effective pitch. The number of swaras within a raga may vary from four to seven, and may even differ from arohana to avarohana. Each raga has its own unique sound and ornamentation. Furthermore, many ragas are associated with seasons, or even times of the day, like *Bhupalam*, which is only sung at dawn.

The *gamaka*, one of the defining features of Carnatic music, is a graceful quiver that embellishes each and every musical phrase. Gamakas are ornamentations serving as the fingerprint of each raga, reflecting their unique characteristics. Sadly, western music does not seem to have anything similar to a gamaka. The variations and ornamentations mentioned hitherto serve as factors for the further sub-classification of ragas, which is beyond the scope of this essay. In his book, *South Indian Music (Book I)*, musicologist Padma Bhushan Prof. P. Sambamurthy, states that permutations and combinations of these numeric series have led to the construction of no less than 5,256 ragas! However, it is interesting to note that despite having 22 srutis, only seven may be used in any single raga, prohibiting Carnatic musicians from employing a chromatic approach to music. Why?

Carnatic music follows a very orthodox tradition. All ragas have been structured to serve as a framework upon which musicians may perform. What all ragas share in common, is that there is not much dissonance formed in any of them. The ideology behind this restriction is that dissonance should be employed sparingly, and only in certain circumstances. The ragas are constructed such that dissonance can only be formed in strategic positions, where they may be used to artistically resolve a musical phrase. The presence of a chromatic scale would have opened up a Pandora's box of dissonant sounds for the musician's use. The exclusion of such a scale from the enormous system of ragas is but an effective way to contain the appearance of dissonance.

On the other hand, jazz relies heavily on the use of the chromatic scale. Counterintuitively, many jazz standards are based on the *modal* structure of melody in vogue prior to the development of equal temperament. A mode

is the closest thing to a raga found in the realm of western music. It is a scale defined of seven specific notational intervals, each creating its own unique mood. Certain modes, such as Mixolydian, play an essential role in jazz and blues numbers. Cemented in jazz tradition by Miles Davis in his album “Kind of Blue”, modes have become an essential foundation for jazz melodies.

Unlike, Carnatic, however, rules in jazz are more like guidelines. Although predominantly a harmonic concept, dissonance does occasionally make itself known in jazz melodies as well, through the use of *accidentals*. As the name suggests, an accidental is a note borrowed from a neighboring mode or scale. When executed well, this adds character, interest, and complexity to a melody. Built on equal temperament, jazz has access to and extensively utilizes accidentals. This is made possible due to the presence of the chromatic scale. As mentioned earlier, this leads to a considerable amount of dissonance. But the philosophy of jazz is to appreciate the beauty in imperfection. In the hands of a virtuoso, even dissonance can be made to sound soothing.

Harmony

Jazz is separated from other genres of western music by its sophisticated harmonic progressions. Unlike traditional forms of music, jazz harmony does not utilize a triad (chord consisting of three notes); that is considered far too plain. The simplest form of functional jazz harmony is a *tetrad*, a four-note chord. The presence of three notes in a chord may be manipulated to evoke basic feelings of happiness or sadness. Adding a fourth note to the cluster provides enough complexity to create sounds representing more sophisticated emotions. Even the simplest tetrad has the capability of combining contradictory emotions simultaneously, such as a chord that is both happy and sad at the same time. This counterintuitive juxtaposition evokes a bittersweet feeling. The ample use of tetrads is what gives jazz its characteristic mood.

However, the tetrad is quite simply the simplest form of jazz harmony. Jazz chords may contain as many as six or even seven notes playing at once (CMaj¹³ for example). In such situations, to prevent the sound from becoming too “dense”, many of the less characteristic notes of the chord are removed from the cluster. This reduces the magnitude of dissonance created, while still conveying the intended disposition of the harmonic structure. These complex harmonic concepts allow musicians to create rich tapestries and narratives. Even when repeating a chorus, a virtuoso may refrain from using purely consonant chords. This informs the audience that there is still more of the song left and effectively delays the satisfaction of completion. This technique is sometimes informally referred to as “going home”. The end result is that there is rarely ever a blunt portrayal of happy or sad; everything in jazz lies between the two extremes, present as distinct shades of grey.

On the other end of the spectrum, harmony in Carnatic music is almost non-existent. Carnatic singers are accompanied by a *tambura*, a four-stringed drone. The strings of a tambura are tuned to different combinations of Sa and Pa, the only two swaras that do not vary their frequency. These strings are plucked at an unchanging speed, constant throughout the entire performance. This is in no way dependent on, or affected by, the rhythms and ragas of the different songs being performed.

Tuned precisely, the constant drone of the strings of the tambura resonate together to form *overtones*. An overtone is a harmonic sound produced by the partial vibration of any vibrating column. All vibrating strings produce what is known as a harmonic series, or overtone series. Though it is a naturally occurring phenomenon, this may be difficult for the average human ears to perceive distinctly. However, when specific frequencies combine accurately, we are able to hear one or more of the overtones that are produced as a result. This concept is employed by the tambura. By repeatedly playing two or three frequencies, ample combinations of overtones are formed, and chances of perception are maximized. Although not always directly heard, these overtones subtly resonate with the singer’s voice, providing a sense of indirect harmony. Due to the richness of these harmonic overtones, a tambura can resonate with any combination of the 22 srutis. This effect of the tambura creates an elegant and peaceful sonic canvas to accompany the singers.

Rhythm

Just like ragas, Carnatic music has a plethora of rhythmic structures called *talas*. On a very high level, a tala is similar to the concept of time-signatures and measures of western music, but it does not stop there. A tala is a

logical pattern of beats that denotes a rhythm. Talas are constructed from 6 different possible *angas*. The word “anga” can be loosely translated from Sanskrit as “limb”, or “member”. The six angas are laghu, drutam, anudrutam, guru, plutam, and kakapadam. Each anga represents a distinct duration of musical time, similar to minims or crotchets in western music. They are also denoted by unique hand gestures. These angas have been combined in different sequences to construct over 175 talas. When performing, a singer will use his or her hands to play the tala on his or her lap, by using the hand gestures corresponding to the constituent angas of the tala. This is done to keep time and maintain a foundational rhythm. The tala loops throughout the entire song, forming a rhythmic framework upon which musicians may improvise, and form polyrhythmic patterns during performances. Unfortunately, most of the vast talas in existence are no longer in vogue. Only a handful of talas are used in modern performances, and three of the six angas are rarely discussed outside of a theoretical context.

Similarly, jazz also has a rich heritage of complex rhythmic patterns, which can be traced back to African origins. Jazz musicians, especially percussionists, are often expected to master certain polyrhythmic exercises before they are considered professionals. Polyrhythm is the combination of multiple distinct rhythmic patterns (that cannot be simplified into each other) playing simultaneously. The simplest form of this is called 3:2 polyrhythm, in which one rhythm splits each beat into halves (duplets), while the other divides it into equal thirds (triplets).

Having evolved from swing music, jazz relies heavily on the use of triplets and *syncopation*. Syncopation is a technique in which a performer adds emphasis at the least expected places, forming a choppy, off-beat rhythm. Popularized by the ragtime songs of Scott Joplin, such as The Entertainer or Maple Leaf Rag, this unpredictability, while shocking at first, eventually begins to form patterns. A swing rhythm can be found underscoring almost all styles of jazz, with the exception of Bossa Nova, or Latin Jazz. It is this swing rhythm which gives listeners the urge to commence foot tapping. To quote songwriter Irving Mills, “It don’t mean a thing if it ain’t got that swing”. It’s interesting to note, however, that despite both jazz and Carnatic music implementing polyrhythm, it is quite rare to see the use of triplets in the latter. Carnatic musicians use triplets sparingly, as the subdivision of beats is typically expected to follow an exponential progression. So, as one can clearly see, these two genres, despite having rich rhythmic backgrounds, each form complex rhythmic structures unique from the other.

Education and Performance Culture

Carnatic music, being a form of classical music, is very formal and follows a strict, orthodox system of pedagogy. Students initially begin learning multiple series of exercises, or *varisas*, laid down by composer Purandara Dasa in the raga *Mayamalavagaula*. This allows students to become acquainted with semitones and critical microtones of Carnatic music. Upon completion, students will gradually begin learning *Swarajathis*, *Varnas*, *Kirthanas*, and increasingly complex compositions. Carnatic music is taught in a purely aural tradition, i.e., by listening to your teacher and repeating. Books, although used by some in the modern world, are not part of the traditional teaching system. This is mostly due to the fact that the teachings of Carnatic music predate any form of scribing, and even today, no notational system has been developed which can accurately represent the intricacies of gamakas.

Traditionally, Carnatic musicians used to lead lives of devotion. Majority of Carnatic music is written in praise of the Lord. Hence, it was originally performed in temples, or in the halls of great kings. Some of this tradition still continues today, but it is more common to find stage performances in dedicated music auditoriums. The rules of performance, however, are still absolute. Performers must be seated on the floor of the stage, cross-legged, in a semicircular fashion. The lead performers must be in the center, the tambura player slightly behind them, other accompanists (flautists, violinists, etc.) positioned on either side of the lead performers, and percussionists at the two ends of the semicircle. The stage presence of performers is of utmost importance, as improper posture or conduct may be shunned by an elite audience. The songs that are performed, though selected by the musicians, must follow a specific sequence. The first song must be about Lord Ganesha, to pray for a smooth concert without any problems. When singing a song in a raga different from the previous, it is customary to first perform an exposition, or *aalap*, to demonstrate the intricacies of that raga. Certain lengthy or famous compositions may be followed by a *jugalbandhi*, a sort of duel of wits between the various performers and accompanists. Finally, all performances must end with a *mangalam*, an auspicious song of repentance,

seeking forgiveness for any mistakes that may have occurred during the concert, and for possibly have sung ragas outside of their prescribed time of day.

It is interesting to see that jazz, too, follows an aural system of training. As the first jazz musicians were of lower economic stature, some were illiterate, and could not read music. Moreover, even those who could, could not always afford to purchase or publish books. The aural traditions of jazz grew out of necessity and circumstance. Although many jazz "fake books" containing transcriptions and charts of famous jazz standards are available today, musicians are valued for their harmonic ear. Ear training continues to be a staple of jazz training. Unlike Carnatic, jazz does not seem to have any defined structure of education. A few modern publishers, such as Hal Leonard, have come up with their own educational system. Most of these structures follow a similar pattern, studying rhythm, basic tetrads, and the circle of fifth, before proceeding to basic jazz numbers.

The performance culture of jazz is radically different than that of Carnatic. Mostly performed during the night at cocktail bars, musicians are encouraged by the sight of dancing couples. If your foot isn't tapping, the performance isn't good enough. Rules of performance are almost nonexistent unless specified by the host of the concert, or by the performers themselves. Apart from such individual conditions, no universal performance rules are present as such. So, what is the purpose of a jazz concert? To have fun, of course!

Improvisation

Improvisation plays a front and central role in Carnatic music. Each song is considered a foundation for further development. Improvisation must be contained within the same tala and raga as the original song. Musical phrases, or *Sangathis*, are sequentially added one by one to the composition, each more complex than the previous. The sangathis sung at first must be simple and reflect the musical structure of the phrases existing in the composition. As newer sangathis are added, more and more deviation may occur, until the wildest ones are unleashed at the tail end of the song.

Carnatic music, as a whole, places more emphasis on improvisation than composition. Composers of old have created innumerable treasures for us, that very few musicians ever compose today. This may be because the common listener values performers over composers. Although exceptions do exist, musicians today are praised for interpreting famous songs in their own unique styles, while still paying tribute to the masters who composed them. The annual *Thyagaraja Aradhana* is a concert that occurs worldwide as a tribute to Thyagaraja Swami, one of the famous *mummurthy*, or Trinity of Carnatic music.

Similarly, jazz has the concept of "standards", famous songs that all performers are expected to know. For example, Juan Tizol and Duke Ellington composed the song "Caravan" and gave its first performance in 1936. Over the years, it has become a standard, making its way through the skillful fingers of Nat King Cole, Wes Montgomery, Art Pepper, and Buddy Rich, to name but a few. Though composition is encouraged, improvisation is an indispensable aspect of jazz. Most jazz standards, like Carnatic songs, are merely foundations for further enrichment through improv. A few basic rules of improv (like maintaining a consistent harmonic progression) do exist, but are not necessarily followed all the time. Pianist Herbie Hancock mentioned in an interview an incident that occurred when performing in Miles Davis's band. When accompanying Miles's trumpet solo, Herbie accidentally played the wrong chord. Without missing a beat, Miles changed his solo to fit the new harmonic structure that Herbie mistakenly created. Just like that, his mistake was no longer a mistake.

Conclusion

Based on the parameters of comparison made above, one can clearly see that Carnatic and jazz are from two different worlds. Carnatic music is by and for the elite community. There exists a meta state, a big picture, forming a complex framework governed by strict norms. It concerns itself with maintaining purity to elevate the mind and soul, and attain salvation. Jazz is down to Earth, embracing the imperfections of man. It was built from the ground up by commoners, the goal being to unwind and have fun, forgetting the troubles of the tiresome day. That does not mean they are without commonalities. In spite of having different sounds, lifestyles, and objectives, one underlying philosophy forms an unmistakable thread out of which both genres have been woven: the beauty of spontaneous creation is revered above all as the epitome of creative expression.