
Ornamentation in South Indian Music and the Violin

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Introduction

On first hearing the violin played in the South Indian classical (Carnatic) style, listeners often remark how well instrument and music suit each other. The violin's unfretted fingerboard and player's relaxed left-hand hold seem ideal for executing the various gliding and wavering *gamakas* (ornaments) which characterize Carnatic *raga*. Investigation reveals a specific reason for this good fit: each type of *gamaka* matches a distinctive violin technique.

This article is based on material drawn from the author's doctoral dissertation (1989), which explores the thesis that types of melodic ornamentation shared by South Indian and other musics can be matched with shared principles of violin fingering. This correspondence helps to explain why the violin appeals to the various peoples who have adopted it. And it accounts, at least in part, for the instrument's power as a vehicle of communication and influence between musical traditions.

In particular, the three broad classes of modern South Indian *gamaka*—slides, deflections, and fingered stresses—correspond to the three types of left-hand movement which are intrinsic to the violin: shift, oscillation, and fingerfall. This parallel was key to the author's dissertation, and the present article describes it in detail.

Overview of Literature on Gamaka

The standard translations of *gamaka* as "ornament" (used in this paper) and "embellishment" are both inadequate, to the extent that they suggest something incidental added on to what is fundamental. For *gamaka* is itself a fundamental element of *raga*.

Gamaka performs an integral, rather than decorative function in Indian music. Theoretically, one can define a *svara* simply as a scale degree . . . , but in practise a *svara* is properly defined only when taking into consideration the *gamaka*(s) traditionally associated with it. *Gamaka* is what gives a *raga* its unique character. (Viswanathan 1974:1/150)

So *svara* and *gamaka* are intimately linked. *Svara* is not a discrete note in Western terms, but a scale degree and all its associated melodic movement, or *gamaka*.

As an organic manifestation of *raga*, *gamaka* has affective power, and can directly influence the listener's state of mind.

The *gamakas*, or grace notes—the many different ways of sounding, embellishing, and resolving notes—are the subtle shadings of a tone, delicate nuances and inflections around a note that please and inspire the listener. . . . The ornaments are not arbitrarily attached to a melody; rather, they seem to grow out of it. (Shankar 1968:23)

Gamaka animates a *svara*, imparting motion and life to the scale degree. This dynamic quality leads the contours of a particular *gamaka* to vary from one context to another, depending on the preceding and succeeding *svaras*.

The moment a *gamaka* clothes the Swarasthana [note position in the octave], the latter is quickened into life. For the *gamaka* builds

up a relationship with neighbouring members of the family [of *svaras*] to the right and to the left. (Ayyangar 1972:148)

Its subtle and variable nature makes *gamaka* highly problematic, at best, in any notation of Indian music. At times, the effort to convey such intricate, fluid melodic movement by means of fixed-pitch signs may seem quite futile. And this is especially true of the densely ornamented Carnatic style. When a South Indian musician does use notation, it serves only as an aid in remembering a piece already learned by hearing and imitating another musician. A detailed notation of *gamaka* isn't needed. Letters represent the *svaras* which form the main structure of the melody, and these summon up the appropriate *gamakas* in the musician's memory.

On the other hand, theorists have long labored to notate this music as accurately as possible. Over the past four centuries they have proposed various solutions to the notation of *gamakas*, often using symbols attached to *svara*-letters. But the symbolized *gamakas* must first have been defined and distinguished from each other.

Writing in the early thirteenth century, Sarangadeva lists fifteen *gamakas* in his *Sangita-ratnakara*, the most important musical treatise of India's medieval period. Sarangadeva describes many of his *gamakas* in terms of their execution on the *vina*—the fretted plucked lute which has been an emblematic Indian instrument from ancient times. But so little is known now about the actual sound of this period's music that modern writers can only make free interpretations of Sarangadeva's definitions, discussing the ornaments in terms of modern music and the technique of the modern *vina* (Powers 1959:1/127-128).

A major advance in the written description of *gamakas* came in Somanatha's *Raga-vibodha* (1609). The famous fifth chapter of this work lists 23 symbols for use in *vina* notation. Somanatha describes the execution (*vadana-bheda*) of the corresponding ornaments, and

he gives musical examples of 51 *ragas* in *svara*-letter notation. According to Harold Powers, "this section is the only example before modern times of any Indian music in notation sufficiently detailed to be interpreted at all" (ibid.:1/40).

In her study (1976) of this chapter of the *Raga-vibodha*, E. te Nijenhuis reproduces Somanatha's ornaments and musical examples in Western staff notation, and translates his detailed ornament descriptions (1976:2/64-67). Nijenhuis correlates some of Somanatha's *gamakas* with Sarangadeva's and with modern ornaments. (In a related effort, V. Ranganayaki has conducted an exhaustive comparison (1981) of the *gamakas* of the *Raga-vibodha* with earlier and later compilations of ornaments.)

Somanatha's 23 ornaments include a striking variety of sounds and musical events. Like Sarangadeva, he describes them in terms of *vina* technique; but this doesn't mean that the ornaments applied only to that instrument. "It would appear . . . that by Somanatha's time the *vina* had acquired a style of performance similar and comparable to that of the voice" (Ranganayaki 1981:232).

Subbarama Diksitar's *Sangita-sampradaya-pradarsini* (1904) is a treasury of compositions in the family tradition of its author's great-uncle, the saint-singer Muttusvamy Diksitar (1775-1835). In this work the younger Diksitar introduced a new threefold classification of ornaments. His grouping was taken up by later writers, and it will be the central feature in the discussion of violin technique here. The three classes are: slides (*jaru* or *ullasita*), deflections (*gamaka*), and fingered stresses (*janta*). (Note that the more specific meaning of *gamaka* here should not be confused with its use as a general term for all ornamentation.)

According to Ranganayaki, Diksitar's work attempted to reconcile the 15 *gamakas* of the written theoretical tradition with ten from the oral

tradition. That is, he lists 15 but assigns symbols to only ten (Ranganayaki 1981:345).

Mrs. S. Vidya further describes this set of ten ornaments in an article on *gamaka* symbols in notation (Vidya 1943). Seven of the ornaments appear yet again, with symbols, in a collection by C. S. Ayyar (1955) of compositions by Tyagaraja (the most famous Carnatic saint-singer, 1767-1847). The preface of this work discusses violin technique in some detail and will be referenced below.

In his dissertation on the South Indian tradition (1959) Harold Powers analyzes the melodic functions of a similar set of ten ornaments, using the threefold grouping first described by Subbarama Diksitar.

Powers divides the slides (*jaru*) into functional and stylistic types. The functional slide connects two significant pitch areas in a phrase, while the stylistic slide involves a single significant pitch—as in the attack of an initial note, or the release of a final note. He divides the deflections (*gamaka*) into three types: those which serve to prolong a note, those which contribute to melodic movement, and those which are specific to the technique of a particular instrument. The fingered ornaments (*janta*) he describes as stresses which emphasize relatively stable, stationary tones (Powers 1959:1/chap.7).

In her dissertation, V. Ranganayaki discusses ten ornaments known in the oral as opposed to the literary tradition (1981:343). She identifies three types as most important: *jaru* (slides), *gamaka* (shakes), and *ravai* or *brika* (turns and mordents). Her third type exemplifies Diksitar's fingered stresses, so these represent the same three classes described above.

Finally, in his ground-breaking work *Raga Alapana in South Indian Music* (1974), T. Viswanathan presents a similar list of ten ornaments with examples of each in *svara*-letter form. His list is a distillation of the earlier writers' *gamakas* together with Viswanathan's own knowl-

edge as a preeminent performer and scholar, and these ten are treated here as the established modern ornaments (Viswanathan 1974:1/152-153). Table 1 presents them, grouped for analysis by the author into the three broad classes.

As Nijenhuis points out, many of these modern *gamakas* can be correlated with ornaments in the *Raga-vibodha* (Nijenhuis 1976:1/2-3). And three of them (one from each of the three main groups: *ullasita*, a slide; *kampita*, a deflection; and *sphurita*, a stress) are found even in the thirteenth-century *Sangita-ratnakara*. So there emerges a line of continuity through 700 years of theoretical writings—not just for these three specific *gamakas*, but also for the types which they represent.

TABLE 1.

CLASSIFICATION OF CARNATIC ORNAMENTS	
<i>Jaru/Ullasita</i> (Slides)	<i>Irakka-jaru</i> - descending slide <i>Etra-jaru</i> - ascending slide
<i>Gamaka</i> (Deflections)	<i>Nokku</i> - stress from above on successive (non-repeated) tones <i>Odukkal</i> - stress from below on successive (non-repeated) tones <i>Kampita</i> - oscillation <i>Orikai</i> - momentary flick, at the end of the main tone, to a higher tone
<i>Janta</i> (Fingered Stresses)	<i>Ravai</i> - turn from above <i>Sphurita</i> - stress from below on repeated tones <i>Pratyahata</i> - stress from above on repeated tones <i>Khandippu</i> - sharp dynamic accent

Fingering Techniques in South Indian Violin

This section discusses specific techniques by which the Carnatic violinist executes the various classes of ornament. (The author is a practicing violinist and a longtime student of Carnatic violin. Remarks on technique in this article draw on direct study with, or close observation of, several South Indian artists of the violin—including V. Thyagarajan, T.N. Krishnan, L. Shankar, L. Subramaniam, and Lalgudi Jayaraman.)

According to most accounts, the earliest master musicians to successfully adapt the violin to Carnatic music were Balasvamy Diksitar (1786-1858), disciple and younger brother of the saint-singer Muttusvamy Diksitar; and Vadivelu (1810-1845), one of the Tanjore Quartet (four brothers, all famous musicians). Both men studied the Western style of playing the violin before going on to experiment with applying the instrument to their own music.

The Carnatic violinist, sitting cross-legged, braces the instrument lightly between chest and hollow of the right ankle, where the scroll of the violin rests. The left hand is thus freed from having to support the instrument as in the Western hold, and the player moves with ease among the various positions. (The term "position" on the violin refers to the placement of the left hand relative to the end of the fingerboard. In first position the index finger is at an interval of a second above the open string; in second position it is a third above the open string; and so on.)

Barbara Benary (an accomplished player of both Western and South Indian classical violin) has traced the development of left-hand technique during the century-and-a-half since the violin's assimilation into the Carnatic tradition. She describes a progression from the initial style which used mostly discrete fingered notes in the Western manner (the "four-finger" style), through a slide-based ("two-finger")

style, to the sophisticated blend of slides, oscillations, and fingered clusters which is found in the playing of today's concert artists (Benary 1971:38).

C. S. Ayyar comments on a typical method in the preface to his Tyagaraja collection:

The fingering technique with 4 fingers enables one to produce the *gamakas* . . . highly enriched with a sense of true notes without any dissonance. . . . The 1-finger and the 2-finger technique now-a-days adopted in the first grip position on the four strings, I regret to add, entirely kills the emission of the full and pure tone of the violin. . . . The usual grip positions used by the South Indian in European terminology are the 1st and the 3rd, the fourth being restricted to the steel [i.e., the highest] string only. (Ayyar 1955:iii)

The passage invokes a standard justification for using all four fingers of the left hand: this preserves the integrity of the various *svaras* in the *raga*. If only one or two fingers are used, then a slide from one *svara* to another blurs together all the intervening pitches—destroying by "dissonance" the true colors of the *raga*. (Of course it could be argued that the voice itself, after which instrumentalists model their playing, has only one "finger," yet this does not prevent vocalists from showing the *raga* in its true colors.)

Various motions of the hand and fingers are used for the different classes of *gamakas*. The first class considered here is *jaru*, the slides; it includes *etra-jaru* (ascending) and *irra-ka-jaru* (descending). These slides vary from quite short to very long, and are usually executed on the violin by one finger as it tracks a movement of the forearm up or down the violin neck. The whole hand, thumb included, moves with the finger in an outright shift from one position to another. A crucial element here is the thumb's movement, although this may not be obvious in very short slides. In some mordent-like ornaments, the hand (with thumb) returns immediately to its former position; in other cases, the slide leads to and ends in a new area of melody elaboration.

Powers calls the ornaments of the second class—*gamaka*—"the most characteristic of South Indian music" (1959:1/149). They include *nokku*, *odukkal*, *kampita*, and *orikai*. These are often termed "deflections," after the associated *vina* technique of deflecting or pulling the string sideways to modulate the pitch. On the violin no such technique exists; instead these ornaments are produced by short slides up and down the string, or by rolling a fingertip (or a group of adjacent fingertips acting as a unit) forward and backward. The deflections are usually executed without changing position, that is, with the thumb stationary. But some broad *kampitas* (oscillations) may be played on just one finger, by sliding the entire hand back and forth between two positions.

According to Benary, the wrist is the foremost source of motion for the wide variety of oscillations, rolls, and short slides which comprise the deflection class.

If . . . two *svaras* are connected by a *gamaka*, they should blend into a continuous sound. Finger one slides up to cover most of the interval between its former position and the place where finger two will be. But finger two cannot come down sharply. It must take over smoothly from finger one. The fingers are touching sides and their tips are adjacent. The smooth transition between the two fingers is accomplished by a rolling motion of the wrist. It is the same motion by which, in the western technique, hand vibrato is made. Only here the motions are much slower and more deliberate. (Benary 1971:73)

All manner of *kampitas* are made with this general motion. They range from the microtonal, in which the oscillation is so narrow that (as in Western vibrato) it does not impinge on either of the neighboring half-tones, to the broad wave whose limits are an interval of a third apart. The microtonal *kampita* may be executed by one finger alone, rolling on its tip, or by two fingers lying very close together. The larger waves may use one, two, or more fingers, depending on the size of the interval and on the player's fingering style. When three

fingers are used, the middle one of the three joins in the rolling contact with the string. The goal is always to transform the sequence of finger-contacts into a continuous glide.

This description applies to the playing of most violinists; a variation can be seen in the technique of L. Subramaniam. He strives for less motion in the wrist and hand, and more motion among individual fingers. For instance, in an oscillation between one note and another a whole tone distant, he prefers to keep the lower finger in its place and to slide through the entire interval with the higher finger. His explanation for this technique is that it allows the hand as a whole to remain calm and relaxed, while ensuring accurate intonation by fixing one of the limits of the oscillation (personal communication).

The third class of ornament is *janta*, the fingered stresses; these include *sphurita*, *pratyahata*, *ravai*, and *khandippu*. The violinist produces *jantas* with fingers placed precisely along the string at scale degrees of the *raga*, rather than placed together with sides touching as for deflections. Thus the different tones involved (in a turn, for example) can be sounded quickly, distinctly, and in tune.

In practice, the ten ornaments do not fall neatly each into one class as depicted in Table 1. For example, *nokku* and *odukkal* are described there as stresses, but their typical execution (by rolling or sliding) puts them in the deflection class rather than among the crisp fingered stresses. *Orikai*, too, has attributes of both deflection and stress. A broad *kampita* executed on just one finger partakes of slide as well as deflection. And *khandippu*, a dynamic accent which is classed with the fingered stresses, may be executed on the violin with an explosive slide or roll up and then back down again, rather than by simply fingering the upper limit of the ornament.

Intrinsic Elements in Violin Fingering

This section describes left-hand motions which are intrinsic to the violin—fingerfall, shift, and oscillation—and correlates them with the classes of Carnatic *gamaka*. Most of the sources quoted here on technique belong to the European classical tradition. This is because Western classical violinist-teachers have written the most detailed works on violin technique. But the author's study of violin and fiddle styles in several musics around the world has failed to uncover other motions so basic as the ones described here.

Of course, each violin style uses a particular blend of these techniques, emphasizing some and underplaying others. In Carnatic music, shifts and oscillations are more common than the discrete fingered pitches of *jantas*. Most pitches in Western classical music are of the discrete type, and oscillations are less various, represented chiefly by vibrato. In some fiddle styles, the player remains entirely in first position, thus eliminating shifts. And the ornaments of the Persian classical style, while profuse as in Carnatic melody, consist mostly of trills, grace notes, and arpeggiated figures—all discrete pitches—rather than the sinuous slides and oscillations of the South Indian style (Zonis 1973:109,114).

The key used here to identify common elements in different violin styles is the concept of wave motion described by violinist and teacher Yehudi Menuhin (1916-1999) in *Violin: Six Lessons with Yehudi Menuhin* (1971). He observes that "the three main functions of fingerfall, shifting and vibrato will be seen to be not only related, but to proceed from a waving action, varying in amplitude from a narrow vibration to a broad scope" (1971:108).

Since vibrato is an oscillation, these "main functions" are the three intrinsic motions identified above. And they correspond to the three

classes of Carnatic ornamentation. Fingerfall is the motion involved in *janta*, those stresses and turns which are fingered as in Western music. Shifting, like *jaru*, uses a sliding movement up or down the fingerboard. And vibrato is an example, within a very narrow compass, of the motion used in *gamaka*, the deflections. This match between musical style and instrumental technique is what gives the violin such a natural place in the Carnatic ensemble.

The reader may easily experience the basic wave motion by following Menuhin's directions:

Hold the left hand in the playing position, without the instrument, with loose wrist, palm facing you, and wave it as if saying goodbye to yourself. . . . See that the wrist and fingers are completely soft, offering no resistance. Now induce a passive waving of the hand by moving your forearm back and forth. . . . To introduce a circular swing into the continuing waving of the hand, add a sideways oscillation of the elbow and arm. (ibid.:109-110)

Menuhin analyzes the physical movements involved in fingerfall, shifting, and vibrato, to show how they all derive from this wave motion. For example, the trill, an ornament which partakes of both fingerfall and vibrato movements, "grows naturally out of our exercises in waves, the wave movement now becoming smaller and faster to resemble an oscillating pivot movement" (ibid.:122).

Each time the hand changes direction in the whip-like motion described above, fingers and wrist move contrary to each other. At these moments the wave acquires a circular or rotating quality, as when the top of a breaking ocean wave curls down toward the beach while the bottom is sucked up and out. Likewise, on the violin the wave motion manifests itself in rotating gestures along the fingerboard. The rotations tend to alternate, moving in one direction and then back in the opposite direction.

This alternating movement is most easily seen in oscillating ornaments like vibrato and Carnatic *kampita*, but it is ever-present. For example: A shift may be thought as a large rotation in which the forearm serves as radius, elbow at the center. Oscillations are repeated back-and-forth rotations on a smaller scale.

And plain fingered notes are produced through even subtler rotations, in which the wrist and the fingertip on a stopped note act in opposition to each other. A falling finger is part of a rotation up the fingerboard (toward the player), while a rising finger is part of the reverse (away from the player). Fine movements of the wrist muscles accompany and oppose these finger motions: on fingerfall the wrist bends very slightly away from the player, and on fingerlift the wrist moves toward the player.

The Physiology of Violin Playing (1971) by Ottó Szende and Mihály Nemessuri gives a scientific basis to Menuhin's analysis. Using electromyography—"the automatic photo-registration of muscle action potentials"—they observed muscles and nerves involved in playing the violin. Their results are presented according to a now-familiar threefold division of muscle actions involved in stopping (i.e., fingerfall), vibrato (oscillation), and change of position (shift).

In a comment to violin teachers, the physiologists conclude that the various muscle functions are interrelated: a student's progress in learning any one function is dependent on progress in the others.

To attain the thumb relaxing its clutch-like action [as in stopping] constitutes a persistent problem. . . . The holding of the violin itself becomes really responsive only after vibrato and changes of position have been mastered. (Szende and Nemessuri 1971:73)

It is their common origin in the wave motion that links the three left-hand functions together. A student gradually gains more facility with each function, and with holding the instrument securely but without

tension, by working with the wave in its various magnitudes or frames of reference. Table 2 summarizes this discussion.

TABLE 2.

RELATION OF WAVE MOTION, VIOLIN TECHNIQUE, AND CARNATIC ORNAMENT CLASS		
Wave motion	Violin technique	Ornament class
Great	Shift	<i>Jaru</i> (Slides)
Medium	Oscillation	<i>Gamaka</i> (Deflections)
Small	Fingerfall	<i>Janta</i> (Fingered Stresses)

Of course, the physiology of Carnatic violin playing is somewhat different from that of Western playing because of different postures and holds. The author knows of no such scientific study of muscle movements in the Indian hold. But the reader may acknowledge by now the coincidence between basic violin techniques and classes of Carnatic *gamaka*. To fill out these connections, the remainder of the discussion here draws on comments by Western writers as well as on Carnatic practice.

Motions involved in the *janta* ornaments are familiar to Western violinists: precise, rapid fingerfall and fingerlift in a vertical plane, executed while the hand as a whole remains in one position. The fourth finger, which is naturally the weakest, deserves special attention.

Leopold Mozart was esteemed in his time as a master violin teacher, and in 1756 he brought out the first edition of *A Treatise on the Fundamental Principles of Violin Playing*. There he gives timeless advice on the problem fourth finger: "This finger, because it is the weakest and shortest, must by unremittingly earnest practise be made stronger, a little longer, more expert, and more useful" (1948:190). Some Carnatic violinists use the fourth finger rarely or not at all. Others, like Western classical players, build its strength through exercises and regular use.

Like *janta*, the movements of the *jaru* (slide) class of Carnatic ornaments have their counterparts in Western playing: portamento and glissando. The Hungarian-born violin teacher Carl Flesch (1873-1944) discusses these techniques in his *Violin Fingering* (1966):

When two tones are connected by gliding, this may be a matter of either necessity or choice. The unavoidable type is designated glissando; the optional type portamento. Glissandi accompany any change of Position in a series of rapid notes and should be as inconspicuous as possible, since they have no expressive value; they merely represent a technical necessity. Portamenti, however, produce a gliding sound by which the player deliberately connects two tones and intensifies their expressive power. (1966:329)

In *The Principles of Violin Fingering* (1967), Soviet violin teacher and musicologist I. M. Yampolsky (1905-1976) makes the same distinction between glissando and portamento, and he describes three kinds of portamento. In one type, the lower finger sounds its note and slides into a new position, the higher finger then dropping onto its note. In another type, after the lower finger's note has sounded, the higher finger slides into its note as the hand arrives in the new position. And in the third type, the first note, slide, and second note are all made on one finger.

The third type, "produced by the direct slide of the same finger from one note to the other, gives a particular expressiveness to the sound,

similar to the expressive effect of portamento in the human voice" (Yampolsky 1967:121). It is, in effect, the *jaru* of Carnatic music.

In fact, all three kinds of portamento are types of slide. Further, any shift of position involves a slide—whether it is audible as in portamento and glissando, or inaudible as when the player shifts on one string while bowing a different (open) string. Common to all is a movement of the whole hand along the violin neck. Since in the Western hold the thumb is critical to supporting the violin, slides are constrained somewhat by concern that the instrument not fall while the thumb is in transit between positions.

Yet slides are inherent in the violin by virtue of its fretless fingerboard. One practical consequence of this design is what Barbara Benary calls the "one-string aesthetic," a feature of her Carnatic violin teacher's style in which even wide-ranging phrases were often played entirely on one string. Leopold Mozart describes the same ideal:

The positions are used for the sake of elegance when notes which are Cantabile occur closely together and can be played easily on one string. Not only is equality of tone obtained thereby, but also a more consistent and singing style of delivery. (1756:132)

Yampolsky too invokes the "one-string aesthetic" for cantilena passages.

In cantilena (at slower tempi) it is possible to choose a fingering which allows a greater number of shifts with the aim of increasing expressiveness. . . . One should aim at preserving uniformity of timbre by playing the phrases as far as possible on one string. (1967:125)

He recommends restricting the use of the fourth finger in such passages, because of "(a) its comparative physical weakness, (b) the limitation of the extent of vibrato possible, (c) its unreliability in the higher positions" (ibid.:127). These are the very reasons why Car-

natic violinists, who play with a vocal or cantilena ideal most of the time, tend to use the fourth finger in fingered stresses but not in slides and oscillations, unless it is supported by the other fingers.

Of the three classes of Carnatic ornaments, *gamaka* (deflections) involve motions which are exploited least in Western classical technique. These motions generally do not involve outright shifts of position. Here the thumb stays in position on the violin neck, though it may well move from side to side, or slip further underneath the neck at times. The fact that the thumb remains basically in place provides a feeling of security in the hold, and this in turn frees the player for other movements of the hand.

In *Principles of Violin Playing and Teaching* (1985), teacher and editor Ivan Galamian (1903-1981) describes a comparable motion in the Western hold—the "half shift."

In the half shift, the thumb does not change its place of contact with the neck of the violin. Instead it remains anchored, and by bending and stretching permits the hand and fingers to move up or down into other positions. This type of motion, the half shift, can be used in many instances where the fingers have to move into another position for a few notes only. Properly applied, it can greatly promote facility and security. (1985:23-24)

The deflections, which include oscillating ornaments, clearly display the wave motion which permeates both Carnatic and Western violin technique. Vibrato is a prime example. Every classically-trained Western violinist has a physical understanding of this oscillating movement. But the player is usually taught to think of vibrato as a natural attribute of every tone sustained long enough to be vibrated. When viewed instead as a specific ornament (as it was before the nineteenth century), vibrato takes its place as a very narrow, relatively rapid oscillation—just one member of a large family comprising shakes, rolls, and oscillations of various widths.

Conclusion

This article has described Carnatic *gamaka* types and has correlated them with distinctive violin techniques. These links help to account for the violin's rapid assimilation into the Carnatic ensemble, and for its enduring popularity there. The techniques discussed represent the basic left-hand motions which may be used in playing the violin in whatever style—they are intrinsic to the instrument.

These motions are of three types. Shifts (e.g., Carnatic *jaru*, the slides) are made with a sliding movement of the whole hand, including the thumb, to a new position. Oscillations (e.g., *gamaka*, the deflections) are executed by rolls or short slides with the thumb in place, though it may bend or stretch. And fingerfall (e.g., *janta*, the fingered stresses) is accomplished with crisp stopping and release of the string by individual fingers, the thumb remaining still.

This study has an implication for Western violinists who want to develop elements of technique which may have been underplayed in their own training. There is no way that a violinist working in the Western hold can achieve the free fluidity of left-hand movement that is possible in the Carnatic playing position. This constraint is due to the role of the Western player's thumb in supporting the instrument: whenever the thumb moves, support is unstable until it comes to rest again.

But experimentation with the techniques described here—audible slides, and oscillations of various widths and speeds, using the half-shift as a source of security in the hold—can enhance any violinist's ease and confidence in moving about the instrument. This is one example of how the violin, through far-flung adaptations to different musics of the world, may itself act as a vehicle of practical communication between them.

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