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Intricacies of Musical Notes in Raag Bhoop & Durga: An Analytical Approach

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Abstract

*Raga Durga and Bhoop use two different sets of "five musical notes" i.e., "Sa Re **Ga** Pa Dha" and "Sa Re **Ma** Pa Dha", respectively. If the "Ga" (Gandhar) in Bhoop is substituted with "Ma" (Madhyam) while keeping the positions of the other four musical notes intact, would this replacement alone be enough to convert Raag Bhoop into Raag Durga? Certainly not! In this study, we emphasize that the dissimilarities between Raag Bhoop and Durga surpass the easily perceptible differences of "Ga" and "Ma" notes and the positions of the "Re" (Rishabh) and "Dha" (Dhaivat) also exhibit differences. Specifically, in Bhoop, the "Re" and "Dha" notes seem to be lower (i.e., at 10/9 and 5/3 respectively w.r.t Shadaj) as compared to Durga (where these notes appear to be at 9/8 and 27/16 respectively w.r.t Shadaj). This difference in the respective placements of Rishabh and Dhaivat in the two Ragas can be quantified by the ratio 81/80, commonly referred to as Praman shruti. In the subsequent section of the article, we examine the fusion of these two Ragas in a "Jasrangi" rendition, a unique jugalbandi that follows the principle of Moorchana. We highlight that in such a Jugalbandi, the interplay between the two Ragas can influence the placement of notes within the respective domains of each Raga and present a challenge for the performing artists to preserve the individualities of both Ragas.*

Keywords: Tanpura, Raag, Bhoop, Durga, Frequency

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Introduction:

"Why is it important to comprehend the distinctions between Ragas and the intricacies of their musical notes through an analytical approach? What is the anticipated outcome of such an analysis? Shouldn't we prioritize understanding these differences through auditory perception?" Such questions may often arise when one encounters an analytical approach to understanding music. Although understanding the relative pitch of musical notes in numerical terms may not have a direct influence on enhancing auditory perception, it does offer a pathway

for appreciation and realization that the same musical note can manifest variations in its characteristics across different Ragas. While it is ideal for music students to achieve these realizations through auditory experiences, it is undeniable that comprehending such realizations and even appreciating the possibilities within the realm of a musical note can require years of study and practice. In such a scenario, numerical comprehension can serve as a catalyst to better understand and appreciate the lowness/highness of musical notes. This comprehension can further spark an individual to enhance one's listening and learning experience of Raag Sangeet. Therefore, the present article aims to explore the nuances of Raag Bhoop and Durga utilising the numerical representations of musical notes.

Ragas Bhoop and Durga are generally introduced to a student of Hindustani classical music at the very onset of the musical journey. Exploring the distinct characteristics of these Ragas, one realises that both employ five sets of notes, with four notes (Shadaj, Rishabh, Pancham, Dhaivat) being common to both Ragas and only one note being different (Gandhar in Bhoop and Madhyam in Durga). While the auditory experience of listening to both Ragas highlights that both these Ragas weave different musical ambiences and evoke varied impacts on the listeners (Sanyal et al., 2020), it prompts the question of whether such experiences are solely influenced by the distinction of a single note (Gandhar in Bhoop and Madhyam in Durga), or there are other “seemingly similar notes” that also play a role? In the present work, we emphasise that the differences between these two Ragas extend beyond the Gandhar and Madhyam, and even “seemingly similar notes” possess variations in their "shades." To better understand the term “shades”, let’s draw an analogy with the color "Blue" and its various shades, such as peacock blue, sky blue, and cobalt blue. Although these shades are categorized as "Blue," they exhibit specific nuances of blueness. Similarly, the seemingly similar notes in Raag Durga and Bhoop may share a common name but differ in their shades (or frequencies). However, this raises another important question: "who decides" “which shade or shruti” of a musical note should be used in a particular Raga? A possible answer may stem from an understanding of the Tanpura and hence, we present a concise overview of the Tanpura at the outset. Further, we move on to analytically explore any differences in the musical shades of “seemingly similar notes” in Raga Durga and Bhoop. Having examined the differences between Raag Bhoop and Durga, we delve into their convergence as a Moorchana pair. The confluence of two Ragas is frequently heard in a distinctive jugalbandi known as "Jasrangi," which is based on the principle of Moorchana. We shed light on the grey areas surrounding the commonly held belief that Raag Durga and Bhoop constitute a Moorchana Pair, and we discuss the potential challenges that artists may encounter in presenting a Jasrangi performance.

A brief overview of Tanpura—musical notes and consonances:

Tanpura is a multi-stringed drone instrument integral to Indian classical music. (Sengupta et al., 2005). It is intriguing to understand how an instrument tuned to a limited number of musical notes (such as Pa-Sa'-Sa'-Sa or Ma-Sa'-Sa'-Sa or Ni-Sa'-Sa'-Sa, etc.) produces a vast range of musical notes; the answer lies in the "physics of string instruments.” When a string tuned to a specific fundamental frequency is plucked, it produces a sequence of overtones (Walstjin et al., 2016); similarly, when multiple strings of a Tanpura are plucked in succession, a series of

musical notes and overtones along with various consonances of these musical notes can be perceived, resembling an expansive ocean of sound.

Figure 1 illustrates the theoretical production of various musical notes by the four strings of the Tanpura (tuned to Pa-Sa'-Sa'-Sa). As depicted in the figure, the first string (tuned to Pa) not only generates Pa (3/2) but simultaneously produces various other so-called "Shuddh notes": Re (9/8), Ni (15/8), Ma (21/16), and Dha (27/16). Similarly, the string tuned to Sa (or Sa') not only produces Sa but various other musical notes such as Pa (3/2), Taar Sa (2), Shuddh Ga (5/4), and Komal Ni (7/4). Hence, a Tanpura (tuned to Pa-Sa'-Sa'-Sa) directly gives us the so-called "Shuddh notes" and also one of the so-called "Komal note." However, these notes differ in amplitude (or loudness) and are not heard simultaneously but at different times within one cycle of Tanpura plucking. Among them, Ga (5/4) and Pa (3/2) exhibit the strongest audibility; Re (9/8) has moderate audibility, while the higher overtones such as Ma (21/16) demonstrate weak or very weak audibility. These musical notes and the aforementioned observations were experimentally established by Paritosh K. Pandya (2005). Here, it is important to highlight that the ratio 21/16 w.r.t Sa is not regarded as Shuddh Madhyam. A more prominent ratio (4/3 w.r.t Shadaj) is regarded as Shuddh Madhyam; a brief explanation of how this ratio comes into the picture is in the forthcoming discussion.

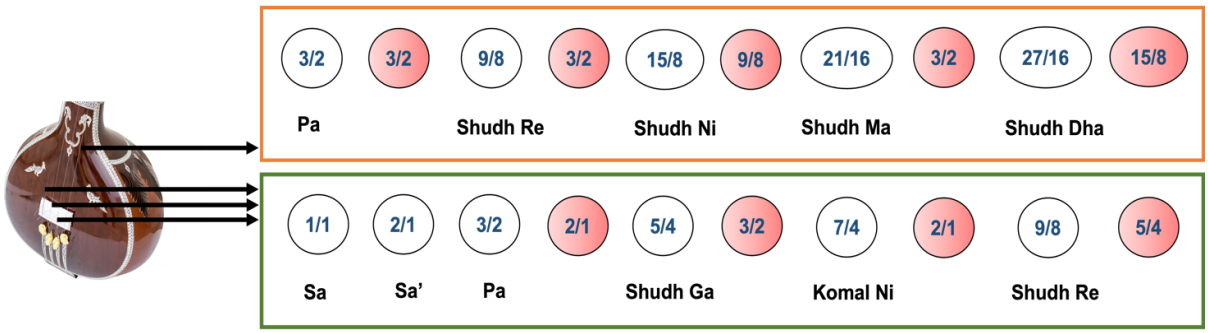

Figure 1. *Overtones obtained from Tanpura tuned to Pa-Sa'-Sa'-Sa (redundant notes are highlighted in red)*

So far, we have highlighted the musical notes and overtones directly generated from the Tanpura. However, the generation and perception of musical notes do not end here. Several other notes emerge as a result of the conversations of these notes with each other. Conversations of Taar Shadaj (Sa') with the so-called Shuddh notes are the notable ones. The so-called Shuddh notes (Re, Ga, Dha, Ni) when converse with Taar Shadaj give rise to corresponding "Komal notes", namely ni, dha, ga, and re, respectively. This has been discussed in detail in specific sections of our previous articles (Sati H and Bhide GK, 2020, 2021). The conversation of Pa with Taar Shadaj is particularly intriguing and leads us to Shuddh Ma. As we have highlighted earlier that Shuddh Ma is also obtained as an overtone (21/16 with respect to Sa); however, this Ma is lesser significant (due to its weak audibility) than the one obtained from the conversation of "significantly audible Pa and Taar Shadaj". Hence, Shuddh Madhyam is positioned at 4/3 w.r.t Shadaj.

Hence, one may observe that although numerous consonances can emerge as a result of interactions of various notes amongst each other, not all of these interactions are equally

significant. The most noteworthy consonances (or Samvaads) are as follows: Shadaj-Taar Shadaj (1:2), Shadaj-Pancham (2:3), Shadaj-Madhyam (3:4), and Shadaj-Gandhar (5:4). The primary reason for considering these as the fundamental Samvaads is the strong audibility of the notes Shadaj, Taar-Shadaj, Pancham, Madhyam, and Gandhar produced by a Tanpura tuned to Pa-Sa'-Sa'-Sa. One may notice that if we consider the series of natural numbers: 1, 2, 3, 4, 5, 6...and so on, the significance of a consonance (or ratio) diminishes with the progression in natural numbers used in its formation.

Raag Durga and Bhoop: Analytical divergence:

As observed in the previous section, Tanpura generates various consonances such as Shadaj-Taar Shadaj, Shadaj-Pancham, Shadaj-Madhyam, Shadaj-Gandhar, Shadaj-Komal Gandhar, and so on. Among these, the most significant consonances in terms of audibility and pleasantness are Shadaj-Taar Shadaj, Shadaj-Pancham, and Shadaj-Madhyam. Now, let's explore how these consonances play a crucial role in determining the positions of various notes in Raag Durga and Bhoop.

Figures 2 and 3 illustrate multiple possibilities of Rishabh and Dhaivat in Raag Bhoop and Durga. These figures showcase the different options for obtaining the shades of Rishabh and Dhaivat in the two Ragas. However, not all of these possibilities hold equal significance.

In Bhoop, the Swayambhu Gandhar (5/4) is an important note that influences the frequencies of Rishabh and Dhaivat. Therefore, any logic for determining the frequencies of Rishabh and Dhaivat must take into account the influence of the "Swayambhu Gandhar." Hence, Possibility I and III appear to be better choices than Possibility II since, in Possibility II, the positions of Rishabh and Dhaivat are not influenced by Gandhar. Although Possibility III considers Gandhar when determining the position of Dhaivat, it overlooks Gandhar when determining the position of Rishabh. Therefore, Possibility I emerge as the most suitable option for deciding the placements of Rishabh and Dhaivat in Bhoop. Consequently, the essence of Bhoop is more likely to be expressed through the combinations in the order: Possibility 1 > Possibility III > Possibility II. In conclusion, the frequency levels of Rishabh and Dhaivat in Raag Bhoop appear to be best suited at 10/9 and 5/3 w.rt. Shadaj, respectively.

Now, let's investigate Raag Durga. Figure 3 portrays various possibilities of Rishabh and Dhaivat in Raag Durga. As discussed earlier, the Shadaj-Pancham or Shadaj-Madhyam samvaads hold the utmost importance, followed by Shadaj-Gandhar, Shadaj-Komal Gandhar, and so on. Possibility I and III consider the Shadaj-Gandhar samvaads when determining the positions of Rishabh and Dhaivat in Raag Durga, while Possibility III solely relies on the Shadaj-Pancham/Shadaj-Madhyam samvaad. Hence, Possibility III appears to be the most convincing in determining the frequency levels of Rishabh and Dhaivat in Durga. In conclusion, the Durganess of Durga may lie in selecting the frequency levels of Rishabh and Dhaivat as 9/8 and 27/16 w.r.t Shadaj respectively.

The two Rishabhs and two Dhaivats of Raag Durga and Bhoop seem to differ by the ratio 81/80, which is also referred to as "Pramaan Shruti."

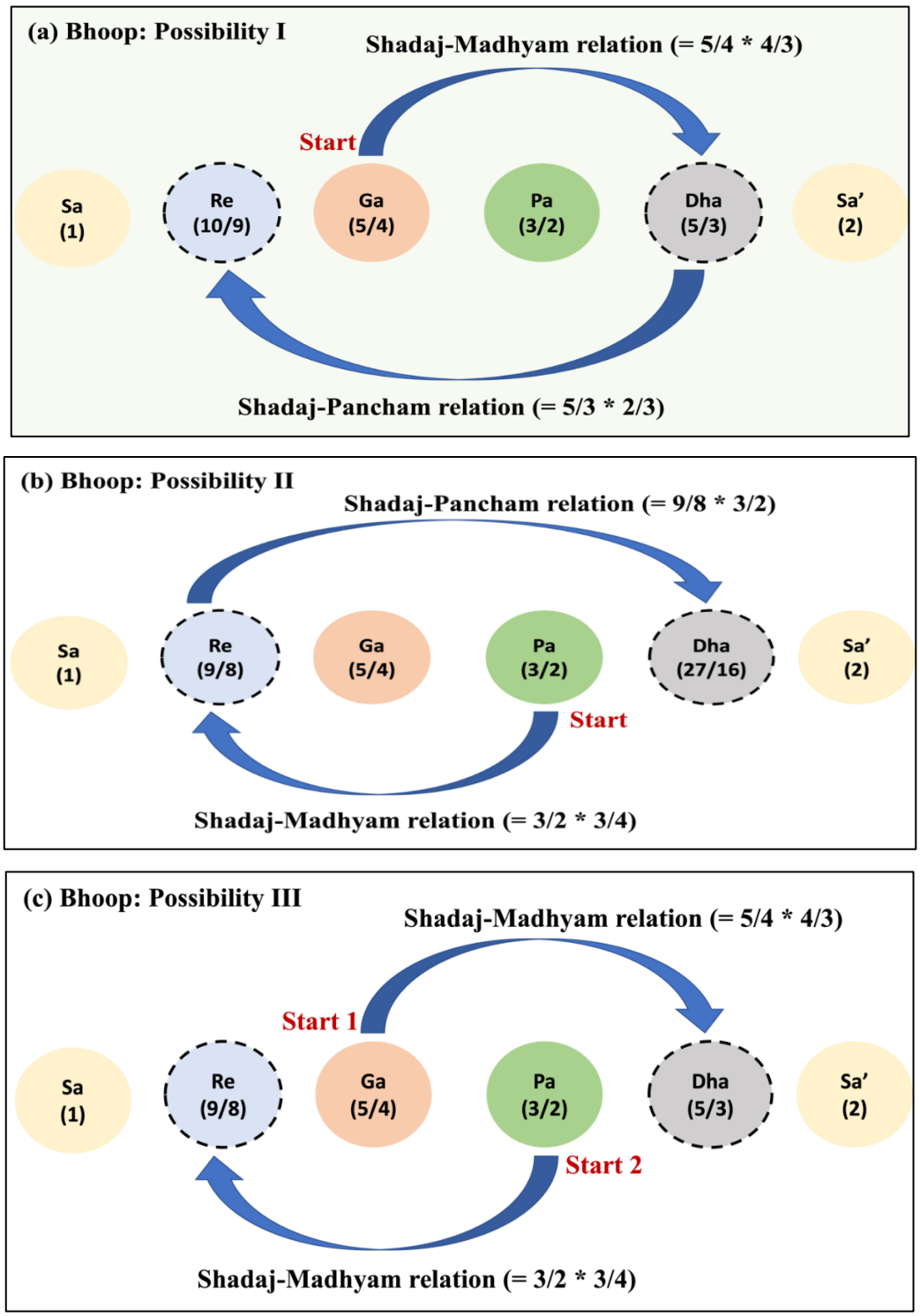

Figure 2. *Possibilities of Rishabh and Dhaivat in Raag Bhoop*

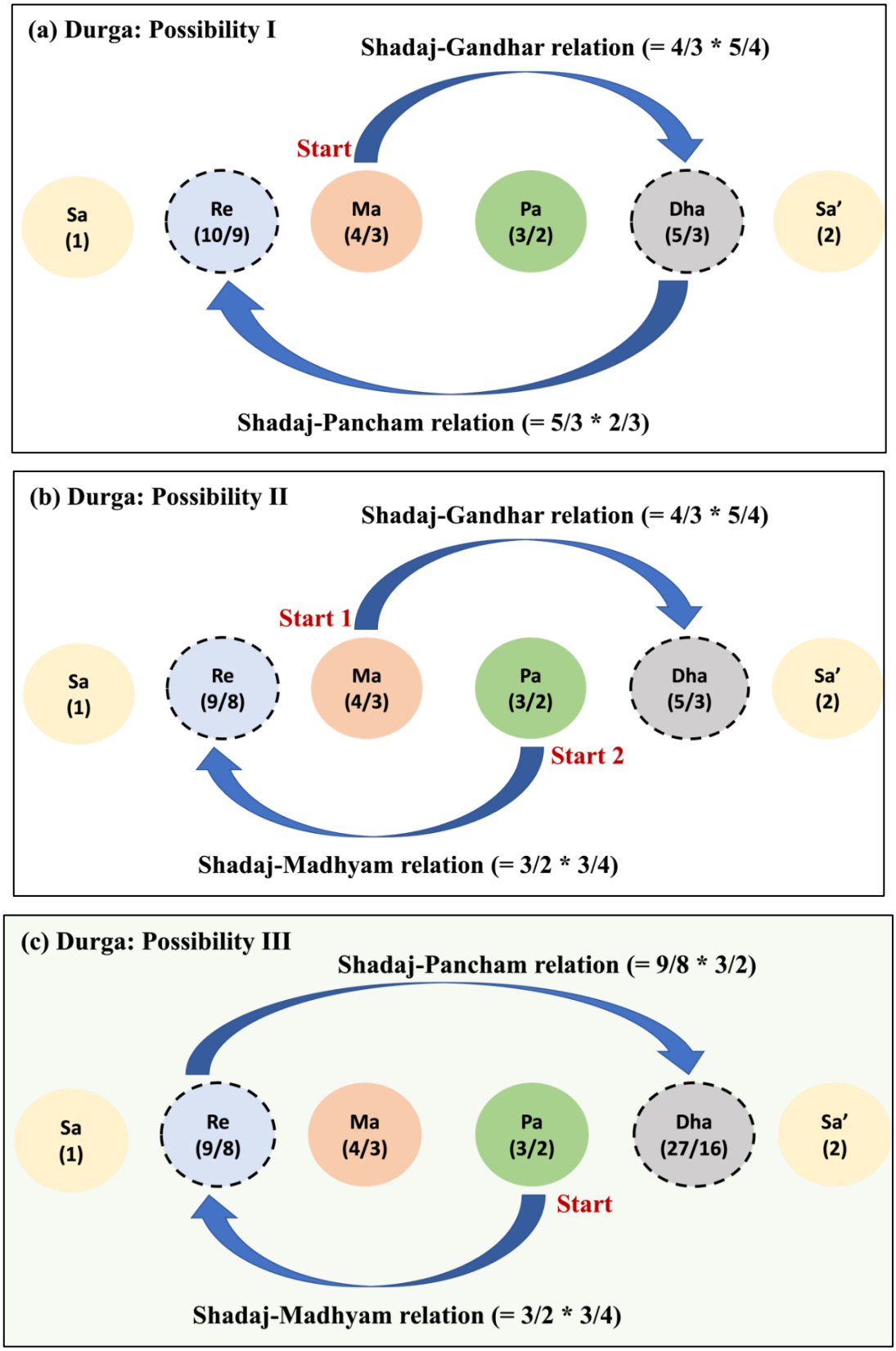

Figure 3. Possibilities of Rishabh & Dhaivat in Raag Durga

Raag Durga and Bhoop: Aesthetic confluence in Jasrangi:

Ragas Durga and Bhoop come together in a unique jugalbandi called Jasrangi, conceptualised by Pt. Jasraj. This jugalbandi allows a male and female singer to perform together without compromising their natural scales. Typically, female and male voices naturally differ by half an octave, and this difference is artistically utilized in Jasrangi. In Jasrangi, the Madhyam of the female musician becomes the Shadaj for the male musician, and he follows the same musical notes laid by the female musician or vice versa. However, in this process, the Raga presented by the male musician differs from that of the female musician. Raag Durga and Bhoop are one of the pairs that exemplify this phenomenon. When the female musician sings Durga as "Sa Re **Ma Pa Dha Sa' Re' Ma'**," and the male musician takes her Madhyam as his Shadaj, the corresponding musical sounds "Ma, Pa, Dha, Sa', Re', Ma'" of the female musician seem to transform into "**Sa, Re, Ga, Pa, Dha, Sa'**" for the male musician, creating Raag Bhoop. Therefore, the female musician sings Raag Durga, while the male musician simultaneously sings Raag Bhoop. However, upon closer examination, we realise that this seemingly simple phenomenon is not as straightforward as it appears. Figure 4 illustrates the positions of various notes in an actual Durga and Bhoop, as well as how they may be influenced in a Jasrangi performance. The solid circles represent notes that do not change their positions, while the dashed circles indicate the dynamic ones.

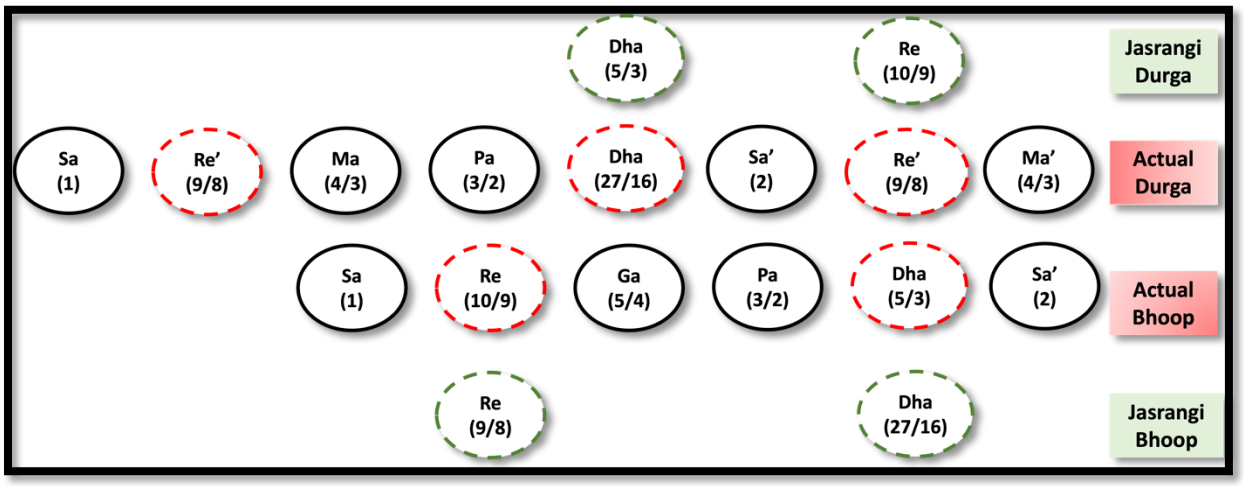

Figure 4. *Raag Bhoop and Durga as Jasrangi pair*

As we observe the transformation of "Ma Pa" in Actual Durga into "Sa Re" in Bhoop, it becomes crucial for the ratios "Ma: Pa" and "Sa: Re" to be precisely equal. Only then can "Ma Pa" (sung by the female singer) blend harmoniously with "Sa Re" (of the Male singer). However, in reality, these ratios differ. To achieve the desired overlap, the frequency level of Re must be adjusted to 9/8 instead of 10/9, deviating from the characteristic Bhoopness of Bhoop. This analysis can be extended to the Rishabh and Dhaivat of both Ragas in a Jasrangi performance. One would observe that these two Ragas influence each other by affecting the positions of notes within each other's domain. It becomes evident that the frequency levels assigned to Rishabh and Dhaivat in Durga and Bhoop during such a jugalbandi are not limited to those found in the actual Bhoop and Durga. Instead, they can assume various positions (as

discussed in the previous section) with equal effectiveness. The Shadaj-Gandhar consonance also comes into the picture in an equally significant way alongside the Shadaj-Pancham/Shadaj-Madhyam consonance in such a presentation.

This variable nature of the notes in a Jasrangi presentation poses a challenge for the artists to preserve the characteristic Raganess of Durga and Bhoop. Despite this challenge, the overall effect of such a jugalbandi is aesthetically pleasing because it maintains the fundamental principle of Indian music—consonance (or Samvaad Tatv), at any given moment during the performance.

Conclusions:

The dynamic nature of musical notes in Indian Ragas is fascinating and perplexing. It is intriguing how the same musical note can exhibit different characteristics in one Raag compared to another, influenced by the factors such as consonance, dominant note of the Raag. This work primarily focused on shedding light on two Ragas: Durga and Bhoop. We emphasized that these Ragas differ not only in terms of Gandhar and Madhyam but also w.r.t the shades of Rishabh and Dhaivat. By exploring the various possibilities of Rishabh and Dhaivat in these Ragas, we highlighted that in Bhoop, the optimal positions for Rishabh and Dhaivat, relative to Shadaj, appear to be at 10/9 and 5/3, respectively. On the other hand, in Durga, the most suitable placements for these notes are at 9/8 and 27/16 w.r.t Shadaj, respectively. Hence, the respective Rishabhs and Dhaivats of Raag Bhoop and Durga differ by a ratio of 81/80, known as Praman shruti. Furthermore, we explored these two Ragas from the perspective of a Jasrangi presentation, where they are performed as a Moorchana pair. We observed that they both can influence the positions of musical notes within each other's domain. Preserving the unique identities of each Raag may be challenging for musicians in such a Jugalbandi, yet the performance remains pleasing due to the adherence to the principle of consonance.

We believe that the theoretical framework presented in this article to decipher the possible mechanism that governs the positions of musical notes in the two Ragas may serve as a stepping-stone toward a better understanding of the “Raganess of a Raag.”

Author’s Contributions:

HS contributed to the writing and design of the framework of the Manuscript. GKB contributed to the conceptualization and critical review of the manuscript.

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