

Analysis of Vocal Ornamentation in Iranian Classical Music

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ABSTRACT

In this paper we study *tahrir*, a melismatic vocal ornamentation which is an essential characteristic of Persian classical music and can be compared to yodeling. It is considered the most important technique through which the vocalist can display his/her prowess. In Persian, nightingale's song is used as a metaphor for *tahrir* and sometimes for a specific type of *tahrir*. Here we examine *tahrir* through a case study. We have chosen two prominent singers of Persian classical music one contemporary and one from the twentieth century. In our analysis we have appropriated both audio recordings and transcriptions by one of the most prominent ethnomusicologists, Masudiyeh, who has worked on Music of Iran [1]. This paper is the first step towards computational modeling and recognition of different types of *tahrirs*. Here we have studied two types of *tahrirs*, mainly *nashib* and *farāz*, and their combination through three different performance samples by two prominent vocalists. More than twenty types of *tahrirs* have been identified by Iranian musicians and music theorists. We are currently working on developing a method to computationally identify these models.

1. INTRODUCTION

The repertoire/system of Persian classical music, *radif* consists of seven *dastgāhs* and five *āvāzes* (secondary *dastgāhs*). Each *dastgāh* consists of several pieces (*gushes*). These *gushes* are in different *maqāms* and they are related to each other through a special order, which provides a path for modulation from one *maqām* to another inside a given *dastgāh* [2]. *Radif* is a model and source for improvisation. The pieces in vocal and instrumental *radifs* are rarely performed exactly as they appear in *radifs*. The musicians use the models and patterns in *radif* to improvise new pieces. During the twentieth century, the *radif* was established as an icon of tradition, authenticity, and heritage. It has been the center of discourses about preservation, change, creativity, imitation, individuality, emotion, style, meaning, authority, and national roots in Iranian music. Through these discourses, the *radif* has been developed as a two-headed arrow pointing towards the future and creativity, and at the same time towards the past and authenticity.

There are two main recorded vocal *radifs* sung by two masters of the art during the twentieth century: Davāmi and Karimi.

Tahrir is rapid transition between the main note and a higher-pitched note. The second note is usually referred to as *tekyeh*, which means leaning in Persian. From signal processing perspective one of the differences between *tahrir* and vibrato is that the pitch rises and fall in *tahrir* is usually sharper and the deviation from the main notes can be larger compared to vibrato [3]. Also, the oscillation in vibrato is toward both higher and lower frequency around the main note, but in *tahrir* mainly the higher frequency is touched abruptly. There are different types of *tahrir* in Persian vocal music that can be categorized from both performance style perspective and from studying the melodic contour.

We have decided to study the transcriptions of *radif* as well as the audio, since these transcriptions are among the main sources for teaching and learning *radif*. Musical notation has a long history in Iran. We can see early examples of musical notation in Maraghi's works in 14th century [4]. He uses alphabet letters to show the pitch and rhythmic circles to illustrate the rhythm of the pieces. When western musical notation was introduced in Iran, it naturally replaced the use of alphabets and rhythmic circles [5]. Nowadays it is part of the musical pedagogy in modern Iran. Furthermore, transcriptions of vocal *radifs* are among important sources for instrumentalists who usually accompany the vocalists in a form of *āvāz* and *javāb āvāz* (question and answer). In this form the vocalist sings a hemistich of poetry and the instrumentalist plays a short sentence as a reply to that. The musical intervals we see in the transcriptions in this paper, although in some cases are different than what the vocalists sings, are the intervals that instrumentalists use in their answer to the voice.

In order to understand different types and styles of *tahrir* we need to parametrize the characteristics of *tahrir*. Since there has not been enough computational models for analyzing *tahrir*, the parameters of vibrato can be a good start for modeling different types of vocal embellishments. Luwei mentions four computational attributes for vibrato: rate, extent, sinusoidal similarity, and envelope. Vibrato rate determines the tempo of the vibrato, the extent shows the variation in the fundamental frequency of the pitch in vibrato, sinusoidal similarity examined the similarities between the shapes of vibratos, and envelope which shows the changes in the vibrato extent [6].

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2. VOCAL TRADITIONAL MUSIC IN IRAN: A BACKGROUND

2.1 A brief history of musicological research and music education in modern Iran

Interest in education and research on Persian music increased during the twentieth century. Among the most prominent musicians from the early twentieth century to the 1970s, one can mention Vaziri and Khāleqi, who were both modernist and in favor of using Western music methods and ideas to “improve” Persian classical music. The efforts of such modernist musicians changed the status of music in the society. The classical Iranian music became recognized as an element of “high culture” associated with the newly formed urban middle class. Western ethnomusicologists started to visit Iran for fieldwork and ethnographic research. The main areas of their focus were Persian classical music and folk music. Among the prominent Western ethnomusicologists who worked on Persian classical and folk music, one can mention Nettl [7] and Blum [8] and [9], who did their fieldwork in Tehran and Mashhad in the 1960s, Zonis who visited Tehran during the years 1963-1965 [10] and [11], and During who visited Iran multiple times since the mid-1960s. They all worked closely with very prominent musicians of the time in Tehran and other large cities. The first works on Persian classical music were mainly devoted to different aspects of the *radif* [12], [7], and [13], as well as biographies of musicians [14] and [15], documentation, transcription, and archiving [1].

The process of documentation and transcription of the *radif*, together with the availability of recording technology, partially, implicitly, and gradually changed the music scene of Iran. The idea of preservation and protection started to work, to some extent, against itself, even before scholars could notice the flaws and the contradictions of this idea. Descriptive transcriptions of the *radif* by various Iranian and Western ethnomusicologists and music scholars, and the recordings of masters, later served as sources of knowledge. The practice of *radif* has changed partially from an oral tradition to a written tradition. The role of memorization of the whole *radif* has been reduced to a great extent. Students learn “improvisation” more as a technique, and perhaps to some extent mechanical, rather than as a result of full and in-depth knowledge of *radif*. Many students use recordings of different masters and transcriptions of *radif* to familiarize themselves with various performing styles. The direct master to student teaching, which was historically central to the practice of the *radif*, became inevitably less important in the new setting. This “modern” setting brings up many questions regarding the forms of continuity and discontinuity in the functions and directions of traditional music in today’s Iran.

2.2 Traditional Music after the 1979 revolution

Historical events¹, after the 1979 revolution and the anti-Westernization movement changed the cultural scene of Iran. The restrictive cultural policies of the government almost eliminated production of popular music. The government defined the “appropriate” (*mojāz*, acceptable) forms of music, whose definition always remained vague and changing. The lyrics have been among the important elements for deciding the “appropriateness” of music. Persian classical music, traditionally, has been linked to masterpieces of Persian poetry, such as *ghazals*² of Hafez, Sa’di, and Molavi (Rumi). This is an important factor that gives traditional music a relatively safe position. Another factor in deciding on the “appropriateness” of the music is the performers. The government accepts older male musicians more easily compared with their young and/or female counterparts. In general, there are always exceptions to these rules. Because of the nature of traditional music, it has always been one of very few genres that is judged as “appropriate.” In the absence of popular music, famous traditional musicians, such as Shajariān, Lotfi, and Alizādeh gained the social popularity of pop stars. This made the prominent traditional musicians less accessible for teaching. Many of these musicians no longer accept beginning students. Many of them teach workshops that accept a limited number of performers from many applicants. These social factors contributed to fundamental changes in the classical music.

After the 1979 revolution, international policies made Iran a difficult destination for Western visitors, including ethnomusicologists. Furthermore, because of governmental censorship, the safest areas of studies for insider scholars were those that did not involve any social and political issues. Hence (purely) musicological study of “appropriate forms of music” has been one of the most popular topics for Iranian ethnomusicologists after the revolution. Among the more recent works in this field one can mention Bubān’s dissertation which compares the rhythmic patterns of the Persian language with rhythmic patterns of the *radif* [5]. She also talks about the insufficiency of Western musical notation for rhythm in Persian music and suggests a visual notation. There are many other recent works on the *radif*, among which one can mention Asadi’s dissertation, which is on the structure of the *radif* [16], Āzādehfār’s book on rhythm in Persian āvāz [17], Mehrāni’s three-volume work on the theory of Iranian music [18], Fereyduni’s book on the characteristics of the vocal *radif* of Davāmi [19], and Jafarzādeh’s book on Iranian musicology [20].

2.3 Vocal Traditional Music

The word *āvāz* has several meanings in Persian. It refers to humans’ singing as well as the sound of birds and instruments in old Persian literature. In Iranian traditional music, *āvāz* specifically means the elaborate improvisatory non-metric part of the vocal performance usually accompanied by one instrument at a time in the form of *āvāz* and *javab-e*

¹ Among the important events one can mention the Iran-Iraq war (1980-1988), and the Cultural Revolution (1980-1983).

² A classic form of Persian poetry

āvāz, also known as question and answer, which is considered a dialogue between the vocalist and the instrumentalist. In this part the vocalist leads the performance and sings some or all lines of a *ghazal*³, and the instrumentalist answers creatively. The vocalist usually sings one or two verse(s) in each selected *gusheh* of a *dastgāh*.

The most common format of the performance is to start with vocables and then to sing the first line of verse in *darāmād* which is the beginning *gusheh* of each *dastgāh* and then sing other lines of verse in a different *gushehs* of the same *dastgāh* in a conventional order. Usually there is at least one main modulation, which gives a feeling of a different *maqām* and then finally last line of verse is sung in *forūd*, which is a return to the main *maqām*. The duration of *āvāz* depends on the proficiency of the singer. One of the main elements of *āvāz*, which shows proficiency in singing traditional Iranian music is *tahrir*. The expertise and the level of proficiency of a singer is evaluated mainly in this part of the performance (*āvāz*). There are singers who can only sing *tasnifs* (a metric pre-composed piece). *Tahrir* usually appears towards the end of hemistich, or on the words where vocalist want to emphasis on the meaning.

3. TAHRIR: A CASE STUDY

3.1 Different types of *tahrir*

Mohammad Reza Lotfi, one of the most prominent Iranian musicians and *tār* players of the late twentieth century identifies seven types of *tahrir* based on Davami's performance of *radif* [19]. We studied three references in Persian that classify different types of *tahrir* [19] and [18]. *Nashib* and *farāz* are two types of *tahrirs* according to these sources.

3.2 Karimi's Vocal Radif

Karimi is one of the main masters of the art in the twentieth century. His repertoire consists of 145 *gushes*. His performance is recorded and available to public. It has also been transcribed by one the most prominent ethnomusicologists, Masudiye [1]. It is later transcribed by two other musicians, Atrāyi and Tahmāsbī. Hence for each *gushe* of Karimi's vocal *radif*, we could have three MIDI files that are slightly different. Finally, after much consideration we found Masudiye's notation more appropriate for the purpose of our study. Figure 1 shows the way we organize our study.

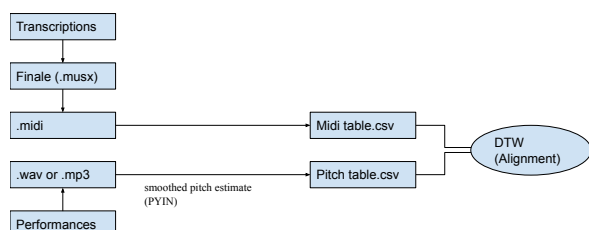


Figure 1. Audio and midi processing steps

³ Other forms of poetry are also used but are not as common as *ghazal*

As can be seen in Figure 1, we have used PYIN for pitch recognition, using Sonic Visualiser, Smoothed Pitch Track transform by Mathias Mauch and Simon Dixon [21]. Parallel to the audio we have made a table corresponding to the MIDI file, and then we have used Dynamic Time Warping [22] algorithm in MATLAB to compare these two curves. We modified the MATLAB *dtw* plot function, so that we can mark the differences between the two curves. The results can be seen in Figures 2 and 4.

3.3 Tahrir-e Nashib and Farāz in vocal *radif* of Karimi

Tahrir-e nashib (literally: descend), and *farāz* (literally: ascend) are two types of *tahrir* that is discussed by Fereyduni, Mehrani, and Lotfi. Their melodic movement as it can be inferred from their names is a slow descend or ascend towards the main note, where the vocalist or instrumentalist usually spends a relatively longer time. The movement is most of the time towards the *shāhed* or *ist*, or *owj*, which are the main functional notes in each *gusheh*. According to Owen Wright “*Shāhed* (‘witness’) is the most prominent pitch of the *gusheh*, its salience marked primarily by relative duration; *ist* (‘stand’) is an intermediate phrase final note other than the *shāhed*.” [19] p. 33. *Owj* (‘peak’) is usually a fifth above the *shāhed* of a *gusheh*.

Figure 2 shows *tahrir-e nashib* in the final phrase (*forud*) of the *gushe-ye daramād* of shur in Karimi's *radif*. The vertical axis shows the pitch value in cents and the horizontal axis is time. As we can see in this figure there is a mis-match between the audio and transcription. We have marked the duration mismatches in Midi with yellow. The red color shows the audio and blue shows the midi. Figure 3 shows the original Masudiye's transcription of the same *tahrir*. The circles below the notes show leaning (*tekyeh*) of the main note towards the higher note.

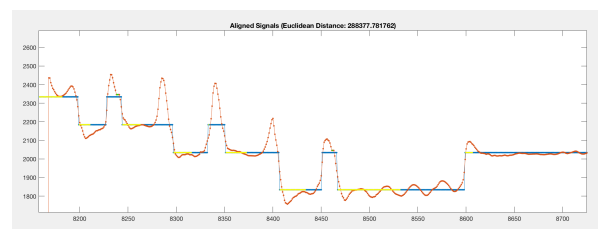


Figure 2. *Tahrir-e nashib* in *daramād* of Shur of Karimi



Figure 3. *Tahrir-e nashib* in *daramād* of Shur of Karimi, Masudiye's transcription, page 13, line 4 of *darāmād*

One of the melodic characteristics of *tahrir*, as can be seen in the above figure, is a repetition of a simpler form

or group of notes. In the above *tahrir* the repeating form consists of a note which leans toward a higher pitch. In this example the interval between the main note and the peak of the higher note is at most as high as about a tone and half (≈ 300 cents). The vocalist repeats the same pattern in a descending manner. Sometimes different types of *tahrir* can be combined to form a more complicated melodic phrase. For example in *darāmad* of *bayāt tork* we have a longer pattern which consists of a *nashib tahrir* followed by *tahrir-e farāz*. As can be seen in Figure 4, the whole longer pattern is repeated twice. In figure 5 we see Masudiye's transcription of this *tahrir*.

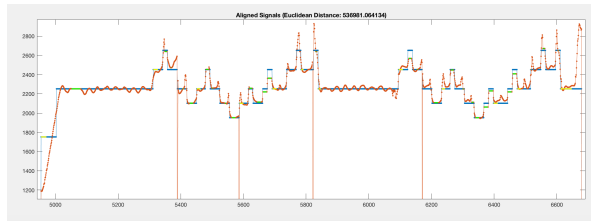


Figure 4. *Tahrir-e nashib* followed by *tahrir-e farāz* in *daramād* of Bayāt-tork



Figure 5. *Tahrir-e nashib* in *daramād* of Bayāt-tork of Karimi, Masudiye's transcription, page 49, lines 3 and 4 of *darāmad*

3.4 Tahrir-e Nashib and Farāz in Shajarian's Performance

Figure 6 shows a sample of Shajarian's *tahrir* in *gushe-ye Owj* in the hemistich (36':01"- 36':14'): "*baske shostim be khunābe jegar jāme-ye jān*."⁴ This *tahrir* is on the last word, *jān*, and on vowel *ā* for 5 seconds, involving the sequence G, F, F, E, E, D, E, E, F, F, G with *tekyehs* to higher pitches. Fereyduni mentions the name "*nashib o farāz*" for this type of *tahrir* ([19], P. 19). This name is also mentioned by Payvar, in his transcription of Davami's *radif*. In this *tahrir*, the average duration to reach the peak of the *tekyeh* note from the main notes is 0.75 m.s. The highest frequency jumps in this *tahrir* are about one and half tone (≈ 290 cents), and the lowest frequency jumps are about a half tone (≈ 90 cents).

4. FUTURE DIRECTION

Our goal is to computationally analyze more *tahrir* types and their subtle differences. We would like to study *tahrirs* performed by various vocalists and to find their stylistic features.

⁴ Hamnavā bā Bam ["Compassion for Bam"]. Delāwāz. (Tehran concert and background documentary). 2006, available at: <https://www.youtube.com/watch?v=7xalZQOFW88>

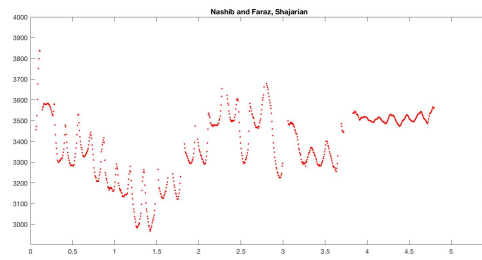


Figure 6. *Tahrir-e nashib* and *farāz* in *owj* of Bayāt-kord performed by Shajarian

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