Music as healing in the Anatolian Seljuk Times

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SVEUČILIŠTE U ZADRU

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Ja, **Ivana Mihaljinec,** ovime izjavljujem da je moj **doktorski** rad pod naslovom **Music as healing in the Anatolian Seljuk Times** rezultat mojega vlastitog rada, da se temelji na mojim istraživanjima te da se oslanja na izvore i radove navedene u bilješkama i popisu literature. Ni jedan dio mojega rada nije napisan na nedopušten način, odnosno nije prepisan iz necitiranih radova i ne krši bilo čija autorska prava.

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Sadržaj mojega rada u potpunosti odgovara sadržaju obranjenoga i nakon obrane uređenoga rada.

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Contents

Introduction

The period of the Middle Ages in Anatolia has been a subject of many scholarly researches, but so far, the subject of music as healing during that period was not in the research focus. One of the reasons lays in the fact that there are few written sources from that period, and the only written sources known today come from the Ottoman period (1299-1923), where the written documents can be found regarding the buildings and endowments, from which we can learn about the past.

This thesis is an interdisciplinary study, with an approach covering the disciplines of ethnomusicology, ethnology, anthropology, music therapy, music history, art history, history of architecture, acoustics, focusing on the context of healing practices in and with music, analyzing music material and architectural features in order to find and prove the connection between belief and praxis within the gained results. Music is, as ethnomusicologists Marošević and Zebec stated, woven into life of every human community, harmonized with the mentality, psychology and lifestyle of people who create, perform and transfer it through oral transmition, from generation to generation. It is a constituent part of customs and ceremonies, as well as of daily life, and as such, fulfills various functions in culture and life. It does not just serve to satisfy the human needs for expressing the creativity, but also to fulfill other psychological, social and cultural needs (Marošević, Zebec, 1998: 231).

The use of the term healing in this work, which is usually divided into mental and physical healing, is intended to cover both aspects, although most issues which are discussed here are by and large associated with mental healing[1].

The ethnological and anthropological component covers different cultures and beliefs, showing how the past and today's alternative was and are implemented in the daily life, in order to improve the well-being and the quality of life of the individual and the community.

The research included pitches and intervals of the makam scale; however, *usul* (rhythm) was not taken into the scope of this work because it is a subject which demands extensive and separate research.

[1] To heal is by definition a process to make free from injury or disease, to make well again, to restore to health, and healing is the process or period of gradually regaining one's health and strength (https://www.merriam-webster.com/thesaurus/healing).

In this work the reconstruction of the acoustic space of the Divriği hospital was made and the sound was revived to show how the soundscape functions within the venue, since the use of music therapy has long tradition in the Islamic world since the 8th century, as it is seen in the works of al-Farabi, al-Kindi, Ibn Sina, Safiyuddin Urmevi and other scholars.

As there is no written data from the Middle Ages, there is no record or evidence that music therapy was conducted in the hospitals. Some sources such as the works of Farmer (1926: 96) suggest that people in medieval Anatolia believed some illnesses (especially mental illness) could be cured with makams, and that each makam was used for some specific illness. The Divriği hospital which is the focus of this research was chosen because it is the only example from the Seljuk times of a dual mosque-hospital complex and with the closed courtyard.

In terms of music therapy, focus is on Turkish classical music (Turkish Art Music) which uses the modal form of makam (interval scale which will be explained and analyzed in detail in a separate chapter) as a style for the compositions.

Given that this interdisciplinary research combines more different scientific and artistic fields and branches such as ethnomusicology, ethnology, anthropology, music therapy, music history, art history, history of architecture and acoustics in order to prove the hypotheses, the following methods were used for this work: musical analysis, acoustic analysis.

Review of previous research

The review and examination of the literature regarding the periods before, during and after Seljuk period led to the idea that the healing effect in the makams which is known so far from Turkish literature and the traditional Turkish concept regarding music and music therapy should be determined scientifically. Also, examination of the literature was used in order to study the musical past of the social environment, as well as for the research regarding healing, music history and urban settlement. The cross reference of theorists from the 8th century until today and their ideas regarding makams and its use will be shown in the table in chapter 2.1.5.

The overview of the existing scientific knowledge focused on various historical books and articles about Anatolia in the Middle Ages, the foundation of the Rum Sultanate, the Anatolian

Seljuk State, different architectural analysis of the buildings in that period, as well as socio-economic traditions and trading routes of the medieval period. Also, archaeological findings during recent research, scientific literature about music therapy, in particular the Turkish music history, with emphasis on the recent discussions and analysis of the makam scale, led to the presumptions for setting the hypotheses in this work.

As music therapy is a relatively new discipline, accepted as a scholarly discipline only in last 30 years, invaluable was the research of Henry George Farmer (1926) who analyzed Turkish and Arabic sources from the 8th century onwards. Farmer states that first theoretical written sources date back to 8th and 9th century, in the work of Ibn Sina (*"The Kitab Al-siyasa")* and al-Farabi, in which makams and their connection with therapeutic qualities was explained. The book by Karl Signell (2008) was considered as an important source for the understanding of the makam scale system and its construction, as were the articles and theses from Turkish scholars. The medieval Anatolia is also the time when Sufism developed, with a certain type of music therapy through Mevlevi ceremonies for which the works of Henry George Farmer (1926; 1931; 1934), Annemarie Schimmel (1975; 1993), Mehmet Fuat Köprülü (1943; 1993) and others were followed, to name but a few.

Since the music experience, especially when used in traditional customs, can transfer listener to a subconscious state (Burnett, 2000; Chiang, 2008; Çoban, 2005; Farmer, 1926; Güvenç, 1985; Koen, 2009) in which a person faces themselves in a way, it is necessary to know the social environment of the listener, so that the music can be customized accordingly and boost the therapeutic function of music which is to be experienced. Multiple therapeutic possibilities are also found in the structured potentials of the sounds in a certain framework which takes place in time, and the foundation is a mutual interplay of rhythmic, melodic and harmonic elements.[2]

The research started with an examination of the existing literature on the subject of history of Anatolia, Islamic Art and architecture, Turkish music history, music therapy, acoustics, various scientific articles on music in the medieval times in Turkey, books on pre-Ottoman Turkey, articles on makam scales and the division into the comas and cents (there are two different streams in the understanding of how the scale is built), articles on the beliefs and life in the pre-

[2] A similar pattern is seen in the music and dance tradition (Marošević and Zebec, 1998), as well as in the various doctrines as described by Farmer (1926: 94, 96, 99)

Islamic period, on the instruments used in that period, and several articles about the fMRI, magnet resonance research recently used to show how the brain responds to external stimuli.

As Truax (1984: 61, 88) points out, the signals are either repetitive or occur on regular intervals, and may remain in the background of listener's attention, but still acquire their power precisely because of such repetition. This brought up the idea to analyze the frequencies of repetitive notes in makams.

In the recent years, there have been several studies regarding the influence of music on the brain (Şengül, 2008; Ayata, 2008; Moerel, 2015; Van Dongen, Van Strien, Dijkstra, 2016), many research was conducted showing the benefits of music therapy on patients with various disabilities, but the influence of Turkish music in particular in terms of targeted impact of makams has not been studied. Therefore, this thesis aims to point out the specificity of the makam melodies which have been used since the ancient times and are still used today, in order to emphasize the frequencies as the possible "trigger" for healing in terms of influence on the brain and whole human being.

Since recent research regarding the makams in music therapy approached the subject only by analyzing the melodic structure (Aldridge, 2008; Bozkurt, 2008; 2014; Gündüz, 2005; Sezer, 2012; Tarikci, 2010; Yöre, 2012), in this work the melodic-frequency analysis has been made. The contribution of this work is to highlight from a new point of view the relations within makam, fundamental common frequencies as sound event within the specific architectural environment.

Methodology

The aim of this research is to prove the healing elements of makams used in the medieval period and their connection with the architectural structure and acoustic characteristics of the hospitals where these makams were performed.

The first hypothesis is that makams have a healing effect. The traditional Turkish concept of the healing effect strongly depends on specific frequencies and the harmonic intervals of the perfect fourth and perfect fifth of the makam scale.

The second hypothesis is that the architectural structure of the Seljuk hospital and sound events in that venue support the healing effect. The traditional Turkish healing concept is understood in a way that the healing effect depends on the architectural structure of the hospitals and produced sound events in such architectonic structures.

Considering the interdisciplinarity of the set research topics, covering the disciplines of ethnomusicology, ethnology, anthropology, music therapy, music history, art history, history of architecture and acoustics, the methods used for the research in this thesis were the following: the historical method, according to Čavlović (2012: 118), was applied to gain an overall view of the music history of the Anatolian region in the Middle Ages, to determine the chronology, development, cause and consequence of the development of certain musical phenomena, in this case the makams. Following this method, sources were used in order to understand the musical past of the social environment, as well as for the research regarding healing, music history and urban settlement. Works regarding the history of Seljuks, their expansion through Anatolia, the specifics of the architectural style and building tradition were examined.

The methods of analysis and synthesis were used to obtain data, followed by a critical interpretation of the analytical data to explain the results.

The structural analysis, which was used in the analysis of the makams, according to Čavlović (2012: 123), deals with discovering of the facts and connections between them accordingly to the wholeness of the research subject. The aim of this analysis is to perceive individual elements of the makams and determine their relations and role within the musical entity.

Descriptive analysis in musicological terms is the "verbalization of music" (Čavlović, 2012: 121) which includes description as an opening and closing phase of the analysis.

The deductive method was used for the integration of the data obtained by analysis as well as the integration of the interdisciplinary results in this work.

Written sources which were used for the research were mostly scientific, although some information was gathered also from expert articles. According to Chiang (2008: 1), the term "healing" today is mostly connected with alternative medicine, so it was also necessary to take into consideration their perspective, as the Turkish communities in the period before Anatolia were also partly based on beliefs and shamanic practice. From the ethnological and

anthropological point of view, the idea of beliefs which was present in a community and was gradually transferred to the construction of the big hospitals, partly implementing those beliefs and healing practices, is interesting for a whole picture regarding the research of a human, culture and customs.

Methodological procedures used were:

- collecting materials in the form of photo documentation – during study visits to different cities, photo documentation was taken of the buildings relevant for research, mainly the hospital building complexes, but also photos of other buildings from the Seljuk period, to make the catalogue of the buildings which will be shown in the first chapter.

- observation with participation – this method was used during the study visit to the music therapy seminars in Edirne and Ankara where, in addition to listening to the lectures, the author actively participated in the training group and had a discussion with the participants and the organizers. The seminars were organized by the Turkish association Tümata, which is the only association performing the music therapy today through makam music. Discussions with Turkish therapists shed light on their experiences regarding music therapy which they conduct and perform. The performance included a dance which has roots in the Mevlana ceremony (zikir-saying a prayer, in a certain pattern), and playing on wind and string instruments which were also used in the medieval period. This meditation tool involves body movements and breathing patterns which can bring one's mind to a state of peace and closer to God. Here a parallel can be drawn with an idea of Levi-Strauss (1964: 18) who said: *Since music is the only language with the contradictory attributes of being at once intelligible and untranslatable, the musical creator is being comparable to the gods, and music itself the supreme mystery of the science of man*. Beside the seminars, study visits to Konya, Istanbul, Amasya, Bursa, Kastamonu, Sivas, Çankırı, Mardin and Divriği provided opportunities for direct contact, offering a chance for an insight view through observation of everyday life and customs of the local communities, and leading to some conclusions regarding the traditional life which is partially preserved even today in the small cities of the Anatolian heartland.

For the purpose of this research, various subject had to be explored, such as Turkish music history, especially the makams, together with the usage and performing of the instruments from medieval times, as well as the architecture of the Middle Ages, influence of the frequencies on the brain and specific parts of the body, shamanism as a healing method and belief in the pre-Anatolian era, archaeological excavations and art history research which is ongoing and constantly revealing new evidence on what life of the Seljuk was like during their rule and many more.

Various questions were raised, such as: if it is known from al-Farabi in the 8th century onwards that a specific makam is used for specific illness, and that the musicians improvise the melody, what exactly constitutes the healing, the frequency or the melody? Does it depend on the space/venue in which it is performed, meaning the acoustic of the building, hence the architecture of the building? Is there a connection between music therapy in medieval times and the contemporary music practice in Turkey, with a focus on the influence and significance of medieval architecture? Is there a connection between Pythagoras's idea of the string division and al-Farabi's invention of the Ud?

These and some other questions will be discussed in the following chapters.

In the first chapter, an overview of the Anatolian life in the Middle Ages will be given with the emphasis on the settlement and building activities, as this period from 1078-1308 was very dynamic and turbulent, with many regnal changes and a fast development of urbanism due to many conflicts. The main East-West trading route resulted in the construction of numerous edifices, and the focus in this work will be on the hospital buildings. The architecture will show the connection with music as treatment, as well as an important factor for daily life.

The second chapter will show the development of Turkish music, from prehistory until today. Its continuation and development will be seen, as well as how the knowledge from ancient western philosophers was embedded in the development of Islamic philosophy and broadened to a more spiritual level, following the idea of Oneness and the unity with the Creator. The idea how the music and sound for the purpose of healing were understood in the Islamic world and how music impacts the brain will be shown, which, in author's opinion, is important for understanding the path which tone/sound makes from the moment it is produced to the moment

when it is perceived and processed, and where the brain processes this information. Also, an overview of the most commonly used instruments since the medieval times will be presented.

Chapter three gives an insight on the makams, their history, intervallic structure, construction of the scale. Makams are the link throughout the whole thesis, although in different aspects. But in this chapter, the core of it is given in order to prepare the ground for the analysis of the researched data.

Chapter four provides information about the historical use of frequencies, especially in music theory, from Pythagoras until today and their meaning and application in music and architectural design.

The fifth chapter will present the analysis, how it was constructed, progressed and the results which were obtained. The representative sample of 45 makam compositions was used and analyzed. After the obtained results, the deductive method was used, from general information about the makams to an analysis of each tone with its specific pitch, showed in terms of the frequencies which were calculated based on interval ratios. Makams were understood as a part of the soundscape, and the analysis perceives them as a sound source of certain levels which determined the soundscape.

The known literature does not go deeply into the analysis. This work enters in elaborating and proving of the healing elements. An overview will be given of the previous and current literature and knowledge, and through an analysis a connection of the mentioned hypotheses will be made, from which certain conclusions will be drawn.

The photos used in this thesis were mostly obtained by the author during study visits, as noted under each photo.

1.ANATOLIAN SELJUK STATE - HISTORICAL FRAME AND CULTURAL CONTEXT

1.1. Settlement and building history of the Anatolian Seljuks

1.1.1. Historical timeline of the establishment of the Anatolian Seljuk State - social life

The Anatolian Seljuk State was founded in 1078 in Iznik and had a very turbulent history for over 200 years. As one of the most important strategic routes, it was on the crossroad between the Byzantine Empire on one side, and the Great Seljuk Empire on the other, and was then subjected by the Mongols.

There are a limited number of historical texts regarding the establishment of the Anatolian Seljuk state[3]. Sources taken from F. Köprülü were presented as "local sources" (1943), while historical sources regarding that period include limited information about the socio-cultural context. Nevertheless, Köprülü in his work gives an overview of the local chronicles written in Anatolia that are known until the present day[4], as well as a list of lost chronicles, which could be considered as guidance for researchers.

The list of Anatolian Seljuk Sultans and their regnal years is essential for chronological reasons, for the purpose of clarification and distinction from other dynasties which were on the Anatolian plateau in the same period[5].

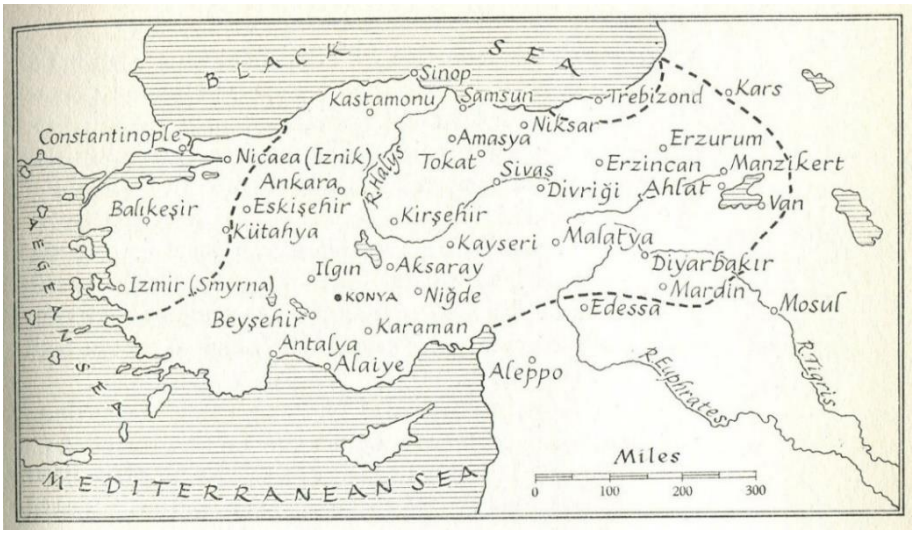

Figure 1. Anatolian Seljuk State (Talbot Rice, 1961: 47)

[3] The Anatolian Seljuk State is also referred to as the Rum Sultanate or Seljuks of Rum in some sources.

[4] In the book *Islam in Anatolia after the Turkish Invasion (Prolegomena)*, Köprülü gives the following list of chronicles: Anis al-gulub by Durhan al-Din Al-Alawi, 13th century; Ibn Bibi-Saljuqname, 13th century (Al-Husain al-Ja'fari); Tadhkira-I Aqsarayi by Muhammad al-Aqsarayi, 14th century; Al-Wallad al-shafiq by Ahmad of Niğde, 14th century and Ta'rikh-I al-I Saljuq by Anonymous, 14th century (1993: 55).

[5] The list is compiled from various books which are mentioned in the bibliography and deal with the history of the Anatolian Seljuks.

Table 1. List of rulers in the Anatolian Seljuk State

Order	Regnal Years	Sultan's Name
1	1075-1086 AD	Rükneddin Süleyman Şah I
	1086-1092 AD	Ebu'l-Kasım (viceroy)
2	1092-1107 AD	Izzeddin Kılıç Arslan I
	1107-1110 AD	Empty Throne
3	1110-1116 AD	Şehinşah
4	1116-1155 AD	İzzeddin Mesud I
5	1155-1192 AD	Izzeddin Kılıç Arslan II
6	1192-1196 AD	Gıyaseddin Keyhüsrev I
7	1196-1204 AD	Rükneddin Süleyman Şah II
8	1204-1205 AD	Izzeddin Kılıç Arslan III
	1205-1211 AD	Gıyaseddin Keyhüsrev I (second time)
9	1211-1220 AD	İzzeddin Keykavus I
10	1220-1237 AD	Alaeddin Keykubad I
11	1237-1246 AD	Gıyaseddin Keyhüsrev II
12	1246-1249 AD	İzzeddin Keykavus II
	1249-1254 AD ("üç kardeşler – three brothers")	Izzeddin Keykavus II Rükneddin Kılıç Arslan IV Alaeddin Keykubad II
	1254-1262 AD	Izzeddin Keykavus II Rükneddin Kılıç Arslan IV
13	1262-1266 AD	Rükneddin Kılıç Arslan IV (second time)
14	1266-1284 AD	Gıyaseddin Keyhüsrev III
15	1284-1296 AD	Gıyaseddin Mesud II
	1296-1298 AD	Empty Throne
16	1298-1302 AD	Alaeddin Keykubad III
	1302-1310 AD	Gıyaseddin Mesud II (second time)
17	1310-1318 AD	Kılıç Arslan V

Rükneddin Süleyman Şah I (1075-1086)

Rükneddin Süleyman Şah I (d. 1086) was the founder and the first ruler of the Anatolian Seljuk State. Conquering the Byzantine troops, which were trying to recapture the important religious center of Iznik, Süleyman Şah I made progress all the way to Üsküdar (today a quarter on the Asian side of Istanbul) (Kommena, 1996: 124), where he founded a customs office and started to charge taxes to the ships which went through Bosporus (Turan, 1993: 61). After conquering Iznik with its surrounding, Süleyman Şah also conquered the area of Antakya (Mateos, 1987: 161-162; Comnena, 1928: 153).

There is insufficient data about the building activity from Süleyman Şah's period, who was constantly involved in conquering actions, although some researchers mention one palace in Iznik (Turan, 1993: 78). The reign of the sultan, who is said to have known astronomy, was based on the principle of tolerance (Turgal, 1935: 6). One of the most important indicators of tolerance was that during the period after conquering Antakya, he permitted the Christian community to build the churches of St. Mary and St. George (Turan, 1993: 79). Besides, collective amnesty which was proclaimed during the invasion on Antakya can be characterized as one of the steps for achieving social peace. One of Süleyman Şah's main activities was change of the usual land system. Distribution of the land to the people and free life made the integration of local population easier, so these and similar examples will also be present in the ruling period of later sultans. This way, the prosperity and well-being of the people increased (Turan, 1993: 56, 79). In the period six years after Süleyman Şah's death, the state was ruled by his successors. Although there were some activities in Iznik and its surrounding, the most interesting being the building of the shipyard in Kios, no exquisite artwork was found (Turan, 1993: 60).

Izzeddin Kılıç Arslan I (1092-1107)

In 1092 Kılıç Arslan I, the son of Süleyman Şah, returned from Horasan and took the throne in Iznik as the second ruler of the Anatolian Seljuk State (Comnena, 1928: 163). He ruled from 1092-1107 and had first copper coins minted. The money depicts a horseman, his father's and his name with the title *es-sultan* (Erkiletlioğlu & Güler, 1996: 42). Kılıç Arslan I, who is mentioned as a just and brave ruler in the sources from that period (Mateos, 1987: 231), transferred the capital to Konya and took areas of other governors under his authority. The most interesting event from this sultan's period was the beginning of the Crusades. This dangerous development of the events ended with surrender of Iznik to the Byzantine emperor on 19th June 1097 (Comnena, 1928: 273). The most important building which dates back to the period of Kılıç Arslan I is the Garipler Mosque in Tokat, built from 1086-1104. In Niksar, above the grave of Danishmend Gazi a tomb was built, as well as a tekke (dervish house) and imaret (public kitchen). The other examples of construction activities during this period are numerous imarets in Sivas, built by Yağıbasan and restoration of the mosques and madrasas which were built by his grandfather Melik Danishmend Gazi (Turan, 1993: 149-152).[6]

6 Regarding the monuments in Niksar see Çal (1989).

Şehinşah (1110-1116)

After the period of Kılıç Arslan I, the historical sources have no information on the period of Şehinşah. The only building is in the area of Artukids, the Mosque El –Afsar (Cami el-Afsar) from 1111, which was built by Necmeddin, ruler of the Artukids. Emineddin Külliyesi (1108-1122), building complex in Mardin which consists of a mosque, madrasa, hospital, place for prayer in an open area, fountain and bath, is of great importance because it is the first building complex in Anatolia (Altun, 1978: 66-69).

İzzeddin Mesud I (1116-1155)

Sultan İzzeddin Mesud I was under the protection of Danishmend Gazi almost until the death of Gazi in 1134. Emir Gazi rebuilt the destroyed city of Kayseri and proclaimed it the capital. By using the material of destroyed churches and temples, he built new buildings (palaces-mosques) as well as the Great Mosque in Kayseri (Turan, 1993: 173). In 1143, with the death of Melik Muhammed, the pressure of Danishmends on the Seljuks stopped, and Seljuks again took over Ankara, Kastamonu and Çankırı. The following year, they captured Elbistan as a center, and the cities Göksun, Ayıntab, Duluk and Raban come under the administration of Kılıç Arslan I. In his 39-year rule, Izzeddin Mesud I (Mateos, 1987: 312) saved the state from collapse and raised it to a dominant power with his reasonable politics and patient fighting. While Sultan Mesud was strengthening his position in Anatolia, at the same time İmadeddin Zengi, ruler of Zengids, was destroying the administrator of Urfa with an invasion in 1144 (Mateos, 1987: 296-297). As for the building activities, which can be determined through inscriptions and sources from the time of the Anatolian Seljuks, all are associated with the name of Sultan Mesud I. In that period, the city of Konya was built; some researchers date the mosque, palace and fortress from the period of Alâeddin Keykubad I in the period of Mesud I (Turan, 1993: 194). Besides, the name of sultan Mesud is on the minber of Alaeddin mosque in Ankara. Furthermore, during this period, in the city of Aksaray the Sultan built places for prayer and social assistance on the site which was used as a military base during the campaign to the East (Konyalı, 1974: 277-280). The inscription on the minber of the Great Mosque in Aksaray also mentions the name of Sultan Mesud as the Sultan of the Anatolian Seljuks (Oral, 1962: 26). In addition to Konya and Aksaray, the Fethiye Mosque in Amasya was renovated and the Eskil Mosque was built, but today it no longer exists (Ibn Bibi, 1941: 161).

Izzeddin Kılıç Arslan II (1156-1192)

Shortly before the death of Sultan Mesud, the land was divided between his three sons, so Izzeddin Kılıç Arslan II took over Konya with its surroundings and took over his father's position on the Seljuk throne (Sevim and Yücel, 1989: 130). This period marks the turning point regarding the economic view whose main element was gold coins minted in the Sultan's name (Erkiletlioğlu and Güler, 1996: 48-49). While the Seljuks used golden coins, Danishmends were, according to the established economic traditions, minting coins with Greek inscriptions. Seljuks giving up that practice probably symbolizes their settlements and economic advantage. Political unity and security which was ensured by Izzeddin Kılıç Arslan II and great trade routes which were spreading in the direction East-West, concentrating in Anatolia, created a possibility of economic and therefore also cultural development. And so, the first Seljuk caravanserai was built, a day's walking distance from Aksaray, and another on the Konya-Akşehir route was built by Emir Altunaba (Turan, 1946: 476). Kılıç Arslan II is mentioned in the sources as free-minded, liberal, tolerant towards Christians and a ruler who treated the citizens with fatherly compassion. He was friends with Patriarch Mikael (patriarch of the Syrian orthodox so-called Jakubit Church) from Malatya. During his stay in Malatya Kılıç Arslan II organized religious and philosophical discussions where Muslim scientists were present, and he released the monastery Barsuma from the obligation to pay taxes (Turan, 1993: 230). It can be deduced that during Kılıç Arslan's II reign social peace was established. According to the quotation of Arabic traveler Herevi, who during that time went through Konya, there were marble sculptures in the garden of Kamerüddin (Herevi, 1953: 59), which were very expensive and rare then. In addition, in the rebuilt Aksaray, the Sultan built a palace for himself, buildings for the army, mosques, madrasas, bazaars, hans, dervish tekke and baths, where he settled tradesmen, scientists and gazis (religion fighters) from Azerbaijan. In view of the fact that Kılıç Arslan II mostly lived in Aksaray and from there went on conquests, Aksaray got names like *Dar'üz-Zafer, Dar'ül-Cihad and Dar'ür-Ribat*[7] (Turan, 1993: 233). The name of the sultan who *"gave this city a fortress, palace, bath inside the palace and an old bath"* is in the inscription above the minber in the Great Mosque in Aksaray, but with no specified date (Oral, 1962: 26). The only building in Konya which mentions the name of Kılıç Arslan II is the Alâeddin Mosque, the building whose construction started in the period of Mesud I and was

[7] These names in English are translated as House of Victory (*Dar'üz-Zafer)*, House of Sacred War (*Dar'ül-Cihad)* and House of Soldiers (*Dar'ür-Ribat).*

finished after Kılıç Arslan II came to the throne. Moreover, it seems that the Alâeddin Mosque, which is in Ankara, was also finished during Kılıç Arslan II's reign.

During the reign of the Anatolian Seljuks, the dynasties of Artukids, Saltukids, Danishmends and Mengujecks who came along with Seljuks to the area were also present in the Anatolian plateau. But after approximately 100 years, they were merged with the Seljuk dynasty and their properties were included in the Anatolian Seljuk State, except for the Artukids who preserved their reign until the 15th century.

During the reign of Kılıç Arslan II, in the area of Artukids the following were built: The Great Mosque in Silvan (1152-1157), the Great Mosque in Harput (1155-1156) and the Great Mosque in Mardin (1176). In addition, the mosques Nizameddin Beguş in Mardin (1186) and Çarşı Mosque in Siirt (1125-1165) were rebuilt. Also, the Muzafferiye Mosque (1164) and madrasa were built, which did not survive until today. The Artukid area had the most buildings constructed. Outside the area of Artukids, the only building constructed in the Danishmend area is the Great Mosque in Niksar. In the same period the Kale Mosque by Mengujecks was built in the town of Divriği (1180-1181), the Great Mosque in Erzurum which is, according to the inscription dated 1179, the work of Saltukids, while the Kale Mosque in Diyarbakır is the work of Nisanoğuls and, according to the inscription on minaret, dates back to 1160.

The buildings from the Saltukids period (12th century) which are preserved until today are the Kale Mescid, Tepsi minaret and the Great Mosque (Ünal, 1968: 18-31), three tombs and caravanserai in Tercan. The biggest of the three tombs located south of the Çifte Minareli Madrasa (double minaret madrasa) in Erzurum is considered the work of Saltukids and it is known as the Turbet of Emir Saltuk[8]. In addition, the Erzurum Castle Kümbet Mescidi, believed to have been built at the end of 12th century, can also be placed among the monuments of the same period (Aslanapa, 1984: 156).

Behram Şah (1117-1157) – first ruler of the Mengujecks / Erzincan area

When looking at the cultural activities in the area of the Mengujecks reign, which was split in 1142 (Kemah-Erzincan and Divriği), it is obvious that Erzincan in the time of Behram Şah became an important trade and cultural center, and Genceli Nizami[9] wrote the work entitled

8 For more information regarding the Saltukid buildings see Beygu, 1936: 88-90; Konyalı, 1960: 419-422; Ünal, 1968: 101-108; Aslanapa, 1984: 156; Tuncer, 1986: 122-128.

9 Gencelii Nizami (1141-1209) 12th century Persian Sunni Muslim poet.

Mahzen'ül Esrar (Treasure of secrets) for him. During the reign of this sultan, Erzincan developed its trade and industry. Behram Şah is the first ruler of the Mengujecks who starts minting coins, and his successors continued this tradition (Artuk and Artuk, 1971: 387, No: 1188-1191).

Erzincan was a place suitable for development because of its arable land, numerous vineyards and fruits. Also, the caravan path which connects Anatolia with Tebriz and Iran on the east is one of the most important sources of economic development. As a result of these conditions, industry in Erzincan made progress, as did the *Buharin* fabric which was produced in the city (Turan, 1973: 71). Erzincan which developed economically was also in a good situation regarding its culture. After the death of Behram Şah, his son Alaeddin Davud Şah II (1142-1168) became the head of the Principality of Mengujecks. He was like his father, interested in science, literature and art, wrote poetry, was engaged in philosophy and medicine, and protected people who made progress in those fields. He invited a well-known doctor and historian in the Islamic world Abdüllatif *Bağdadi*[10] to Erzincan. Bağdadi stayed in his palace and dedicated several of his important works to him (Turan, 1973: 74). As for Erzincan, it was noticed that music had an important place in the fields of art, and the neighboring countries invited musicians from Erzincan to give concerts. *Siraceddin Ahmed*, a man with a strong identity and very popular in literature and mysticism was invited to Damascus by Melik Eşref, Ayyubid ruler of Syria, where his talent was fancied also by the court musicians (Turan, 1973: 75).

Mengujecks in Divriği

From the preserved monuments, it is evident that the Mengujecks had a branch in Divriği. Their first leader was Süleyman (1142-1162). When Şehin Şah, Süleyman's son, took over his father's position (1162-1198), the sources suggest that two types of coins were minted for him (Artuk and Artuk, 1971: 389, No: 1192-1193). Although the coins which are dated 1175 only have Şehin Şah's name, the coins which were minted later besides his name *Seyfeddin Şehin Şah bin Süleyman bin İshak* also have the names of the Seljuk sultan Izzeddin Kılıç Arslan II and his son Rükneddin Süleyman Şah (Turan, 1973: 64). The branch of the Mengujecks in Divriği showed great construction activity (Cahen, 1979: 120). *Maragalı Hasan bin Firuz* built

10 Abdüllatif Bağdadi (1162-1231), born in Baghdad, Abbasid Caliphate (modern Iraq), a physician, historian, Egyptologist and traveler, and one of the most voluminous writers of the Near East in his time (Chambers Biographical Dictionary, ISBN 0-550-18022-2, page 3).

the Kale Mosque for Şehin Şah in 1181[11], and *Tut Beğ bin Behram* built one tomb for him in 1196. Today it is known under the name *Sitti Melik*[12]. Near the Great Mosque is the tomb of Kamerüddin, dating back to 1196, but it is not known who he was.

The Danishmend area

When looking at the construction activities in this period in the Danishmend area, it is important to mention two madrasas with two closed courtyards, built by Yağıbasan in Tokat (1151-1152) and Niksar (1157-1158), as these are the first madrasas with a dome built in Anatolia (Kuran, 1969: 11-12; Aslanapa, 1984: 135). From this period, 6 sepulchral monuments are known: the Melik Danishmend Gazi tomb (Kayseri-Pazarören, end of the 12th century; Aslanapa, 1984: 154), The Kulak tomb (end of the 12th century), the Melik Gazi tomb in Niksar and the Halifet Gazi tomb in Amasya from 1145-1146 (Önkal, 1996: 59-64). In this period, the first book that was ever written in Anatolia is presented. The work was written in Kayseri and presented to Gümüş Tekin Ahmed Gazi, approximately 25 years after the Malazgirt battle. It is a book *İbnü'l Kemal İlyas b.Ahmed* dedicated to Ahmed Gazi under the title *Keşfu'l-Akabe* in which he is mentioned as a keeper of Kayseri and which describes his conquests in the Byzantium area, as well as Armenia and Syria (Bayram, 1979: 32). One of the works entitled *Takvim al-adviya* was written by doctor *İbrahim bin Abı Sa'id al-Ala'i* for Emir Zülkarney (d. 1162), member of the Danishmends from Malatya (Yınanç, 1945: 474-475).

The Artukid area

The surrounding of the Artukids was the second area of construction. In view of the fact that roads connecting Anatolia with Irak, Iran, Syria and Egypt went through that area, it was an important trade activity center. According to the authors of that time, the hostel and the village Koçhisar (Kızıltepe) which were on the caravan route, south of Mardin, within a short time became a place for international trade fairs. Merchants from the Roman land (Anatolia), Syria and Diyarbakır gathered and traded here. Eventually, madrasas, baths, bazaars and funduks were built at the same place[13] (Sevim and Yücel, 1989: 215). In addition, there were great trade

11 For more information on building of the Kale Mosque in Divriği see Mayer, 1956: 67; Sönmez, 1989: 157-159; Bayburtluoğlu, 1993: 117. Since 2007 archeological excavation have been conducted on the Divriği citadel. Upon completion, they will provide more information regarding the building history, see: Eser and Acara Eser, 2018.

12 For more information on building of the Sitti Melik tomb see Mayer 1956: 69; Sönmez 1989: 160-161; Bayburtluoğlu 1993: 138-140.

13 Funduks – special market places, for specific merchandise.

connections between Mosul, Nusaybin, Koçhisar and Harran. The area of Artukids, especially Mardin, becomes a place where annual pilgrim caravans and merchants from Ahlat, Erzurum, Caucasus, Azerbaijan and Iran came (Turan, 1973: 208-209). In the period from 1108-1122 the Emineddin Külliyesi, a building complex which included a hospital, was built in Mardin, as a result of all those activities (Cantay, 1992).

Idrisi, a geographer from the 12th century describes famous textile, linen fabrics, handkerchiefs and knitted ribbons which were exported from Mayyafarkin (Silvan), a beautiful city surrounded by gardens and forests. Silk handkerchiefs and tulle (pile fabric), which were manufactured here in the 10th century, were very much in demand, especially in the Islamic countries. Furthermore, Marco Polo, passing through Anatolia on his way to Mongolia mentions cotton and cotton manufacture, as well as Buharin (Buchram) cloth which was produced in Mardin (Turan, 1973: 210; Marco Polo, 2004: 45).

In the land of the Artukids, along with agricultural production mining also made progress and new ores were found and processed. In the second half of the 12th century the Caliph of Baghdad spent a large amount of money on building a bridge across the Tigris (1174). For a big section of the bridge which was brought from the place called Hani he paid 1.500 golden dinars. In the Artukid area next to Ergani in the Diyarbakır province, a place known for copper, another copper mine was located near the fortress Zu'l-karneyn (1122). It is known that the state controlled this mine and manufacture. In 1147 Hüsameddin Timurtaş personally oversaw the mine and was the first to have the first copper coins minted from that mine. The examples of those coins without a date are preserved until today.[14]

Figure 2 Hüsameddin Timurtaş coin, averse and revers, 1147

In 1155 and 1163 Necmeddin Alpi minted silver coins named *Fulüs ün-Necmiyye*. Taking into consideration the fact that the towns Mardin, Dunaysır, Hısn Keyfa and Amid had coin mints, the money was primarily produced there (Turan, 1973: 212). One of the characteristics of the Artukid minted coins was presenting Christian figures on the mints. These coins portray rulers,

14 Photos taken from http://amadiocoins.com/catalog/coin/2901 24.09.2016.

god of victory, Jesus and angels (Artuk and Artuk, 1971: 390-407, No: 1197, 1201, 1202, 1204). Human figures which were displayed on the coins of the Sunni Artukids can relate to the trades they had with the Byzantine Empire. Despite the fact that Zengi's taxes were increased to cut down the war expenses, the Artukid taxes were reduced and this resulted in the immigration of the people to the neighboring region (Altun, 1978: 7). The goods produced in the land of the Artukids were transported to Mosul and Baghdad (Turan, 1973: 212). All those data show how developed the land of the Artukids was in terms of the economy and trade. The *power* which was growing in the economic field was spread also to culture; from this area, monumental art was preserved until today.

The Artukids created numerous social and religious works after saving their economic strength from the burden of the crusades (Turan, 1973: 212). The ruler of the Artukids Hüsamettin Timurtaş was interested in literature and art and supported and protect artists. Artukid's records contained within the documents of Istanbul libraries are significant also as they show the rich cultural life in that period (Turan, 1973: 221). The intellectual life of the Artukids who wrote their Divan's in Arabic contributed important works. These are: İmameddin Muhammed (d.1208) from Koçhisar, known for his work *Makalat el-murşide fi derc el-edviyye ve fi diryak el-faruki* on medicine and pharmacy. He worked in Cairo in Bimaristan el-Kebir, a psychiatric hospital, and in the great psychiatric hospital of Atabeg Nureddin in Damascus. The fact that the Ayyubids asked *İsmail bin İbrahim*, famous scholar in the field of logic and medicine, to issue the halal fatwa for drinking wine shows the cultural influence of the Artukids on their environment (Turan, 1973: 223).[15] It seems that during that period building mosques was the priority almost everywhere. Greater construction activity is found in the areas conquered by the Seljuks, which can be associated with more frequent conquests. Later the building activity decreased and the land of the Seljuks looked like a construction site. If we take into consideration the architects in charge of constructing monumental buildings, these were architect Meragalı (Sönmez, 1989: 157-158; Bayburtluoğlu, 1993: 117-118) and his Kale Mosque in Divriği (1180-1181) and builder Gürganlı who built the Kale Mosque in Diyarbakır (Sönmez, 1989: 89-92). The above examples show that artists come from outside the borders of Anatolia in the second half of the 12th century.

15 The Artukid area, later under Anatolian Seljuks, where Syrian artists will be active, for them was the first and neighboring area of work. Regarding the subject see İnal (1982).

Rükneddin Süleyman Şah II (1196-1204)

Sultan Kılıç Arslan II (1155-1192) divided the land among his eleven sons, according to the Turkish feudal ceremony (Ibn Bibi, 1996: 31). This act was a cause for expanding cultural activities to other cities, which were until then limited to the palace and its surrounding (Uzunçarşılı, 1948: 288). However, after the Sultan's death, his eleven sons increasingly argued over the throne. When all of them were subjected by Rükneddin Süleyman Şah II, he headed towards Konya (Ibn Bibi, 1941: 25)[16].

Rükneddin Süleyman Şah II gave great importance to art and science; he built the Tekgöz Bridge near Kayseri and rebuilt the walls in Niksar, Konya and the town Niğde (Turan, 1993: 264; Erkiletlioğlu and Güler, 1996: 69). It is known that the Sultan was also a poet and that he expressed his talent in calligraphy, rhetoric and literature, and was also interested in philosophy. Some records regarding this exist in the work of Ibn Bibi (Ibn Bibi, 1941: 35, 37; 1996: 78). There is also a work entitled *Ravzat-ül-ukul* which was, in the name of the Sultan, written by his vizier Mehmed b. Gazi from Malatya, written in Persian in the style of *Kelile ve Dimne* (Uzunçarşılı, 1948: 293). Turgal states that the Caliph gave the Sultan title *Sultan-ı Kahir* and that he was probably an atheist because he liked philosophy and took philosophers under his protection (Turgal, 1935: 23). During that period the Danishmends built the Great Mosque in Sivas (1196-1197). Other examples of mosques built during this sultan's reign are the Dağ Mosque in Mut (1200), the Boyacı Mosque in Antep (around 1200) and the Alacalı Mosque in Harput (around 1200). From the above-mentioned examples, it can be seen that during the period after Kılıç Arslan II building activity increased in almost all parts of Anatolia. This is also an indicator of a more pleasant life for communities living in Anatolia.

İzzeddin Kılıç Arslan III (1204-1205)

After Süleyman Şah's II death, his son İzzeddin Kılıç Arslan III took his place (Ibn Bibi, 1941: 39). Only one building in the Artukid area – the Great Mosque in Kızıltepe (1204) dates to his short reign. Another work of the Artukids from the same years is a bridge in Dunaysır, built by Emir Artuk Arslan.

16 Although Kılıç Arslan II chose Gıyaseddin Keyhüsrev I for the throne, after the quarrel between brothers he was ousted from throne and after a long journey arrived to Constantinople (Ibn Bibi, 1996: 54-55, 70).

Gıyaseddin Keyhüsrev I (1192-1196 and 1205-1211)

Gıyaseddin Keyhüsrev I used the title *Es Sultan ül Muazzam, Gıyased-Dünya Ved-Din, Ebu Feth Keyhüsrev bin Kılıç Arslan.* He was on the throne twice: first time from 1192-1196 and second from 1205-1211. The coins that he had minted were found in Konya, Kayseri and Malatya. On one side of the coin minted in Konya the Byzantine ruler is shown with a mace and globe (Erkiletlioğlu and Güler, 1996: 65-67, 77-84). When Gıyaseddin Keyhüsrev I stayed in Constantinople, he married the daughter of Manuel Maurozomes from the Comnen Dynasty (Ibn Bibi, 1941: 40; Abu'l Farac, 1987: 474). The Sultan's mother was Byzantine, and it is assumed that he was well educated and that besides Turkish he spoke Latin, Greek and Persian (Afet Inan, 1993: 5). During his reign the construction was highly appreciated, and the Gıyasiye-Şifahiye Madrasa was built, and Great Mosque was restored in Kayseri. During the second reign of Gıyaseddin Keyhüsrev I (1205-1211), when international trade started in Anatolia on the Antalya, Sinop and Samsun trails, there was an active sea route between Anatolia and Egypt. In the letters, which were exchanged between Keykavus and the king of Cyprus, we learn that after conquering Antalya Keyhüsrev signed a trade agreement with Cyprus and gave two fermans (decrees) to the Venetians. By the decision in these fermans the Venetians were granted free trade in Anatolia; they were provided the protection during travel and trade and the tax they were obliged to pay was not more than 2%. This agreement was valid also in the time of İzzeddin Keykavus I (ruled from 1211-1220) and Alâeddin Keykubad I (ruled from 1220-1237) (Turan, 1988: 123-124). One of the examples of how important trade was for Gıyaseddin Keyhüsrev I was that he made the decision to conquer Antalya after some merchants stole some of his goods (Ibn Bibi, 1941: 44). After the conquest, the damaged merchants asked for payment of compensation for the damage that had been done to them according to the known trade books (Ibn Bibi, 1941: 45).[17]

In the time of Gıyaseddin Keyhüsrev I, beside the restoration of buildings in various centers, place for prayer was built in Bor (Namazgâh) (1205-1206), and in Boyalıköy a religious complex which consists of Hanikâh/tekke with two tombs (1210). Parallel to the development of trading, one road house in the city and three outside the city were built: Deve Han in Seyitgazi (1208-1209), Kızılören Han (1206) and Kuruçeşme Han (1204-1210) on the Konya-Beyşehir route (1206), and Dokuzun Derbent Han (1210) on the Konya-Akşehir route. The most

[17] After these events, a sort of a trade insurance and deliberation of tax began to be applied (Ibn Bibi, 1996: 120-121).

attractive regarding the Seljuks is the Gevher Nesibe Hospital and the Medical School in Kayseri (1205-1206), which was in use for therapy and education (Afet Inan, 1993: 3). The incomes of the hospital were insured through the vakfiye which the following places were obliged to pay: estate in the Talas village; estate in the Erkilet village; one third of the estate's income in the Yorgat village; arable land of Acı kuyu; estate on the arable land in Saslu; rent according to the annual contract for Sultan Hamam, 50 akches; hamam income from the rented land near the hospital, 50 akches and the annual income from the rented land near Gıyasiye Madrasa, 30 akches (Yinanç, 1991: 14; Yoska, 2005: 126).[18]

In this period the area of the Artukids remained significant as an important cultural center. One of the architects named *Bedi'uz-zaman*, who worked for many years in the service of Kara Aslan and his followers, wrote the book *Kitab Cami el-ulum ve'l-amel* and became an important figure in the field of mechanics. In his work *Bedi'uz-zaman* he gives theoretical and practical information about machines, pumps, fountains, water pumps and musical instruments and with added photos explains how they are made and how they function (Turan, 1973: 224). Due to the fact that *Cezeri* and later Bedi'uz-zaman focused their works on mechanical tools, the question arises if education on mechanics and architectural design was carried out in the cultural circle of the Artukids, and an affirmative answer can be clearly discerned. This idea is also supported by the fact that the Artukid buildings have advanced technical and structural features.

It can be noticed that inside the Artukid's cultural circle numerous edifices were built. such as mosques, madrasas, baths, palaces and fortresses with towers. The Great Mosque in Harput, the Great Mosque in Mardin, the Great Mosque in Kızıltepe, the Great Mosque in Hasankeyf, the Great Mosque in Silvan (Gabriel, 1940: 221-28, 20-26, 40-46, 61), the Emineddin building complex / Külliye in Kızıltepe, the Necmeddin religious complex in Mardin, the Alacalı Mosque in Harput, the Latifiye Mosque in Mardin, the Melik Mahmud Mosque in Mardin; the Hatuniye Madrasa (Sitti Radviyye) in Mardin, the Zinciriye Madrasa in Diyarbakır, the Mesudiye Madrasa, the Marufiye Madrasa in Mardin, the Şehidiye Madrasa, the Harzem Taceddin Mesud Madrasa, the Melik Mansur Madrasa, the Altunboğa Madrasa, the Sultan İsa (Zinciriye) Madrasa; the Hamam Maristan in Mardin, the Radviyye Hamam, the Yeni Kapı Hamam, the Great Mosque Hamam, the Harput Dere Hamam. The remains of the palace in

[18] Yinanç, Refet. 1991. *Kayseri Gevher Nesibe Tıbbiyesinin Vakfı*. Selçuklu Gevher Nesibe Sultan Tıp Fakültesi Kongresi, Kayseri.

Hasankeyf, the remains of the palace İç Kale in Diyarbakır, Firdusi's kiosk in Mardin, Fortress in Harput, the Ulu Beden Tower in Diyarbakır and the Yedi Kardeş Tower were built in this period (Altun, 1978: V-VI). Also, in that time the bridges Hasankeyf, Cizre, Batman Suyu, Çermik, Devegeçidi Suyu and Ambarçayı were built (Çulpan, 1975: 38-48, 51-54, 59).

With the help of the inscriptions found on some of the buildings from that period, we can know the name of the masters who worked on them. The first Artukid artist whose name was known was *İsa Ebu Dirhem,* the builder of the Zinciriye Madrasa[19]. The builder from Halep *Cafer b. Mahmud* worked on the building of Mesudiye Madrasa[20]. The building was designed by *Cafer b. Mahmud* and built by *Mesud*. The second artist whose name is known was the builder of the Ambarçayı bridge, *Takak b. Osman*[21]. On the inscription found on the Ulu Beden Tower in Diyarbakır is the name of *İbrahim b. Cafer*[22]. The tower of Yedi Kardeş was built according to the designs by *Yahya b. İbrahim el Sarafi*[23]. It is interesting that Melik Salih Mahmud (1200-1222), who had built numerous buildings in Diyarbakır and its surroundings, was versed in the knowledge of architecture, due to the fact that he designed the construction plan for one tower. This information testifies that the Artukid sultans were personally interested in art. The fact that construction, or in other words, building activity was highly valued, as well as the advanced design visible on the monuments, indicates the presence of many artists at that time.

İzzeddin Keykavus I (1211-1220)

After Gıyaseddin Keyhüsrev I, his older son İzzeddin Keykavus I rose to the empty Seljuk throne. The Sultan wore the title *Es Sultan el-Galip-Izz'ed-Dünya ve'd-Din Ebu'l-Feth Keykavus b. Keyhüsrev* (Erkiletlioğlu & Güler, 1996:86). From the quatrain engraved after Keyhüsrev's death on the entrance of his tomb, which he himself dictated when he got ill, we see that the Sultan wrote poetry (Yinanç, 1991: 15-44). Also, there are various events proving that he was a true protector of the arts (Ibn Bibi 1941: 54). After conquering Sinop, Keykavus

19 For more information on the Zinciriye Madrasa see Sönmez, 1989: 101-107; Bayburtluoğlu, 1993: 162-164.

20 For more information on the Mesudiye Madrasa see Sönmez, 1989: 132-139; Bayburtluoğlu, 1993: 270-274.

21 For more information on the Ambarçayı bridge see Mayer, 1956: 131; Sönmez, 1989: 142-146; Bayburtluoğlu, 1993: 242-244.

22 For more information on the Ulu Beden Tower see Mayer, 1956: 72; Sönmez, 1989: 116-122; Bayburtluoğlu, 1993: 255.

23 For more information on the Yedi Kardeş Tower see Mayer, 1956: 85, 131; Altun, 1978: 298; Sönmez, 1989: 108-115; Bayburtluoğlu, 1993: 257.

had churches turned into mosques and restored the places where towers were damaged. (Ibn Bibi, 1941: 64). The Hospital in Sivas built by the Sultan in 1217 also is worthy of attention, with its twin plan, which at the same time served for the purpose of education and treatment. Today the hospital is part of the Faculty of Medicine. The fact that İzzeddin Keykavus I built the hospital, just like his father, as one of his biggest monuments, shows the importance he has given to social institutions. At the same time, the monumental measures symbolize the growth of the Seljuk economy. The endowment of this building, in addition to showing the wealth of the vakfiye and the way of functioning, is important regarding the information it provides about the history of Sivas (Turan, 1951: 447-457). Through the endowment, the following places were connected and gave their income for the Izzeddin Keykavus Hospital as was designated in the vakfiye: a garden outside the city of Konya; Konya area, the city of Cenne, mill, barn and stable near the Beytekin village; Eregli, 30 stores down the Armenia street; Aksaray - Mermindi /the village Rumiye outside of the city; Kayseri – the village Efkere or Bahçeli; 7 meadows belonging to the village Efkere; the village Saman in Malatya; the village Ebigül in Tokat; the village Horhun or Düzyayla in Sivas; the village Kömür in Sivas and Koymad Divanîsi, 12- 78 stores in Sivas (Bayat, 1991: 13; Yoska, 2005: 125).[24]

In that period İzzeddin Keykavus I built the Great Mosque in Sinop (1214), western part of the Alâeddin Mosque in Konya and rebuilt the demolished Kale Mosque in Sinop (1215). Moreover, the Great Mosque in Akşehir (before 1213), the Halil ül-Rahman Mosque in Urfa (1211-1212) and the Şerefeddin Mosque (1213) were restored. The name of the latter building is mentioned in the vakfiye Devlet Hatun in 1213. This information is important because it shows that women as well were owners of the foundations in the Seljuk Anatolia. Also in the later years, female owners can be seen and buildings which they had built.[25] From the five mescid[26] built in that period, only two were preserved until today: the Beşarebey Mescid (1213/1219-20) and the Hacı Ferruh Mescid (1215-1216), the Hatuniye (Güdük Minaret/Devlet Hatun) Mescid, with only the minaret preserved, the Bagavi (Kapturga) Mescid (1216) and

[24] Bayat, Ali Haydar. 1991. Anadolu Hastane Vakfiyelerinin Tek Örneği olarak Sivas Darüssifası Vakfiyesi. Türk Kültürü Dergisi, 29/333: 5-19.

[25] On the subject of women patrons see Bates, 1978: 245-260; Durukan, 1998: 15-36. Furthermore, for another work regarding the subject of patronage see Crane, 1993.

[26] Mescid – (Masjid) Small mosque without a minber (pulpit) (Hughes, 1895: 329).

Nizamiye (Nalıncı Baba) Mescid. The larger number of mescids which were active in mahalas (quartiers) in Konya, reflects population growth and expansion of the residential area.

Other buildings from the time of İzzeddin Keykavus I are: the Harzem Taceddin Mesud (1211-1212) and the Şehidiye Madrasa in Mardin (1214); the Hatuniye Madrasa and Nizamiye in Konya, one madrasa outside the walls of Ankara (Ibn Bibi, 1941: 57), the Seljuk Madrasa (Medrese-i Selçukiyye) (1220) and the Izzeddin Keykavus Hospital in Sivas (1217-1218) and the Keykavus Hospital in Konya which was not preserved (Ibn Bibi, 1941: 63; Cantay, 1992). Kadınhanı, Han el-Barur, Gömse Han, Hekim Han and Evdir Han were built as buildings for trade in this period. One of the buildings from the Artukid area which was built in this period is worthy of attention because of its master. This work, the Devegeçidi Suyu bridge is located on the north of Diyarbakır and was built by *Cafer* from Halep (Sönmez, 1989: 132-133).

The Seljuks taking over Antalya and Sinop in the 13th century (Ibn Bibi, 1996: 173) completely opened up Anatolia to foreign trade. However, there is no data about the Turks leaving neighboring Black Sea and Mediterranean countries after the establishment of the trade fleet. During the conquest of Sinop, the Greeks in Antalya with the support of Cyprus, organized a rebellion and captured the city. Keykavus quickly headed to Antalya and regained command (Ibn Bibi, 1941: 58-59); his last military action was against Ayyubids and in 1220 he fell ill and died in Viranşehir (Ibn Bibi, 1941: 83).[27]

Alâeddin Keykubad I (1220-1237)

After İzzeddin Keykavus I, Alâeddin Keykubad I rose to the Seljuk throne (Ibn Bibi, 1941: 92-93; 1996: 226-228). Sultan Keykubad I used the title *Es Sultan ül-Azam Zıl'l Allahu fil-Alem Alâe'd-Dünya ve'd-Din Ebu'l Feth Keykubad bin Keyhüsrev* (Erkiletlioğlu and Güler, 1996: 94) and was one of the greatest rulers of that time and of the Anatolian Seljuk State. With him the state reached its pinnacle in terms of culture, economics and politics. There are common coins of Alâeddin Keykubad I, Armenian Hetum and Artukid from Hasankeyf and Mardin (Erkiletlioğlu and Güler, 1996: 94). He started public works in almost every part of the country. He enjoyed science and the arts, he organized debates on history and politics in his councils and protected scientists and artisans. The period of his reign was the most prosperous one in the

[27] After death, Sultan was buried in Şifahiye Madrasa in Sivas, built by himself (Ibn Bibi, 1996: 217).

history of Anatolia. Mosques, madrasas, caravanserais, bridges and hospitals which he built have kept their luxuriance until today.

The Sultan himself, regarding the fact that he had some architect experience, made various designs.[28] One of the most important things of this Sultan's period is the fact that he was surrounded by a group of artisans. According to Ibn Bibi, while visiting Konya the Sultan noticed its crumbly walls. He invited master builders and painters, gave them his plans to make layouts which he then checked (Ibn Bibi, 1941: 99-100). Since the program he started was extremely successful, Alâeddin Keykubad I was considered to have shaped the classical period of Seljuk Art (Ögel, 1972: 132). The first work he started after rising to the throne was completion of the construction of the Alâeddin Mosque in Konya. According to the inscription on the north facade, the building was finished during the time of Alâeddin Keykubad I. During this period the walls of Konya were also restored, and the walls of Sivas rebuilt (Ibn Bibi, 1996: 272-273). When construction activity is observed, the following buildings can be mentioned: the Şekerfuruş Mescid and tomb in Konya (1220), the Erdemşah Mescid in Konya (1220), the Halkabeguş tomb in Konya, the Erdemli Paşa tomb, the Ebce Sultan tomb in Ebçe, the Kırkkızlar tomb in Niksar, the Hoca Fakih Mescid in Konya (1221), the Kızıl/Red Minaret and Mescid in Aksaray (1221), the Alâeddin Mosque in Niğde (1223), the Atabey Ertokuş Madrasa (1224), the Atabey Cemâleddin Ferruh in Çankırı (1235), Çankırı Darülhadisi (1235), the Pınarbaşı Han (1220), the Elti Hatun Mosque in Mazgirt (1229-1230), the Alara Han (1222), the Ağzıkara Han (1219-1236), the Kadın Han (1223), the Ertokuş Han (1223), the Niksar Han (1224), the Konya-Aksaray Sultan Han (1228-1229), the Çardak Han in Denizli (1229-1230), the Kayseri-Sivas Sultan Hanı (1232-1236), the Alay Han (1219-1236), the Zazadin Hanı (1235) and the Tercan tomb of Mama Hatun (1225). The Sultan, who also opened the first Seljuk shipyard in the town of Alaiye, was killed during the campaign on Syria and was brought to Konya where he was buried (Ibn Bibi, 1941: 188, Cantay, 1992: 256-258). In the Mengujeck area of Divriği the ruler was Sultan Ahmet Şah in that period, and the most important building from that time is the Divriği complex: Great Mosque and Hospital (1228-1229). The Hospital was commissioned by his wife Turan Melik, whose name is written on the inscription above the main portal. (Eser, 2012).[29]

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[28] Some of the art branches that Alâeddin Keykubad I was master in were: construction, goldsmiths, making knives, painting, processing of copper and leather (Ibn Bibi, 1996: 246).

[29] In Chapter 1.2.4. the details of this hospital can be seen.

Gıyaseddin Keyhüsrev II (1237-1246)

After Alâeddin Keykubad I his son, ruler of Erzincan, Gıyaseddin Keyhüsrev II took the throne (Ibn Bibi, 1996: 456-457; Turan 1993: 404). Sultan Gıyaseddin who used the title *Es Sultan ül-Muazzam Zil'l- Allahü fill-Alem Gıyas'ed-dünya ve'd Din Ebu'l Kasım Emir ül-Mü'minin Keyhüsrev bin Keykubad* inherited the structure which reached its economic peak during the reign of his father Alâeddin Keykubad I. However, during this period the beginning of the collapse of the state can be noticed. The Sultan minted common coins with Atabeys of Mosul and Armenian ruler Hetum (Erkiletlioğlu and Güler, 1996: 123). One of the main problems in this period is interference of the statesmen in ruling and influencing the governance, as well as the lack of experience and failures of the Sultan. The uprising of Baba İshak and the Kösedağ war created hard conditions for the Seljuk economy (Gordlevski, 1988: 66). Despite these negative influences, construction activity which started in the period of Alâeddin Keykubad I continued undisturbed. Keyhüsrev II had built numerous han's and caravanserais next to the important trade routes which connected mid-Anatolia and Antalya (Ögel, 1987: 2)**,** and the Sultan continued the plan of building caravanserais which was started by his father Keykubad I, in whose time building activity was intensive. In the time of Keyhüsrev II, there was a smaller number of masters than in his father's time. Some of the masters were: Şihabeddin İnal bin el-Cemâli who worked on Cemaleddin Ferruh Darülhadisi (1242), and master of ceramic tiles *Muhammed bin Osman el-Tusi* who worked on the Sırçalı Madrasa (1242) and on some other buildings. Some researchers claim that he was also the owner of an atelier (Bayburtluoğlu and Madran, 1981: 213-214).

The Sultan who was not that interested in ruling the country fell under the influence and authority of the viziers. The ambitious vizier Sadeddin Köpek was executed in 1238 after his intrigues and frauds came to the surface. The rebellion of Turkmen sheikh Baba Ishak in 1240 was curbed with great difficulties and this was an indicator that the Seljuk State was falling apart (Çamuroğlu, 1992: 174). The bad situation which started with Baba Ishak's rebellion continued with the Mongol invasion in 1242. They attacked and destroyed Erzurum (Ibn Bibi, 1941: 209), and in 1243, with the power of 30 000 men they advanced in Anatolia. Two armies met in the Kösedağ area, 80 kilometers east of Sivas. As the soldiers thought that the Mongols had retrieved, they sent a message to Sultan and proclaimed victory. At that moment, Baycu eturned and ordered a strong arrow attack on Anatolian soldiers. Most of the soldiers died as martyrs from Mongolian arrows (Ibn Bibi, 2010: 176-177). After the battle, the defeated Sultan

escaped to Antalya, and the Mongols advanced to Sivas, and later to Kayseri. After the city was conquered, it was robbed and destroyed. In the battle of Kösedağ two flags were faced (Gordlevski, 1988: 65), red (Mongolian) and black (Abasid-Seljukian); in the end, the red flag fluttered over Asia Minor.

There are 18 caravanserais which date back to the period of Gıyaseddin Keyhüsrev II: Antalya-Burdur, Kırkgöz Han (1237-1247), Susuz Han (1237-1247) and Kargı Han on the Alanya-Beyşehir route (1237-1247) are some of the examples. In addition, Keyhüsrev II built one mosque, six tarikat[30] buildings[31], nine madrasas, eight tombs, three buildings palace-kiosk, one bridge, one place for prayer/namazgâh and two mescids (Ibn Bibi, 1941: 193, 206). In this period are also buildings made by important statesmen like Atabey Lala Cemaleddin, Sadeddin Köpek and Bedreddin Muslih (Sönmez, 1989: 256-257).

It can be said that the death of Gıyaseddin Keyhüsrev II designates the death of the last real sultan of the Seljuk dynasty. The sultanate of the second period of Seljuk history, which starts with Baba Ishak's rebellion and defeat on Kösedağ is connected with the Mongols.[32] They put the second man, vizier, in the foreground in the political and cultural sense. Celâleddin Karatay, Muineddin Süleyman and Fahreddin Ali left their mark on the political structure as well as the cultural environment. In 1261 the Turkmen started a rebellion under the leadership of Karamanids (Gordlevski, 1988: 67).

The reign of the brothers (Keykavus II, Kılıç Arslan IV and Alâeddin Keykubad II (1249-1266) and the period of the big viziers until 1288

The most important event regarding the political structure is the coming to the throne of three brothers of the vizier Celâleddin Karatay (1254-1262) (Turan, 1993: 469). After 1262 Kılıç Arslan IV (Turan, 1993: 514) rose to the throne for the second time but with his two brothers, while the period from 1262-1277 is mentioned as the reign of Regent Muineddin Süleyman Pervane, until his death in 1277 (Turan, 1993: 523). In the reign of the three brothers

30 Tarikat (Tariqah) – A term used by the Sufis for religious life (see Hughes, 1895: 628).

31 For more information regarding the tarikat buildings see Ibn Bibi, 1941: 209; Ahmet Eflaki, 1973: 493; Baykara, 1985: 95.

32 After the Mongols entered Anatolia many changes took place in the art circles. For information about buildings constructed in this period see Tuncer, 1989.

(Üçkardeşler), until his death in 1288 vizier Sahip ata Fahreddin Ali[33] was considered as the most important figure in the history and cultural life of the Seljuks (Turan, 1993: 558).

As for the rest of the sultans who are mentioned in the table at the beginning, there was no activity under their name; rather all the construction and cultural activity took place in the vizier dynasties.

As a result of Muineddin Süleyman's bilateral policy, he invited the Egyptian-Turkish sultan Baybars to Anatolia, and he defeated the Mongols in 1261. In 1277 Baybars came to Kayseri and took over the Seljuk throne. The *hutba*[34] was read and coins were minted in his name. However, he did not stay long there and upon his return to Egypt everything reverted to how it was before (Turan, 1993: 545-546). Once Baybars returned to Egypt, Abaka Han entered Anatolia, killed a large number of people and had Muineddin Süleyman Pervane executed in 1277 (Turan, 1993: 553-554). From then until 1318, the Seljuk dynasty existed as a name, but the power was in the hands of the Mongol governors and commanders. The Seljuk administration and army did not succeed. But the development of the economy and cultural life continued until the death of Muineddin Suleyman Pervane.

A continuation of construction activity is also noticed in the time of Muineddin Pervane (1262-1277). Some of the buildings from that period are: the Esirüddin Ebheri tomb in Afyon (1264), the Sahibiye Madrasa in Kayseri (1267), the Kesikköprü Han (1268), the Seyfeddin Karasungur tomb in Konya (1270), the Cacabey Madrasa in Kırşehir (1272), the Yılanlı Hospital in Kastamonu (1272), the Emir Nureddin tomb in Konya (1273), the Ahlat Ulu tomb (1273), the Mevlâna tomb in Konya (1274) and the Gök Madrasa in Tokat (1275). The most interesting construction activity from Pervane Muineddin Suleyman's period is visible in Sivas (1271). The Seljuk vizier Sahip Ata Fahreddin Ali, governor of İlhanlı Şemseddin Cüveyni and merchant Muzaffer Burucirdi were patrons and built Gök Madrasa, Çifte Minareli Madrasa and Buruciye Madrasa in Sivas (Tuncer, 1989).

Looking at the construction activity in the period between 1247 and 1277, the following buildings can be seen: tomb of Sadeddin Ali in Karaman (1247), the Melike Adile tomb in Kayseri (1248), the Sahip Ata Han on the road between Konya and Afyon (1249), the Taş

33 For more information about the period of Sahip ata Fahreddin Ali see Turan, 1993: 492.

34 Khutba (Khutbah) – The sermon or oration delivered on Fridays at the time of *zuhr*, or meridian prayer (see Hughes, 1895: 274).

Madrasa in Akşehir (1250), Karatay Darüssülehası in Antalya (1250), the Konya Karatay Madrasa in Konya (1251), the Elti Hatun tomb in Mazgirt (1252), the Ak Han in Denizli (1253), the Sahip Ata Mosque in Konya (1258), the Melik Gazi tomb in Kırşehir (1260), the Emir Yavtaş tomb in Akşehir (1261), the Bedreddin Gevhertaş tomb in Konya (1262), the Pervane Madrasa in Sinop (1262), the Gök Madrasa Mosque in Amasya (1265) and the İnce Minareli Madrasa in Konya (1265) (Aslanapa, 1984; Önkal, 1996).

The cultural life in Konya was on the rise after it was taken over by the Karamanids in 1277 (Gordlevski, 1988: 68). Karamanoğlu Mehmed Bey's decision, which he announced at the Council meeting that "from now on, on the Divan, tekke and bârgâh meetings as well as on the squares no other language except Turkish will be used" (Turan, 1993: 562), is important because it ends the traditional state inclination towards the Persian and Arabic language and the Turkish element came forward. Displaced and loaded with high tax, peasants were the ones who gave the greatest support to these developments (Gordlevski, 1988: 69).

For 41 years, from Muineddin Pervane to the end of the Seljuk State in 1318, construction activity was noticed in different parts of Anatolia. This period indicates the strengthening of the new ruling system over Seljuk land, which is ever more in the hands of the vizier families who had the power and land. These dynasties were the Sahipataoguls in Afyon and the Karahisar and Pervanides on the coast of the Black Sea (Gordlevski, 1988: 73).

During that time many edifices were built, such as the Afyon-Çay Taş Madrasa (1278), the Çay Taş Han (1278), the Sahip Ata Hanikâh in Konya (1279), the Muineddin Süleyman Pervane Hospital in Tokat (after 1262), the Sahip Ata tomb in Konya (1283), the Ateşbaz Veli tomb in Konya (1285), the Şeyh Bedreddin tomb in Ilgın (1286), the Fatma Hatun tomb in Kırşehir (1287), the Şeyh Alaman tomb in Konya (1288), the Güroymak tomb in Muş (1290), the İlhani tomb in Kırşehir (1288), the Padişah Hatun tomb in Erzurum (1291), the Sünbül Baba hostel (1292), the Seyyit Şerif tomb in Develi (1295), the Eşrefoğlu Mosque in Beyşehir (1296), the Niksar Çöreği Büyük Tekke (1300), the Mehmed Dede tomb in Turhal (1301), fountain of Şeyh Şahabeddin in Tokat (1304), the Anber bin Abdullah Psychiatric hospital in Amasya (1308), the Yakutiye Madrasa in Erzurum (1310), the Hüdavend Hatun tomb in Niğde (1312), the Fakih Ahmed tomb in Harput (1313) the and Nureddin Sentimur tomb in Tokat (1314) (Aslanapa, 1984; Önkal, 1996; Cantay, 1992).

1.1.2. Life and trade

From the ethnological point of view, it is interesting to understand the way of life in the Anatolian Seljuk state, how life was organized, the role and usage of music in daily life (ceremonies and military) and which instruments were used, all of which can be understood from historical sources and secondary texts. Generally speaking, the organization of the Anatolian Seljuk State is like a sequel of the organization of the Great Seljuk Empire. Although in the beginning they were bounded by the Great Seljuk Empire, from 1092 they became independent.[35] After it was accepted as common good, the state was divided among the principals (Ibn Bibi, 1996: 31-32).[36] This situation made big problems in the country. The rulers used titles such as *Sultan-ı A'zam, Sultan-ı Muazzam*. Çetr, *nevbet* and *sancak*[37] are shown as symbols of power. The Abbasid Caliphs from Baghdad, with the fermans/proclamations with which they confirm the power and administration of the sultan, also send *hil'at***,** *turban and cane*[38]. Members of the administration in the palace were *Beylerbeyi, Tuğrai, Atabey, Pervane, Arız, Müstevfi and Müşrif-i memâlik***.**[39]

The affairs of the Anatolian Seljuk state are divided in four segments: military, financial, legal and sharia[40]. The base of the army were horsemen who owned *tımar*[41]. They are Turkish soldiers whose service is passed down from father to son. Horsemen with tımar were associated with the country and were sent to various parts of the country. Commanders that were in the important centers of the vilayet-province got the title *subasha*. Subashas were subordinated to

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35 It is visible that the vizier of the Great Seljuks Nizam'ül-mülk, despite his independence from the Great Seljuk Empire, followed the doctrines which he described in his book *Siyasetname* regarding the methods and state politics (Nizam'ül-mülk 1983). For example, Seljuk historian Ibn Bibi mentiones how he was always reading sultan Alâeddin Keykubad's Siyasetname (Ibn Bibi, 1996: 246).

36 It is confirmed that rulers in terms of controlling the areas under their command were not connected with their fathers (Ibn Bibi, 1996: 41).

37 Çetr – round element resembling an umbrella which Eastern rulers wear on the head, a symbol of power; Nevbet-military music and a band, which performed in specific places in specific time; sancak-flag (Sözen and Tanyeli, 1986).

38 As Jasienski (2014: 192) points out, *hil'at* is a robe of honour, a richly embroidered kaftan which was given to foreign diplomats. For this subject the period of İzzeddin Keykavus I and Alâeddin Keykubad I is very interesting Abbasid Caliph sent symbols and clothes of the Futuvet organization (a sort of fraternal organization) to İzzeddin Keykavus I (Ibn Bibi, 1996: 150).

39 It can be seen that with time this list got bigger. Every city had a city divan, as an annex to the Divan. (Baykara, 1985: 72; Baykara, 1985a: 49-60).

40 Sharia – religious law.

41 Timar – the land whıch a sultan gives as a gift so people could earn money.

Serleşkers-chief of command (Emir-i sipehsâlâr and Serleşker), as well as to the commanders of the county. The second group by size in the army consisted of bodyguards who were in the center next to the rulers and who called themselves *kapikulu.* Sipahi's were mostly horsemen while kapikulu soldiers were infantry and horsemen. In addition to these two groups, nomadic forces also had an important place within the army. The main commander of the army was entitled as Beylerbey or Melik'ül-ümer. In situations when the ruler is not a part of the invasion, they were in charge of the army. The Seljuk army used *çarh arrows, bows, swords, spears, cudgels, maces, axes, shields, stone balls, catapults and ladders* as weapons.[42]

From these sources, it can also be seen that the Seljuk sultans were always accompanied by military bands named *nevbet* when going to the war. The sultans, along with *nevbet groups* always had *çetr*, a spear and a flag (Uzunçarşılı, 1988: 28). The tradition of *nevbet* was continued in the time of the Anatolian Seljuks. In the sources from that period *zurna*[43] is not mentioned in the military music (Uzunçarşılı, 1988: 74).[44] Some other sources imply that *zurna* was used by *nevbet* bands in the Anatolian Seljuk times. Such differences between sources are frequently seen. These contradictions are present due to the author's lack of knowledge of texts about the "form/shape" of *zurna*. Instead, long rice straws named *nefir* or *buk* were used to make a sound designating the beginning of the battle, as it was believed these would have a much stronger emotional empowerment for the quest.

Because of this, war music is considered not to have a melodic structure, but that it consists of rhythmic noise of the drums and pipes with which soldiers were signaled and ordered to battle (Altınölçek, 1999: 752).[45]

Administrative and financial works were conducted by the *Great Council*. The Great Council which was also called *Divan-ı Saltanat* was chaired by the vizier, and sometimes the ruler. The Seljuk vizier who was acting as the ruler's emissary, as the highest official who ruled the state affairs, could give *fermans*[46] and send ambassadors. The vizier who was also entitled *Sahib-i*

42 Among these items are the tools for burning and demolitiong (Ibn Bibi, 1996: 155).
43 Zurna – a wind instrument which was used as the forefront of the army, calling for start of the battle.
44 Uzunçarşılı, İsmail Hakkı. 1988. *Osmanlı Devleti'nin Saray Teşkilatı*. Istanbul.
45 See Chapter 2.1.3. Military music.
46 Ferman – a charter of an imperial order.

azam was appointed by the ruler and was given a crown and a golden *divit* as a symbol of position[47].

In the state of the Anatolian Seljuks the *Kadı'*s[48] managed legal affairs and the decisions were made according to the Hanefi Sharia law. Ibn Bibi mentions that the kadıs dealt separately with military and civil disputes. The biggest head of the science was judge in Konya, who was entitled the *kadıl-kudad*. He was also the chairman of the council which dealt with all Sharia and legal matters.[49]

The ownership over state land was divided into three groups: *îkta*, *vakıf* and *mülk*.[50] *Ikta* and *has* land were reserved for the ruler, his family, viziers, emirs, statesmen and spahi's. *Ikta* property ceased with the end of service, which means that the one who was discharged from service would lose his *ikta*. Endowment land as part of state ownership and its taxes were used to cover the expenses of scientific and social institutions, which was determined by the *vakfiye*[51]. Another form of land named *mülk*, separated from the *araz-ı emiriye*[52] for various reasons was given to different persons and their servants, then the land was transferred to their children's ownership, and one part would be transferred into endowment. The owner of *mülk* was entitled to full savings and the land could not be taken from him. People were, according to the form of governance, divided into "classes" and were called "ikta", "mülk" and "vakıf" *reaya*[53]. According to the "class" to which they belonged, they paid their tithes and taxes. *Reaya* were not slaves and had the right to appeal. As the land was periodically subject to listing, listing in the registers after conquering land was also done immediately.[54]

Sultans of the Anatolian Seljuks considered science and arts very important. This is why the madrasas in the bigger cities, each one a work of art, are proof of the level of scientific activity

47 Divit – an ink stand with a tube for pens (Redhouse, 1856: 700).

48 Kadi – a Muslim judge.

49 Disputes were taken into consideration in three chapters: religious, commercial and ethical. Religious disputes were solved by judge, and commercial and ethical by Divan (Ibn Bibi, 1996: 114).

50 Ikta – type of property; vakıf – foundation; mülk – property, real estate. All these are differentiated in the way of usage, which is explained in the following twxt.

51 Vakfiye – legal text determining list of real estate and movable estate isolated for endowment and rules of their usage in the future.

52 Araz-ı emiriye – land which was given to the people from the government, government property (Hughes, 1895: 21).

53 Reaya – nation under a government rule (Sözen and Tanyeli, 1986).

54 Local sources of that time attempt to explain data about land tenure in the Seljuks period and its use in the Ottoman period. Regarding this subject see Turan, 1948: 549-574.

in Anatolia. First, Konya, then Sivas, Kayseri, Erzurum and other cities had one or more madrasas. Seeing madrasas in every part of the country shows how widespread and popular science was. In those schools, religious sciences were taught such as the Kur'an, *hadis*[55], Islamic law, *tefsir*[56] and natural sciences such as medicine, astronomy and mathematics. Among them, as special buildings, sultans built health institutions, facilities and medical schools. Aside from the ones which were preserved until today, there are examples of destroyed buildings which we can learn about from source materials (Kuran, 1969; Sözen, 1972).[57]

Caravanserais[58] which were built during that time have a crucial place among the most important examples of public construction (Erdmann, 1961). Caravanserais served as inns and marketplaces and during war for a storing food supplies and equipment. The biggest and most important of those buildings are the ones which integrated summer-winter, open-closed structures. Examples of some caravanserais are the Konya-Aksaray Sultan Han and the Kayseri-Malatya Karatay Han. Before the Turkish invasions, Anatolia, which was always on the intersection of the East-West trade routes, was behind in the economic terms. Commercial life of Anatolia in the 11th and 12th century lost vitality and roads were used only for military purposes (Özergin, 1959: 43; Tanyeli, 1987: 20). After the Turks conquered the land, many people settled and stopped trading, and the economic activity once again intensified. During the establishment of the Anatolian unity from the 11th to the beginning of the 12th century, due to the conflicts with the Byzantines and Danishmends, transit trade through Anatolia moved towards the Mediterranean. Especially after the First Crusade rapid development of agriculture, commerce and industry is visible. The Seljuk sultans considered commercial activity, science and public works very important and encouraged them. When confusion after the Crusades vanished, the main goal was to ensure economic stability and vitality of the country. These efforts enabled the development of caravan trade between the East and West as well as sell off the surplus outside the country (Heyd, 1975: 334; Sümer, 1985: 5-10). While the Christians

55 Hadis – Muhammed's saying.

56 Tefsir – to comment, to explain, hermeneutics.

57 Madrasas which were in the various Anatolian cities were built in two ways: with open courtyards or with domes. Some of the madrasas built in this period are the following: *Hacı Kılıç Madrasa in Kayseri, Sırçalı Madrasa in Konya, Karatay Madrasa, Gök Madrasa in Sivas* (Kuran, 1969; Sözen, 1972). It is not possible to determine the exact number of the buildings erected in that period, but there are works regarding this subject. For numeric estimates see Madran, 1973; Bayburtluoğlu and Madran, 1981.

58 Caravanserai (tur. Kervansaray) is housing alongside the road where travelers could rest and get refreshement.

managed more with industrial activities and trade within the city, the Turks took over the trade between the cities and international trade (Durukan, 1989: 50). Trade within the city had an important place at fairs, markets, points of sale and shops. Hans were focused on fair sale and markets and production, and *suks*[59] were organized as points of (Akdağ, 1979: 31). Hans, caravanserais and bridges were built along the roads which spread in the direction North-South and East-West, stimulating thus the development of all trades. Sultans including Kılıç Arslan II, Gıyaseddin Keyhüsrev I, İzzeddin Keykavus I and Alâeddin Keykubad I who understood the importance of international trade took protective and stimulating measures (Turan, 1946: 473). Some of those measures included giving benefits to foreign traders and keeping the taxes low. Furthermore, as mentioned by Pamuk, they built new harbors or overtook the existing ones on the Black Sea and the Mediterranean, in order to facilitate transit trade (Pamuk, 1993: 29). Trade agreements with Venetians and Cyprus are interesting as examples of such measures. The first agreement which was signed with Christians is seen after the conquest of Antalya in 1205. From the correspondence between İzzeddin Keykavus I and Huguesom, king of Cyprus, we know that Gıyaseddin Keyhüsrev I made a similar agreement with the Cypriots after the conquest of Antalya (Turan, 1988: 111). In this agreement, some of the chapters consider the right to free trade, customs, safety of the goods and personal safety (Ş. Turan, 1990: 118). One of the measures undertaken for trade development was that the state guaranteed personal safety and safety of the goods. This *government warranty* which represented a sort of trade insurance was the reason all nations preferred Anatolian routes (Turan, 1946: 473). Antalya and Sinop were the first to become centers of foreign trade. The main centers of domestic trade were Sivas, Kayseri, Konya and Erzurum. Great care was given to improving agriculture and various arts, resulting in the sale of finished products. All kinds of fabric, fine wool, silk and leather were exported internationally. Export products also included wheat, barley, sesame, chickpeas, saffron, rice, cotton and all kinds of fruits. Because of economic development, people's welfare grew in the country. However, although the Mongol rule did not bring about political decline, science, economics and society started to stagnate. The Mongols significantly destroyed Anatolia in terms of demolishment of the buildings, causing thus the loss of written documents from that era. During that time, the weakened Seljuk Anatolia started to divide into many principalities until the 15th century, when all of them were subjected to the Ottoman Empire.

[59] Suk – shopping district, often covered (http://www.osmanlicaturkce.com/?k=suk&t=%40).

1.2. Architecture of hospitals in the Anatolian Seljuk Period

As was seen in the previous chapter, building construction was very vivid in the Anatolian Seljuk period, and hospitals were actively built in the main cities. The architecture of the hospitals which will be mentioned follow the idea of "architectural design which embodies central religious belief, natural and mystical landscape, prayer and the music" (Koen, 2009: 75).

The architecture of the hospitals is important in the context of sound events and soundscape, and as such is a part of the acoustic research and the analysis which will be elaborated in Chapter 5.2. Hospitals from the Anatolian Seljuk period were built according to the madrasa plans. Although, as Çantay mentions, there were numerous hospital complexes in the 12th century Anatolia, there is no written data from the Seljuk period about them. Some such examples are Emineddin Darüşşifa and buildings in Silvan, Harran and Antakya (Cantay, 1992: 9).

Medical education in the Seljuk period is relatively developed considering the period conditions. As pointed out by Terzioğlu and Çetin, Christian doctors who at the time joined the Crusades on expeditions, claimed that they had learned a lot from the Muslim doctors. Hugo von Lucca, surgeon from Bologna was in 1218 part of a Crusade army. In his memoires, Lucca explains how he, after noticing that wounded soldiers and commanders prefer Muslim doctors, spent three years examining and learning about hospitals and treatment methods in the Islamic army (Terzioğlu, 1993: 52; Çetin, 2011: 325).

In addition to the hospital buildings[60] which are still preserved and visible today, there are other examples mentioned in the historical texts, such as the hospital in Havza, built by Kılıç Arslan I (in 1116), the hospital in Akşehir, built by Vizier Sahip Ata, as well as hospitals in Erzurum and Erzincan (Çetin, 2011: 327, 329). Archive documents indicate that in the capital Konya the Little Hospital / Küçük Darüşşifa was built in 1173 and the Big Hospital/Büyük Darüşşifa in 1221 (Köker, 1991: 9). Researcher Afet İnan mentions the Kılıç Arslan Hospital in Kırşehir (1145) and the Alaeddin Keykubad Hospital (1236) in Ilgın (Inan, 1972: 4). Sühelya Ünver adds the hospital in Harput to this list (Ünver, 1972: 14), Kazım İsmail Gürkan adds the Rahatoğulları Hospital in Sivas (1288), and Ahmet Acıduman adds the hospitals in Silvan

[60] Hospital buildings in Turkish are referred to as Darüşşifa, Şifahane, Bimaristan, Maristan, Şiffaiye, Tımarhane. The specificity of the Turkish language understands the distinction of those names, but dictionaries do not offer any such variation of names.

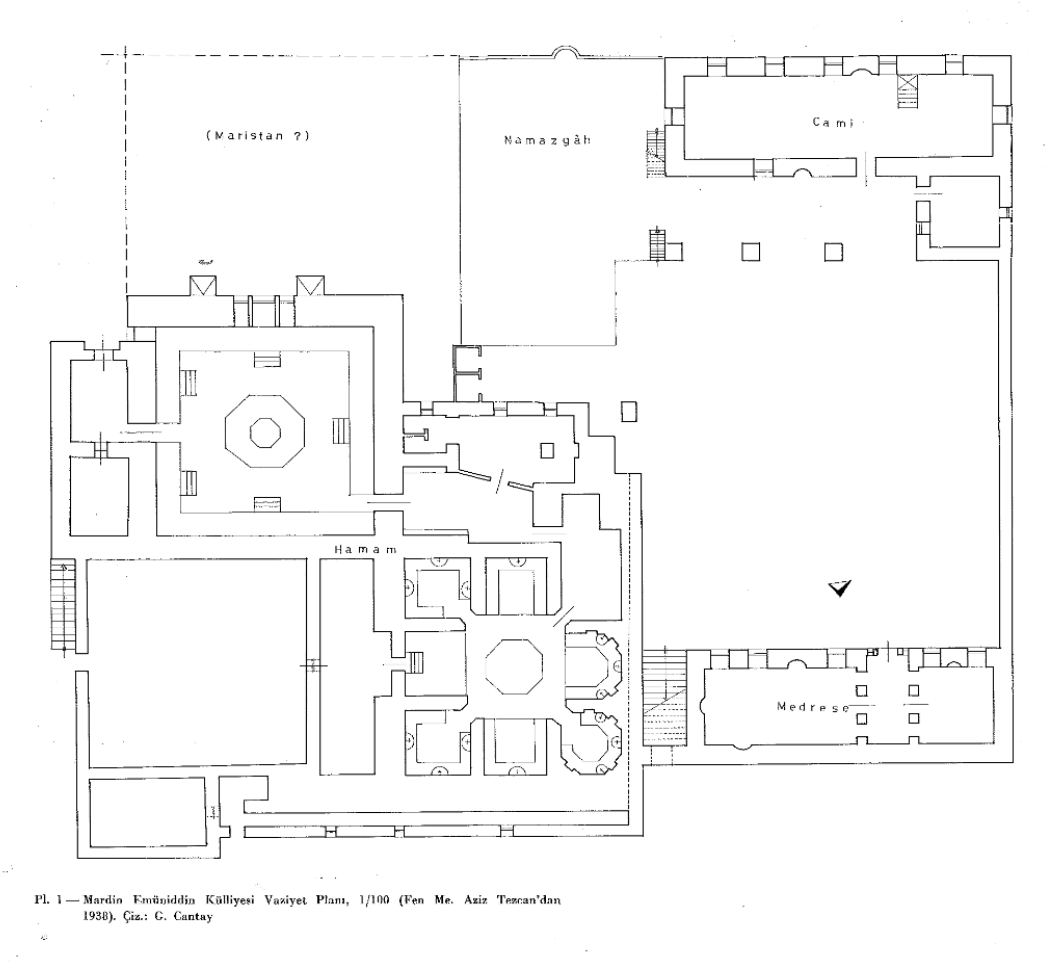
(1184), old Malatya from the 13th century, and Kars from the 12th century (Acıduman, 2010: 11).

As mentioned in the beginning of the chapter, the hospitals from the Anatolian Seljuk period were built as a madrasa plan. In the following subchapters the floor plans will be shown and description of 9 hospitals for which it is believed[61] that music therapy was conducted in medieval times and which are important in terms of their architectural style. These hospitals show the Islamic idea of healing.

61 Usage of music therapy in Anatolian hospitals is mentioned in the works of Schimmel (1975: 180), Çoban (2005: 51-58), Arda (2009: 10).

1.2.1. EMINEDDIN DARÜŞŞIFA (KÜLLIYESI) IN MARDIN

The building complex which included a hospital was built in 1108-1122 in the Maristan quarter in Mardin by the brother of the Artukid Sultan Necmeddin Ilgazi. Today there are no clues which would point to the area where the hospital was. According to the data in the archives it can be concluded that the edifice was used as a hospital until the 19th century.



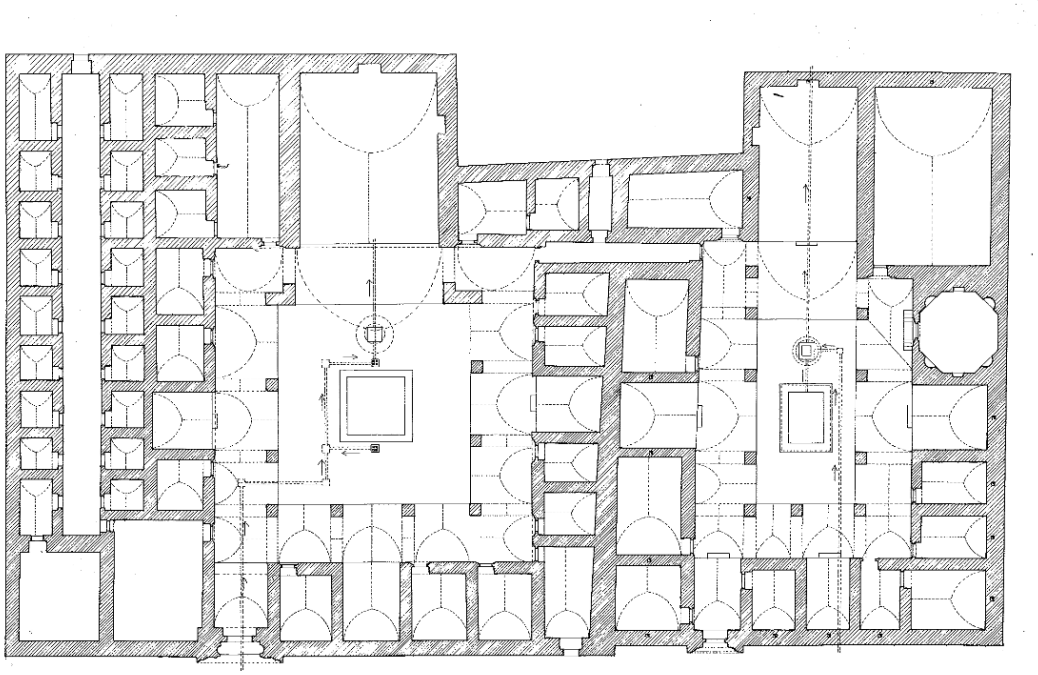
Pl. 1 — Mardin Emüniddin Külliyesi Vaziyet Planı, 1/100 (Fen Me. Aziz Tezcan'dan 1938). Çiz.: C. Cantay

Figure 3 (Cantay, 1992: plan 1)

1.2.2. GEVHER NESİBE DARÜŞŞIFA AND MEDICAL SCHOOL IN KAYSERI

The hospital was built in 1205-06 in the Hacı İkiz quarter of the Yenice area in the district of Kayseri and under the patronage of Gıyaseddin Keyhüsrev I. This is the first example of a hospital built in Anatolia and it is the most preserved one. The west part of the complex was a hospital, while the medical school was in the east part. The income of the hospital was ensured through *vakfiye* which included several estates, hamams and arable land.[62]

According to researcher Afet Inan, the complex was in use for therapy and education (Inan, 1993: 3). The size of the hospital is 41.40 x 42.30 m. The courtyard of the edifice is square shaped, measuring 13.30 x 13.70 m, and a pool is in the center of the courtyard. The main iwan is 9.50 x 12.00 m, in the west there is corridor 31.80 m long and 2.60 m wide. On each side of the corridor there are 9 rooms for patients (Cantay, 1992: 41-44, plan 2).



Pl. 2 — Kayseri Gevher Nesibe Darüşşifası ve Medresesi (Vakıflar Genel Müdürlüğü Arşivi'nden). (Ö, 1/100)

Figure 4 (Cantay, 1992, plan 2)

[62] Detailed information regarding the vakfiye is given in Chapter 1.1.1. in the paragraph regarding Gıyaseddin Keyhüsrev I.

The Gevher Nesibe Hospital had rooms for physicians, surgeons and ophthalmologists, as well as wards for patients with mental disorders. The other characteristic distinguishing the *şifaiye* section is the *bimarhane section* positioned behind the patients' rooms located left from the main iwan. This unit was used for the treatment of mental disorders. Acoustic sound channels between the walls made up a unit which consisted originally of 18 small rooms. According to Aşiliskender (2003: 28-32), they tried to treat patients in these small rooms with suggestions, using these sound channels accompanied by the sound of music and water.

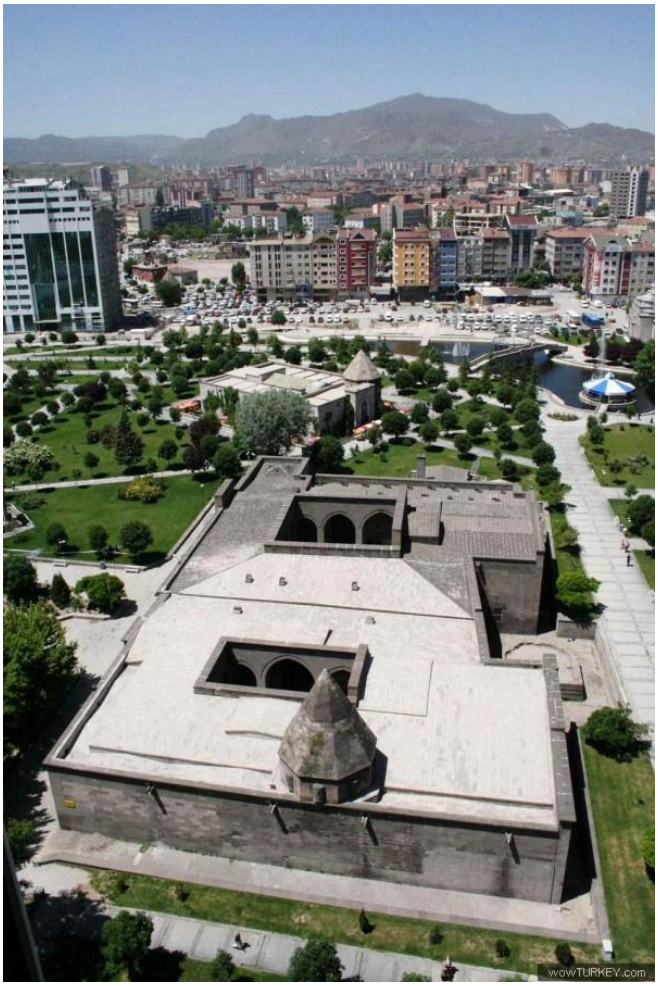


Figure 5 A general view from the east (Photo by Burhanettin Akbaş)

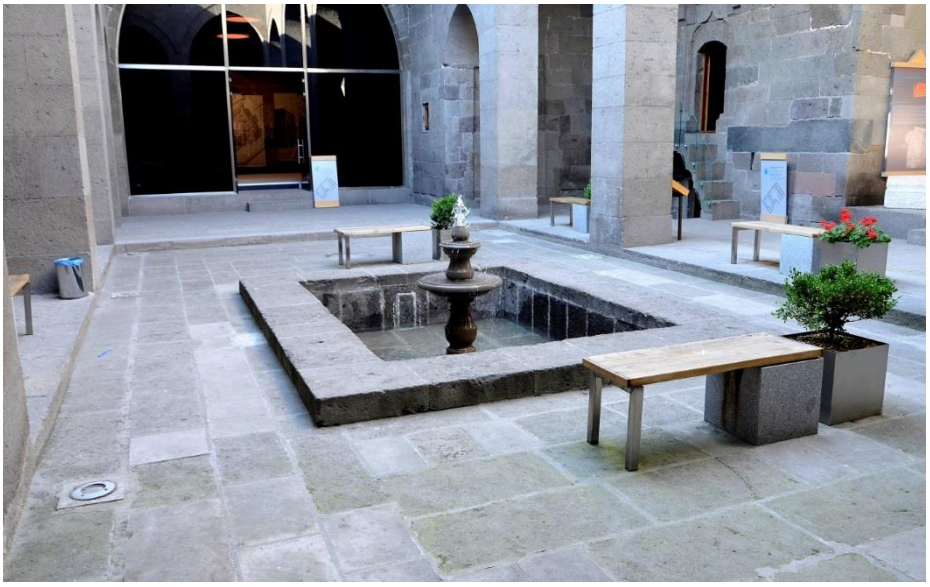


Figure 6 Madrasa, open courtyard, general view from the south

Figure 7 The main iwan, general view from the south

1.2.3. İZZEDDİN KEYKAVUS DARÜŞŞIFA IN SIVAS

The hospital is located in the Yapı medreseler street (*lit. madrasa buildings*). According to the data from the inscription above the door, it was built in 1217-18 by Izeddin Keykavus I (Bayat, 2006: 355-356). The rectangular shaped edifice was built in the direction East-West and covers the space of 46.80 x 61.90 m. In the center of the building is a courtyard 22.40 x 30.80 m and a rectangular shaped pool. On the North and West are two opposite iwans. The south iwan was later closed and it is where its founder Sultan İzzeddin Keykavus I is buried. The most important part of this building is the main iwan, 9.90 x 10.40 m large (Cantay, 1992: 45-50, plan 3).

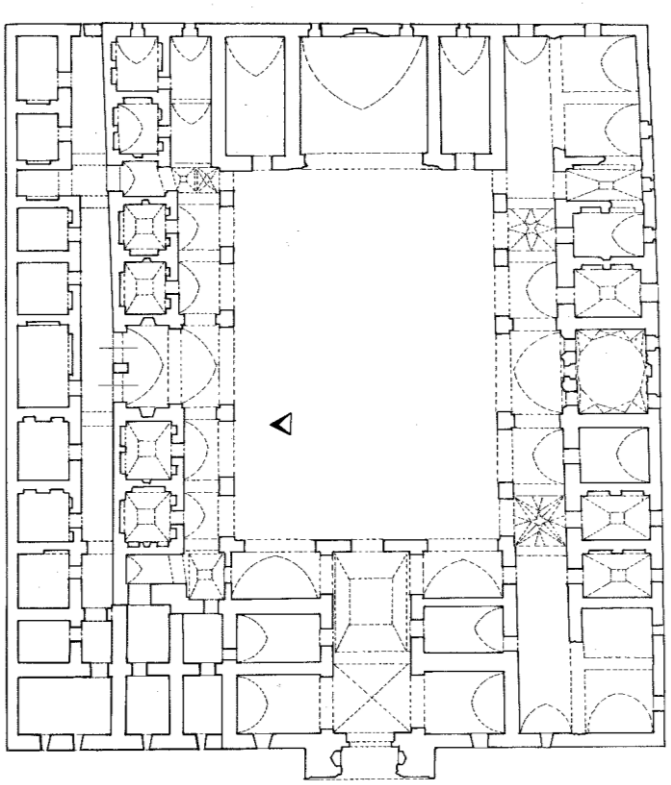


Figure 8 (Cantay, 1992, plan 3)

The vakfiye (foundation deed) written in 1220 is the only preserved document from that period. It contains the information that the edifice was built in 1217. According to the vakfiye, more than a hundred stores and incomes from several farms were left for the edifice. The vakfiye also indicates that the hospital staff included ophthalmologists and surgeons (Cevdet, 1938: 37-

38).[63] The administration of the vakfiye was given to Ferruh who was the palace treasurer, and who decided on the wages of various workers in the hospital as well as provided the raw material for the making of medical remedies (Bayat, 1991: 8).

Although there is no written data about the therapy conducted in the Keykavus hospital, observing the floor plan with the main iwan across the entrance and the pool in the center of the inner courtyard, it can be assumed that the musicians were positioned in that iwan and the patients around the pool, similar to the Divriği hospital. The general belief of the people and as such taken as general knowledge[64] is that music therapy was conducted in all the hospitals mentioned in this chapter.

Figure 9 General view from the west

[63] As was mentioned in the previous chapter, many villages arable lands and stores were obliged to give income for the hospital.

[64] In the known literature there is no information about the source. Scholars are repeatedly using same information without giving a background or a source.

Figure 10 The main iwan and the pool, general view from the west

Figure 11 Human figures on the main iwan wall

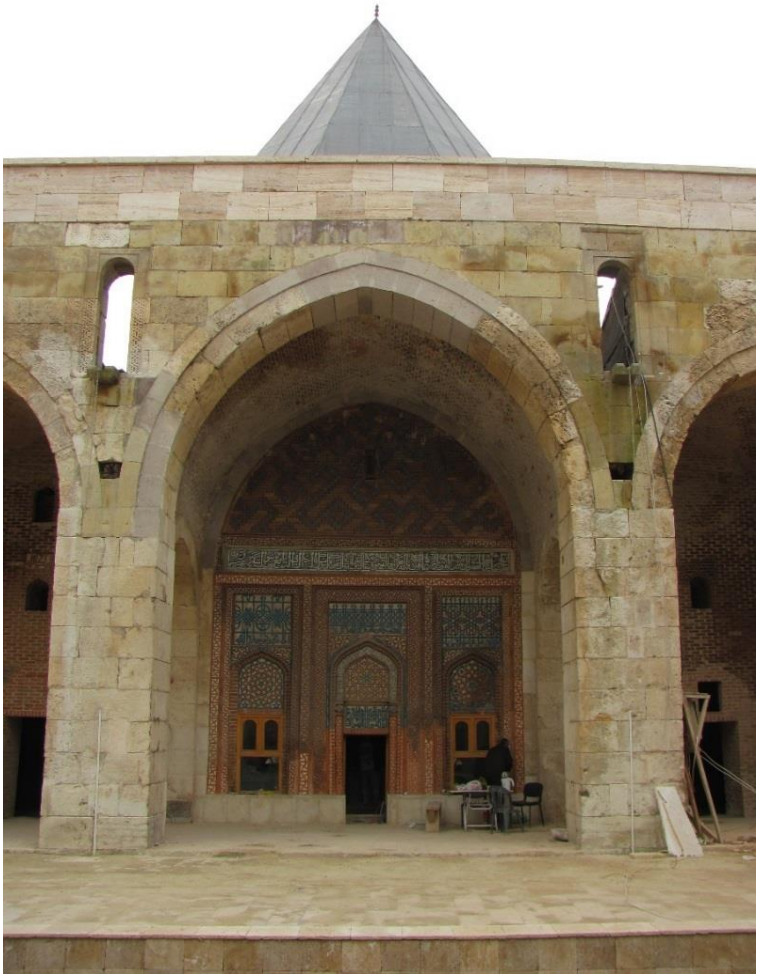


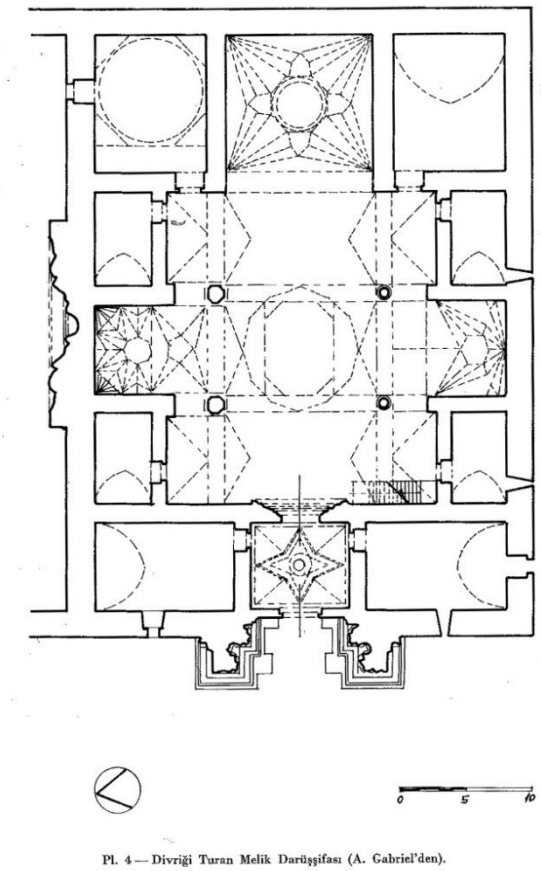
Figure 12 The tomb of Izzeddin Keykavus I, view from the west

1.2.4. TURAN MELİKE DARÜŞŞIFA IN DIVRIĞI

The hospital is part of the complex built on the leaning terrain south of the fortress in the district of Divriği. The inscription above the main entrance of the hospital reveals that the hospital was built in 1228-29 by Turan Melike, the wife of the Mengüjeck sultan Ahmet Şah. As pointed out by Çoban (2006: 54) and Giray (2008: 47), it was one of the centers in the Anatolian plateau where music therapy was conducted[65].

The edifice whose entrance is in the west is 24.00 x 32.00 m in size. The central part consists of a domed courtyard and pool. The most important part of this building with two iwans is the main iwan which is on the east. The ornamentation work on the walls and top of the main iwan definitely attracts attention. The upper part of the north, south and west side of the main iwan has ornamentation in the shape of a peacock tail while the top is ornamented with a spiral which is also present in the north iwan.

The entrance area of the building and its southern part are on two floors. It is believed that the venues on the upper floor were used by doctors and hospital employees. Although it is known that this edifice, which was built according to the closed madrasa plan, was used as a hospital, there is no information about the usage of individual rooms (Cantay, 1992: 51-55, plan 4).



Pl. 4 — Divriği Turan Melik Darüşşifası (A. Gabriel'den).

Figure 13 (Cantay, 1992, plan 4)

65 Neither Giray nor Çoban give any details regarding music therapy treatment. Çoban (2006: 54) only states "1985 yılında, bu listede yer alan ilk üç varlık içinde olan Divriği Ulu Camii ve Darüşşifası da Anadolu topraklarında müzikle tedavinin uygulandığı merkezlerden biribir" (since 1985 the Divriği Mosque and Hospital are among the first three on the list (UNESCO) as centers where music therapy is applied in the Anatolian territory).

Figure 14 General view from the north

Figure 15 The main door of the hospital

Figure 16 The main iwan and the pool, view from the west

Figure 17 The pool, in the center of the courtyard

Figure 18 Inside the hospital, looking to the west

Figure 19 North side of the main iwan

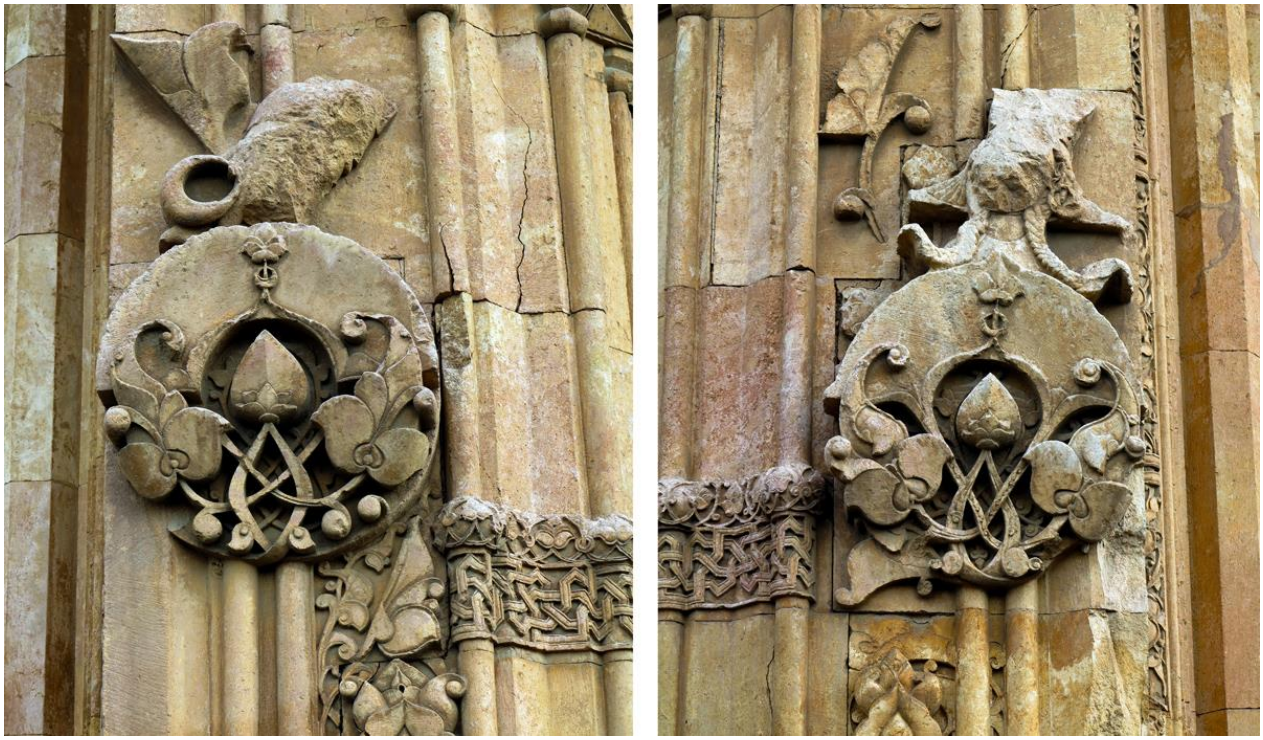


Figure 20 Man and woman reliefs, on the main door of the hospital

Figure 21 Two human figures, on the north side of the main door of the hospital

1.2.5. ATABEY CEMÂLEDDİN FERRUH DARÜŞŞIFA IN ÇANKIRI

The hospital was built by Atabey Cemâleddin Ferruh in the neighborhood of Çankırı Tımarhane in 1235 according to the inscription which is on display at the Çankırı museum. The building collapsed and today only the north wall is preserved. In 1242 next to the hospital Ferruh built the Dar'ül Hadis, which today serves as *mescid*[66] in the part which is preserved. There is no data about the plan of the edifices nor the functionality of the venues (Cantay, 1992: 256-258, plan 5).

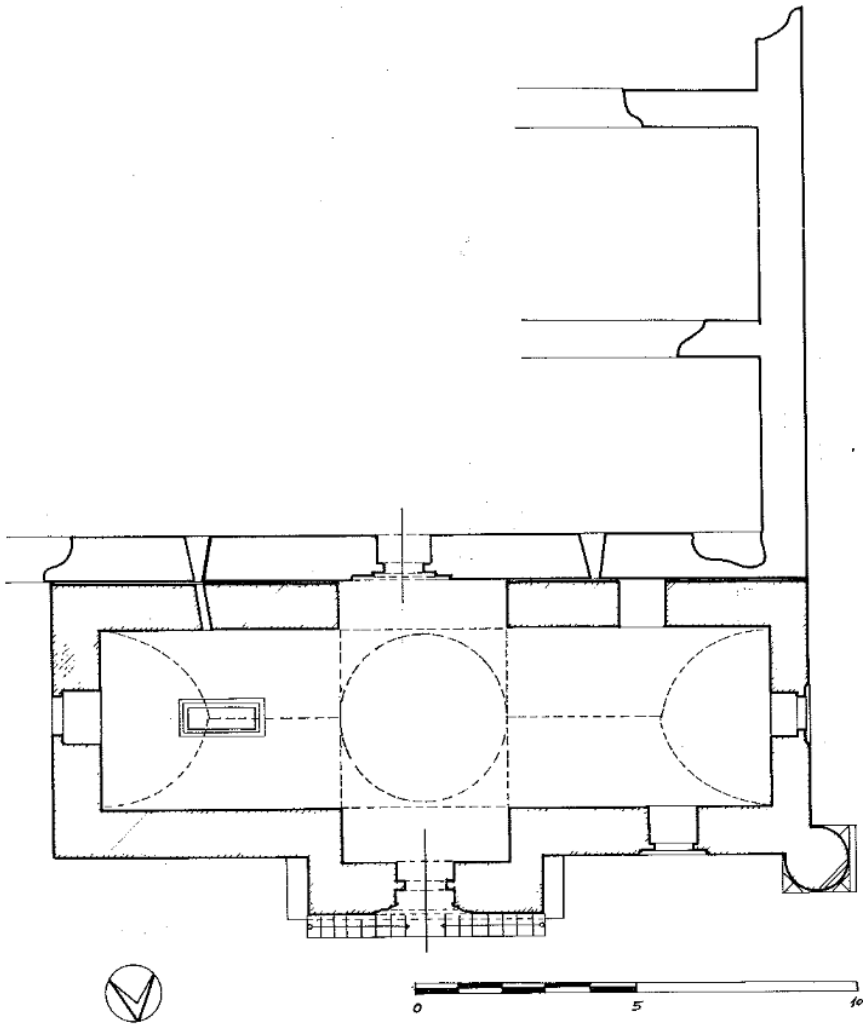


Figure 22 (Cantay, 1992: plan 5)

[66] Mescid — a small mosque without a minber (pulpit)

Figure 23 General view from the north

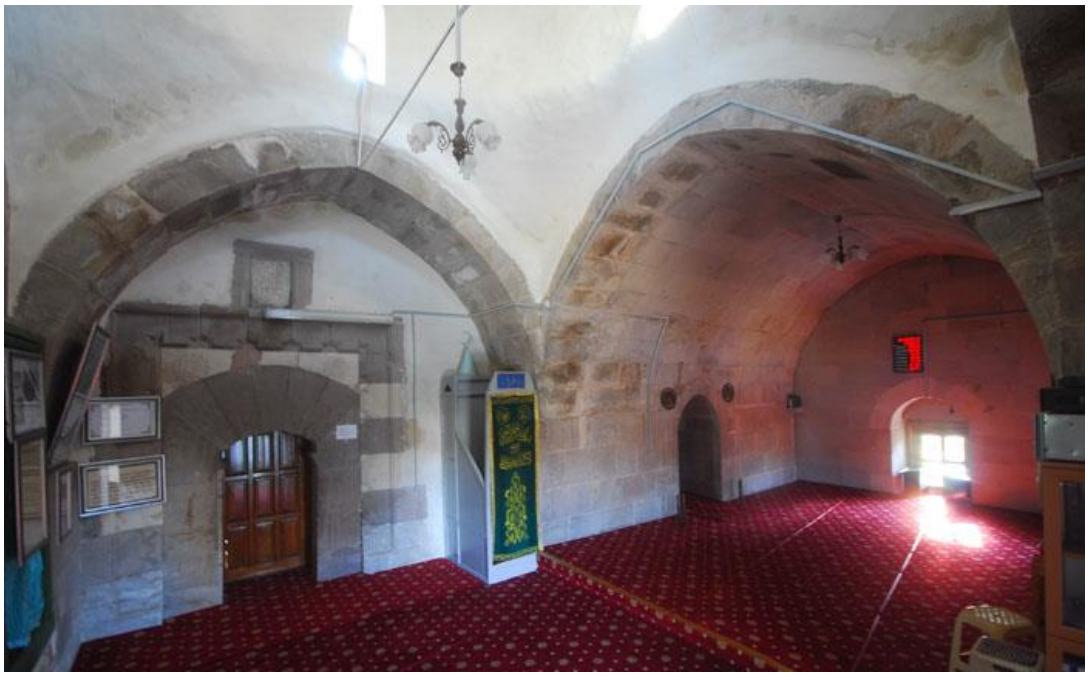


Figure 24 Interior of the building, looking towards the west

1.2.6. PERVANEOĞLU ALİ ("YILANLI") DARÜŞŞİFA IN KASTAMONU

The edifice was built in 1272 in Kastamonu. The architect's name was Said from Kayseri, and the builder was Güherbaş. Only one door with the inscription was preserved until today and there is no information about the venue layout nor the plan. For the hospital "Yılanlı"[67] there is archive data from 1726 and 1773. In the data from 1726 there is information that there were many patients suffering from epilepsy and mental disorders. According to this data, it seems that during this period the edifice was used as a mental hospital (Köker, 1991: 9). Unfortunately, the data does not provide any information whether music therapy was used in this hospital.

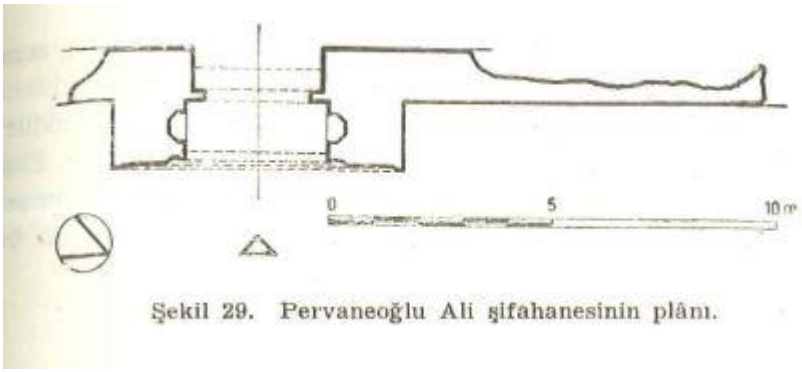


Figure 25 The plan (Sözen, 1972: 147)

Figure 26 The main door (portal), general view

[67] Yılanlı – serpentine. Yılan literally means snake. Yılanlı refers to serpentine snake which is one of the oldest symbols and represents life and healing. Today it is a part of the caduceus.

Figure 27 General view, inside the building

Figure 28 The main door, ornament detail

1.2.7. MÜİNEDDİN PERVANE DARÜŞŞİFA IN TOKAT

The construction of the hospital was probably started by Müineddin Süleyman Pervane after 1265, but after his death, it was finished by one of his relatives. Today's position of the hospital is within the city on the main street. By the remains which are on the north side, it can be interpreted that it was originally built as two edifices which consisted of a hospital and medical school.

The building has a madrasa plan with an open courtyard. It was built in the direction East-West on two floors, 12.45 x 20.50 m, and a pool is situated in the center of the courtyard. The most interesting part of the building is the main iwan, but there is no information about the function of the rooms (Cantay, 1992: 60-66, plan 6).

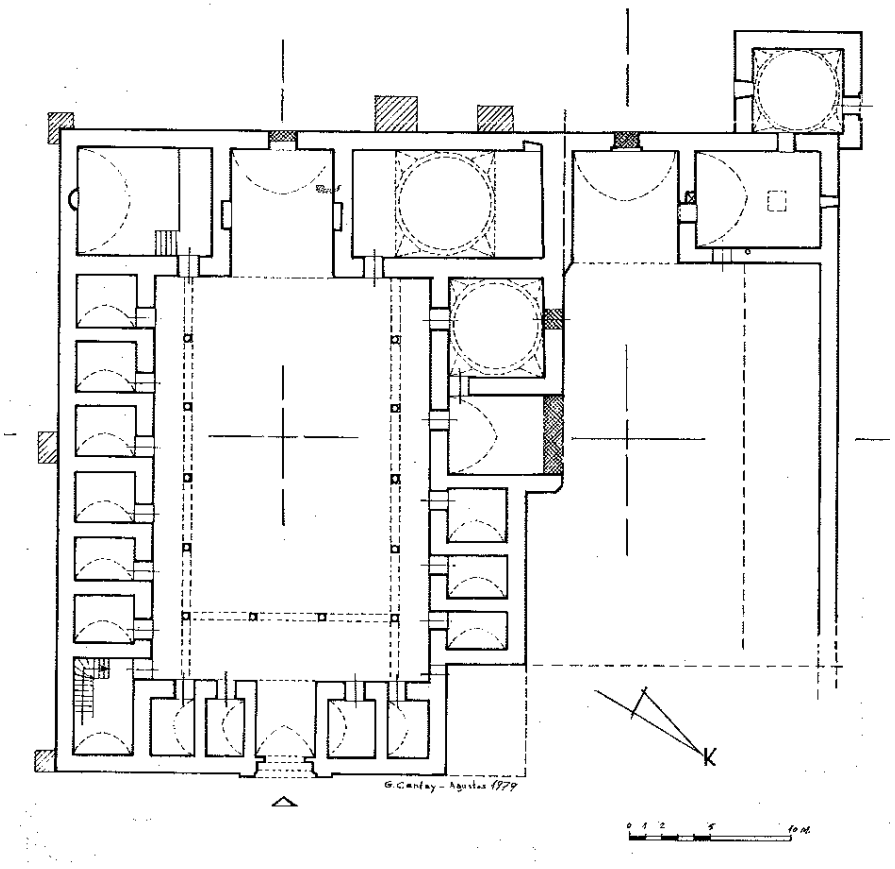


Figure 29 (Cantay, 1992: plan 6)

Figure 30 General view from the east

Figure 31 General view of the building from the north (Hospital?)

Figure 32 The main iwan, general view from the east

Figure 33 Open courtyard, looking at the east side

1.2.8. ANBER BİN ABDULLAH DARÜŞŞİFA IN AMASYA

The hospital was built by Anber bin Abdullah in 1308-09 in the Yakutiye quarter, in the street which is parallel with the river *Yeşil Irmak* (lit. Green River). The vakfiye made in 1312 was not preserved.

The edifice was built in the direction East-West and is 25.60 x 33.60 m large. It was built as a madrasa with an open courtyard. The most important part of the building is the main iwan, 5.70 x 7.10 m in size, from whose sides there are rooms lined in the shape of bedrooms. It is believed that these bedrooms were used by patients (Cantay, 1992: 67-71, plan 7).

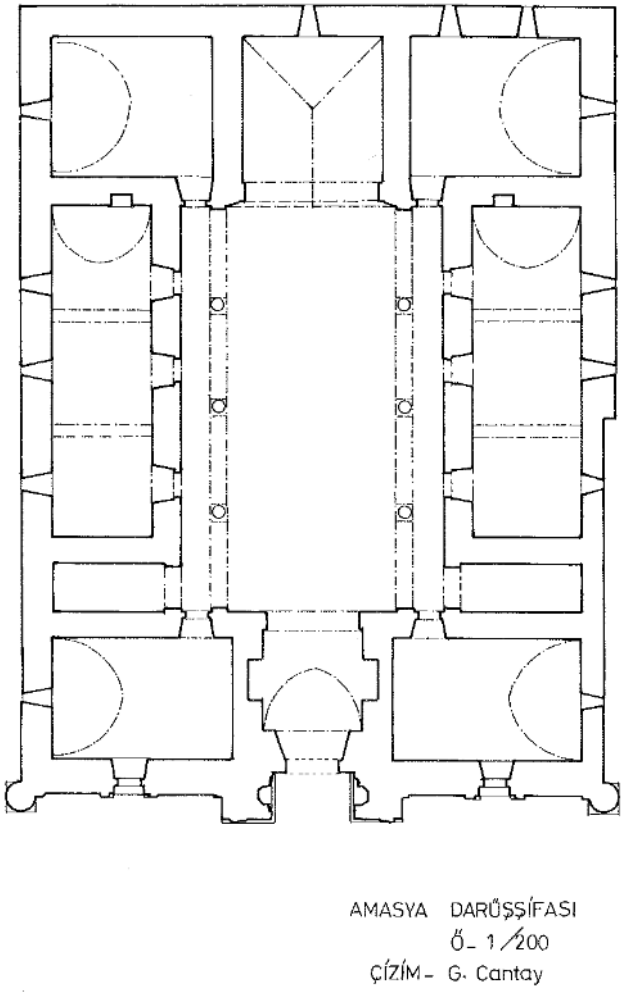


Figure 34 (Cantay, 1992: plan 7)

According to Dr. Adnan Çoban (2005) it was the first hospital in the world where patients with mental disorders were treated with music and the sound of water. Like in today's practice, medical students were educated, and patients were treated in the hospital. In the Amasya hospital the main idea was that the sound vibration directly affects the brain cells and patients were treated with music therapy (Çoban, 2005: 51). The hospital became the main educational and healing institution of that time. For centuries, important doctors were educated here. Çoban points out this hospital was one of the places where patients with mental disorders were treated with music and says: "*The hospital in Amasya looked like faculties of medicine today. In other words, students are given medical information while patients were being treated*" (Çoban, 2005: 51). Sabuncuoğlu Şerefeddin, a doctor who worked in this hospital for 14 years wrote the book *Cerrahiye-i al Haniye,* decorated with medical miniature pictures and presented it to Sultan Mehmet Fatih (Şengül, 2008: 62). In the period of Tanzimat[68] the building itself lost its significance and in 1999 was given to the Municipal Conservatory (Giray, 2008: 46). In 2011 it was organized as a museum, with a permanent exhibition on history of the health and with examples, but only from the Ottoman times. Unfortunately, there is no information regarding music therapy within the hospital.

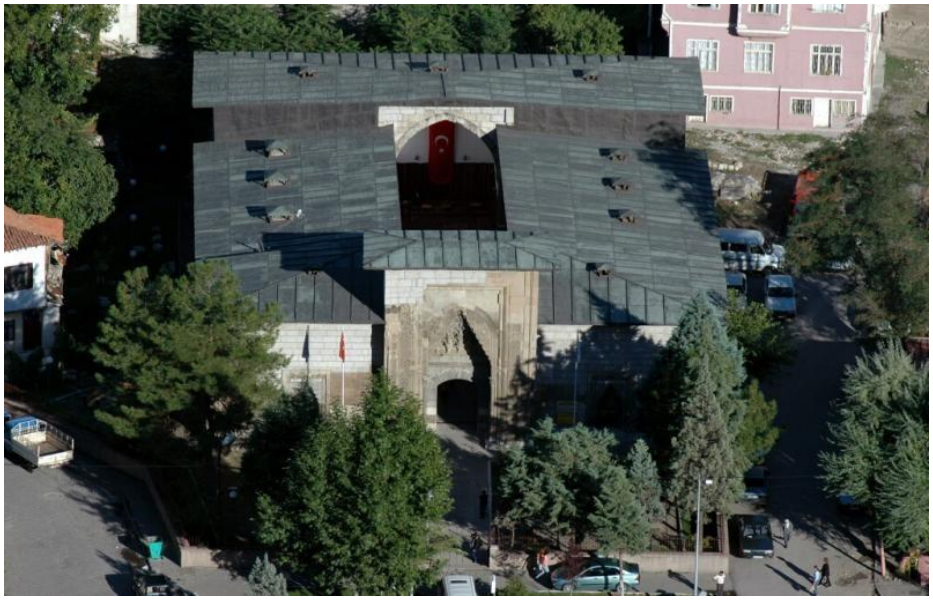


Figure 35 Amasya Hospital – General view from the west side

[68] The Tanzimat period was a period of reformation of the Ottoman Empire 1839-1876.

Figure 36 Amasya Hospital – The main iwan and the musicians[69]

[69] Figure 36 and 37 show the permanent exhibition on display in the hospital which is a musem today. A similar display can be seen in Edirne Bayezid Darüşşifa.

Figure 37 Amasya Hospital – Medicine maker, pharmacist

Figure 38 Amasya hospital – The main door, human relief, detail

1.2.9. AKSARAY DARÜŞŞİFA

According to one document from the Topkapi Palace Archives (Cantay, 2014: 70), the Aksaray Darüşşifa was still in function in 1524, but there is no exact date of its construction. Today only the ruins of this building are preserved. It is estimated that it was probably built either during the reign of Kılıç Arslan II or after 1192 (Cantay, 1992: 72). According to the name of the quartier, Tımarhane,[70] it can be concluded that it was used as a mental hospital (Köker, 1991: 10).

As Güvenç (2002: 460; Yoska, 2005: 202) pointed out, the health professionals in Turkey who were working on patient treatment and care have changed throughout history in terms of their professions as well as their names and identities. The history of Turkish physicians starts with the *Kam* who was a person performing rituals, with a direct relationship with Heaven and Earth, God and souls, and treated patients with votives, drinks, various movements, music and plants. Yoska (2005: 174) points out that in the example of Central Asian medical therapy with music which al-Farabi and Ibn Sina made more systematic, the Seljuks in Turkey applied it accordingly to people's illness and race.

The doctors who worked in hospitals during the Anatolian Seljuk State mentioned in this chapter are shown in the table which is created from the information given by Yoska (2005). Although it is not certain and not mentioned by Yoska (2005) whether they conducted music therapy, their names are given here, for an overview and future research on their exact positions in the Anatolian Seljuk State hospitals.

Table 2 List of doctors in the Anatolian Seljuk State, after Yoska (2005)

Reign period	Doctors Name
Kılıç Arslan II (1155-1192)	Hubeyş et-Tiflisi Tabip Hasnun
Gıyaseddin Keyhusrev I (1192-1196, 1205-1211)	Urfalı İsa
İzzeddin Keykavus I (1211-1220)	Muzaffer Kurşi Şemsüddin İbn-i Hibli Musuli
Alaeddin Keykubad I (1220-1237)	İzzeddin bin Hubel Şemsüddin İbn-i Hibli Musuli Cerrah Fasil

70 Tımarhane – literally lunatic asylum (Bakır and Başağaoğlu, 2006: 64).

	Ebu Salim Muvaffakuddin Abdüllatif b. Yusuf el-Bagdadî Hekim Ahron Tabip Ebu Bekir Beyhekim Hoca Ekmelüddin
Gıyaseddin Keyhusrev II (1237-1246)	Tacüddin el-Bulgari Urfalı İSa Tabip Ebu Bekir Rıdvan bin Ali
Mevlana Celaleddin Rumi (1207-1273)	Gazanfer et-Tebrizi

1.2.10. Darüşşifas (hospitals) in the Ottoman times

Previously the Anatolian Seljuk hospitals and buildings were shown. Here we will provide a list of hospitals from the Ottoman times to show the architectural continuity and adherence to the Seljuk ideas for healing treatments. As pointed out by Ucaner and Heiderscheit (2016: 9), both in the Seljuk and Ottoman times the Houses of Healing were places where music was utilized in healing practices. The given examples of hospitals are preserved until today and are used for various cultural purposes, mostly as museums. According to Bayraktaroğlu (2014: 146) hospitals in the Ottoman times were built as part of a larger complex and their design included the necessary infrastructure for musical treatments and acoustic considerations.[71]

- Bursa, Yıldırım Bayezid Darüşşifa, 1406
- İstanbul, Fatih Darüşşifa, 1470
- Edirne, Bayezid II Darüşşifa, 1488
- Manisa, Hafsa Sultan Darüşşifa, 1539
- İstanbul, Haseki Darüşşifa, 1550
- İstanbul, Süleymaniye Darüşşifa, 1556
- İstanbul, Atik Valide Darüşşifa, 1583
- İstanbul, Sultan Ahmed Darüşşifa, 1617

[71] Regarding the Ottoman architecture of the hospitals, an article by Nina Ergin (2015) is interesting. In it she states that the outer perimeter of the hospital was rectangular with the central courtyard surrounded by portico-fronted rooms, conceptually simple. The innovation of the Ottoman hospitals compared to the Seljuk ones was not in the overall concept but in details and adjustments which were made to suit the monument's size and wishes of a patron (2015: 11-13).

1.2.11. General properties of the hospital buildings

Medieval hospitals were differently named but with the same meaning, such as Darüşşifa, Şifahane, Maristan and Bimaristan. General properties which are observed for these buildings can be described in the following way.

Although until today a small number of them has been preserved, from the historical texts, we know the construction periods for a large number of hospitals. The first known example which is preserved until today is an edifice built in the 12th century in the Artukid area, while the last example was built in the 17th century during the Ottoman period. These buildings were works of endowments, but unfortunately a great number of vakfiyes was not preserved.

Hospitals (*bimarhane*) built during the Seljuk and Ottoman period are different from other medical and social care buildings. In these institutions' priority was on improving the state of health of patients with mental disorders, treatment with the sound of music and water; a therapy known since the Roman times. The hospitals were constructed in the medieval times by various engineers such as el-Cezeri (Özdemir, 1997: 19-20; Gorini, 2017: 17). The Amasya hospital is also an example of such a place.

As Eser (2012: 58) points out, it can also be noticed that hospitals were built far from the cities in peaceful areas. Although all known examples today are in the city centers, at the time when they were built, they were situated outside of the city. The choice of the place to build a hospital was made by a method which was used in the 12th century in Syria during the reign of the Zengids. The method was to hang liver on the designated spot in the city, and the edifice was built at the place where the liver started to decompose the last. This meant clear surroundings and clean air (Eser, 2012: 58).

These examples, which are preserved until today, and traces found next to the buildings show, that the edifices were always built as twin buildings. One of them was used as a medical university and place where new employees would be trained, while the other was composed of the rooms in which patients would be examined and, in cases when it was needed, be hospitalized and treated.

In addition to being built outside the residential area and as twin buildings, the architecture of the Anatolian Seljuks has no other specificities regarding the construction of the hospitals (Eser, 2012: 58). The edifices are built according to the plans and shape of educational "institutions"

(buildings). Most probably many hospitals had a dormitory for patients, as can be seen in the example of the Anber bin Abdullah Darüşşifa in Amasya (Cantay, 2014: 69).

In addition to this setting, the plan itself was obviously defined according to the courtyard shape: open courtyard and closed courtyard. If we try to relate the construction of open or closed courtyards with the climatic conditions, according to the research findings of the existing educational institution buildings, we can see that in almost every environment it is possible to build edifices with a closed courtyard. The most important space of the building, besides the courtyard structure, is the main iwan. This space can be the main diagnostic center, as well as, occasionally, a venue for lectures and praxis (Cantay, 2014: 69). The same space was doubtlessly used as a stage during music therapy sessions. The closed rooms between iwans can be interpreted as hospital units. It is most likely that patients stayed in those units, sometimes examinations were done, and sometimes surgeries took place.

When architectural elements of some building are considered, the terms acoustics and soundscape come as a natural flow of the sequences which form and complete the whole picture and the general idea of the medieval Islamic healing concept.

The soundscape concept[72] can be understood from the positions where the hospitals were built, outside the city, on higher ground and with clean air, as well as in terms of architectural acoustics. As Truax (1984: 12) pointed out, "the aim of acoustic design is that desired stimulus arrives at the receiver, preventing the undesired noise to obscure the desired signal or create annoyance". Of course, the natural soundscapes are acoustically well designed and human design of a soundscape follows these designs through analysis of the positively functioning soundscape. The usage of certain materials such as stone and limestone is important because of the "echo" and "reverberation" effect on the listener in the venue. This will be elaborated in Chapter 5.2.

The materials and techniques used for the hospital buildings seem to have high quality production characteristics. The names of the masters who built hospitals in Divriği and Kastamonu are known. On the other hospital buildings, there is no artist name or signature. Quality stone production allowed the buildings to stay in good condition for a long period, while

[72] For more information regarding the soundscape see Truax, 1984 and Truax, 2012. Soundscape has been used as a term since the late 1960's through different disciplines and its definition has been standardized by the Soundscape International Organization for Standardization, ISO 12913-1:2014 Acoustics Soundscape Part Definition and Conceptual Framework, ISO, Geneva, 2014.

at the same time providing good heat and noise isolation. In terms of acoustics, iwans with opened walls and iwans opened towards the courtyard, with a tunnel-like structure are very successfully constructed and form the shape which is good for the acoustics, as it will be explained in the acoustic analysis of the venue in Chapter 5.2.

Although the constructions and spaces were sometimes repaired for various reasons, the acoustical success of the buildings and spaces is still remarkable. This quality is undoubtedly a supportive factor in treatment with music. If sound is understood as a form of energy caused by vibration, this is the basis for understanding the healing potential of music. The effectiveness of the music depends on intention, providing an environment that will enhance the listening process (McClellan, 200: 9, 179). The acoustic energy in the form of sound waves and vibration, together with people who are observing and listening, is the core of the acoustic communication model. The people who live within the soundscape are in fact creating it (Truax, 1984: 9-11).

Another point that draws attention in terms of hospital buildings is that they have always been built by Sultans and their families. It is clear that the construction of healthcare buildings is considered as a kind of a task for the rulers (Eser, 2000: 139).[73]

Hospitals built according to the madrasa plan have decorative architectural characteristics of that period. Floral, geometric and written ornaments carved in stone can be seen on the main portal, courtyard and iwans. Along with this type of ornaments, on the hospitals Gevher Nesibe in Kayseri, Izzeddin Keykavus in Sivas, Turan Melike in Divriği and Anber bin Abdullah in Amasya figures/ depictions of living beings can be seen.

In the Gevher Nesibe hospital in Kayseri, relief of a lion is damaged, but preserved. After the example carved in Kayseri, on the main portal of the Keykavus hospital in Sivas the reliefs of two lions facing each other are visible, and on each side of the iwan's arcade is relief of a man's and a woman's head.[74] In the Islamic world the floral and geometrical composition reliefs are dominant on the façade decorations, especially mosques for religious reasons. Human reliefs were only used on hospital buildings and were dedicated to their patrons.

[73] According to Eser (2000), during the mentioned period along with the hospital buildings, the Sultans also built large caravanserais on the main roads.

[74] Depictions of both the lion and people are very damaged.

Figure 39 (Ünver, 1972: res.6)

The second building with a relief portrayal of a man's and a woman's head is the hospital in Divriği. These depictions can be found on the main portal of the building from both sides. On the same building, a little bit lower, at a place which is not spotted on first glance, are reliefs of two winged persons facing each other. In his recent book, Eser (2017) describes the meaning of the reliefs and shows that those are the reliefs of the builders of the Divriği complex, Ahmet Şah and Melike Turan[75].

The outer part of the Anber bin Abdullah hospital in Amasya has much more ornamentations. On the arch of the door there is a ruined relief of a sitting man. On many buildings from the Seljuk times there were depictions of living beings. They were mostly of predator animals, dragons, eagles, bears and lions. Sometimes they were shown individually, sometimes in an animal fight scene. Usage of strong and predator animal depictions on the buildings had the purpose of invoking their protective features (Eser, 2017: 27, 30). Human depictions on the buildings from that period can be found only in the examples of palaces and hospital decorations (Eser, 2017: 33). Human figures used in the palace decorations can mostly be seen in the interior venues, while in hospitals they are situated on the outer parts, on the spots which can easily be noticed. Since health problems are associated with people, it is understandable that on those buildings there are relief depictions of humans. There is one stucco piece which has a human

[75] Eser describes that the architect was following the idea of an old folk story about Ferhat and Şirin, and made the reliefs of the founders the same way. For more information see Eser, 2017.

relief including musicians, but as it is still undergoing restoration and evaluation, at the time of writing this thesis it was not possible to get permission to work about it.

From the general properties of the hospital buildings it can be assumed that architects in medieval Turkey had knowledge of the soundscape idea, as architectural features point to this fact. The "Quadrivium"[76] of the medieval world in which music was associated with arithmetic, geometry and astronomy, presumably based on its quantitative features (Truax, 1984: 43), set the foundations for understanding soundscape and how acoustic communication works. As Merriam (1964)[77] pointed out regarding sound making in other cultures, anthropologists seem to understand that all traditional communities have a strong acoustic orientation.

Architectural acoustics puts the emphasis on the design of the indoor spaces in which good acoustic is needed[78] and together with the external sound signals (the "cantus firmus"[79] tones) creates a positive and usable soundscape for healing purposes. The listener is a part of the design because s/he is always included in the listener-environment system and may be involved in the changing of the sound environment itself, as thinking habits are essential for acoustic design (Truax, 1984: 12).

In the reconstruction of the acoustic space[80] of the Divriği hospital for the purposes of this dissertation, the idea was to revive the sound with the specific type of music which was performed in that specific venue. The intention is to show how the building sounded in the medieval time with the makam music. The complete soundscape includes the culture, spiritual and religious components as well as frequencies which are musically part of the culture (Truax, 2001: 9-11).[81]

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76 See Farmer, 1926; Truax, 1984.

77 Merriam, 1964 in Truax, 1984:75.

78 Joelle, 1972 in Truax, 1984: 62.

79 Truax (1984: 10-11) explains "cantus firmus" as a lower melody. In the Medieval time music became polyphonic, and horizontal melodic variations can be seen. One of the characteristics is the tonal center while the second voice is free to create a complex melodic variation above it.

80 A 3D model of the Divriği hospital for the acoustic analysis purposes was created.

81 Regarding the soundscape, Murray Schafer states that it is any acoustic field of study which can understand musical composition, radio program and an acoustic environment as a soundscape, consisting of the heard events (1993: 10).

The parameter of the height of the hospital is treated as one level of a sound source which determines the soundscape, whereas makams are understood as a sound source[82] within the soundscape.

Soundscape is used in this work for the purpose of showing the characteristics of a specific building, the Anatolian medieval hospital, as well as to show its connection with the specific music which was performed in the hospital. As will be shown in Chapter 5, the architectural characteristics of the building create a soundscape which is applicable for the listeners to enter into the "safe-zone" and receive the sound signals within the space as a positive cognitive experience. Therefore, it can be used as a healing venue, not only in terms of the name itself, but also in the meaning of a response to the soundscape experience. As Truax (2001: 97) points put, *the area whose physical characteristics allow to retain its own acoustic character, an acoustic sanctuary*.[83] The soundscape, understood as a reflection of ourselves (Truax, 2011: 106), enhances the experienced sounds. Therefore, the effect of the received frequencies on the body and brain has a greater impact.

[82] The sound source is defined as source that radiates the sound equally in all directions in a free field and has a maximum instantaneous volume velocity and is emiting a wave with sinusoidal variation with time (International Electrotechnical Commision, IEC 801-29-10; IEC 801-21-33). Retrieved from http://www.acoustic-glossary.co.uk/definitions-s.htm#sound-source.
By another definition, a sound source is something that vibrates between 20 – 20,000 times per second and therefore makes a sound pressure wave. Retrieved from https://musicterms.artopium.com/s/Soundsource.htm.

[83] Truax also emphasizes that this acoustic sanctuary may be a park, a wilderness area, a valley or lake with limited access, or even an old building (Truax, 2001: 97).

2. MUSIC, HEALING AND MUSIC THERAPY

For understanding the idea of the subject "Music as healing in the Anatolian Seljuk times" general terms such as music, healing and musical therapy need to be explained.

Music has had different definitions since the ancient times. As Chiang (2008: 519) emphasizes, in the works of Plato, Rousseau, Kant and other scholars different definitions can be found, but the one from Henry Wadsworth Longfellow (1835: 200) "Music is the universal language of mankind" could be considered as the most common.

The philosophical concepts of music differ, but according to McClellan (2000: 4) one idea they have in common is that *music represents a microcosm of the order of the universe and follows cosmological laws*. As the concept of the harmony of the spheres originated in Babylonia even before the 6th century B.C.[84] (McClellan, 2000: 120; Farmer: 1925-26), the idea that celestial bodies create sound as they move through heavens was also very prominent with the Pythagoreans who connected the harmony of the stars and planets with the harmony of the inner body and soul *as the central principle of human health* (McClellan. 2001: 120).

McClellan (2000: 168) states that *music therapy is closely aligned with behavioral psychologies and uses the same approaches and terminology*, and that *music healing implies a much more comprehensive approach that addresses the needs of the whole person on all levels: physical, emotional, mental and spiritual*.

The golden age of the Muslim civilization is considered between the second half of the 9th to the end of the 10th century, the beginning of the medieval period. Numerous circles of scholars emerged, discussing ideas rising from the recent Arabic translation of the Greek scientific and intellectual heritage. It is within this emerging intellectual tradition that some of the ancient ideas of music and medicine were elaborated and put into practice (Shiloah, 1992: 53; Ruud, 2000: 73)[85].

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84 McClellan mentions the work of Alfred Sendry, Music in the Social and Religious Life of Antiquity. Cranbury N.J. Faitleigh Dickenson University Press, 1974: 48). Nevertheless, an article by Henry George Farmer, The influence of Music: from Arabic sources, 1925 is also interesting regarding the harmony of the spheres.

85 Shiloah emphasizes the importance of al-Kindi and al-Farabi's work as the earliest texts in Arabic that discuss musical principles. In his words, *al-Farabi introduced a speculative-mathematical approach to music that dealt with basic questions of theory such as the intervals and scales. Al-Kindi…discusses the basic harmony of the universe and the balanced order inherent in human beings* (Shiloah, 1992: 53).

The works by Pythagoras, Aristotle, Aristoxenes and Plato which were obtained during the reign of the first dynasty of the Umayyads who collected many manuscripts for their libraries, were inspiration and served for the development of Islamic philosophy and science. The idea of Plato that mathematics represents pure, absolute truth in its most beautiful form and that is the most important factor of understanding nature was accepted by Muslim philosophers who applied this to every field. Also, they accepted the idea of Neo-Pythagoreans that numbers have an esoteric significance, and this especially influenced Shi'a and Sufism, the gnostic branches of Islam. Islamic medicine relied directly on the Hippocratic tradition (Dols, 1984: 138). As stated by Dols (1984: 138), insanity and madness were understood as a result of imbalance of the humors, excess of black bile and as for Galenic's second basic premise of medicine, it is the disturbance of the vital, psychic and natural spirits as a major cause of mental disorder. McClellan (2000: 97) states that illness occurs when the natural vibrational energy flow is in disbalance as it accumulates stagnant energy and this condition needs to be resolved to avoid a greater threat to a person's health. This can be done through channeling which can resolve the primary cause rooted in the personality and ego.

Since Pythagoras's time the idea of all scholars is how to help people whose body (in general terms and specific illnesses) is in disbalance to regain their balance. They were deliberating from metaphysics to music therapy and offering various solutions which are today considered, discussed and accepted as the basis for extending the thoughts and ideas on healing.

2.1. Music in the Middle Ages

The Middle Ages as discussed in this work refers to 1078-1308 in the Anatolian plateau, today's Turkey. As discussed in Chapter 1, during the Anatolian Seljuk period, Anatolia was a crossroad for many travelers, a rich area in which different nations decided to settle and build their homes and trades. By comparison, Europe at that time was in the period of High Middle Ages (1100-1200), the Crusades (which are strongly inter-connected with the subject presented in this work) and finally, the beginning of the Late Middle Ages, after the Mongol invasion and Great Famine in 1315.

As the first scales, both in the East and West, were developed on probably four- or five-tone scales based on the relationship of the natural harmonic series, the early forms of chant utilized only three tones, which is still used in Vedic chanting, the oldest continuous tradition of sacred chants[86] (McClellan, 2000: 69).

By comparison, in medieval Europe, this is a period where Gregorian chant theory, Goliards and Ars Antiqua dominate (1170-1310) (Leech-Wilkinson, 1990: 218-221; McKinnon, 1990: 88-90; Mendoza de Arce, 1981: 54-57). The rediscovery of medieval music in Europe, as pointed out by Kreutziger-Herr (2005: 82) happened in the early 20th century, was the only reconstructable aspect of the medieval soundscape which could open the door to a historic reconstruction of medieval life.

Most of the music forms from this early medieval period are monodic[87]; polyphony developed at the end of this era (Chailley, 2006: 57). Before that period, the most important music theorist was Guido of Arezzo (992-1033), Italian monk of the Benedictine order, who is regarded as the inventor of modern musical notation (staff notation), which replaced the neume notation. In this period, the scale system used was mode or modal scales, which originated from the Greeks, and had determined intervals[88] for each scale (Dorian (D), Phrygian (E), Lydian (F), Mixolydian

86 McClellan discusses also chakras and mantras, showing the problem of finding the proper tones for each chakra. For more information see McClellan, 2000: 58-71.

87 Monodic (monophonic), by contrast with polyphonic means a single melodic line, while polyphonic means multiple melodic lines led together under some rules (Kovačević, 1974: 604). The monodic style was typical for Italian songs of the Middle Ages, and the forms were motets and madrigals. The specificity was that it was a song with a single melodic line and instrumental accompaniment. For more information see Chailly (2006).

88 Interval is a distance between any two tones.

(G), Aeolian (A), Ionian (C). The "set-up" was two tetrachords, forming a scale within one octave (Kovačević, 1974: 598).

Generally, the characteristic of the Middle Ages is the use of modal scales. In the West, the tonal system is known as modes, and in the East as makams. The modes used 7 "scales", a name deriving from the first tone with which the scale begins (Dorian, Phrygian, Lydian, Mixolydian, Aeolian, Ionian). The makam system uses similar yet different system, due to just intonation, where there are more divisions of a tone within one scale, a microtonal system. As explained by Bozkurt (2012: 61), *"in the Western notation system a scale consists of 12 tones, where in the Eastern notation system a scale consists of 24 tones (even 96 tones)"*. A more detailed explanation of the makams will be given in the following Chapter 3.

Eastern music can be considered in terms of music theory as microtonal music, as a micro tone is any tone less than half tone, which is characteristic for Eastern scales and tuning of the instruments (Middle East, Turkey, Bali (Gamelan music), India).[89]

Turkish music has many different divisions. Theorists divided Turkish music into Turkish Folk Music (*Türk Halk Müziği*) and Turkish Art Music (*Türk Sanat Müziği*) (Reinhard, 1972: 266-280; Şenses, 2013). For Turkish Art Music, which is a modern form of Ottoman classical music played at court, and also referred to as "classical music", academic sources can be found, but for Turkish Folk Music, even today it has been notated, was by character a type of music which was orally transmitted from generation to generation, trying to preserve its originality and yet, always changing or adding a little bit from the one who passes it on. This can be understood as an added value to the melodies which originate many centuries back. Nevertheless, Turkish Art Music[90] may also have added value, since it was used also from the 9th century, from al-Farabi's times, when the first books and theories of music were written and effects of makams discussed (Farmer, 1931: 356-376).

In his thesis, Yaman states that "the period between 1200-1700 is considered as beginnings of Turkish music" (Yaman, 2007: 7). This is a questionable statement, since it is known that Farabi and Sina were already writing in the 9th and 10th century, and that even today there are musical

89 For more information see Tamer and Bozkurt (2013), Benetos and Holzapfel (2015), https://www.britannica.com/art/microtonal-music.

90 Turkish Traditional music is divided in two parts as Turkish Art Music and Turkish Folk Music (Şenses, 2013: 3).

examples (score sheets) from that time. Although musical notation was not developed at that time, there are transcriptions because knowledge, and especially music, was orally (instrumentally) during that era. Yaman continues, stating that the biggest phenomena are that all of them (musicians) have a common point in understanding the makams although most composers are musically illiterate, creating their works by memorizing the songs (Yaman, 2007: 7).[91]

Signell states that examples of cipher notational systems[92] were very rich in the early Muslim world, from Safiyuddin in the 13th century to Kantemiroğlu (Cantemir) in the early 18th century (Signell, 2008: 2)[93]. As the repertoire of Turkish Art Music stretches back to the 16th century, the repertoire of Turkish Folk Music most probably stretches quite a bit further back, to the 9th century or even before (Tarikci, 2010: 5). Western notation was first used for Turkish music by Ali Ufki in the 17th century. His collection *Mecmua-i Saz ü Söz* contains the earliest examples of Turkish music in European notation (Signell, 2008: 3; Oransay, 1964: 48), only this notation was generally accepted in the 20th century. Tarikci states that transmission of music and culture was done orally unlike for other branches of Ottoman teaching and learning. This process included; teaching new songs, techniques of playing, singing, practicing and performance (Tarikci, 2010: 7).

The works regarding the stages of Turkish music history have diverging evaluations, so that according to one of them, the stages were defined as follows: 1200 – 1700 – period od preparation, 17th century – classical period, 18th century – last classical period, 19th century – neo-classical period, Romantic period and last classical Turkish music period (Yaman, 2007). According to Somakçı, the stages are 1-Turkish culture of Middle Asia, 2-Islamic civilization, 3-Seljuk-Ottoman (Somakçı, 2003: 131)[94]. For the purpose of this work the stages defined by as Somakçı are followed.

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91 For another work regarding Turkish music periods see Karadeniz (2007). In her work "The Understanding of Periods in Turkish Music" the cross section of different classifications from various theorists are given, from different fields of science.

92 The cipher notational system is rich in the early Muslim World, from Safiyüddin to Cantemir (Signell, 2008: 2). The notes were annotated with the letters of alphabet. Another similar example is the Hamparsun notation, also a cipher system, created under the comission of Sultan Selim III in the late 18th century, which was widely spread until the Western staff notation replaced it in a general usage in the beginning of the 20th century.

93 For more information, Signell points to Oztuna (1952: 110) and Ezgi (1953: 526).

94 For a different evaluation see Karadeniz (2007).

2.1.1. Old Turkish culture

The old Turkish culture refers to the Somakçı Turkish culture of Middle Asia. Turkish culture of Central Asian Turks dates back to the oldest example from 6000 years ago. Somakçı states that it covers a period from as early as 1134 BC (Somakçı, 2003: 132). The example from East Turkistan, Horan province in the Çerçen district next to the Mülçe river has rock paintings which show dancing figures (Güvenç, 2005: 7-8). Eberhard's related research on the history of Chinese culture (Eberhard, 1947), where the center of culture was in Shensi and Ganzu provinces which were in the highlands, shows there is a connection with the Turkish culture and the first example of Proto-Turkish culture. There is no doubt that this carrier of the culture were the ancestors of the Turks (Şengül, 2008: 35). In the time of ancient Turks, physicians who practiced music therapy or provided music treatments were called *shamans* or *baksı*. *"The Shamans at that time came to Central Asia as the representatives of Baksi. During that period, they were referred to as expelling the evil spirits in ceremonies using a flute. The Kirgiz Baksi providing treatment with a flute were referred to as "doing a favor". Later the name Baksi was used for the Altai people who lived in areas such as Ürümqi and Kashgar which were stops on the Silk Road."* (Çoban, 2005: 41). Shamans, as pointed out by McClellan (2000: 162-163), used trance music for spiritual and healing purposes in the form of repetitive rhythmic patterns sounding simultaneously for a long period of time[95]. Howard (2000: 363-366) discusses various explanations of trance, stating that music is one potential stimulus to generate an altered state with an effect because of social coding or meaning, from an anthropological perspective. He continues explaining that the drum is an important factor in shamanic rituals. Based on the above, it can be seen that musical instruments were used and therefore, music itself during shamanic ceremonies of expulsion of the spirits. Baksi sessions included rhythm, melody and dance. In these sessions, they tried to reach the ancestor's spirit, while the unity of the ensemble was supported by a reed or flute to increase the power, as an element of excitement was present and tried to be reached.

[95] McClellan (2000: 163) states that trance music first affects the body by altering brain wave frequency and by flooding the sensory areas of the brain, and as a result the glandular system increases hormone production which affects the emotions and mind. He further state that *trance is a state of consciousness that is induced by the physical body for spiritual purposes*.

In general, Baksis were support and helpers for the community. Musical instruments used during the rituals were considered sacred. The moves used during the dance were usually in a form imitating sacred figures. Since the ancient times Turkish music and dance went hand in hand with healing (Taşdemirov, 1987: 76; Güvenç, 2005: 7). This tradition is still present today, mostly in the village communities, but also some therapists, like the Tümata group, perform various seminars and workshops, following those old practices.

Music healing was practiced with all patients regardless of the type of disease. The shaman who was summoned to treat the patient, would start the treatment with counselling to be sure that at the end of the séance and ceremony the evil spirit will leave the patient's body (Güvenç, 2002: 462, 464; Yoska, 2005: 28, Chiang, 2008: 1). Later, the musicians who were shaman's assistants, would play string instruments (*kopuz*, *dombra*[96]) based on the pentatonic system and drums, which would create the music. On one side were the musicians playing their instruments, while on the other side, with the sound of water which they considered sacred, the incense would be lit, as it was believed to have a purifying effect. Thus, they helped heal the patients. (Yoska, 2005: 29). Such musical séances and treatments were repeated several times daily until the full recovery of the patient (Güvenç, 2002: 465).

Music and dance used in the therapeutic processes among the ancient Turks had an important place in the mysticism of social life. The most important feature of Asian Turkish music is that it had a pentatonic (*beş-sesli*)[97] system. This system, which has been considered as the oldest source in Turkish music, is still in use today in many parts of Europe. Additionally, in many countries this system is used to increase concentration in parapsychological studies (Selanik, 1996: 23-25).

As mentioned by Uçan (2015: 1), it became clear from the results of archaeological and cultural studies that the first ancestors of the Turks were the Altay Turks, and the first roots of Turkish music culture in Central Asia should be marked in this period from 700-600 BC.[98]

96 Kopuz – an ancient fretless string instrument; Dombra – a long-necked lute, musical string instrument

97 Beş sesli – literaly five voice, but the actual meaning is the pentatonic system.

98 Some historians and musicologists mention 6000 years of ongoing Turkish music histrory. Russian scolars Rudenko and Griaznov who investigated the Pazırık and Başadar valleys in Altay found very old pieces of a rug and an old Turkish music instrument called the "çeng" (Güvenç, 1990: 6).

In this period of the so-called "Altay culture", Turkish music was primitive, as was all music dating back to the prehistoric age. Melodies were built on two tones within an interval. The number of tones increased in time to three and four. With the tetratonic, "pre-modal music" reached its most advanced stage (Saygun, 1967: 1-8). In the same time, "magical-religious-ceremonial" music, also called "shamanic music", became more and more evident. "Vocational musicians" called "shamans" had an important and respectable position in the community and society (Uçan, 2015: 1). The dispersion of the Altay Turks in Central Asia through 700 BC-600 AD and the chronology of the following periods also symbolizes Turkish music leaving the frame of very narrow and regional understanding of music, and the development of music forms, styles and usage.

In the following subsections this chronology and development of Turkish music will be given.

2.1.1.1. The Huns (370-503)

During the Hun period, Turkish music culture was organized and institutionalized by the state and public in a way that would form the basis for the later periods. Under the Hun khanate, the first "Tuğ band" or "military music state association" was founded and first "civilian musicians state association" were commissioned as "lute playing troubadours" and kept on disposal. The first major distinctions between "religious music - secular music", "civil music - military music", "state music - folk music" and "art music - folk music" were drawn (Ak, 2009:44). Turkish music reached the stage of "modal music" and at this point reached an advanced level. After consolidating the Turkish music scale on the pentatonic mode, in time it gradually developed to six, seven and eight tones within the scale. In folk music, the "five tone scale" was rooted and spread to all Central Asia.

From the ancient documents that have survived until the present day we know that the following were instruments used in *tuğ bands* of the Turks in Central Asia: yurağ *(zurna),* sıbızgı *(sipsili nefir, boru-the horn)* şahnay (the horn of Hun), burguv (type of horn), küvrük *(kettledrum),* tümrük, *(drum)* and çeng *(bell)* (Dağlı, 2005: 13).

2.1.1.2. Göktürks (552-745)

In this period, Turkish music culture flourished in its structure and quality and became an inevitable part of culture in its full meaning. Progress was made in modal music, the number of different tones rose both in folk music and art music, and melodic lines were wider**.** Vocal music

was called *yır* and instrumental music was called *kök* (the root). A more "subtle and artistic style" started to appear. In addition to the two-stringed *kopuz*, the curved kopuz called *ıklığ* was developed. (Mahmut, 1994: 334-336).

According to Mahmut (1994: 336), a transition from a semi nomadic music culture to semi-settled music culture occurred. Opening to the outside world through the Silk Road became constant. The names and the work of the first important Turkish musicians who were educated and took part in activities that left a permanent trace reached us through Chinese written sources[99]. One of the most famous of these musicians was Sacup Akari[100] who around 560 AD introduced, explained and presented the theory of the 12-tone tuning, Turkish music theory and Turkish modal music to the Chinese musicians. At that time, Turkish music deeply influenced Chinese music (Mahmut, 1994: 334-336). Farmer (1934: 328) mentions the same story as the Turkish princess married in 568 AD the Chinese emperor Wu-ti and she took a musician *Su-ch-i-po* (this is probably Sacup) from Kucha who played the "barbarian" pipa (Turkish barbat) for them, and also introduced them to seven musical modes.

2.1.1.3. Uygur Turks (745-840/1209)

During this period, the Turkish music culture reached the most advanced level of modal music. Along with the transition to a settled lifestyle, the transition to the settled lifestyle music form also occurred, and new genres and varieties in music began emerging. Significant progress was seen on the path of forming the 17-tone tuning system of the Turkish music scale. Melodies gained a structure with a wider range, the melody expanded gradually, the motives are longer, the measure is symmetrical, and it is forming a shape with simple order. The melodic and rhythmic structure created a form which became more complex. Based on the adoption of diverse religions, religious music became more diverse. New distinctions emerged from the types and varieties of the instruments used, their purpose and function, the way they were held and played, the structure of the music ensembles, the place where music was performed and the environment in which it was performed (Uçan, 2015: 16).

All of this led to a new differentiation in style. The understanding of making and creating music became widespread by adhering to certain techniques and methods, principles, rules and

99 See about: Ögel (1986), Farmer (1934), Budak (2006), Mahmut (1994), Uçan (2015).

100 For more information regarding this subject see Mahmut (1994).

patterns in music life. The stage was reached where making-creating music based on writing was achieved. In particular, "troubadouring/poet–singing" earned its own independent occupation or profession (Mahmut, 1994: 339). The Uygur music had intensive interactions with the surrounding music cultures, primarily Chinese, Iranian, Indian, Arabic and Japanese. In that period, there was a versatile, multidimensional, multilayered, diversified, very rich and dynamic music life. New styles and diversity dominated the Turkish Uygur music. According to Dağlı (2005: 16), the development in this period prepared Turkish music for the 17-tone series scale.[101]

2.1.1.4. Karahanids (840-1212)

With the adoption of Islam by society, and the Islamic religion becoming the state religion, the Turkish music culture entered a new period of development, change and transformation. The rooted "modal" Turkish music opened itself to the makam music environment and it became an active part of it. The tuğ band was turned into a *tablhane* and a tradition of singing accompanied by *tanbur*[102], while folk song performance accompanied by *kopuz* started to develop. New styles, forms and varieties of music appeared. The number of tones in Turkish art music increased and a traditional tone system of the Turkish art music, consisting of an octave divided into seventeen intervals and of the eighteenth tone (which is the octave of the first tone) was shown and explained on the "Horasan" tanbur – a music instrument by al-Farabi[103]. Thus, tanbur became a basic-scale instrument in Turkish Art Music. The first Turkish music theory books were written. *Kitab-ül Mudhal fi'il Musiki* (Introduction to Music) and *Kitap-ül Musiki-ül Kebir* (The Big Music Book) written by al-Farabi (874-950) became not only the fundamental theory books of the Turkish and Islamic world, but of that period as well. In his famous work *Divan-ı Lügat-it Türk*, Kaşgarlı Mahmut (11th century) gave very important and comprehensive information about the Turkish music culture. Master Ahmet Yesevi (1093-1166), as a pioneer in the Turkish *tekke* poetry, formed the basis for the birth of the Turkish tekke music that depended on the *tekke* poetry (Uçan, 2015).

101 Dağlı (2005: 16) after Budak (2000: 46).

102 Tanbur is a long-necked string instrument (plucked lute) with raised frets (Aga Khan Trust for Culture).

103 Al-Farabi explains the origin of the Horasan and Bagdad tanbur in his work el-Mûsîḳa'l-kebîr (islamansiklopedisi.org.tr7tanbur retireved on 10/10/2019).

The identification and use of the makams also took place among the most important developments of the period. Although it is generally believed that there are more than 400 makams, some of them were found to be more special. The makams Rast, Rehavi, Kuçek, Büzürk, Isfahan, Neva, Uşşak, Zirgüle, Saba, Buselik, Hüseyni, and Hicaz had an obvious relation with health according to the aforementioned sources, including al-Kindi, al-Farabi, Ibn Sina, Mahmut and Yesevi. Zekeriya Er Razi (854-932)[104], al-Farabi (870-950)[105] and Ibn Sina (980-1037)[106], important Turkish-Islamic scholars and physicians who lived in this period founded the scientific principles of music therapy, especially of the treatment of psychic diseases. Al-Farabi also tried to explain the relationship between music, physics and astronomy (Somakçı, 2003: 134). In the next chapter, an overview of the benefits according to the mentioned scientist will be given. All this knowledge shows that these discoveries were important not only for music but for science as well.

2.1.1.5. Ghaznavids (962-1187)

Turkish music showed its multifaceted change and development in the town of Gazne that became a great center of culture, art and music. It entered into interaction with Persian, Arab and Indian music cultures. Certain features of makam music began to emerge. The poetry of *"kaside"*, which was mostly used for glorification of someone's life and work, started to be accompanied with melody without rhythm, and this was the beginning of merging classical music with classical poetry as a new form of song. Turkish music had also a big influence on the North-Indian music. Indian scholars associated North-Indian music with the Turkish music system and called it "Turuşka" (Uçan, 2015). The Ghaznavids as Turkic descendants, although predominantly Persian, had a great influence on the Seljuk Turks who took over the territory after the battle of Dandanakan in 1040 (Bosworth, 1960: 62, 76).

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104 Zekeriya Er Razi (854-932) was a Persian philosopher, alchemist and physician, whose works were important in the history of medicine, music and philosophy. He was refered to as the "Arabic Galen" due to his important contributions to medical science (https://islamansiklopedisi.org.tr/razi-ebu-bekir).

105 Al-Farabi (870-950) was an important Islamic scholar, who followed the ideas of Aristotle. His origin is not known for certain (either Persian or Kazakh) but he died in Damascus in 950. His works in the fields of logic, mathematics, philosophy, music and alchemy are among the most important works of the Islamic philosophers of the Middle Ages (https://islamansiklopedisi.org.tr/farabi).

106 Ibn Sina (980-1037), also known as Avicenna, was a Persian philosopher, astronomer, theologist, alchemist and a father of modern medicine. His works were fundamental in the Islamic World of the Middle Ages and his medical encyclopedia (to name only one example) was in use until the mid 17th century (https://islamansiklopedisi.org.tr/ibn-sina).

2.1.1.6. Great Seljuks (1040–1157)

The works of this period were works about the military music used during wars. However, it can be said that parallel to the developments that occurred by that time, music had an important role in social life (Uzunçarşılı, 1988: 28; Erendil, 1992: 7; Altınölçek, 1999: 752; Özcan, 2003: 546; Özaydın, 2007: 39-40; Vural, 2012: 70). [107]

2.1.1.7. Anatolian Seljuks (1078-1308)

The pentatonic system in pre-Islamic Asian Turkish music began to change with the Islamic religious influence and eight tones started to be used within one scale**.** This music gradually formed the Seljuk music and the Mevlevi music, which is closely related to it. Safiyüddin Urmevi (1230-1294), was an important Turkish-Islamic scholar,[108] who presented the Turkish music system in a scientific manner and invented instruments such as the santur, nüzhe and mugni (Somakçı, 2003: 135). Safiyüddin wrote a music theory book, the *Kitab El-Edvar* in which he showed the source of music as the sound made by revolution of the heavenly bodies. Islamic scholars followed the idea of the Hellenistic "ethos" but adapted to their own ideas (Karakaya, 2014: 98). The makam music was at that time transmitted orally, but some theoretical treatises such as Safiyüddin's *Kitab El-Edvar* used symbolic representation for musical expression (Ergur and Doğrusöz, 2015: 151) which is commonly called the *Ebced*[109] system (Fig. 40).

107 For transcripts see mentioned sources.

108 Safiyüddin Urmevi (1216-1294) was a musician and a Turkish music theorist of Persian origin. He is known for his work *Kitab el-Edwar* in which he presented the ebced notation system based on Arabic letters (https://islamansiklopedisi.org.tr/safiyyuddin-el-urmevi). For more information regarding Safiyüddin Urmevi, his style and his works see Köprülü and Arslan (2012: 201).

109 Ebced means alphabet, as the official language was Arabic, so the Arabic alphabet was used for simbolically expressing music.

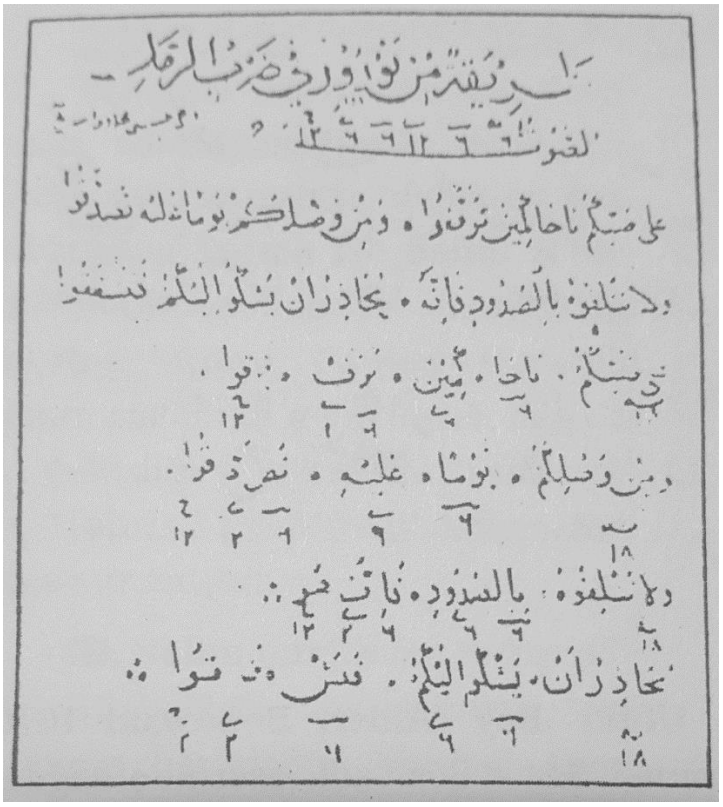

Figure 40 Notation example from Safiyüddin's Book El-Edvar (Ak, 2009: 31)

The tradition of shaman music therapy started a thousand years ago With Asian Turks, gradually changing and becoming stronger under the influence of Islam, reaching the Anatolian Seljuks, then transferring to the Ottomans. Finally, the Turkish Sufi Music was born (Şengül, 2008: 38).

2.1.2. Sufism

In Islamic world of the medieval period, mystical streams started to spread in the Anatolian area through migrations, where they came to a favorable environment. Many scientists and Sufis/mystics came to Anatolia from various Islamic countries[110] including Turkestan, Iran, Irak and Harezm, especially because of the Mongolian invasion. Together with the Sufis educated in Anatolia they contributed to the strengthening of this movement. *Muhyiddin ibn el-Arabi* (1165-1240), leading thinker of not only the Islamic world but in general, spent a part of

[110] Sedgwick in his book *Western Sufism: from the Abbasids to the new age* (2016) elaborates that Sufism is not just an Islamic Neoplatonism but Arab Neoplatonism in the form of Arab Philosophy. For more information see Sedgwick (2016: 30-49).

his life here. *Mevlana Celaleddin-i Rumi* came to Anatolia as a child and wrote his works there. Mevlana himself is an example of the philosophical, scientific and religious level achieved in Anatolia. Mevlana wrote his famous works *Divan-ı Kebir, Mesnevi, Fihi mâ Fih, Mektubât ve Mevâ'iz Mecâlis Seb'a* in Konya (Baykara 1985: 11). The famous mystic's *Muhyiddin İbn el-Arabi* students and followers of some of his ideas were *Sadreddin Konevi* (1207-1274), *Nizâmeddin Gencevi* (1135-1202), *Şihabeddin Suhreverdi* (1155-1191), *Necmeddin Dâye* (1177-1256), *Kadı Burhaneddin Anevi* (1143-1212), *Ibn Bibi* (d. 1285), *Kerimüddin Aksarayi* (d. 1332), *Hoca Dehhani (13th century), Yunus Emre* (1238-1320), known as important scholars, Sufi's, historians and writers from the Anatolian Seljuk period[111].

In the history of Islam, the members of mystical schools (Sufis) in particular were engaged in music. They believed in its benefits and used and protected it. Again, Sufis were those who spoke about the influence of music on human health and saw these characteristics of music as proof of the usefulness and necessity of this art (Ak, 2006: 127).

Dr. Adnan Çoban (2005: 47) states that music therapy started in the Ottoman times long before Europe. According to the sources, the Nureddin Maristan (hospital) in Damascus (colloquially known as Şam) music therapy has been in use since 1154 while under the Seljuk Atabey Nureddin Zengi. According to Grebene (1978: 23), in the medical history texts there is extensive data about the way the Turks treated and rehabilitated psychiatric patients. Even in the 17th century music therapy was conducted in this hospital according to the notations of Evliya Çelebi. In the earlier sources, in Islamic history, members of Sufism were interested in music and believed that it can contribute to curing mental illnesses (Çetinkaya, 1995: 14).

[111] https://islamansiklopedisi.org.tr/ibnul-arabi-muhyiddin

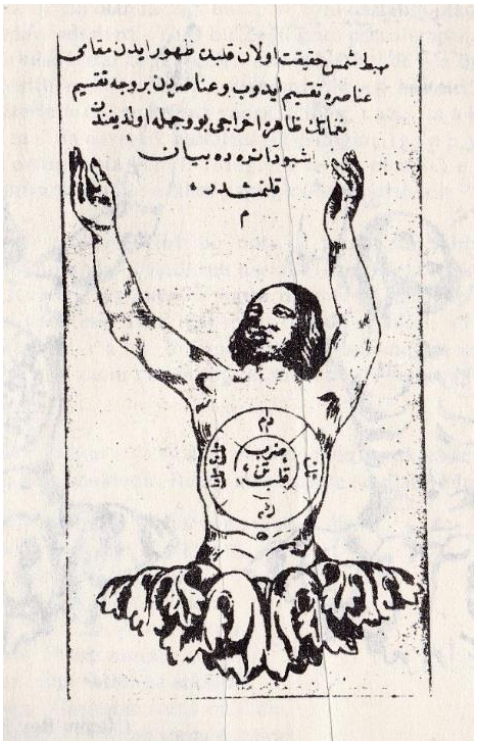

Figure 41 Haşim Bey's Music Theory Book has a photo of a man with heartbeats displayed on his chest (Grebene, 1978: 31), İn Turkish music *usul*[112] is considered to be the same as heart beats

In his Book of Travels *Seyahatname,* Ottoman explorer Evliya Çelebi (1611-1682) records the following information which provides an insight on how music therapy was conducted during the reign of Sultan Bayezid II[113] (1447-1512) in his hospital in Edirne (mentioned in Chapter 1.2.10.).

> *In vakfiye of the late Bayezid-i Veli for whom prayers are intended, 10 servants as players and singers were named and they came three times a week; three singers, one with a ney, one with a kemancı (violin), one on the santur, one on the ud and they performed for the patients and mentally handicapped people a musical act which would be the solution for the sick ones, healing for the worried ones, food for the soul for the insane ones, alleviation of torment for the ones in love* (Evliya Çelebi, 1944: 470; Özçelik, 2007: 25, 28-29).

[112] Usul is a rhythmic pattern consisting of specific time intervals and accents. For more information see the Multimedia Encyclopedia of Turkish Classical Music.
[113] Sultan Bayezid II was also known as Bayezid-i Veli

The continuation of the music therapy and healing tradition from the Seljuk period can be seen in this example. Valuable is the information regarding the musicians and the instruments used.

Figure 42 Energy flow in the human body and parts of the body which are influenced by makams. From the Music Theory Book by Haşim Bey (Grebene, 1978: 32) [114]

Figure 43 Picture from the book "Treatment of Mental Illnesses with Musical Tunes" written by Hekimbaşı Gevrekzade Hasan Efendi[115] in the beginning of the 19th century (Grebene, 1978: 38).

[114] Haşim Bey (1814-1868), musician, known for his work *Haşim Bey Mecmuasi* in which he described musical aspects of Turkish music, written under the supervision of Abdulbaki Nasır Dede. The book was dedicated to Sultan Abdülaziz (https://islamansiklopedisi.org.tr/hasim-bey).

[115] Hekimbaşı Gevrekzade Hasan Efendi (1727-1802) translated Ibn Sina's *Canon of Medicine* into the Ottoman language and is credited for establishing the makam classification of effectiveness in the treatment of illnesses (Gill, 2017: 161).

In in his book *Ar-Risāla al-fatḥīya (fi 'l-mūsīqā)*, the 15th century Muhammad Ibn 'Abd al-Hamid al-Ladhiqi (d. 1495) describes how some musicians gave names to the modes and how they observed a certain ideal relationship between the makams, Zodiac constellations, planets and elements (Pacholczyk, 1996: 148). This modal system shows a direct application of astronomical concepts to music.

Table 3 Association of musical modes with the Zodiac, planets and elements, after al-Ladhiqi (Pacholczyk,1996: 148)

MAQĀM-s		
Maqām	**Zodiac**	**Element**
1. *Rāst*	Aries	fire
2. *'Irāq*	Taurus	earth
3. *Isfahān*	Gemini	air
4. *Zīrāfkand*	Cancer	water
5. *Buzurg*	Leo	fire
6. *Zengūlah*	Virgo	earth
7. *Rahāwī*	Libra	air
8. *Ḥusainī*	Scorpio	water
9. *Ḥijāzī*	Sagittarius	fire
10. *Abū Salīk*	Capricorn	earth
11. *Nawā*	Aquarius	air
12. *'Ushshāq*	Pisces	water
AVĀZ-s		
Avāz	**Planet**	**Element**
1. *Gawasht*	Saturn	earth
2. *Nāw Rūz*	Jupiter	fire
3. *Salmak*	Mars	fire
4. *Shāhnāz*	Sun	fire
5. *Ḥiṣār*	Venus	water
6. *Gardāniyā*	Mercury	mixed temperaments
7. *Māyah*	Moon	air

This idea is followed by many scholars until today, connecting modes with cardinal directions, body, animal sounds and attributing therapeutic qualities to them, creating a system of ethos connecting music with the cosmos. Bearing that in mind, returning to Pythagoras and the idea of harmony of the spheres (Frishkopf and Spinetti, 2018: 188) and celestial bodies is natural, the idea that everything in the universe is connected and intercrossed. Can music therapy have this influence? Can it be the tool to bring the body and/or state of mind into balance? Can it be

the doorway to connect with the Creator and to achieve Oneness[116] as it was presented in the idea of Ikhwan al-Safa? The analysis which follows will offer answers to these questions.

2.1.3. "The other side of music" - The importance of military music in the Turkish community

In studies related to Turkish music, two important issues come to the forefront considering the spread of the music tradition and transmission of music over the centuries. First would be the shamanic ceremonies that could be discussed in terms of religion, while the second would be military music.

The appearance of military music in Turkish culture and its centuries-long usage is a subject that could be studied in greater detail. According to the historical sources, the first appearance of military music with the Turks was during the Hun period.[117] The Huns believed that people trembled inside when the divine powers played the drums and when they made supernatural sounds like thunder (Ögel, 1986: 19-20). This military community, called the *"tuğ takımı"*, during this period continued its existence within the Gök Turks and Uyghurs. Although there are various sources on the organizational structure of the military music community, it is not possible to speak about a specific structure but only in general. After the Turks embraced Islam, Great Seljuks, Anatolian Seljuks, Ilkhanids, Karakoyunlu, Akkoyunlu and Mamluks used military music within their communities. It consisted of the *tabl* (drum) *nakkare*, *nefir* (pipe) and *zil bell* as symbols of power**.** This military music community was named the *tablhane* or *nevbethane*, and their concerts were called the *nevbet*.[118]

The first representatives of the Turkish music culture, mainly military music, were the Gökturks. As Budak (2006: 2) pointed out, the first written documents regarding the Turkish military music were in the 8th century in *Orhun inscriptions*[119] (Gökturks), where the Tuğ community is mentioned as the predecessor of *mehter* - the oldest military band in the world.

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116 Pacholczyk, 1996: 145

117 According to researcher Gazimihal; those who spread military music from the South to the West were the Turks. ınstruments such as the davul, zurna, boru and zill (bell) were used in the Hun army and during official ceremonies (Gazimihal, 1955: 1).

118 Nevbet — military music which was played in specific places at a specific time. For more information see Uzunçarşılı (1988: 28).

119 These inscriptions written in Chinese and Old Turkic were translated in 1930 by Thomsen. They are considered to relate the origins of the Turks. For more information regarding the Orhun inscription see Ross, 1930.

According to Budak (2006: 25) during this period, the hypothetical 12-tone scale of Turkish music was introduced to the Chinese by the Gökturk "Sucup Akari" (AD.560)[120]. During this period ruled by the Huns, military music bands were used as a symbol of sovereignty and instruments as a symbol of dominance. Coming to the throne, rulers were given a banner with the head of the wolf (*tuğ*) and a drum. During the battles, the attack and standstills of the army were announced with the royal sound of the big drum (Özaydın, 2007: 39). Again, according to Ögel, in 585 AD, Chinese emperor sent a carriage, drums and flutes to the Gökturk Işbara and thus recognized him as the Gökturk Khan (Ögel, 1986: 42).
As mentioned in the beginning of this chapter, military music can be considered as a counterpart to the shamanic ceremonies. It appeared for the first time during the Hun period, according to the known sources. The influence on the listeners of military music of course cannot be considered as therapeutic, but definitely as influential as the music used in shamanic and Sufi rituals.

After the year 585 AD and the Gökturk Khan, there are long gaps in Turkish music history. From the data found in the available sources, it is evident that the subject of military music was taken very seriously. For example, a record given by Erendil (1992: 7) is very important regarding the development of military music: *The Nesa war took place in 1035. The Seljuks used military music during battle. In Seljukname*[121] *the following entry is found: "The soldiers of Gazne were robbing and Salar Beg Toğdı was busy watching them. They were unprepared, resting, some of them were lying down or sitting, thinking the enemy is not near. The Seljuks attacked from one side playing the tablo (drum) and nakkare, the Gazne army could not even open their eyes when they were struck by their swords".*

According to Kaya (2012: 96), these communities, as products of the tradition of the Turkish military music culture, had percussion and wind instruments, and also became a unique part of the Turkish music culture, known as the *Tuğ* in Huns, *Tabl* in Karakhanids, *Nevbet* in Seljuks, *Mehter* in the Ottomans, today known as *The Band*. Schools with their centuries-long history also assured the existence of the military music genre in the world music literature.

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120 There is not much information regarding the Göktürk musician Sucup Akari, but according to Tanrıdağlı (2018: 33), the influence of the 12-tone scale made a significant innovation in Chinese music. Tanrıdağlı also mentions that Kenzo (1933) in his text about the Silk Road mentions how Akari's influence reached Japanese music as well, and had a strong impact in China even in the time of the Sui Dynasty (581-618).

121 Erendil refers to Ibn Bibi's work *Seljukname.*

As with the Great Seljuks, the tradition of *nevbet, nöbet* and *tabılhane* although under different names continues with the Turkish Seljuks (1078-1308) and the Anatolian Beyliks (Gazimihal, 1955: 12). *Nevbet,* a name for military music, was a symbol of the military structure of the state in the Turkish Seljuks.

The Seljuk sultans, according to Uzunçarşılı and Altınölçek, always went to war accompanied by military music bands. Along with the *nevbet* band, sultans always carried their flags, banners and çetr which was held over their heads. (Uzunçarşılı, 1988: 28; Altınölçek, 1999: 752). The tradition of the *nevbet* continued during the period of the Anatolian Seljuks. Sultans who were always at the head of the army had a *nevbet* group next to them, implying the sultanate strength, starting from the coronation, Friday prayers, hajj celebrations or hosting (Gazimihal, 1955: 13, Vural, 2012: 445-446). Also, the *nevbet* group played five times a day in front of the sultan's gate. According to the sources, only the Sultan had this privilege to have the *nevbet* performing for him five times a day. Music was on the one hand the symbol of dominance and on the other hand it had an important effect on the Seljuk soldiers in terms of encouraging them while weakening the enemies' courage (Uslu, 2010: 15).

In different parts of Seljuk historian Ibn Bibi's work "Seljukname", information was given regarding the music which was used and played by the army. One states that the reason for the army's defeat during the Battle of Kösedağ was the misusage of musical instrument during communication (Ibn Bibi, 2010: 176-177).

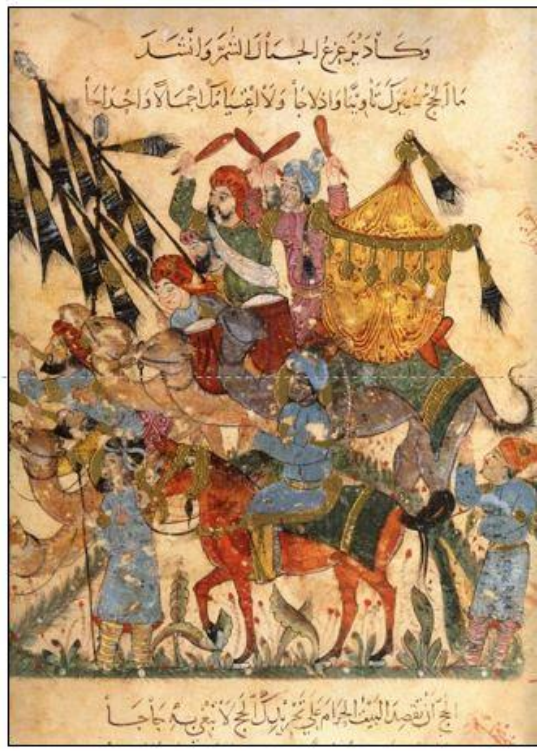

Figure 44 Nevbet group accompanying the Sultan to battle (Bibliotheque Nationale de Paris, Makamat-ı Hariri, 1237; Vural, 2012: 448)

Figure 45 Nevbet group

One example is from the time of Alâeddin Keykubâd I (1220-1237) when he was conquering the fortress Alaiye (Alanya), next to the *çetr* as a symbol of sultanate, the *nevbet* group had its place within the army, with the kös, bora, nakkare and zurna (Uslu, 2002: 163). Figures 44 and 45 show how the nevbet group accompanied the sultan in the battle, on these 13th century miniatures.

Nevbet music and instruments, a kind of war tools, were quite often present in the palaces. In the classified Seljuk army, next to the flag carrying fighters, drummers and trumpeters was also a division of "non-warriors" (Köymen, 2001: 263-265) and as such had an important role in the community.

As pointed out by Turan and Vural, military music, entertainment music and later Mevlevi (religious) music were obligatory in the Seljuk palace and the musicians' salaries were related to the decisions of the Great Council (Turan, 1988: 37; Vural, 2012: 446).

The meaning of music for the Seljuk society was more than just a tool used by the sultan and clergy. According to Ibn Bibi (1944),[122] the Seljuks performed and listened to music for entertainment as well. Entertainment venues were in the palaces where music was extensively used for various occasions such as reception of the ambassadors, animal shows and dances, music entertainment and, maybe the most important ones – wedding celebrations. For this

[122] In the sources related to the history of the Seljuks, such entertainment places can be found. For more information regarding this subject see Sevim and Merçil, (1995: 43) and Uslu (2010).

reason, it was natural that the musicians were always present in the palace. One of the examples was the wedding of Izzeddin Keykavus I where masters of art were present, including city musicians, court musicians (*mutribân-i şehr ve haşşe)* and dancers (semâ) *"fravvâlân-i haşş"* (Turan, 1988: 38; Vural, 2012: 447).

Based on all of the above mentioned, it can be seen how important music and musical life in the Anatolian Seljuk period was and how music was an inevitable part of the social component with an important role within society. As Ibn Bibi and Henry George Farmer wrote, musicians who performed for various events in the palaces, often were borrowed from the surrounding countries and rich cities with high educational standards, and because of that, musicians were considered as a group of professionals among people.

The historical stages of Turkish music history periods can be summed up from al-Farabi to the mid-20th century. The following timeline was made according to Yarman (2002: 8).

900	Formation Period	10th century (Al-Farabi)	Cultural circles of the Middle East influence Turks who adopted Islam and stated to create their own musical form
995		11th century (Ibn Sina)	Seljuk Turks come to Anatolia
1071		12th century	The Byzantine Empire and the Anatolian Seljuk State are in intense competition, violent reaction to the Turks and the Crusades
		13th century	(Mevlana, Safiyüddin Urmevi, Kürbettin Şirazı) Cengiz Khan rules the Mongols, the Turks search for shelter in Anatolia and Hülagü Khan demolishes the Abbasid State
1299		14th century (Abdulkadir Meragi)	Ottoman Beyliks take over the Seljuk's legacy, establishment of the Timurid State, Meragi is in the Timurid's Herat palace, start of the "Renaissance period"
1405		15th century	(Hızır bin Abdullah, Amasyalı Şükrullah, Meragi's son Abdülaziz Çelebi and grandson Mahmut Çelebi…) Reign of Murat II in the Saruhan and Edirne palace, the conquest of Constantinople in the time
	Conversion Period		

			of Fatih Sultan Mehmet and the end of the Byzantine Empire
1512	Oriental Period	16th century	(Şehzade Korkut, Hasan Can Çelebi, Abdül Ali Efendi, Gazi Giray Bora Han, Durak Ağa, Pir Sultan Abdul…) Reign of Yavuz Sultan Selim, Shia/Alevi conflicts, Safavid attacks to rule over the Caliphate and beginning of the Ottoman Empire State
1640		17th century	(Benli Hasan Aga, Mevlevi Yusuf Dede, Ali Ufki, Seyyid Nuh…) Turbulent years of the empire, suppression of Celali revolts during Murat IV, development of art and culture during the reign of Mehmet IV
1730	Classical Period	18th century	(Nayi Osman Dede, Dimitri Kantemir, Tanburi Mustafa Çavuş, Sultan Mahmut I, Hafiz Şeyda Abdürrahim Dede …) Tulip revolution and fall of the Ottoman Empire
1836	Last Classical Period	19th century	(Abdulkadir Nasil Dede, hamparsun Limoncuyan, Ismail Dede Efendi, Sultan II Mahmut, Haci Arif Bey, Tanburi Cemil Bey…) Tanzimat and post-Ottoman period
1945	Romantic Period	20th century	(Rauf Yekta, Suphi Ezgi, Saadetin Arel, Abdülkadir Töre, Selahattin Pınar, Mahmut Ragıp Gazimihal, Mesut Cemil…) End of the Ottoman times, beginning of the Turkish Republic

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2.1.4. Notation, early Islamic scholars and theories

While it is not known how musicians made use of the notes during these performances, the term *"ebced müzik yazısı"* for music writing has been used from the times of philosopher and music theorist al-Kindi (Uslu, 2010: 104).[123] In general, the *Ebced* system is based on the mathematical values of the letters (Ergişi, 2008: 19). It is understood that the same system was used after al-Kindi.

Figure 46 al-Kindi, Ebced note example, in his own handwriting (Ergişi, 2008: 23).

As mentioned by Ergişi (2008: 7, 22), in the period after the 9th century, together with the notes in the Ebced style, makams known from the times of Farabi (872-950) were used. In table 3, a list of makams used by and after Safiyüddin Urmevi (1216-1294) is presented.

123 Examples of the **Ebced note** based on the letters invented by Yakub al-Kindi, important islamic philosopher that lived in the 9th century were used in the work under the title *Risâle fi khubr te'lifi'l-elhân.* This is the first example of this type of notes (Ergişi, 2008: 22).

Table 4 Makams after Safiyüddin and other writers that used them (Levendoğlu, 2004: 133)

	Safiyuddin	Kutbuddin	Bedri Dilşad	Hızır bin A.	Merâgî	Kirşehrî	Şirvânî	Ladikli Z.E	Ladikli F.	Hacı Böke	Seydî	Kadızâde Tirevi	Ali Ufkî	Hâfız Post	Kantemiroğlu	Seyid Emin	Nâyî Osman	Çhalatzoglou	Artin	Hızır Ağa	Kevserî	Abdülbaki Nasır	Hafîd	Hâşim Bey	Kâzım Uz	Tanburî Cemil	Yektâ	Ezgi	Arel	Karadeniz
Bûselik	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Büzürk	x	x	x	x	x	x	x	x	x	x	x	x			x		x	x	x	x	x	x	x	x		x		x	x	x
Gerdâni-ye	x	x	x	x	x	x	x	x	x	x	x	x			x	x	x	x	x	x	x	x	x	x	x	x		x	x	x
Geveşt	x		x	x	x	x	x	x	x	x	x	x			x		x	x	x	x	x		x							
Hicâz	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Hisar	D	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x
Humayun	D		x	x	x	x	x	x	x	x	x	x			x		x	x	x	x		x	x	x	x	x		x	x	x
Hüseynî	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Irâk	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x				x	x	x
Isfahân	x	x	x	x	x	x	x	x	x	x	x	x			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Mâye	x	x	x	x	x	x	x	x	x	x	x	x			x		x	x	x		x	x		x	x			x	x	x
Muhayyer	D	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Nevâ	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Nevrûz	x	x	x	x	x	x	x	x	x		x	x			x					x		x	x		x					x
Nikriz	D		x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x
Nühüft	D		x	x	x	x	x	x	x	x	x	x			x	x	x	x	x	x	x	x	x	x	x	x		x	x	x
Râst	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Rehâvî	x		x	x	x	x	x	x	x	x	x	x		x	x		x	x	x	x	x	x	x	x				x	x
Selmek	x	x	x	x	x	x	x	x	x	x	x	x			x		x	x	x	x	x	x	x	x					x
Şehnâz	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x
Uşşâk	x		x	x	x	x	x	x	x	x	x	x	x	x			x	x	x	x	x	x	x	x	x	x	x	x	x	x
Zengüle	x	x	x	x	x	x	x	x	x	x	x	x		x	x		x	x	x	x	x	x	x		x				x	x
Zirefkend	x		x		x		x	x	x	x	x				x		x		x		x		x		x			x	x	x

After Safiyüddin, Hoca Abdülkadir Meragi (1360-1435) is mentioned as the greatest composer, musical scholar, saz player and singer of the East. When Bahaeddin Veled, the father of Mevlana arrived in Anatolia in 1207, he brought instruments that were the foundation of the Mevlevi culture, such as the ney, rebab, çeng, kudüm, halile and mazhar. After some time, composers such as Itri and İsmail Dede Efendi entered the world of music. As Güvenç (1985: 21-22) pointed out, religious motives gradually abandoned social issues and Turkish Art Music and Mevlevi music emerged. Mevlana especially gave importance to instruments such as the *rebab* and *ney*.

While Mevlevi and classical music continued on the one hand, on the other new forms emerged in Turkish folk music, such as *türkü*, *uzun hava*, *atışma*, *bozlak* etc.; they were performed with the poems of Hoca Ahmet Yesevi and accompanied by Bektasi voices, *kopuz* and *bağlama*.
As Öztuna states (1976: 23), Hacı Bektaş Veli played a role in introducing Mehter music (used for military purposes and transferred from the Seljuks to the Ottomans) to Janissary troops. In this type of music, instruments such as *askös, davul, nakkare, kudüm, zurna, nefir, nısfiye, zil, zilli maşa* etc. were used[124].

Ak (2009) emphasized that sultans including Murat II (1404-1451), Beyazıt II (1447-1512), Murat IV (1612-1640), Mustafa II (1664-1703), Ahmet III (1673-1730), Selim III (1711-1789) and Mahmut II (1785-1839) were brought up in Ottoman palaces and were music lovers. Also, famous musicians and composers such as Mustafa Itri (1640-1712), İsmail Dede Efendi (1776-1846), Hafız Post (1630-1694), Recep Efendi, Zekai Dede (1825-1897), Emin Dede (1883-1918), Nayi Osman Dede (1652-1730), Ebubekir Ağa (d. 1759) and Dimitri Kantemiroğlu (1673-1723) were educated during this period. The continuity of music tradition in performance and composing is seen throughout the Ottoman period.

As the overview and history of Turkish music showed, in the Middle Ages, in this turbulent part of the world, music had an important role in everyday life, as well as for military purposes. Of course, information collected during the various quests and migrations, considerably influenced the East and the West.

[124] These instruments mentioned belong to the wind and string group of instruments, and the most used ones will be described in more detail in Chapter 2.2.

Early Islamic philosophy started to develop after the conquest of the Umayyads and Abbasids over a large territory stretching from the Iberian Peninsula to Eastern Turkmenistan. Muslims gained a certain number of Greek philosopher's works, including Pythagoras, Aristotle, Plato. In the 8th century the Abbasids established the House of Wisdom (*Bait al-hikma*) in Baghdad and Kufa, which served as house of astronomy and translation, where translations from Greek and Aramaic into Arabic were made. As paper was already introduced from China, translated works spread all over the empire and cities like Cairo, Toledo, Bukhara and Samarkand established libraries (House of Science-*Dar al-hikma*). These works were an inspiration for Islamic scholars, who developed their own philosophy and science based on them, especially in the field of mathematics, alchemy, medicine, geometry, music and other disciplines (Pacholczyk, 1996: 142).

The first books and theories regarding (not exclusively) music were written by al-Kindi (801-873), al-Farabi (870-950) and Ibn Sina (980-1037). In the 9th century the Ikhwan al-Safa brotherhood wrote the book "Epistle on Music" (*Risala fi'l-Musiqa)* in which, in the preface they wrote: "We propose in this Epistle called 'Music', to study the art which is constituted at one and the same time of the corporeal and the spiritual. This is the art of harmony (ta 'lif) which can be defined in terms of proportions" (Pacholczyk, 1996: 147, as in Shiloah, 1978: 247). The idea of the Ikhwan al-Safa brotherhood is the representation of an idea through a hierarchical model of numbers which corresponds to the Cosmic hierarchy presented by Cousto (2000), following the ideas of Plato and the Neo-Pythagoreans[125].

Al-Farabi (known in the west as Alfarabius), in his work "The Great Book on Music" (*Kitab al-Musiqi al-Kabir*), discusses intervals, their mathematical ratios, the degree of their perfection or consonance and the construction of the modes within the framework of the Pythagorean *Great Perfect System.* It is considered the most important work on this subject, especially in terms of the mathematical ratios and music intervals to the degree of consonance (Pacholczyk, 1996: 148).
Pacholczyk summarized the significance of numbers: *"1"- symbolizes the Creator: one, eternal, indivisible, unchangeable; "2" - symbolizes the Intellect ('aql). It allows for pairs of opposites*

[125] For more detailed information see Mihaljinec and Eser (2017: 125-126), Cousto (2000) and Pacholczyk (1996).

(light/darkness, good/bad, form/matter, spirit/ body, etc.); "3"- symbolizes the Soul (nafs); "4"- symbolizes Matter (hayyula). It has mathematical completeness. It contains all numbers that add up to the decade (1 + 2 + 3 + 4 = 10), the base of the entire decimal system. It is a perfect number; "5"- symbolizes Nature (tabi'ah); "6"- symbolizes the Body (jism); "7" - represents the seven planets; "8" - represents eight qualities (actually four qualities combined two by two with four elements): Earth: cold and dry; Water: cold and wet; Air: warm and wet; Fire: warm and dry); "9"- represents Beings, such as minerals, plants and animals. This hierarchical model contains an analogy to the Islamic model of the cosmos represented in astronomical categories (Pacholczyk, 1996: 145). Together with Cousto's Cosmic hierarchy, based on Plato's idea that mathematics represents the pure and absolute truth, and the Neo-Pythagorean's idea that numbers have an esoteric significance, influenced Shi'a and Sufism.

Ibn Sina (also known under the name *Avicenna*) in his work titled *Kitâbu'ş-Şifa* dedicated a chapter *Cevâmi'u İlmi'l-Mûsika* to explaining his ideas about music. In it, he discusses the definition of music, notes, intervals, types of rhythm, composing and instruments (Kolukırık, 2000: 372). This work gave the most extensive view on music, including information on music therapy, instruments and music theory (Kolukırık, 2000: 373). Also, Sina describes the connection between music and medicine as follows: "…*The best treatment with the most efficient effect is to raise mental strength so that the patient is encouraged to handle the illness easier, to ensure pleasant and satisfactory environment, play the best music and provide meeting with their beloved ones*... " (Giray, 2008: 77).

From the cited sources, we can see that all theories of music made a connection with the healing of patients through music therapy.

For centuries, all doctors and physicians in Islamic history were interested in examining the effect of music therapy. They include Zekeriya Er-Razi (854-932), al-Farabi (870-950) and Ibn Sina (980-1037). As pointed out by Çoban (2005: 42-43), the music therapy tradition started at that time and continued in the Seljuk and Ottoman hospitals.

In the late 12th century in the Artukid area of North-East Anatolia, which was explained in the Chapter 1.1.1., Ebu'l-izz el-Cezeri (1136-1206) [126] served as a chief engineer in the Artuklu palace in Diyarbakır (Amid). Although little is known regarding his life, he is best known for

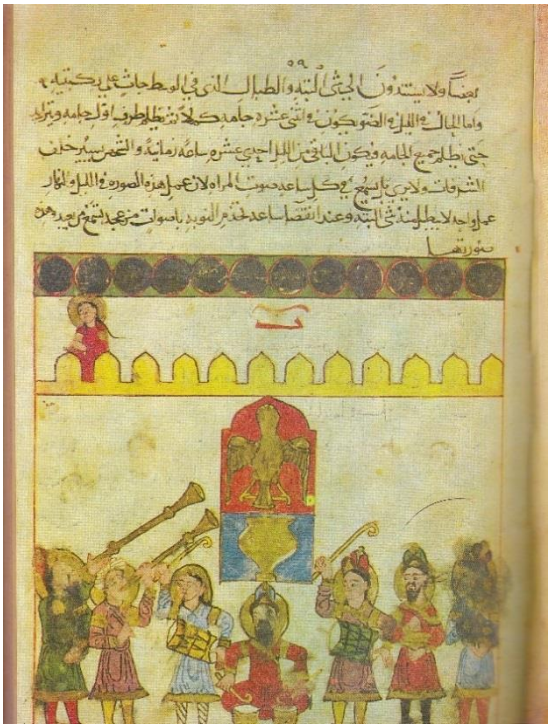
[126] El-Cezeri was of Arab origin and his full name is Badīʿ az-Zaman Abū l-ʿIzz Ismāʿīl ibn ar-Razāz al-Jazarī.

his book *Kitab fi Ma'rifat el-Hiyel el-Hendesiye* (The Book of Knowledge of Ingenious Mechanical Devices) in which he teaches the functioning and work of automatic and mechanical instruments, and is one of the most interesting examples of the Artukid period. The book was written by the request of the Artukid emir Salih Nasreddin Mahmud (1200-1222). The book with a short name *"Otomata"* (1206) is based on the mechanical inventions of Archimedes and other scientists from antiquity. (Özdemir, 1997: 19-20). As Gorini (2007: 17) points out, El-Cezeri also followed the idea of Muslim engineers for increasing the effectiveness of water raising machines which would be used for water-based therapies and designed five such machines[127]. His work and especially the automated machines are considered to be the origin of Leonardo da Vinci's ideas[128]. For this thesis, examples from The Book of Knowledge (1990)[129] showing the automation of musical robots and hydraulics with water (Figure 47) are of interest.

[127] For more information see Gorini (2007: 17).

[128] For more information regarding el-Cezeri see Özdemir (1999); Gorini (2007); https://muslimheritage.com/al-jazari-the-mechanical-genius/; https://www.britannica.com/biography/al-Jazari; Otomata (1990).

[129] Reprint of a facsimile published by Kültür Bakanlığı Yayınları, Ankara.



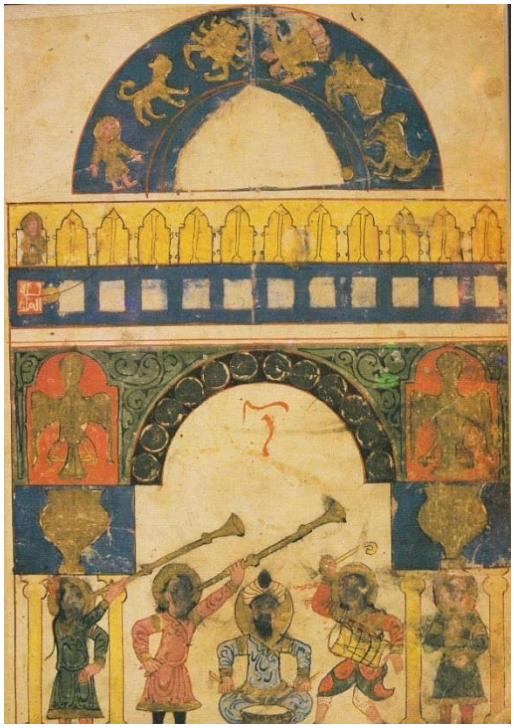
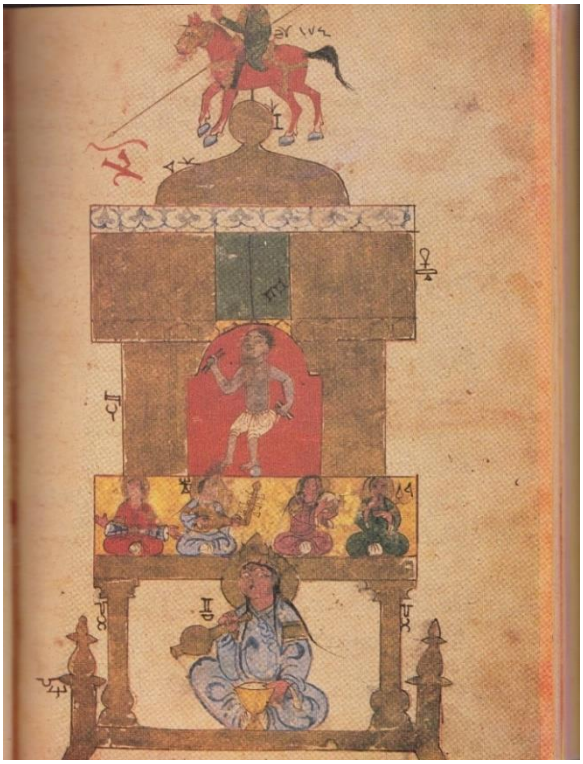


Figure 47 Photos from the book of El-Cezeri (1990: 59, 6, 88, 44)



Besides the written texts of philosophers and theorists, objects made from various materials from the 12th and 13th century show representations of different music scenes, confirming the importance of music and musicians in the life of the Seljuks. Displays of one or more musicians with instruments are visible on miniatures, as well as on metal and ceramic objects. As Dağlı (2005: 171-182) shows in his work, the instruments which musicians used displayed on miniatures (painted manuscripts) are the following; davul, zil, burgu, nakkare, düdük, çengi, bendir, kaval, def, nefir, kös, dutar, and examples on metal objects are; ud, nefir, saz, çeng and bendir. There are also examples of the çeng and ud on ceramic objects.[130]

In general, it can be said that the number of studies on Turkish music and the history of Turkish music has increased in the recent years. A large number of bibliographies and bibliography reviews can be found within this framework (Ece, 2007; Yıldız, 2007; Ağaoğlu, 2011; Ziytok, 2013), indicating continuous research and a variety of works on Turkish music theory and Turkish music history.

[130] For more information see Dağlı (2005); for instrument names see Akyay (2014).

2.1.5. The religious music, healing and music therapy

For the purpose of this work it is necessary to show the overview of religious music, incidence of treatment and healing, and the foundations of the Seljuk music therapy. Along with military music, religious music was also important for the Seljuk society, especially in the form of *ezan* (a call to prayer five times a day). Religious music was performed by the Sufis in their tekke.[131] In the works of Pythagoras, Theophrastus, Democritus and Aulus Gellius, treatment with music as a healing agent can be found (Savill, 1923: 284). For centuries, all doctors and physicians in Islamic history were interested in examining the effect of music therapy. These include Zekeriya Er-Razi (854-932), al-Farabi (870-950) and Ibn Sina (980-1037). The music therapy tradition started then, continuing in Seljuk and Ottoman hospitals (Uçan, 2015: 3; Schimmel, 1993: 42-43).

In *Emraz-ı Ruhaniyeyi Nagamat-ı Musikiye-i Tedavi,* a work by Hekimbaşı Gevrekzade Hafız Hasan Bin Ahmed who lived at the end of the 18th century, there is information about musical treatments of patients with mental disorders. In this work Gevrekzade states that the ancient Turks highly valued musical treatments of mentally ill patients and that positive results were obtained with this treatment. Gevrekzade pointed out that musical treatment was particularly effective with patients who were subdued, embittered and not interested in things around them (Grebene, 1978: 34).

The term "music therapy" originally comes from Greek, but in Old Greek the word which was taken for music is *musike* or *mousa*.[132] As for the Greek word "therapy", *therapeia* designates finding the measures and needs necessary for the care and treatment of the patients (Benenzon, 1991: 13). The temples dedicated to Aesculapius[133] were healing centers where the arts were used in the therapeutic technique of temple rituals (McClellan, 2000: 113). Analogue to this are hospitals in the Anatolian Seljuk times.

Music which was used for therapy in hospitals was used for socialization of the patients, for easing the pain, to make people feel more comfortable. As mentioned by Spiegel and Springer (1997), from early times, people were surrounded by different frequencies from nature, and

131 For more information see Uslu (2010).

132 Kipay, S.S.: Treatment with Music During the Old Turkish Period and in Anatolia, pg.1 as in Grebene, B: Treatment with Music, and Babacan SS, Şirin A: A comparative Study of Massage/Touch and Music/Relaxation Effectuality in the Pain Control during Post-Cesarean.

133 Aesculapius was the son of Apollo, the God of the Sun, Medicine and Music (McClellan, 2000: 113).

were always searching for some which will make them and keep them balanced, in order to function normally.[134] In his book on music therapy Daubresse explains the results emerging from the application of music therapy as follows: 1. Music affects the blood circulation of both animals and humans; 2. Blood pressure rises and falls in intervals; 3. Music sounds improve the cardiac cycle contractions in both humans and animals and 4. The change of blood circulation depends on the volume and tone of the voice (Şengül, 2008: 20).[135] These examples can be found in different cultures, especially in the East, where the idea of wholeness includes religion, astronomy, mathematics, music, aesthetics and many more[136].

Burnett (2000: 85-92) discusses the influence on Western medicine and states that many Arabic texts were not translated into Latin because of the technical references and detailed and complex theory of the makams[137], as well as because the Arabic tradition of treating and classification of mental illnesses and hospitals for the mentally ill was unfamiliar to the Western culture. For these reasons, there are no similar examples in the medieval Europe.

For the purpose of this work, the following paragraph elaborates the term of music therapy as known in the contemporary times.

Music therapy is a relatively new discipline and by the definition of the American Music Therapy Association is *the use of interventions to accomplish individual goals within a therapeutic relationship by a professional who has completed an approved music therapy*

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134 Some researches regarding the outcomes of music therapy used for different illnesses can be seen in the following works: Saleebym C.W., 1929; Medley, A., 1943; Spiegel, A.D. and Springer, C.R. 1997; Callahan, C., 2000; Sudhir Kakar, 2003; L. Kay Metzger, 2006; H. M. Evans, 2007; Hammerschlag, C.A. 2009; Akdemir, S., S. Kara, and V. Bilgiç, 2010; Murrock, C.J. & Higgins, P.A., 2010. Music therapy is also useful in treatment of other different problems. In Turkey, as a result of the experimental work of Özçevik (2007) and Giray (2008), success was achieved in the treatment of: 1-Mental disorders, 2-Autistic children, 3-Substance abuse, 4-Mental retardation, 5-Social-emotional and behavioral adjustment 6-Correction of movement related skills, 7-Development of communication skills, 8-learning disabilities, 9-Hyperactive children, 10-Physically disabled children, 11-Speech and communication disorders, and 12-learning disorders. According to Giray (2008: 94-103), as a result of music therapy, an increase in self confidence has been observed and he concludes that music therapy was effective on 75% of the patients with the mentioned disorders. Another example is given by Özçelik (2007: 40-49) for music therapy effectiveness on disorders such as communication and speech disorders in children with physical disabilities, hyperactive children, eliminating difficulties in learning, communication skills development, improvement of the ability to move, development of social and emotional skills and autistic children. For another important work regarding the subject see Grebene (1978).

135 Şengül quoted from M. Daubresse, (1908) *Musico-Therapie,* Çev. Abdullah Cevdet, Matbaa-i İçtihat, Mısır.

136 Regarding these examples see Pacholczyk (1996).

137 In the original source the word *maqamat* is used.

program [138]. Of course, when the period of the Middle Ages is considered, professional music therapists by today's way of understanding were something completely different. But the main idea that it is a *process in which a music therapist uses music and all of its facets—physical, emotional, mental, social, aesthetic, and spiritual—to help clients improve their physical and mental health* is applicable. There is numerous research[139] on the impact and effectiveness of music therapy today in treatment of different illnesses, but there is no "recommended list" of songs or compositions to be used in music therapy. Considering that until now there is no known list for any type of music nor recommended compositions for specific culture for music therapy procedures, this was one of the reasons and stimulus for scientific research of the effectiveness of makams in this work, which will be further elaborated with makam analysis in the Chapter 5.

In the contemporary world research and knowledge regarding music therapy has been increasing with the development of knowledge and research regarding the brain. Music therapy in psychiatry has become part of the treatment program with which social skills are developed, self-confidence regained, physical activity and motor skills increased, and concentration strengthened (Arıkan and Dilek, 1996: 35). The beginnings of music therapy as a scientific method can be found in the influence of Greek philosophers[140] whose ideas promote music as a psycho-iatric agent (McClellan, 2000: 114).

The connection between music, hearing and the brain is essential in order to perceive the benefits of music therapy treatment.

"Every kind of music which creates a change in human behavior is a way of psychological influence" (Altınölçek, 1998: 32).

Various scientific studies[141] in the recent years has revealed that the right hemisphere of the brain memorizes sound, rhythm, melody and harmony, while the left side memorizes thoughts

138 https://www.musictherapy.org/about/musictherapy/

139 For more information regarding different therapy research see Harford, 1891; Burns, 2005; Gold, Heldal TO, Dahle T, Wigram T., 2005; Grocke, D., Wigram, T., 2006; Wigram, T. and Gold, C., 2006; Gold C, Wigram T, Elefant C., 2006; Maratos, A et al, 2008; Brandes, V., 2010; Mössler K. et al, 2011; McDermott, O. et al, 2013.

140 McClellan (2000: 114) here mentions Homer, Plato, Plutarch, Aristotle, Pythagoras and their disciples.

141 Warren (1999); Griffiths et al. (2001); Kuck et al. (2003); Wieser (2003); Karakaş (2004); Kay, et al. (2008); Moerel et al. (2015).

and patterns about music with frequencies and altered volume. On the other hand, fear, anger, joy as sensory effects are recorded in the limbic system memory and regulatory of the whole body. As Şengül (2008: 11, 12) and Ayata (2008) pointed out, there are numerous researches on the brain and neuroscientific research which precisely studies the brain centers active for reception of the sound, such as the corpus callosum region.

For the purpose of elaborating the title topic and understanding how sound and music provoke reactions in certain areas of the brain, numerous scientific articles were studied in order to try to answer the question: Which part of the brain reacts to music/sound stimuli?

Recent research (experiment) from Moerel (2015: 6) showed that the sounds that came from the left were processed in the right inferior colliculus and thalamus and vice versa. This was proven before on animal testing. But what came as a surprise is that in both the inferior colliculi and the thalamus, sound processing is "tonotopically"[142] organized, in other words organized by pitch. Each part of the investigated areas responded strongest to a specific sound frequency.

Researchers also observed that the concerned part consumed the most oxygen. Successive pitches were found to be processed next to each other, in a comparable manner to the keys on a piano. Even more striking: in the inferior colliculi, there is a single representation ("complete keyboard") for all pitches, and in the auditory part of the thalamus, there are two of those "keyboards". Why the thalamus has a double processing of each pitch is unclear (Moerel et al., 2015).

As pointed out by Bateson (1972), noise in the sense of information that is non-patterned and unordered by the brain, is the only source of new information. At foreign language or a musical style that once seemed unintelligible become meaningful once the cognitive structures that are required to decode and understand them are in place. The sound signals, which are the base of what the human ear perceives and then the brain processes, are unique and the information they convey binds the community together and contribute to its character.

[142] Tonotopic organization expresses gradients in the maps of sound properties which are the frequency of tones, ratios between harmonics and the pitch of complex sounds (Ehret (2009) in Encyclopedia of Neuroscience).

As McClellan pointed out *our brains emit frequencies that respond to our mental and emotional states* (2000: 41). He elaborates that the origin of the brainwaves, according to Beasley[143], is that *they result from the continuous rhythmic swing of electro-magnetic polarities in the cerebral hemispheres of the brain* (2000: 42).

Recent researches carried out by a group of Danish scientist as a pilot study was to measure brain activity with the EEG, concentrating on a brain signal called LPP (Late Positive Potential), which is a measurement of the level of electromagnetic activity of the cortex between 0.6 and 0.9 seconds after the appearance of a stimulus (Van Dongen, Van Strien, Dijkstra, 2016: 48-54). Research was done with art and photos but can also be done with the frequencies and sound in order to see what the response would be with specific frequencies.

On arrival at the ear, sound becomes the subject of study for psychoacoustics which examines the chain of energy transfers, as the soundwave is transmitted from the outer ear via the eardrum to the bones of the middle ear called the ossicles. This transmission involves the transfer of energy from the air to a solid, a process which the eardrum through the course of its long evolution from its equivalents found in fish and reptiles is remarkably adept at performing. Psychoacoustics documents the processing of incoming sound waves by the auditory system to extract usable information for the brain, giving, in other words, the process called hearing (Truax, 1984: 4). McClellan (2000: 148) points out that any active involvement with music engages both hemispheres and balances both aspects of the mental processes.

These statements by Truax and McClellan lead to understanding the process of hearing, in which sound reaches the outer ear, which then conveys it down the funnel shaped passage where it is compressed and then amplified in the tapered shape of the auditory canal. At the end of the auditory canal is the ear drum which then vibrates as soon as the sound wave reaches it. The sound energy, which was accepted by the ear drum, transfers to liquid in the inner ear, through the middle ear which consists of the hammer, anvil and stirrup. Middle ear parts function like a system of levers, doubling the pressure of the sound waves. These sound waves then arrive at a little oval window, which is about 25 times smaller than the eardrum and has the effect of increasing the pressure of the sound waves. This way, sound pressure is increased by about 200 times during its journey to the inner ear. The inner ear consists of the cochlea and the

143 McClellan paraphrases Victor Beasley.1978. *Your Electro-Vibratory Body*.University of the Trees Press, Bouldrt Creek, California.

semicircular canal. The organ that transforms sound into neural signals is called the Corti organ and is situated on the basilar membrane in the cochlea and looks like a harp. It consists of many cilia cells, consisting of tiny hairs. In the inner ear, there are around 3500 cells, and around 20.000 in the outer ear. When the basilar membrane bends, cilia are deformed in many ways. Because of this mechanical strain, electricity is created, and these electrical signals stimulate the ear nerve (Jelaković, 1978: 31-41).

Hans Cousto (2000: 14), mathematician and musicologist, supplements this adding that the oscillations of the cilia are scanned by nerve cells, transmitting them through neurons in the cerebral cortex. He further elaborates that *according to the pitch involved, each vibration will have a certain effect, either stimulating or soothing. Even the intervals in a piece of music can affect us in a certain way*.

The analysis of sounds starts first in the cochlea in the inner ear. They are then transformed according to pitch, timbre and intensity into neural signals in the auditory area of the brain stem. These types of information are sent via the thalamus to the primary auditory cortex. The thalamus is, at the same time, directly connected to the amygdala, which is associated with emotions and emotional behavior. More specific information about acoustic qualities such as pitch level, color, timbre, and intensity is separated in the main auditory center and entered into auditory memory; this is how is the integration phase achieved (Ayata, 2008: 31).[144] To be able to musically perceive the sounds which are heard, the auditory stimulus is first divided into components. Cortical areas within the anatomical and functional hierarchy become active in the process. The hierarchical system, composed of primary, secondary and tertiary centers, starts at the ear, continues to the brain stem, thalamus and up to the hearing cortex, although hearing centers already exist in the hearing cortex (Ayata, 2008: 32).
Levitin (2008: 270-271) showed how the brain responds to specific stimuli and which parts are receptive to music.

McClellan (2000: 149) discusses how the effect of music mentally and spiritually comes to conscious attention by relating to the melodic lines which support the music around them. The separation of the components emerges from the general matrix to the structural patterns. In

144 Ayata's Doctoral thesis (2008) on music and the brain is the most important work in this field recently, for it provides a concise overview and recent research.

order to perceive this and integrate the emerging patterns, one must switch from cognitive linear to holistic intuitive perception.

Keynote sounds[145] as sound signals coming from background listening as habitually perceived can be stored in the long-term memory within the hippocampus and cortex. This means they can create continuity with the past and therefore reflect the fundamental characteristic of the environment. The keynote sound is the background against which all other sounds are heard (Truax, 1984: 21-22, 59).

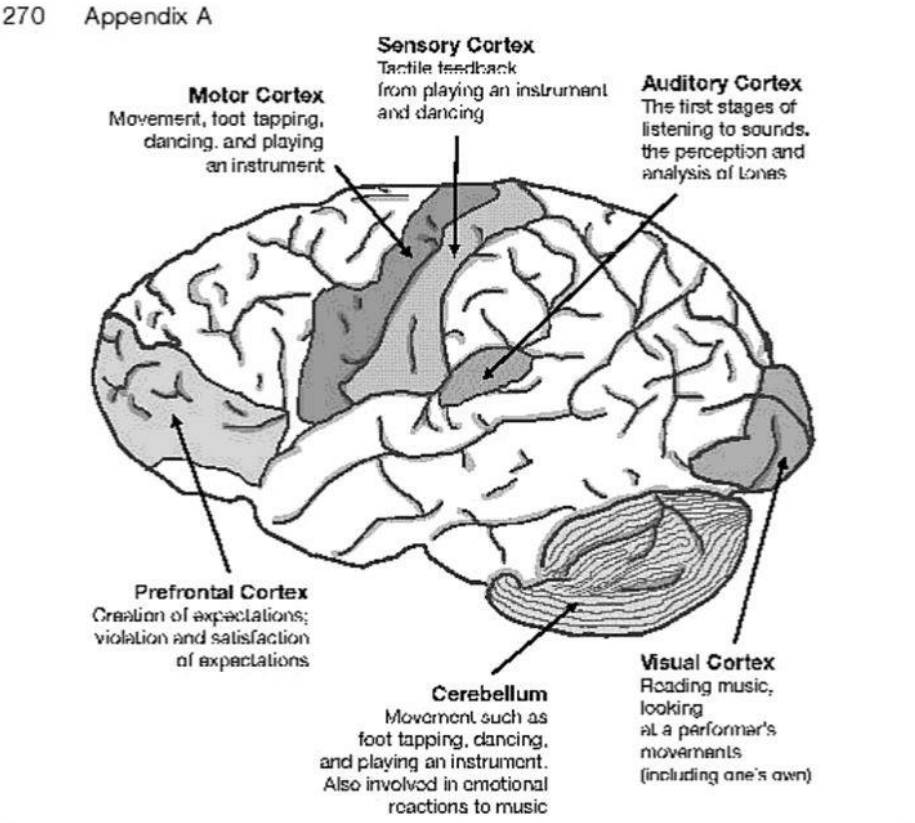

Figure 48 drawing of the human brain (Levitin, 2008: 270)

145 As Truax (1984: 21-22) emphasized, the musical use of the keynote sound term is where the key of a piece is its fundamental tonality or tonal center, to which all other pitches are related.

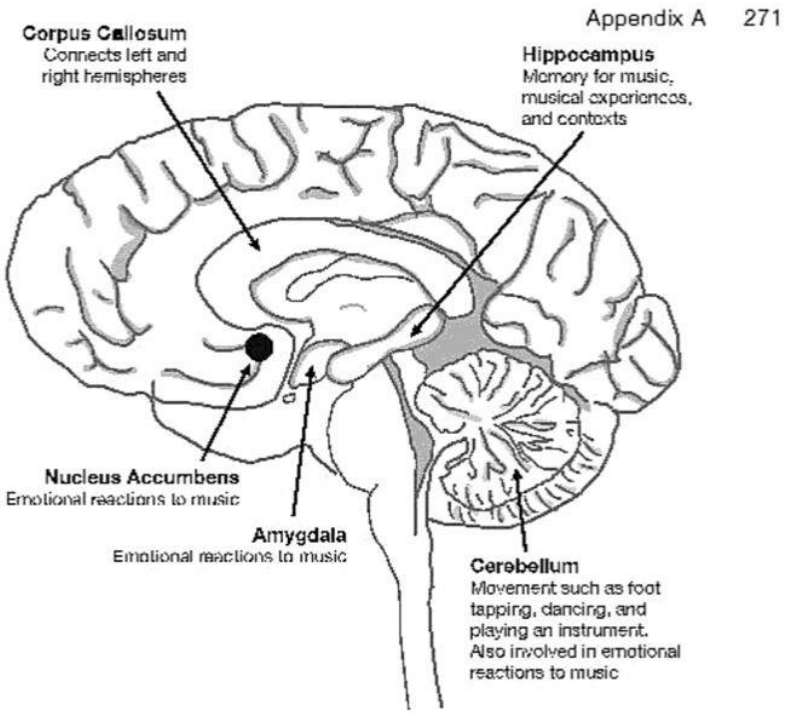

Figure 49 cross-section of the human brain (Levitin, 2008: 271)

In order to attain complete musical perception, the connection and integration between the two brain hemispheres through the corpus callosum is necessary. Ayata (2008:37) states that t*his interaction through the corpus callosum can be enhanced by music*[146]. As stated by McClellan, the specific location of the resonating position in the body can be refined with the full influence of specific pitch (2000: 97).

Total conscious experience of music is the result of activity in different brain areas which form neural networks dedicated to specific aspects of musical processing (Ayata, 2008: 133, as in Warren, 1999). Many areas of the brain are involved in processing various elements of music. Rhythm mainly occurs in the left hemisphere, while timbre (which has the third position in the auditory system), and melody are processed mainly in the right hemisphere. Imaging studies of the cerebral cortex find greater activation in the auditory regions of the right temporal lobe

146 Ayata conducted research using the neuropsychological method and the fMRI method, concluding that the results indicate that the human brain processes music and language with an overlapping cognitive mechanism, in overlapping cerebral structures. And she continues that despite the view of some researchers that music and language are strictly separate domains, it is evident that the human brain engages a variety of neural mechanisms for the processing of both music and language (Ayata, 2008: 116-117).

when subjects are focusing on aspects of harmony. Common places, familiar as whole compositions, are predominantly stored in a left hemisphere[147], as seen on the picture below (Ayata, 2008: 34).

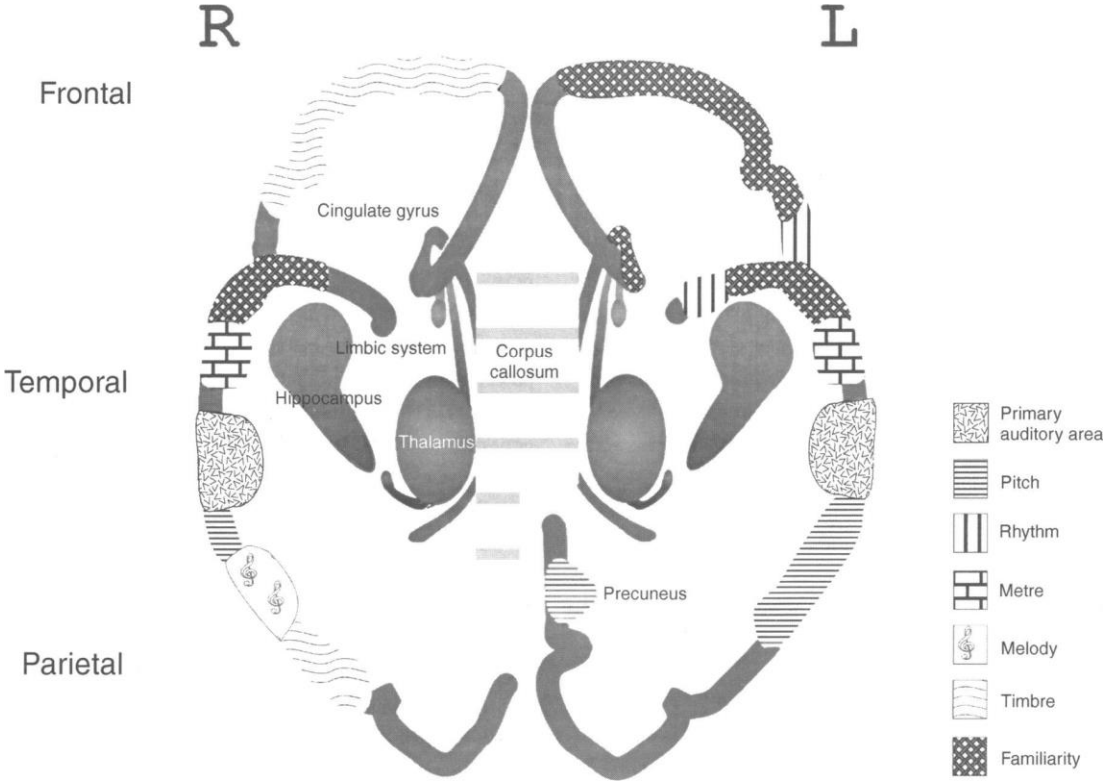

Figure 50 Human cerebral hemispheres showing structures involved in music perception (Warren, 1999; Ayata, 2008: 34)

Truax (1984: 5) emphasized how Fechner[148], the founder of modern psychophysics, tried to understand how the *brain formed subjective impressions based on the magnitude of external stimuli*. Thus, the modern scientific distinction between the "objective" acoustic parameter, such as intensity, frequency and waveform, and their psychoacoustic "subjective" counterparts, namely loudness, pitch and timbre, respectively, came about, which describe the brain's response to those parameters (Truax, 1984: 5 as mentioned in Plomp, 1976; Roeder, 1975; Tobias, 1972; Moore, 1982).

147 The term *Familiar compositions* refers to the compositions which are known from before and are recognized as such.

148 Gustav Theodor Fechner (1801-1887), German philosopher, physicist and experimental psychologist. Truax refers to his book Elements of Psychophysics (1865).

As one of the hypotheses of this work is that makams have a healing effect, in the continuation of this paper the foreign research studies on how frequencies affect the brain stimuli will be shown.

What is known today is that the overtones are sufficient to determine the pitch of the fundamental frequency and our auditory system determines it and allows us to perceive it. This comes from the fact that the difference between the frequencies of the various harmonics is equal to the fundamental frequency (e.g., 792-528=264 – fundamental frequency (middle C)). It is the right temporal lobe that makes this periodicity pitch discrimination (Kolb & Whishaw, 1996: 294).

Many studies have been conducted on how the brain responds to stimuli. An interesting one was one of the first works by Wang (1977) who researched the effects of pitch interval on brainwave amplitude, where the 165, 220, 294, 392 and 523 Hz were chosen as pitch reference and with this the EEG waves of subjects were measured in 4 different level of difficulties of a task. The connection of these frequencies with the Delta, Theta, Alpha, Beta and Gama band and accordingly, the results on the brain response to this stimulus implicated that it can show a deeper insight into the aesthetic nature of music.[149] It is interesting to follow the research which investigated how the brain responds to music stimuli with musicians, which can be a controlled group in terms of the fact that they are strongly exposed to sound and music in research studying music and the brain. Following this idea, the recent research done by Krishnan (2018) suggests that a musician's brain connects physical movements associated with creating that music (a guitarist's brain responded more to listening to guitar music by activating the region which controls the hand movements) which showed that music can affect the mental process, as listening to music increases activity in the brain area involved in language, allowing music to be used for speech and language therapy.

But what is it that actually heals? Is it the melody? Is it the rhythm? Is it the sound of a specific instrument? Does it have a connection with the cultural context that the patient comes from? Is it applicable only with people whose ear and musical taste is used to the makams? Or can it be

[149] For further information see Wang (1977: 150-164).

used also on people from other ethnic groups? We will try to give answers to these questions in the conclusion.

The use of cognitive, behavioral and supportive therapies in music therapy with the arrangement of musical activities in the context of occupational therapy has made music therapy becoming a more inclusive method. The data obtained from the recent years of music and brain research suggest that music can also be effective in the biological sense. The number of scientific studies showing positive effects of music on physiological phenomena such as blood pressure, rhythm and quality of respiration, pulse count etc. and hormones involved in the development of psychiatric disorders such as serotonin, norepinephrine, dopamine, melatonin, cortisol, adrenaline and testosterone has been steadily increasing (Çoban, 2005: 31).

There is numerous research[150] conducted over the last 20 years, showing the benefits of music therapy on patients with various illnesses. Among the published studies regarding music therapy in Turkey, some of them were made on hospitalized patients.[151] A large number of publications has also been issued on the history of music therapy.[152] Music therapy has been more and more discussed, even in the context of comparing the European and world music therapy traditions (Güvenç, 1985; Ak, 1997; Doğan, 2006).[153]

Together with traditional forms used extensively in the context of music therapy, there is research indicating that today, especially in Turkey, treatment is also performed by using Turkish folk and pop music which is also based on various makams (Arslan, Özer and Özyurt, 2008: 46-54). While there is better understanding of the influence of music on human life and health by the day, there are also many unknown facts about the subject. Looking at the results

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150 See additional literature regarding music therapy research in the bibliography, p. 202

151 For research regarding music therapy in Turkey see Özçevik, 2007; Aslan, Özerand Özyurt, 2008: 46-54; Giray, 2008; Şengül, 2008; Koç, et al, 2009: 366-373; Tanrıöver, 2010; Vizeli, 2010; Araç, 2012; İmseytoğlu and Yıldız, 2012: 160-165; Sezer, 2012: 423-427; Bekiroğlu, et al. 2013: 147-154; Polat et al. 2013: 189-192; Kurt, 2014.

152 Regarding research on music therapy history see Yiğitbaş, 1972; Grebene, 1978; Güvenç, 1985; Ak, 1997; Somakçı, 2003: 131-140; Çoban, 2005; Örter, 2005; Gençel, 2006: 697-706; Karahan, 2006. There are without any doubt numerous studies regarding this subject, but not all of them can be presented here.

153 Today's music therapy is not considered as just a treatment connected to Turkish music and the East. In Turkey, the most important name today regarding the promotion and use of music treatment is TÜMATA (Türk Musikisini Araştırma ve Tanıtma Grubu – "Group for the research and promotion of Turkish Music"— www.tumata.com), founded by Rahmi Oruç Güvenç. They regularly organize seminars to educate and enlighten people in this field, and to popularize and induce the usage of makams worldwide.

of patient observations it is certain that music is effective in the healing process. However, it is still a secret how music achieves this. This subject is not only about the culture of music or its history, but it concerns very different and complex disciplines, such as mathematics and physics. Some of those were elaborated in the previous subparagraph and will be discussed in more detail in the Chapter 3 and 4.

For the purposes of this work it was necessary to consult and include the literature concerning customs and religious beliefs for the context of healing benefits of music.

It is important to make the distinguish from the cure. As Chez and Jonas (1997) emphasized: "A cure is an externally applied medical intervention that removes all evidences of the diagnosed disease. Healing is an internal process of recovery that takes place on the physical, emotional, mental or spiritual level and results in the person's having a séance of being completely in balance or harmony with self and surroundings"[154].

As for healing, Koen (2009: 4) states that musical healing is practiced within the context of broader belief systems and religions which often function as holistic entities.
Prayer as a healing method can be seen also in many cultures (Javaheri, 2008: 173; Koen, 2009: 59-91). The text from the holy books is performed through singing, which has its own rules, according to each religion. Generally, texts are sung during the ceremony, in order to glorify and accentuate even more the beauty of the text to please the Creator.
Hafiz Alili (2016) [155] explained that The Holy book of the Qur'an is originally written in Arabic and is always recited in Arabic to preserve the holy text which includes the melodiousness of the language. The *hafizes*[156] are taught the proper way of performing, which is learned through the *tecvid* [157]. The melody which is used in reciting the holy text of Qur'an is improvised by the hafiz, in the frames of one makam scale, and the general rule is that the melody should be

154 Javaheri, 2006:176 as in Chez and Jonas, 1997: 1157.

155 Explanations of the usage of makams were obtained in the lecture "Melodiousness of the Qur'an", held by mr.sc. k. hfz. Aziz Alili from the Croatian Islamic Community as part of the scientific project Religiophony at the Music Academy Zagreb on 6 April 2016. The information which the hafiz gave during this lecture is important for understanding how the makams are used in the religious everyday life of the Muslim community, and therefore, how they influence one's being through music which they listen to five times a day. This information was not found in the sources which were researched.

156 Hafiz – a term used by Muslims for people who have completely memorized the Qur'an.

157 Tecvid as word is used in Turkish; in Arabic it is written as *tajwid*. It refers to the rules governing the pronunciation during the recitation of the Qur'an.

through three octaves in four makams (for the entire holy book). As the holy book of the Qur'an is divided into *suras*, and suras into *ayets*, it could be said that each sura has a certain number of strophes, and the melody is performed accordingly. Makams which are used are the **Rast** makam which is soft in the intervals and peaceful in sound and is used in the text referring to the family, meaning and the appeal. The **Nihavend** makam is also soft and refers to the part which talks about the graces in heaven. For the **Saba** makam unfortunately, there were no details given. The **Hicaz** makam is used for the part of the text which refers to the non-believers, and for the people who are not honest, and their hearts are ill. As for the *ezan*[158] which is five times per day, different makams are used as well, from these proscribed four, depending on the part of the text which is recited and depending on the part of the day when it is performed. Besides them, the **Beyati** makam is the most common one and is used for the **ilahi** songs[159]. Also, the **Acem** makam is used, whose name originally means "foreign" and the word comes from India.

Nevertheless, ideas regarding music treatment can be found in other holy books. In verse 16-23 of chapter 16 of the 1st Book of Samuel (in the Old Testament) the following explanation can be read:

> *Whenever the evil spirit from God bothered Saul, David would play his harp. Saul would relax and feel better, and the evil spirit would go away*. (I Sam 16,16-16,23)[160]

In the notes of the translator into Croatian, Bonaventura Duda, he says: *Music was, in all its antiquity, used to raise good spirit (cf. 10,5), or to chase away evil spirits*. (Biblija, 2014: 312). In the Bible, verse 10,5 says:

> *Next, go to Gibeah, where the Philistines have an army camp. As you're going into the town, you'll meet a group of prophets coming down from the place of worship. They'll be going along prophesying while others are walking in front of them, playing small harps, small drums, and flutes. The Spirit of the Lord will suddenly take control of you. You'll become a different person and start prophesying right along with them*. (Biblija 2014: 300)

158 Ezan – call for prayer.

159 Also known under the term *nashid* – religious songs which refer to history, religion and beliefs. (Alili, 2016).

160 Jeruzalemska Biblija, ed. Rebić A, Fučak J, Duda B, Kršćanska sadašnjost, Zagreb, 2014: 300, 312).

The founder of the Sufi order in the West, Hazrat Inayat Khan (1882-1925)[161], a musician and a teacher of the Sufi tradition in the West, in one of his lectures[162] regarding Sufi messages on the *experience of those who dive deep into life and touch the depth within* quoted a verse by Persian poet Hafez who said: *It is not known how far the destination is, but so much I know: that music from afar is coming to my ears*. Khan elaborates this idea: *The music of the spheres, according to the point of view of the mystic, is like the lighthouse in the port that one sees in the sea, which promises him coming nearer to the destination.* In the metaphysical sense, Khan discusses the harmony of life and the path to its achievement, pointing out that the *harmony of the whole universe sums up in a perfect music*, and concludes with this idea: *Therefore, music, which is the source of creation, music which is found towards the goal of creation, is the music of the spheres, and is heard and enjoyed by those who touch the very depth of their own lives (Khan, 1996: 271).* In Khan's idea and teachings, music is the source of creation, and the Word which was first in Creation (and as such mentioned in all Holy Books), is a sound.

According to McClellan (2000: 161), the spiritual effect of music is cumulative, and our mental concentration is focused as long as one is "exposed" to music as the vibration of the sounds resonate with our physical organism. However, the effect is short, but if listening is focused on repetition of one type of music, it strengthens the effect and may result in a permanent change within a person. As music influences the state of one's spiritual health and vitality of the soul's energy, if the spirit and soul are in harmony and balance, one will be less susceptible to illness and negative thoughts. The inner vibration created by the energy of music harmonizes us spiritually and as such is the deepest source of the healing potential of music. *In terms of the spirit – we are what we hear*.

What is known from pre-Islamic sources, in the works of Ebu Nasr Farabi (al-Farabi), Ibn Sina and al-Kindi, there is a description of some of the most used makams in that time, and which makam is good for what.

Al-Kindi (801-873) in his book *Risala fi ajzd khabariyya fi'l-mausq* shows music as a cosmic ingredient, which corresponds to the harmony of the spheres (Farmer, 1926: 98). Croatian

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161 For more information see Mihlar (2018: 276-281) Hazrat Inayat Khan. In: Kassam Z.R., Greenberg Y.K., Bagli J. (eds) Islam, Judaism, and Zoroastrianism. Encyclopedia of Indian Religions. Springer, Dordrecht

162 Hazrat Inayat Khan's works were published in several books as Sayings and Lectures on Sufism. The idea quoted here is from the book Complete Works of Pir-O-Murshid Hazrat Inayat Khan. Original Texts: Lectures on Sufism. 1922 II: September-December; 271.

renaissance music theorists from the 15th and 16th century Federik Grisogno-Bartolačić and Pavao Skalić also discussed about the Pythagorean cosmology and music of the spheres.[163]

String of the Lute.	Bamm (A string).	Mathlath (D string).	Mathnā (G string).	Zīr (C string).
Rhythm.	Hazaj, ramal *and* khafīf.	Thaqīl al-mumtad.	Thaqīl awwal *and* thaqīl thānī.	Mākhūrī.
Quarter of the Zodiac.	Capricornus to Pisces.	Libra to Sagittarius.	Aries to Gemini.	Cancer to Virgo.
Element.	Water.	Earth.	Air.	Fire.
Wind.	West.	North.	East.	South.
Season.	Winter.	Autumn.	Spring.	Summer.
Quarter of the Month.	21st to last. day.	14th to 21st day.	1st to 7th day.	7th to 14th day.
Quarter of the Day.	Midnight to Sunrise.	Sunset to Midnight.	Sunrise to Mid-day.	Mid-day to Sunset.
Humour.	Phlegm.	(Black Bile)	Blood.	Yellow Bile.
Quarter of Life.	Old Age.	Middle Age.	Infancy.	Youth.
Faculty of the Soul.	Masculine.	Preserving.	Fantastic (*Fantāsiyya*).	Thinking.
Faculty of the Body.	Resisting.	Prehensile.	Assimilative (*lit.* Digestive)	Attractive.
External Actions.	Mildness.	Goodness.	Intellect.	Courage.

Table 5 From al-Kindi's book, in Farmer (1926: 98)

163 For more information see Tuksar (1980).

The written resources from the 8th century onward show the tradition of music as therapy in Islamic culture, especially in the works of al-Farabi in his work *Musiqi-al-kitab*.

Table 6 List of some makams and their benefits according to al-Farabi[164]

Buselik	Gives power-force	Effective at early morning, i.e. 45 minutes after sunrise
Buzurk	Raises the sense of	Effective in the late evening
Hicaz	Brings person humility	Effective at afternoon
Hüseyni	Gives peace, calmness and comfort	Effective at morning
Isfahan	Gives person mobility and a sense of confidence	Effective at sunset
Irak		Effective in the evening
Kuçek makamı	Gives sadness, sorrow and grief	
Neva	Gives a sense of pleasure and contentment	Effective in the evening
Nihavend	Good for liver	To be played at dawn
Rast	Gives person feeling of joy and peace	Effective at time between morning and noon
Rehavı	Gives mankind the idea of eternity	Effective in the time of fake morning
Saba	Gives courage and strength	
Uşşak	Gives you laugh	Effective at noon
Zirgüle	Gives you sleep	Effective between morning and noon
Zirefkend		Effective during sleep

Based on the information from researched articles and books, the following table shows the cross reference of the makams from the theorists until today.

164 Data retrieved from Çoban (2005: 45-46).

Table 7 Cross reference of makams and their influence from the sources (the makams and their healing aspects according to different authors in history)

	Al-Farabi (870-950) **	Al-Farabi- effects on the soul **	Safiyüddin Urmevi (13th century) **	Hekimbaşı Gevrekzade Hasan Efendi (18th century) *	Different Turkish doctors	Tümata
Makam	time when effective	brings a person	time of day to ease the soul and bring comfort:	effective in the treatment of	influence on emotions	zodiac, sign, group, planet
Rast	early morning	happiness and comfort	late morning	paralysis, children's nightmares		Aries
Rehavi	pre-dawn	idea of eternity	shortly before sunrise	all headaches, nosebleed, paralysis and phlegmatic diseases	weeping	Libra, water, connection with Leo, sun, Sundays
Kuçek		sadness and anguish				
Büzürk	late evening	fear	late evening	brain and cramps, eliminates fatigue		Leo, fire, sun
Isfahan	dusk	capacity of action, sense of security	sunset	clears the mind and protects from cold and fevers		Gemini (Cancer), air,
Neva	evening	pleasure and contentment	the evening	children who have reached puberty, pains of the hips, brings joy to the heart	bravery	Aquarius, air, Saturn
Uşşak	noon	feeling of laughter		foot pain and insomnia	laughter	Pisces, water, Jupiter
Zirgüle /Zengüle	toward noon	sleep	at noon	heart and brain disease, meningitis, heartburn, fevers of the liver /	sleep	
Saba	dawn	Bravery, courage power and contentment				
Buselik	mid-morning	strength		pains in the hips and		

				head, eye diseases		
Hüseyni	dawn	serenity, ease	dawn	liver and heart disease, seizures and hidden fevers	beauty	Scorpio
Hicaz	afternoon	humility	mid-afternoon	diseases of the urinary tract / bones	humility	Sagittarius
Irak	late afternoon		late afternoon	childhood meningitis	pleasure and relish	Taurus, earth, Venus
Zirefgend	during sleep time		night	stroke and backache, fosters a sense of strength		Cancer, water, Mercury
Segah	between mid-morning and mid afternoon	revitalizes the heart				water and earth
Acemaşiran		creativity and infinity		helps labor, pain		fire
Zengüle	after dusk			hip joints, inner side of the legs, brain, heart disorders		Virgo (Libra), earth, Venus
Nihavent-pentatonic	afternoon			blood circulation, abdominal area, impact on mental disorders		Capricorn (Sagittarius), earth-fire, Saturn Jupiter
	* AK (2006: 146-148)			** Somakçı (2003: 134-135)		

Table 7 shows the cross reference of different scholars, authors and makams from the 9th century until today. The effectiveness of when a certain makam should be played in order to have the effect on the listener, the effects on the soul (according to al-Farabi) describing how person will feel after the treatment, the time of day to ease the soul and bring comfort (which is similar to but more specific than in the column of effectiveness), effectiveness on specific illnesses and problems (the two columns are showed because from various sources; different contemporary Turkish doctors mentioned some remedies which were different from other scholars), and zodiac sign correspondence to specific makams. The connection with zodiac signs can be explained and understood from the astrological settings and harmony of the spheres which is

present in the ideas of Pythagoras[165] and al-Kindi. The explanation is in the philosophical and natural science system as seen in al-Farabi's Metaphysics and Aristotle's metaphysics and natural science philosophy,

It is not clear how scholars came to see that certain makams are effective at a certain period of the day, probably by experiment and observation, by scientific methods applicable in other sciences, known as the "Greek sciences".

The Anatolian period has few written documents, but there is a belief that music therapy was conducted in the hospitals with an architectural construction for these purposes. As water was also an important element in the Islamic tradition, the usage of water in the fountain, which is located centered in the middle of the central space in hospitals (Divriği Şifaiye, Edirne Şifaiye), across the podium on which the musicians were positioned, signals that water was most certainly part of the treatment, probably as an additional sound. All these elements create a positive soundscape for the visitors/patients and are beneficial in treatments within hospitals. This information brought up the idea to research what the healing part of the makams is.

Many scholars such as al-Kindi, al-Farabi, Safiyüddin Urmevi and Evliya Çelebi mentioned different instruments which were in use for healing purposes. The most common ones will be presented in the following subparagraph.

2.2. Instruments

As Minsky (1981)[166] pointed out, musical instruments refine the sound of nature into a powerful form of human expression. Several instruments will be shown as the most commonly used in the Seljuk period.

Farmer (1936: 2) states that Evliya Çelebi during his travels wrote a book on travel, which was translated and published in London in 1846-1850 under the name *"Narrative of Travels in Europe, Asia and Africa in the Seventeenth Century by Evliya Efendi" (*in the original *"Siyaha nama")*. Farmer claims that these trips started in 1636 as prior to that time Çelebi was at the court where he was a *musahib*[167] and was learning about music for two years. The book contains

165 As McClellan (2000: 114-115) pointed out, Pythagoras believed in a universal law of harmony based on numerical relations that controlled the heavenly bodies, the law of music and the inner world of human beings, both physical and mental.

166 Minsky, 1981 in Truax, 1984: 43.

167 Musahib – a companion of sultan.

two sections on musical instruments, and a reference elsewhere about them. Farmer was a contemporary of Rauf Yekta Bey[168], so his articles have a solid foundation from the Turkish theorists of the early 20th century. In Çelebi's book there are two chapters, one about the makers of instruments and a second one about the players of the instruments. Farmer continues: *"Here we have not only the most exhaustive list of Turkish instruments of music (...) but a complete census of both the makers and players based directly upon the Awsaf kustantaniya ('Praises of Constantinople'), a description of the city made in the year 1638(...) by order of the sultan, which includes an account of every professional and trade guild, as well as every building in the city".*[169]

The oldest melodic instruments used in Turkey, according to Farmer (1936: 16, 17, 35) are the qawal (rustic flute), ney (nay or nai), ud, awzan, kemençe and bağlama.

The Ney is a reed flute played especially in Mevlevi (Sufi) music (Farmer, 1936: 17; Sezer, 2012: 423 as in Gölpınarlı, 2009). According to the Mevlana philosophy, the Ney music makes people feel at ease and closer to God (Sezer, 2012: 423 as in Yöndemli, 1997).
The ancient Greeks mentioned the sound of the reed flute which was generally accepted among the Islamic musicians and was used as music therapy for mental diseases in the hospitals throughout the Anatolian plateau (Schimmel, 1993: 211). Studies revealed that Sufi music had a positive influence on decreasing anxiety (Sezer, 2012: 424 as in Güvenç, 1985) and the cognitive process (Sezer, 2012: 424 as in Arıkan and Dilek, 1996).

168 Rauf Yekta Bey (1871-1935) was the first Turkish musician to write about traditional music in modern times in a European language. His lengthy article in the Lavignac Encyclopedia (1921) places emphasis on intervals, modes and rhythms, and quotes some 73 musical examples. This can be considered as the most authoritative source on Turkish music in a European language (Signell, 2008: 7).

169 For a more detailed description on the musicians and instruments and how they functioned in an organized system at that time see Farmer (1936: 1-43).

Figure 51 Ney player[170]

Farmer gives a detailed descriptions from various sources (Çelebi, Ibn Ghaibi, Rauf Yekta Bey, Meninski and others), among which he mention an instrument called the *awzan* (instrument of the lute class), stating that it was particularly used to accompany Turkish tales in verse and prose, as well as for Turkish songs with the Mamluk sultans of Egypt (Farmer, 1936: 35).[171]

Figure 52 Ney player (from Qusayr Amra, Jordan, Umayyad[172] period, 710 AD, photo by Bülent İŞLER)

170 Taken from https://i.pinimg.com/originals/05/f5/82/05f582e3e68193719be98e2924c13f61.png accessed on 02.02.2017.

171 Farmer here offers Al-Maqrizi (i, i, 136) as a source, stating that Quatremere wrongly identified the awzan as "tambour".

172 The Umayyad period in Turkish is referred to as Emeviler Halifeliği.

Another instrument of interest is the *ud* (Arabian lute). In the correspondence between Farmer and Yekta, Yekta states: *"A Turkish writer on music, Ahmad Ughlu Shukrallah (fifteenth century), describes a five-stringed ud of the Turks, giving a curious design of the instrument. See Lavignac, op.cit., 3012"*[173] As Gorini (2007: 17) mentioned, the ud symbolizes the earthly world and its sound is considered to represent the four elements. The ud differed from the qupuz in that it was made entirely of wood, the parallel neck being distinct from the body. The head was generally at a right angle to the neck. By the end of the 18th century it had practically disappeared from use, according to Çelebi (1936: 39,40).

Figure 53 Ud (oud)

Figure 54 Musician playing the ud (from Kubadabad, Seljuk palace, depiction of musician on tiles, Arık, 2000) [174]

[173] Here Rauf Yekta Bey refers to his contribution to Lavignac (1920: 3012).

[174] Photo from the book Rüçhan, Arık. *Kubad Abad*. Selçuklu Saray ve Çinileri, İş Bankası Yayınları, İstanbul 2000, fig. 6 Ud çalan müzisyen.

From Çelebi we learn that the inventor of the *kemençe* (violin) was Abdullah Faryabi, and that in the fourth year of Hicra (8th century AD) at Imam Hassan's birth, Gabriel brought from heaven the verse prohibiting wine: "Wine, dice, and games of chance, are the Devil's actions". At this time, musical instruments were considered as forbidden as was wine; permission was however given for trumpets, drums and half-drums, flutes and violins, to be played for kings. Philosophers say that music gives the last polish to the soul (Çelebi, 1835: 234). Farmer states that the kemençe's name was rabab, and was played by Solomon, but perfected by Faryabi and that it has three strings. He also states that before the time of the Prophet Muhammad (d. 632) it was considered a lawful instrument. Yekta responds to him that the modern instrument is called the kamancha (kemençe, op.a.) (Farmer, 1936: 41).

Figure 55 Rebab and kemençe

Another string instrument is the bağlama which evolved from the saz and kopuz, but today is also interchangeably called the saz. It is a very commonly used instrument, along with the ney. It has 7 strings in 2-2-3 pairs, and because of the many frets it is used as a microtonal instrument, tempered in just intonation.

Figure 56 Bağlama

In the Multimedia Encyclopedia of Turkish Classical Music there is a chapter on diapason (ahenk/akort) in Turkish music, which also explains the *ney* as an instrument.

"An important attribute of pitches in Turkish music is that they are relative, rather than having an absolute frequency value. When musicians perform a work, they modify the pitch frequencies according to the diapason in use. This practice of playing in various frequency regions from the same notation is called göçürüm (transposition). Virtually all of the Turkish music instruments except the ney can be re-tuned to play in a different diapason. A neyzen (ney performer) picks the ney manufactured in the appropriate diapason (similar to the various key-transposing clarinets in Western music) as needed. The performers of the other instruments either re-tune their instruments or transpose the notation mentally on the fly. There are 12 types of diapasons in an octave, and therefore 12 types of ney in Turkish music. As the diapason targets a lower pitch, the length of the ney has to increase, which constitutes the physical limit of ney design. A special type of ney, called nisfiye (lit. "half"), produces pitches an octave higher than a regular ney. Most of today's Turkish music practice is in one of four diapasons".

Sezer (2012: 426) states that in history, the ney was used to treat psychiatric patients (Arıkan and Dilek, 1996). Studies revealed that Sufi music had a positive influence on decreasing anxiety (Güvenc, 1985) and cognitive processes (Arıkan and Dilek, 1996).

Except for the ney, all of the other mentioned instruments are mainly string ones, which allows the musician to tune them in just intonation so they can be adjusted for a specific makam.

Because of the narrow field of specialization of this work, another crucial problem is the fact that even though there have been many articles written on this subject, many still do not know about Turkish music and the history of music therapy. All articles relating to this subject use data from a few similar publications and the same data has been causing a "data mass". One of the aims of this work is to summarize the information known so far, and through the analysis and conclusions give a new perspective on the medieval Turkish music, history of Turkish music therapy and healing effectiveness of the makams within the Seljuk hospitals.

3. MAKAMS

3.1. History of makams

As mentioned before in Chapter 2.1., Turkish music history has roots in the first written examples of notation which date to Safiyüddin Urmevi in the 13th century (Arnold and Guillaume, 1931: 366). The makams as a form were and are used in the Arabic world, as well as in Turkey and India with some differences, especially in the forming of the scales.[175] Urmevi developed a 17 tone-series system, consisting of 24 and 90 cent intervals, which was in use until the beginning of the 20th century (Antić, 1974: 616).

The Altai Turks are the foundation of the pre-Islamic Turkish culture, which is known for shamans who performed treatments of patients during religious ceremonies by playing the drum. In the shamanic healing rituals, as stated by McClellan, there are always three participants: the patient, the shaman and the spirit with whom the shaman communes. Music is used to assist the patient in obtaining concentration of mind and body and to intensify his will to recover and attain physical well-being. Each sound can be the object of attention through concentration which can be focused on the changing process (McClellan, 2000: 100, 162). During the Old Turkish period, the Gök Turks increased the number of the tones which were previously used in Turkish Music. The Uygur Turks separated music by the performance venue (palace, city, folk and village music), while the Karakhanids used music for religious purposes. During the Ghaznavid period there was immense interaction with other music cultures. As Şenses (2013: 3) points out, with the establishing of the Rum Sultanate in 1078, Turkish music became one of the most widespread in the world, influenced also by the music played in the Byzantine palace through which many different makams were embraced. The development of Sufism in the 12th century also contributed to the development of music which was played to worship God and to achieve closeness and completeness with God. Through Semâ rituals and Baksi dances, which were also built on makam scales, the dervishes spread the idea of oneness and connection with the Creator and also used them to help people in need when (mostly) mental health was in question (Mevlana Celaleddin Rumi).[176]

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[175] Researching the literature on makams, the author observed through the notes and systems that there is a difference not only in the building of the makam scales, but also in the naming of each tone (Arabic musical alphabet differs from the Turkish one). Therefore, focus stayed on the Turkish makams, to avoid misinterpretation and confusion. For more information regarding the makams in existence since the 13th century and the turning points see Levendoğlu (2004: 131-138).

[176] http://mevlana.net/sema.html retrieved on 17.12.2015.

As Farmer (1926) analyzed Turkish and Arabic sources from the 8th century onwards, he stated that first theoretical written sources date back to the 8th and 9th century, in the work of Ibn Sina (Kitab Al-siyasa) and al-Farabi, in which makams and their connections with therapeutic qualities were explained (Farmer, 1926: 109).

On the pronunciation and writing of the name "makam", Tarikci (2010: 8) states that it depends on the different geographical regions, as it covers a very large and multicultural area. In Turkey, the word used is *makam*, in Azerbaijan *mugam*, in Uzbekistan *shash-maqam*, in Iran *dastgah* and in the Arab world *maqam*. Regarding the different regions, there is also a slight difference in building the scales, between the Arab world and Turkey. Observing the book on makams (Muallem, 2010) which originated in the Arabic world, the author of this work discovered that makam scales are differently called and built, in comparison with the Turkish makam scales.

In the Multimedia Encyclopedia of Turkish Classical Music/Turkish Art Music and Turkish Folk Music the definition of makam is: *A maqam is a melodic texture consisting of specific tonal segments, progressions, directionality, temporary stops, tonal centers and cadences. A maqam may consist of more than one scale*. While in the Western classical music theory the octave is divided into 12 pitches, in Turkish music an octave can be divided into more than 12, and the suggested number is between 17 and 79 (Şentürk, 2011: 4).

Signell (2008: 33) gives a list of "basic scales" according to the Arel-Ezgi theory: Çargah, Puselik, Kürdi, Rast, Uşşak, Hüseyni, Neva, Hicaz, Hümayun, Uzzal, Zengüle, Karcığar and Suzinak. He states that *a basic scale has been defined by Arel as one made up of a 'basic' tetrachord and a 'basic' pentachord. These scales are shown as one octave in compass; some have a tetrachord below and a pentachord above, others, the reverse. There are thirteen such 'basic' makams according to Arel* [177] (Signell, 2008: 33).

[177] The Arel-Ezgi system was established during the period of the Turkish Republic. The new stream known as the Turkish Fivesome were composers who interpreted Turkish music according to the Western style, producing new pieces (Şenses, 2013: 3).

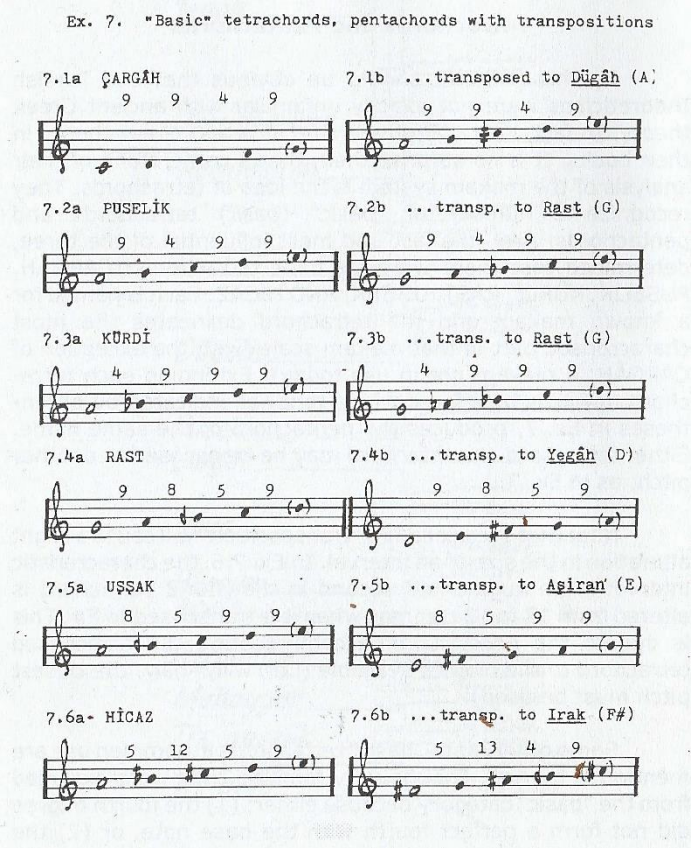

Figure 57 List of basic scales (Signell, 2008: 33)

Many ethnomusicologists evaluated the makam within its own culture and defined it as *motivic groups, melodic patterns* and *melody-models* (Yöre, 2012: 274).[178]

In the following Chapters 3.2. and 3.3. the intervallic structure of makams and the construction of the makam scale will be explained, but for elaborating the first hypothesis and how the makams were generally overviewed in this work, the types of intervals will be explained by sounding.

There are two types of intervals by sounding. One is the melodic interval and the other is the harmonic interval. Also, to understand makams, the horizontal and vertical sounding in a time span must be taken into consideration. In this work sounding is observed as such, simultaneously horizontal and vertical sounding of makams and their frequencies. All this forms an overall sound image, the soundscape.

The melodic interval is sounding within a melody; tone after tone makes an interval which is measurable.

[178] For detailed descriptions on features of the makams see Yöre (2012: 282-283).

The harmonic interval consists of two tones, one above the other in sounding, which means they sound simultaneously and make a vertical interval in sounding. Such simultaneous intervals are concurrent intervals within a harmonic series. This means that the intervals within a harmonic series are harmonic partials.

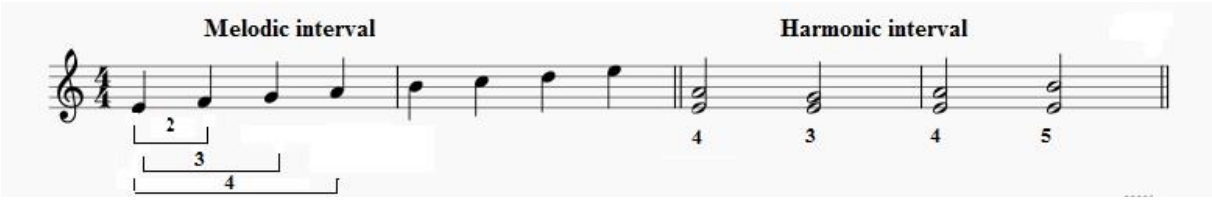

Figure 58 Melodic and harmonic interval (Diagram by I. Mihaljinec).

In this work overtones are mentioned, tones within harmonic series, melodic intervals within makams, vertical harmonic intervals which are accompaniment of the makam. The research which was conducted refers to the harmonic interval of the fourth and fifth because it is the ostinato which follows the melodic makam.[179]

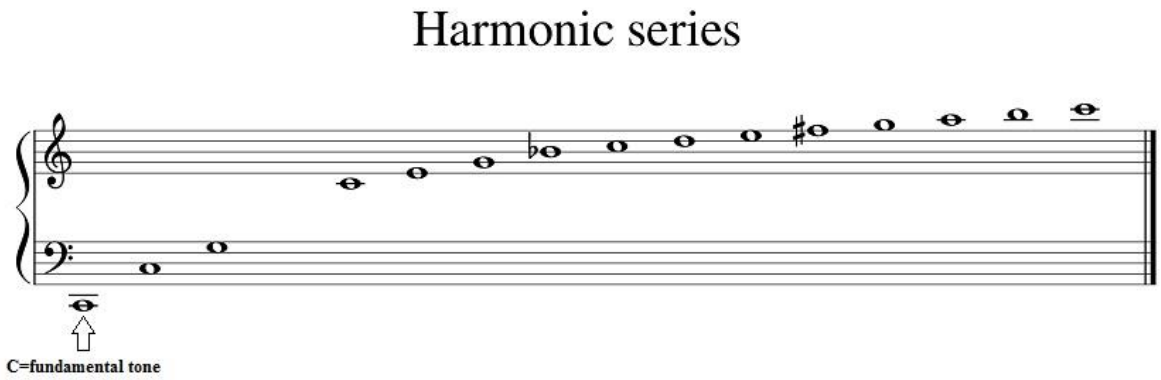

Figure 59 Representation of harmonic series from the fundamental tone (Diagram by I. Mihaljinec)

Each sounding tone in the makam melody has its own harmonic series. Respectively, each sounding tone in the accompaniment has its own harmonic series. Harmonic series give color

[179] The harmonic series are considered as integers since most of the used instruments are string or wind instruments with a determined range span. For more information regarding this subject see Šćekić (2013).

to each tone. When all these tones sound together within one soundscape, it gives a specific sound color to a sound event. This is also the makam, as a whole.

One is the makam which commonly sounds within a venue. This is the makam as a whole, as a sound space. The other is the makam as a tone scale and accompaniment which follows in the performance. This in the accompaniment completing the sound image, but the ostinato which occurs in the accompaniment is what supports the soundscape and heals because it is the constant sound. Our brain perceives this constant sound as one frequency which is constant.

Each melody has a functional spot where it stops, and in 90% of the case it is the first or fifth degree, the tones on which the melody starts and stops.

An example could be like this: when the melody stops on "D", a harmonic series in the vertical again has a "G" and "D". They will sound simultaneously vertically in that moment, then the melody will continue and stop on the "G", and vertically will sound the harmonic series of the "G".

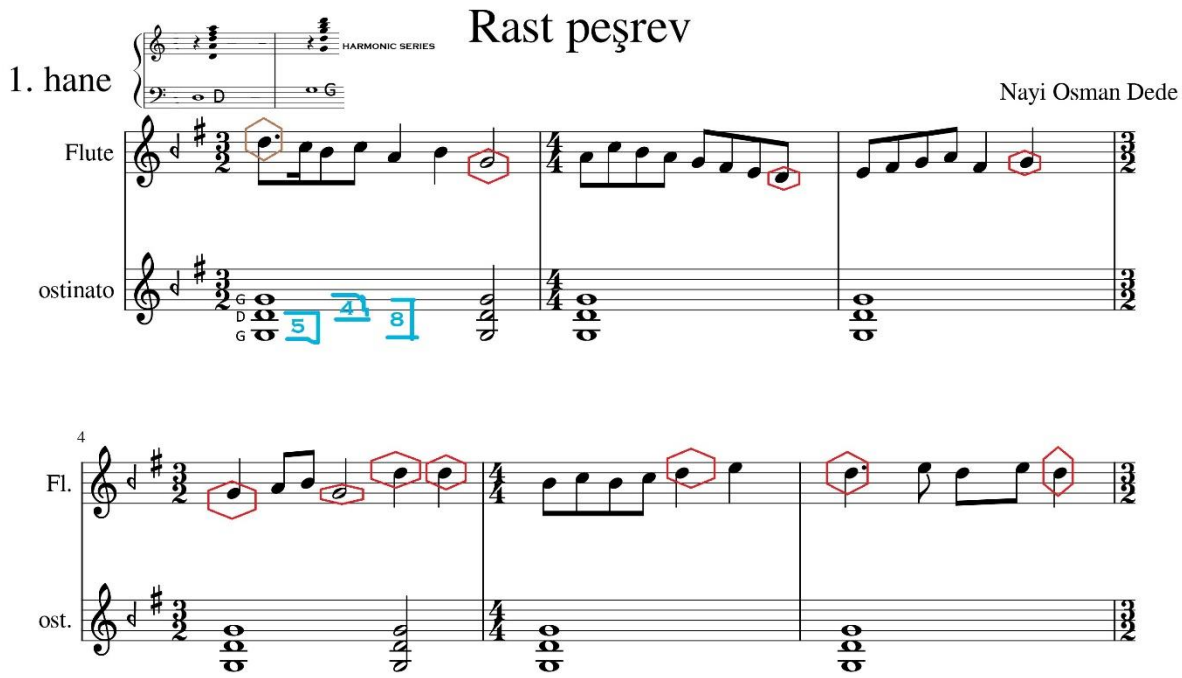

Figure 60 Example from one of the analyzed makams with ostinato and overtones (created by I. Mihaljinec)

The makam has been studied as a melody, not as a sound series but as perception of the whole sound. The focus of this thesis is on the vertical makam. In this work vertical division has been chosen because of the matching points in both the vertical and horizontal elements. This means that the fourths and fifths are simultaneous vertically but also as points within the makam, which again connect every now and then vertically.

3.2. The intervallic structure of makams

The makam interval scale system is in a non-tempered system, which means that the intervals between tones are divided in commas and cents. Musicologist and historian Alain Danielou (1958: 3) even mentions *limmas*[180], whereas in the tempered system they are divided in tones and semitones and Western music recognizes it as such. In Turkish music, one octave is divided into 24 unequal intervals, and the music is modal and monophonic[181].

The explanations of the makam system and notation were given through centuries by theorists Rauf Yekta Bey (1871-1935), the first of the modern Turkish theoreticians, Hüseyin Sâdeddin Arel (1880-1955) and Mehmed Suphi Ezgi (1869-1962)[182] who revised Yekta's system, while under the name Arel-Ezgi the scale system based on the 24-note system is in use from the 1930's onwards. Unfortunately, there are no critical studies in Turkish music history and no sources, which makes it hard to prove the old musical scores. Al-Farabi (d.950)[183] is mentioned as one of the first theorist who wrote about the philosophical principles of music (*Kitab al-Musiqa*), but unfortunately his book did not give any notated example of music. Therefore,

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180 In the work "The influence on music from Arabic sources" Farmer (1926: 33) also discusses limmas. The term of *limma* is given as an example for the microtonal calculations, but in this work, as well as in previous research, divisions into commas and cents were used. As Signell points out, *these microtonal differences between similar scales are the source of unending debate between practicing musicians* (Signell, 2008: 22). Even today discussion continues on the microtonal division of the tones among theorists such as Barış Bozkurt, Ozan Yarman, Metin Yılmaz and Kemal Karaosmanoğlu.

181 Monophonic — having a single unaccompanied melodic line (https://www.merriam-webster.com/dictionary/monophonic#h1)

182 Hüseyin Sâdeddin Arel (1880-1955) researched the Turkish musical system and history from many different angles and wrote theoretical works. He is one of the three musicians who explained the Turkish musical system in scientific terms, together with Rauf Yekta and Mehmed Suphi Ezgi (1869-1962). Ezgi was a Turkish music scholar, composer and one of the first theorists to attempt to place the tonal system of Turkish music on a scientific foundation. He transcribed pieces notated in the Hamparsun system into western notation, making them available to a wide audience. Eliminating certain deficiencies and errors in the Ebced, Hamparsun and western notation systems, he set the modern ground for music notation and music teaching. For more information see Ezgi, 1935; Arel, 1968; Signell, 2008.

183 Fârâbî (Ebû-Nasr Muhammed b. Muhammed b. Tarhan b. Uzluğ) (870 – December 950).

there is no evidence of an ancient instrumental piece which is occasionally played today and claimed as his. Unlike al-Farabi, Abdülkadir Meragi (d. 1435) used a cipher notation in his treatises on music *Jami al-Alhan, Maqasid al-Alhan, Kanz al-Tu.af* and *Sharh al-Adwar*[184].

Bozkurt (2010: 1049) explained that there are makams which are scales built from a specific set of tones (e.g. modes in Western music). In this work, by analyzing numerous recordings and sheet music of different makams, the following conclusions were reached. In order to investigate whether there are elements in the function of the healing effect and which ones, it is possible to start from the initial postulate that each makam has specific tones under which the melody is constructed. Those tones are the first, fifth and final tone of a specific makam[185]. The first tone of the makam is referred to as the *karar*[186], the fifth tone is referred to as the *güçlü*[187] and is considered the most prominent tonal center where the stops occur.[188] The final tone on which melody concludes is referred to as the *durak*[189], preceded by the leading tone *yeden*[190]. Makams can be observed in two ways. One is as a scale, and the other as a melodic progression. Some makams use the same scale, the difference is in which tone is emphasized. That tone is usually at the beginning of the melodic progression. Melodies are formed mostly from multiple consecutive tonal segments, and in Turkish music there are 20 specific segments defined.[191]

In the Multimedia Encyclopedia of Turkish Classical Music/Turkish Art Music and Turkish Folk Music the makam (there referred to as *maqam*) is explained as a *melodic texture consisting of specific tonal segments, progressions, directionality, temporary stops, tonal centers and cadences*. The explanation continues that a *makam can consist of more than one scale* and following the Arel-Ezgi system states that *each scale is made up of pitches that result from the division of the octave into 24 unequal intervals as well as pitches outside this system*. This

184 For further information on Meragi see Özcan (1988: 242-244).

185 The comparison with terms from the diatonic scale as tonic, subdominant and dominant can be drawn but in the diatonic scale these tones have functions while in makams the first and fifth tone are understood as tonal centers and their function is understood as in modal music.

186 *Karar* is a reference point which can be used to make a correction between makams.

187 *Güçlü* or dominant is taken as a concept from modal music. In addition, each makam has its own suspended cadence pitches. See Multimedia Encyclopedia.

188 The stops of the tonal center occur in varying lengths. See Multimedia Encyclopedia.

189 *Durak* as the final tone where makam concludes is in modal music knows as the finalis (Multimedia Encyclopedia).

190 Usually the leading tone occurs right before the finalis.

191 For more information see the Multimedia Encyclopedia.

points to the previously mentioned discussions among the scholars where the division of one octave can be up to 79 tones.

According to the Multimedia Encyclopedia of Turkish Music and Tarikci (2010: 62-63), there are three types of makams: The basic[192] makam, transposed[193] makam and compound[194] makam. For this work, this information is given for better understanding of the construction complexity of the makam scale. In the following Chapter 3.3. the construction of the basic makam scale will be shown.

Turkish Art Music, when considering the Middle Ages, includes the music played in the cities, towns and courts, while Turkish Folk Music includes the music played in the rural areas of the country. The traditions have the same essence despite differences in instruments, style and notation.[195] Regarding the forms, the distinction is on instrumental and vocal forms. For this work, interest was on the instrumental forms of makams for reasons of music therapy. The instrumental forms are called the *peşrev* and *saz semaisi* which will be explained in the Chapter 5.1.

The Multimedia Encyclopedia offers the following table for a better understanding of the difference between Turkish and Western solfeggio.

Table 8 Turkish and Western Solfeggio

Ra	Dü	Se	Ca	Ne	Hü	Ve
↕	↕	↕	↕	↕	↕	↕
Sol	La	Si	Do	Re	Mi	Fa(#)
G	A	B	C	D	E	F(#)

The western scale has a sol-la-si-do-re-mi-fa (#) solfege. The equivalent, according to the Turkish music encyclopedia is ra-dü-se-ca-ne-hü-ve which is g-a-b-c-d-e-f# in tones.

192 A basic makam includes a pentachord joined to the end of a tetrachord or vice versa, and the *güçlü* is the pitch on junction point. For more information see the Multimedia Encyclopedia.

193 A transposed makam is the same as the basic makam, but *karar* is at a different pitch.

194 A compound makam is a combination of two or more makam scale.

195 Multimedia Encyclopedia of Turkish Music

However, as the Turkish music system is a non-tempered system, where the scale is divided into 24 tones instead of 12 as in the tempered scale system used in the Western music, the full octave is shown below, with the full name of each tone. This is necessary to understand the structure of makams by the designated name as shown in the stave.

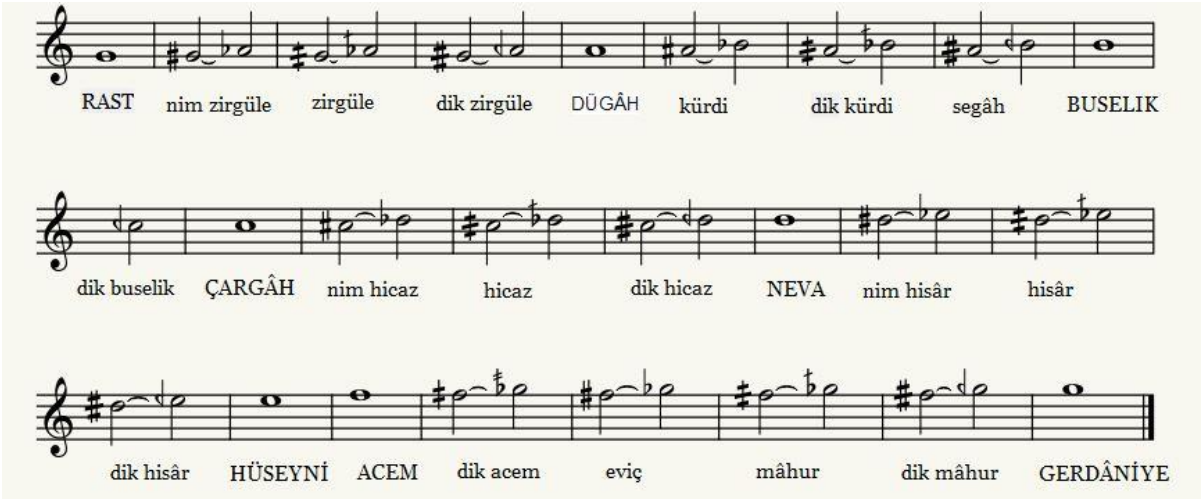

Figure 61 Turkish modal scale[196]

This Turkish modal scale figure was created in order to connect a certain tone with the makams name, which will be used in Chapter 5.1.

The "clear" full notes (o), without sharpening or flattening are written in capital letters, and are also used as the names of makams, whose construction will be shown in Chapter 3.3. The bars with semi notes (𝅗𝅥) represent the enharmonic equivalent of the same tone (depends whether it is written as a sharp (♯) or a flat (♭), but it sounds (almost) the same, the difference is in a few commas). [197]

There is as wealth of literature and discussions on the makams, and each of them provides insight into a certain part. The western scholars[198] who wrote about this subject gave their understanding of how the makams are built. The literature also shows that the Turkish way and the Arabic way of using makams are similar, yet different regarding the names and building of the "scales". On this point, let it be emphasized that today there are many lively ongoing

196 Created by the author of this work

197 Explanations are given in Multimedia Encyclopedia of Turkish Music. For some microtonal musicians, as stated by Tolgahan Çoğulu, microtonal guitarist, makams are considered to be between the scale type and fixed tune, a design for the melodic contour which is "spiced" with ordered progression of micro tonal intervals which are differentiated by commas.

198 Reinhard, 1972; Feldman, 1993; Zannos, 1994; Pacholczyk, 1996; Signell, 2008.

scholarly discussions about the division of the tones inside the makam scale. Here the division to 24 tones is mentioned, while scholars even discuss 96 tones within one scale[199]. But as the division into 24 tones is generally accepted and in use today (through the Arel-Ezgi system), the author decided to follow this.

3.3. Construction of the makam scale

As mentioned previously in this work, the basic makam consists of a pentachord joined to the end of a tetrachord or vice versa.[200] The pentachord is referred to as the *beşli* and tetrachord as the *dörtlü*. According to the Multimedia Encyclopedia tetrachords are the most fundamental building blocks of Turkish makam music.

As an example, we will show here the construction of the RAST makam.

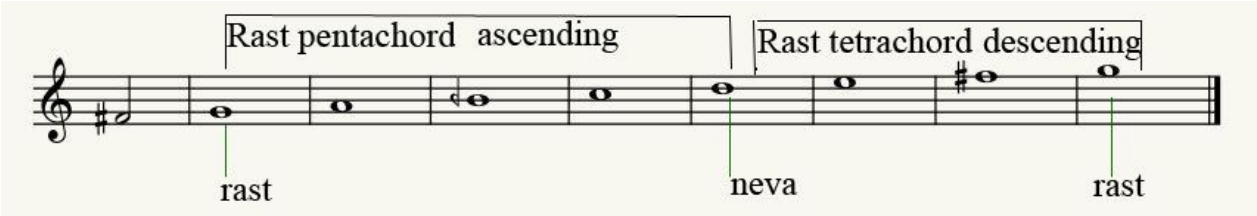

Figure 62 construction of the Rast makam

The author would like to emphasize one very important fact which is not clearly explained in any of the books or articles. The fundamental tone is the *rast* on which the pentachord in the ascending direction is built. The following tetrachord starts on the *neva* tone (which is also the dominant tone), but this tetrachord needs to be observed in the opposite direction, from the last tone to the first, in the descending direction. Only then can the meaning of the name *"rast tetrachord"* be understood.

One of the examples which confirms this claim is a description by Aydemir (Bozkurt et. All, 2014: 9 as in Aydemir, 2010): *The makam Rast has an ascending character and is performed*

199 For more information regarding the divisions of the scale see: Yarman, 2008; Yarman and Karaosmanoğlu (2014: 175-198); Akkoç (2002: 285–293); Bozkurt et al.,2009, 38(1): 45-70.

200 Multimedia Encyclopedia of Turkish Music

mainly within the low register of the scale. The scale extends below the tonic and descends as far as Yegah (D), using the rast tetrachord.

Another study conducted by Gündüz and Gündüz (2005) stated that according to Yilmaz (1994), makams can be fundamental, derived from fundamental ones, and composed from a partial combination of any two fundamental or derived makams which is similar to the afore mentioned idea in Tarikci and the Encyclopedia. This shows that scholars are following the same model and coming to the same or similar conclusion. The *buselik* and *rast* makams are fundamental ones, while *buselik* is the simplest one with no sharps or flats. The *nihavend* is obtained from the *buselik* by transposing the notes one step down. The *buselik* starts at A4 while the *nihavend* starts on G4.[201]

The melodic structure depends on the type of makam. For example, some makams, as modes, have a tendency to start on the second tone of the scale, with the strong center of the song around the fourth degree, while the accidental or lack of it on the seventh tone indicates the next tone will be up or down (the case of the leading tone in the harmonic minor scale in the West). But the closing is on the fundamental tone, and the tonal structure and interval ratios provide understanding which mode is in question. For every makam scale has specifically determined interval ratios.

For understanding the specificity of the makams and oriental music for this subject, it is interesting to include another perspective from musicologist, ethnologist and composer Abraham Zevi Idelsohn (1882-1938). In his book (1923), he describes the *Pentateuchal* mode, which is the basic mode in Jewish liturgy, used for reading the Torah. Idelsohn analyses the structure and follows the history of the modes stating, according to Frühwirth (1894: 36), that the *Pentateuchal mode is compared with the third Gregorian mode… While it is true that the rhythm of the Pentateuchal mode following the Oriental fashion is livelier than that of the*

[201] According to the International Standard Organization, the Standard tuning frequency /Standard musical pitch (ISO 16:1975) the range of the tones mentioned here, G4 and A4, are actually in the first octave. In the mentioned research, the authors calculate A1 as in the low octave, so A4 is in the mid-octave range. The International pitch notation according to the ISOb 16:175 defines the sub-contra octave from C0-B0 (16-30 Hz), contra octave from C1-B1 (32-60 Hz), great octave from C2-B2 (64-120 Hz), small octave from C3-B3 (128-241 Hz), mid-range (or one-line) octave from C4-B4 (256-483 Hz), high (or two -line) octave from C5-B5 (512-966 Hz), very high (or tree-line) octave from C6-B6 (1024-0933 Hz) and ultra-high (four-line) octave from C7-B7 (2048-3866 Hz). This International pitch notation use A4=440Hz as the reference frequency https://www.iso.org/standard/3601.html; http://www.flutopedia.com/octave_notation.htm.

Gregorian chant, it seems however that the latter originally had the same oriental rhythm (Idelsohn, 1923: 10). He transposed all examples in his book "For the sake of simplicity" (1923: 8) into one common scale which is *similar to the scale of the Arabic Maqames Iraq, Siga and Aug and the Greek Dorian.* Idelsohn continues the discussion regarding the steps and the difference between Oriental and European Jews *while the European Jews have been influenced by the interval system of European music*. Idelsohn also compares Byzantine neumas which were used as a cipher notation at that time.[202]

For understanding the specificity of oriental songs, for this work it is interesting to emphasize the following observation by Idelsohn (1923: 8, 15): *In general, the intervals of a mode are more likely to change under influence than the mode itself. This phenomenon is frequently observed in Oriental song. Thus, the mode of the Muezzin call to prayer in Egypt and Palestine is chanted in the scale of Maqam Higaz[203] whereas in Anatolia, it is rendered in the scale of Bajat [204] (minor)*. Idelsohn here shows the similarity of the chant used, but a different makam mode is used for the *ezan* in Palestine and Anatolia (*Hicaz vs. Bayati*).

The intervallic structure of the makams was explained in the previous chapter. For further understanding of the healing elements and attributes of the makams it is important to understand the term of interval itself, examined in the work of Alain Danielou "Comparative table of music intervals". He discusses the problem of music intervals and states that *all musicians notice that the non-defined series of frequencies, if we take any tone as a tonic or basic tone, will appear as a harmonization of that basic tone and together they will make intervals, precise and defined, and any deviation in a certain moment will be shocking for the ear and instantly described as out-of-tune* (Danielou, 1958: 1-4). This can be understood in terms of the overtones[205]; if it is "out-of-tune" then the whole sound picture will be understood like this. Danielou points out that *if the voice is slightly lower or raised, the incorrect intervals which are too high or too low are heard, until the moment when the interval changes its character in order to find a new equilibrium*, and these basic observations on intervals lead to the division of the octave on 22

202 Cipher notation was mentioned in Chapter 2.1 where Signell explained early notation. For more information on Idelsohn's comparison and detailed analysis see Idelsohn (1923).

203 Hicaz (in Turkish), A/N

204 Beyati (in Turkish), A/N

205 An overtone is any frequency greater than the fundamental frequency of sound. Harmonics are frequencies which are numerical integer multiples of the fundamental (Helmholtz, 1954: 24-25).

or 24, *an area of range within which is the pure interval with specific determination.* Danielou also shows examples from India where intervals are the basis of the language[206], The Greeks called these series *enharmonicos*[207]; The Arabs took the Greek tradition and discussed it and interpreted in their own way[208]. For an even more detailed division, he says that *Greeks for example, mention equal limmas 256/243 or 135/128, but Erastoten and Avicenna also mention 20/19 or 19/18, al-Farabi 39/37, Ptolomeus 21/20 etc.* He continues that these frequencies of intervals when written in a measure can be understood if they are truly different or are merely a question of writing, concluding that i*t is quite obvious that a fifth, a fourth, a major third and even a major or minor semitone are common terms in all systems.* A table with some fractions of frequencies after Danielou will be shown in Chapter 4. This is interesting because he compared the fractions which were used in the works of al-Farabi, al-Kindi and Safiyuddin Urmevi. What Danielou mentions as "deviation of the tone and out-of-tune sensation" is the sound color of a sounding event regarding the overtones or harmonic series which was described at the end of Chapter 3.1.

For understanding the healing effects of the makams which are also influenced by performance type (vocal, instrumental or combined), it is important to understand in which polyphony makam melodies are performed. Melodies, especially instrumental ones, are in unison. The melody is usually performed on the instruments called the ney, rebab or kemençe (see Chapter 2.2.), while the accompaniment, performed on the bağlama, ud or saz, usually plays an interval of the perfect fourth or perfect fifth, which gives a harmonic base and surrounding throughout the entire composition. Also, as mentioned in Chapter 3.1., the intervals of the fourth and fifth produce harmonic series which overlap with the harmonic series sounding on the "stop-tones" which are mostly the first and fifth tone of the respective makam, creating the sound color within the soundscape.

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206 According to Danielou (1958: 3) In India, such parts of a series along with corresponding intervals are called SRUTI, a word which in this case means "which was heard" (what was perceived by hearing), but also when applied to the Vedic texts brings the connotation "holy basis of the musical language" (intervals are the base of language).

207 Danielou (1958: 3) states that Greeks notice that these intervals which are recognizable to the ear correspond to the correct divisions of the strained string and to which arithmetic expression can be determined (converted to a number).

208 Danielou (1958: 4) explains the differentiation of the interval of fourth as follows: when we present the fourth in a tempered system as $5^{12}\sqrt{2}$, when our theories of harmony refers to it as a relation 4/3, Chinese on $3^{52}/2^{82}$ and India on 9th interval which expresses the sense of peace, all of this changes nothing on the musical reality of the interval of the fourth, but it just states different ways of the sound series analysis. These micro distinction of the fourth indeed do not change the musical reality when observed solely, but in the melodic environment it can be an out-of-tune sensation.

4. FREQUENCIES – meaning and application in music, healing and architectural design

For the purpose of this work and understanding the elements of healing and therapy with sound, as well as the action of frequencies in the process of human recovery in time of the Anatolian Seljuks and today, it is necessary to define the terms used in this work such as sound, music, vibration and frequency. According to Olson (1967: 3) sound is *an alteration in pressure, particle displacement, or particle velocity which is propagated in an elastic medium, or the superposition of such propagated alterations…it can be produced by a vibrating body*. By definition (Encyclopedia Britannica), vibration is a periodic back-forth motion of the particles of an elastic body or medium, while frequency is the number of cycles of vibrations undergone during one unit of time by a body in periodic motion. Music as a definition and meaning has been described in Chapter 2. Nevertheless, the statement from Olson (1967: 25) defining pitch as *an attribute of auditory sensation…and primarily dependent upon the frequency of the sound stimulus* should be noted here.

The meaning of frequencies in terms of music, healing and architectural design in reality is always restrictive and therefore regulative principle of the interconnected mathematical form. Pythagoras's (570BC-495BC) philosophy of mathematics is the foundation of rational geometry which is known today. Pythagoras went a step further in understanding that truth. The source for this was found in music. Its order is built on the perfect intervals of the octave, fifth and fourth, which stand out from the continuum of intervals with the simple mathematical form, determined by the simple arithmetic ratios 1:2, 2:3 and 3:4. The arithmetic method in the case of music was, as pointed out by Tuksar (1980: 13), *solidly confirmed by commonsense, empirical evidence. The fact of great wealth of relations and connections among the numbers at the beginning of the series, among ratios with small numerical values corresponds to the phenomenon that the ratios of the most "consonant" intervals also have the smallest integers*. Tuksar continues that interval ratios of these consonants were a base for those who wanted to prove the mystical relationship of music and mathematics, while the tetrad became the basis of the Pythagorean theory and fixing the numbers of consonances within one octave.[209] Pythagoras classified three types of music: *musica instrumentalis*, *musica humana* and *musica mundana* (Šikić and Šćekić, 2012: 11-12). Pythagoras, having ascertained that the pitch of notes depends

[209] In his discussion, Tuksar (1980) refers to R.L. Crocker. 1963. Pythagorean Mathematics and Music, *The Journal of Aesthetics and Art Criticism*, 22(2): 189-195.

on the rapidity of vibrations, and that the planets move at different rates of motion, concluded that the sounds made by their motion must vary according to their different rates of motion. As all things in nature are harmoniously made, the different sounds must harmonize, and this combination he called the "harmony of the spheres (*musica mundana).*"[210] Following the idea of harmony of the spheres, McClellan mentions the Hekaloth, the Hebrew esoteric book on the heavenly spheres, which states that *when a new soul incarnates it sends forth a vibration that resounds throughout the entire cosmos-the earth and heavens-which continues to sound through the incarnated life of that soul* (2000: 47). This can be understood as the transfer of (eternal) energy, and frequencies respectively as energy exists in multiple forms.

Another treatise on harmony of the spheres and ethos is given by Farmer (1926), where he compares and merges Pythagorean ideas with the ideas of Muslim philosophers, giving as one of the examples the table made by al-Kindi. According to Farmer, al-Kindi in his treatise *Risala fi ajzd khabariyya fi'l-mausqi* corresponds the strings of a lute with different elements, showing how music was considered as a "cosmic ingredient" (Farmer, 1926: 98).

210 Regarding harmony of the spheres, in the book *Croatian renaissance music theorists* Tuksar presents and discusses the work "*Harmony and the Music of the Spheres"* by Pavao Skalić (Paulus Scalichius) (1980: 35-58).

String of the Lute.	Bamm (A string).	Mathlath (D string).	Mathnā (G string).	Zīr (C string).
Rhythm.	Hazaj, ramal *and* khafīf.	Thaqīl al-mumtad.	Thaqīl awwal *and* thaqīl thānī.	Mākhūrī.
Quarter of the Zodiac.	Capricornus to Pisces.	Libra to Sagittarius.	Aries to Gemini.	Cancer to Virgo.
Element.	Water.	Earth.	Air.	Fire.
Wind.	West.	North.	East.	South.
Season.	Winter.	Autumn.	Spring.	Summer.
Quarter of the Month.	21st to last. day.	14th to 21st day.	1st to 7th day.	7th to 14th day.
Quarter of the Day.	Midnight to Sunrise.	Sunset to Midnight.	Sunrise to Mid-day.	Mid-day to Sunset.
Humour.	Phlegm.	(Black Bile)	Blood.	Yellow Bile.
Quarter of Life.	Old Age.	Middle Age.	Infancy.	Youth.
Faculty of the Soul.	Masculine.	Preserving.	Fantastic (*Fantāsiyya*).	Thinking.
Faculty of the Body.	Resisting.	Prehensile.	Assimilative (*lit.* Digestive)	Attractive.
External Actions.	Mildness.	Goodness.	Intellect.	Courage.

Table 9 From al-Kindi's treatise *Risala fi ajzd khabariyya fi'l-mausqi* (Farmer, 1926: 98)

In Table 9 we can observe strings of the lute showing the meaning of each string, and how the frequency of a particular string influences and/or is connected with quarter of life, season, element, wind, faculty of the soul and body and external actions. These 4 strings represent the four frequencies[211] and respectively four tones – A, D, G, C, which will be shown as one of the outcomes in the following analysis of the makams from which a certain conclusion will be made.

211 In this context the 4 strings represent the four elements, following the Ancient Greek concept of nature and complexity of matter.

Following these ideas, musicologist and historian Danielou (1958: 4) states that the Greek music theory expresses the harmony of sounds as harmony of numbers which emerged from a cosmic system where music plays an important role. Danielou (1958) made an extensive comparative table of intervals showing the micro division of the tone into fractions, cents and respective frequencies, which are interesting for this work as those frequencies were used by al-Farabi, Ibn Sina (Avicenna) and Safiyuddin Urmevi. [212] In the following table a few tones are shown.

Table 10 How frequencies were fractioned, after Danielou[213]

Note	Theorist	Interval	Fraction	Cent	Frequency	
Ut5 (C5)	Shruti	Unison	1/1	0,0	512 (2^9)	A=426.66
Ut-		Low octave	160/81	1178.5	1011.358	
	Al-Farabi, Safiyuddin, Avicenna	Closed quarter tone (1/4)	49/48	35.70	522.667	A=435.55
	Al-Farabi, Safiyuddin, Avicenna	Lower quarter tone	46/45	38.05	523.378	A=436.14
Ut++		2 commas	6561/6400	42.01	524.880	
	Avicenna	Diesis, enharmonic	40/39	43.83	525.128	A=437.60
Ut--	Al-Farabi	Higher quarter tone	39/38	44.97	525.474	A=437.50
	Avicenna, Al-Farabi, Safiyuddin	Free quarter tone	36/35	48.77	526.629	A=438.85
Ut ¼ T		Quarter of the tempered tone	35/34	50.18	527.059	A=439.16
	Avicenna		33/32	53.27	528	A=440

All these treatises regarding music or harmony of the spheres discuss and consider the interval ratios as a perfect order within numbers, in connection with planets, constellations, and the universe in general. The analysis in the next chapter will show the frequencies of certain

[212] In his book, Danielou gave only an introduction for understanding the table, and the rest of the book is the table.

[213] As the table is actually the division of 700 microtones within one octave, here only a few divisions are shown, just to get the idea of how it was made. For detailed information see Danielou, 1958.

commonly repeating tones in Turkish makams and contribute to the discussion of the interval ratios and their meaning.

The application of certain frequencies is interestingly presented in the work by McClellan (2000) and relates to the subject of this work in studying and researching the healing elements in sounding of the makams. McClellan (2000: 48-49)[214] states that frequencies can be directed to a specific part of the body as the sound acts directly on the physical body. The application of specific frequencies regardless of the source should not be rejected by the patient in terms of aesthetics, the process should be monitored, and no negative side effects or pain should be experienced during treatment. The principles for therapeutic application are that *the sound is vibratory energy that interacts with the vibratory energy of body structure through resonance* and *that the structure of the body has its own natural resonating frequency*. A change of frequency causes a change of energy which causes a change of frequency as they are related to each other and that is when illness appears. McClellan also mentions the statement from Cymatics theorists that with such treatment in severe injury cells can be regenerated[215].

The idea of the harmony of the spheres was also raised during the Renaissance through the works of Johannes Kepler[216] who calculated the musical intervals of the planets based on the calculation of the distance between Saturn and the Sun (McClellan, 2000: 121-122).

Cousto (2000: 128) discusses the fundamental tone from many aspects, especially its usage in India and Ancient China. As one of the examples, he gives the frequencies of the planets, tones and colors in a discussion regarding the origins of harmony, following the ideas of Kepler.

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214 McClellan (2000: 47-57) in chapter four named "The Principles of Healing Through Sound" discusses these principles through examples from Hebrew the esoteric book Hekaloth, Cymatics theory, Radionics theory and Ultra-sonics theory, finishing the chapter by saying that *scientific investigations of the effect of frequency on the human body and psyche is relatively new…our understanding of frequency waves and the role they play in our physical universe is as yet unsophisticated.*

215 Cymatics is a study of wave phenomena pioneered by Hans Jenny (1904-1972). It is a study of the effects of sound waves on physical matter. Also, interesting results were achieved by Masaru Emoto, who developed the Hado therapy, based on the same idea of vibrational effects on the human body which consists of 97% water. For more information see www.cymaticsource.com and Masaru Emoto (2008). One of the latest research including Cymatics was done by Algargoosh, Eldien and El-Wakeel (2013).

216 Johannes Kepler (1571-1630) was a German mathematician and astronomer. In his work *The Harmonies of the World* he presented his discovery that when Saturn is farthest from the Sun, it moves at rate of 106 seconds of arc in a day, and when closest at 133 seconds. The ratio between these extremes is 4/5 which equals the major third in musical intervals (McClellan, 2000: 121). For more information see Kepler (1939).

In the following, Cousto's table of periods and frequencies of the planets, audible frequencies of the planets can be seen.

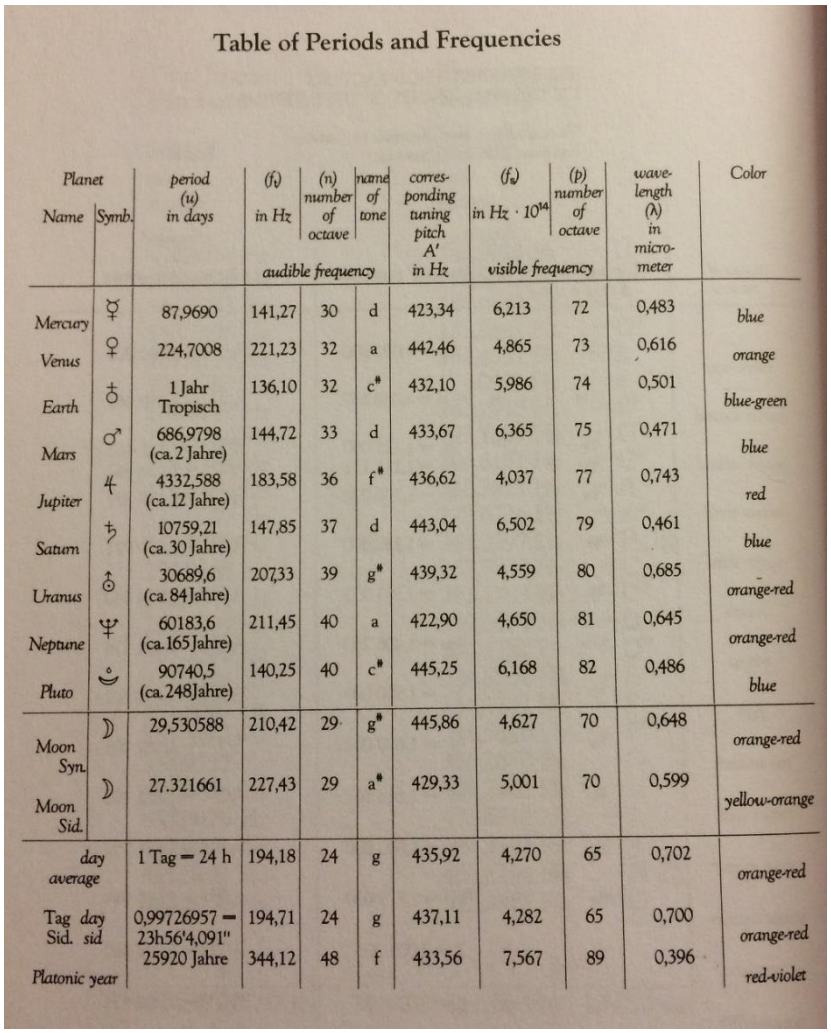

Table of Periods and Frequencies

Planet Name	Symb.	period (u) in days	(f_t) in Hz	(n) number of octave	name of tone	corresponding tuning pitch A' in Hz	(f_s) in Hz · 10^{14}	(p) number of octave	wavelength (λ) in micrometer	Color
			audible frequency				visible frequency			
Mercury	☿	87,9690	141,27	30	d	423,34	6,213	72	0,483	blue
Venus	♀	224,7008	221,23	32	a	442,46	4,865	73	0,616	orange
Earth	♁	1 Jahr Tropisch	136,10	32	c#	432,10	5,986	74	0,501	blue-green
Mars	♂	686,9798 (ca. 2 Jahre)	144,72	33	d	433,67	6,365	75	0,471	blue
Jupiter	♃	4332,588 (ca. 12 Jahre)	183,58	36	f#	436,62	4,037	77	0,743	red
Saturn	♄	10759,21 (ca. 30 Jahre)	147,85	37	d	443,04	6,502	79	0,461	blue
Uranus	♅	30689,6 (ca. 84 Jahre)	207,33	39	g#	439,32	4,559	80	0,685	orange-red
Neptune	♆	60183,6 (ca. 165 Jahre)	211,45	40	a	422,90	4,650	81	0,645	orange-red
Pluto	♇	90740,5 (ca. 248 Jahre)	140,25	40	c#	445,25	6,168	82	0,486	blue
Moon Syn.	☽	29,530588	210,42	29	g#	445,86	4,627	70	0,648	orange-red
Moon Sid.	☽	27.321661	227,43	29	a#	429,33	5,001	70	0,599	yellow-orange
day average		1 Tag = 24 h	194,18	24	g	435,92	4,270	65	0,702	orange-red
Tag day Sid. sid		0,99726957 = 23h56'4,091"	194,71	24	g	437,11	4,282	65	0,700	orange-red
Platonic year		25920 Jahre	344,12	48	f	433,56	7,567	89	0,396	red-violet

Table 11 Cousto's table of periods and frequencies of the planets (2000: 128)

Well known mathematician Leonardo Pisano, known as Fibonacci (1175-1250)[217], in his book *Liber abaci* (1202) presented the Hindu-Arabic numerical system and recursive formula which generates the sequence of numbers, known as the *Fibonacci series.*[218] During his travels and

[217] Leonardo Bonacci, Italian mathematician, known under the name Fibonacci spent his youth in Arabia from where he transferred Indian-Arabic numerical system to Europe (Enciklopedija Leksikografskog zavoda, vol.2, 1967: 372); http://www.encyclopedia.com/science/dictionaries-thesauruses-pictures-and-press-releases/fibonacci-leonardo-or-leonardo-pisa

[218] The series was presented in the form of solving the "Rabbit problem", where he showed progression in a series by multiplication of rabbits. For a detailed explanation see http://www.maths.surrey.ac.uk/hosted-sites/R.Knott/Fibonacci/fibBio.html#fibfirst, accessed 12/2/2017. Also see Vorobiev, Nicolai N. 2002. Fibonacci numbers. Birkauser Basel; Sigler, L. 2002. Fibonacci's Liber Abaci, Springer-Verlag New York.

works in Algeria, Syria, Egypt and Byzantium he discussed and learned from many international scientists and became a superior creative mathematician. Upon his return to Europe he participated in the court of Frederick II who recognized great scholars of the 13th century. Seeing the advantages of the useful mathematics[219] known to Muslim scientists which was known but not in the wide use in Europe at that time, he wrote the *Liber abaci* to bring to the Italian people the world's best mathematics in a usable form. At that time the Hindu numerals replaced the Roman numerals and these new written procedures were called algorithms in the European Middle Ages, to differentiate them from calculating with the abacus. Of course, the *Liber abaci* is not only theoretical but also a practical book, and for three centuries it was taught in Italian schools to the merchants, who spread this knowledge through the Mediterranean to the rest of Europe. [220] The interest for this work in Europe was the Fibonacci series which is 1:1, 1:2, 2:3, 3:5, 5:8, 8:13, 13:21, 21:34, 34:55, 55:89… the divisions of small numbers and simple fractions which was seen in the writings of Arab scholars such as al-Kindi and al-Khwarizmi (Sigler, 2002).

Both Pythagoras and Fibonacci are related based on Euclidean geometry (Eves, 1963: 19) [221]; Pythagoras's theorem and Fibonacci's series. This relation can be understood as following: From the Fibonacci series four numbers are taken, for example 2,3,5,8. The first and fourth number are taken and multiplied (2x8) and their result (16) is designated as "A". Then the two middle numbers are multiplied (3x5) and their result is multiplied by 2 (15x2), and this result (30) is designated as "B". To get the "C", the middle numbers are squared and added (3^2+5^2 = 9+25 = 34). The result is A=16, B=30, C=34. The formula of the Pythagoras's theorem is $A^2+B^2=C^2$. So, any 4 following numbers from Fibonacci series make the edges of the Pythagoras's theorem.[222]

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219 Muslim scientists contributed to mathematics by joining two different aspects, the Greek and Indian. While Greek was focused on geometrical aspects, Indian was focused on arithmetic and calculus (Damjanović, 2017: 6).

220 For more information see Parmanand, 1986; Vorobiev, 2002; Sigler, 2002.

221 For more information see Eves, 1963.

222 For a more detailed mathematical explanation see https://brilliant.org/discussions/thread/when-fibonacci-meets-pythagoras/

As Pythagoras's ratios correspond to the Fibonacci series, this can be applied to the determination of intervals in a musical scale, and, knowing the frequency of the fundamental tone the frequencies for each tone of the scale can be calculated.

The interval ratio (or fraction) of a scale equals to the Fibonacci series: 1/1=unison, 1/2=octave, 2/3=perfect fifth (inversion-perfect fourth), 3/5=major sixth (inversion-minor third), and 5/8=minor sixth (inversion-major third).

Given the theories of physics presented so far regarding frequencies, vibrations and calculations of the intervals, as well as frequencies of each single tone which sounds and is part of a certain scale or melody written within a certain scale, for the sound healing area it is necessary to see how the human body behaves considering its own vibration and resonance characteristics within it and with the space which surrounds it.

In this regard, McClellan (2000) discusses the vibratory nature of the human body, explaining that the atoms forming each cell contain electrons which radiate electromagnetic waves as a result of constant motion and are measurable as frequencies. As all matter has its own natural rate of vibration, the frequency is dependent on the oscillation rate which strengthens the atoms through the principle of resonance (2000: 39). An etheric field also emerges from a dense body which is *an electro-magnetic vibrational field that shields and energizes the dense physical body and integrates it with the Earth's energy fields* (2000: 43)[223].

Davis (2013) discusses the connection and correlation between frequencies and chakras and states that

"There are two ways a frequency can resonate with another frequency: free resonance occurs when an object begins to vibrate only when it comes into contact with a frequency that exactly matches its own, and forced resonance occurs when one vibrating source produces vibrations in another object even though those two objects may not share the exact same frequency".[224]

[223] McClellan (2000) mentions the etheric field in the context of the works by Harold Saxon Burr who investigated etheric fields in a variety of life forms. For more information see Burr (1976).
[224] Davis follows the research of Goldman (2008: 8, 14) and Leeds (2010: 49).

This physical phenomenon is applicable in music, where the frequency of each single tone occurring in the vibrating source produces a harmonic series heard as an interval when sounding together with the basic frequency.

According to Davis (2013: 107-108), *this implies that perfect frequency match is not required to rebalance chakras, but finding a close enough match for forced resonance to occur is necessary. Therefore, therapists employing toning in their practices do not have to worry about finding the exact frequency*. Davis also asserts that frequencies and their intervals are culturally influenced, and a parallel can be drawn regarding the makams and their base frequencies. As Davis shows using examples of which frequency is used for which body part or chakra, respectively, there is a correlation between body parts and frequencies. What was important and interesting is that a single pitch (with a minimal difference of frequencies), is connected with a specific body part, and, as a music CD was used, designates in the explanations the scale of the musical background (Davis, 2013: 109).[225]

Following the discussion of pitch, which Olson (1967: 25) defined as *an attribute of auditory sensation…and primarily dependent upon the frequency of the sound stimulus*, Cavanagh (2000) states that in the early history of Europe *pitch varied widely from place to place and from century to century*. She discusses how pitch depended on many things, including the warmth of the room which influenced the pitch of the instruments. In the Middle Ages, in the example of the early modern organ in Germany around 1511, the organ was tuned to A=377 Hz (Cavanagh, 2000: 1-4; Knuf, 1968: 23). Mozart used A=422 Hz, and Haendel A=423 Hz, which is approximately one-half semitone lower than the standard A=440 Hz.[226] The international standard for musical pitch (A=440 Hz)[227] was first recognized in 1939, and

[225] In further discussion Davis (2013: 109-111) states she analyzed five toning CD's and found that there were different pitches and key centers which could indicate that there is no exact scale used for a specific chakra, but that the toning is provisional, which definitely cannot be accepted since there is research by Goldman (2005), Leeds (2010), Goldberg (2008) and others who support the first idea. As she stated that she *did not make a toning with the non-Americans*, but thinks that *music to which they are culturally exposed should be used*, it is theoretically more acceptable, following the previous idea, that melodies of the cultural environment are more appealing to the "patients" but the frequencies stay unchanged and same. Therefore, frequencies used for specific body parts are not influenced by the cultural environment.

[226] Cavanagh (2000) as in Christopher Kent, "Temperament and Pitch", in The Cambridge Companion to the Organ, ed. Nicholas Thistlethwaite and Geoffrey Webber, Cambridge: Cambridge University Press, 1998: 53.

[227] "A" means "la" in the scale.

reaffirmed by the International Organization for the Standardization in 1955 and 1975.[228] Although it is accepted as standard, many musicians today, especially those who compose and perform in just intonation, are choosing lower tuning, such as 432 Hz, with the explanation that it sounds more natural, warmer, more precise. One should listen to a composition played in 440 Hz and then the same one in 432 Hz to hear and feel the difference.[229]

Some other works discuss ratios and frequencies, including Levendoğlu (2003) who gives an example of a scale with tone, ratio, cents and frequencies (Hz), where the A=440 Hz.

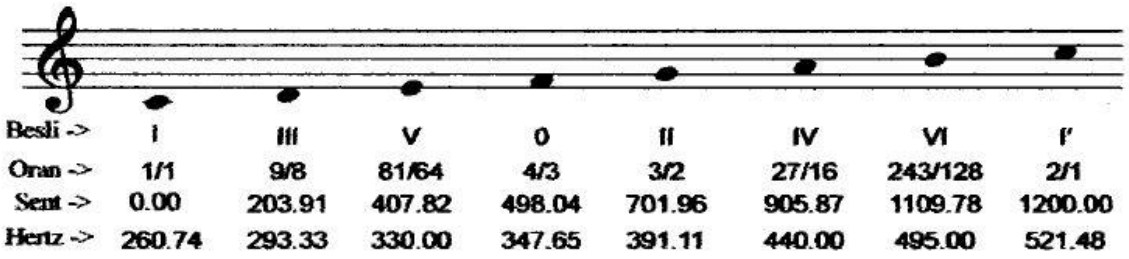

Figure 63 scale with degrees, cents and frequencies (A=440 Hz), Levendoğlu (2003)

[228] International Organization for Standardization, "Acoustics – Standard tuning frequency (Standard musical pitch)", ISO 16, 1975.

[229] The author of this work experienced this episode two times in concerts, and personally agrees that tuning at 432 Hz sounds softer and more intimate in sound and overall experience.

Another example of the correspondence of intervals and ratios is given by Sengspiel[230]

Interval	Equal Temperament Frequency Ratio			Approximate Difference	Harmonic Series Frequency Ratio		
Unison	$(\sqrt[12]{2})^0$	≃	1.0000	0.0	1.0000	≃	1/1
Minor Second	$(\sqrt[12]{2})^1$	≃	1.0595	0.0314	1.0666	≃	16/15
Major Second	$(\sqrt[12]{2})^2$	≃	1.1225	0.0025	1.1250	≃	9/8
Minor Third	$(\sqrt[12]{2})^3$	≃	1.1892	0.0108	1.2000	≃	6/5
Major Third	$(\sqrt[12]{2})^4$	≃	1.2599	0.0099	1.2500	≃	5/4
Perfect Fourth	$(\sqrt[12]{2})^5$	≃	1.3348	0.0015	1.3333	≃	4/3
Tritone	$(\sqrt[12]{2})^6$	≃	1.4142	0.0000	1.4142	≃	$\sqrt{2}$/1
Perfect Fifth	$(\sqrt[12]{2})^7$	≃	1.4983	0.0017	1.5000	≃	3/2
Minor Sixth	$(\sqrt[12]{2})^8$	≃	1.5874	0.0126	1.6000	≃	8/5
Major Sixth	$(\sqrt[12]{2})^9$	≃	1.6818	0.0151	1.6667	≃	5/3
Minor Seventh	$(\sqrt[12]{2})^{10}$	≃	1.7818	0.0318	1.7500	≃	7/4
Major Seventh	$(\sqrt[12]{2})^{11}$	≃	1.8897	0.0564	1.8333	≃	15/8
Octave	$(\sqrt[12]{2})^{12}$	≃	2.0000	0.0	2.0000	≃	2/1

Figure 64 (Sengspiel)

Ratios can be converted to frequencies if the basic pitch reference is known, such as A=440 Hz.

These correlations of frequencies, pitches and ratios as well as the differences between them are essential for the analysis of the frequencies of individual tones in makams which is the focus and research of this work and was essential in order to reach conclusions regarding the results obtained.

230 Taken from http://www.sengpielaudio.com/calculator-notenames.htm, author: Eberhard Sengpiel, Berlin.

5. ANALYSIS

The research of known books and articles regarding makam analysis, listening to various examples of makams and overviewing the scores of various makams lead to a twofold analysis. In order to verify the two hypotheses, set in this work, two analyses were approached on two samples.

For the first hypothesis that makams have a healing effect and that the Turkish traditional concept of healing effect strongly depends on specific frequencies and harmonic intervals of the perfect fourth and perfect fifth of the makam scale, a sample of a certain number of instrumental compositions built on the makam scales was taken. The score samples were chosen based on the writings of al-Farabi, Ibn Sina and Safiyuddin Urmevi. The scores were obtained from the Turkish Radio Television (TRT) archives. The analysis was based on exploring the musical characteristics of the makam in order to find, understand and show what is common in all makams, and which conclusions can be drawn from the results.

For the second hypothesis that the architectural structure of the Seljuk hospital and sound events in that venue support the healing effect and that the Turkish traditional healing concept is understood in a way that the healing effect depends on the architectural structure of the hospital and produced sound events in such architectural structures, an acoustic analysis was made in order to explore the acoustic aspects of a hospital, and to obtain the acoustic parameters.

The research aims to show the connection of the makam's healing elements and features of the architectural structure and to confirm the hypotheses.

5.1. Musical analysis of the makam examples

Musical analysis can be made from various aspects and scientific views. According to Xhu (1990), until the 17th century music was treated as a mathematical discipline. Šikić and Šćekić (2013: 11-12) elaborate Pythagoras's mathematical philosophy whose source is in music. Music is numbers and the principle of musical order is mathematical form. Pythagoras's most lasting contribution to music theory is the discovery that consonant intervals of the octave, fourth and fifth are determined by simple arithmetic ratios 1:2, 2:3 and 3:4. Xenaxis (1992) defines music as organization of elementary operations between the sonic entities or between the functions of sonic entities.

Other authors (see Tarikci, 2010: 1-4) used other tools for analysis, including fractal dimension calculations.[231] Some Turkish scientists[232] used the analysis of audio recordings, in order to determine the intervals of specific makam scales. Ethnomusicological research carried out until now is connected with mathematical and physical science, while literature regarding Turkish music is upgraded with makam musical analysis in order to contribute to previous research. From an ethnomusicological point of view, the analysis in this work is made by examining the form of a specific composition, including the era and style in which it was written as well as the context where it was performed.

In Turkish music, there is no standard tuning (except "ahenk" for rather formal recordings), while most of the studies based the tuning frequency on 440 Hz, with a calculated deviation of the tuning frequency of audio data for various musicians and bands, in order to construct a frequency histogram. Gedik and Bozkurt (2010) made a study where they considered a classification of Turkish music recordings by makams from audio recordings. 180 audio recordings were used to classify them by 9 makam types[233]. They used the definition of the makam type pitch scale as defined by Arel (Gedik and Bozkurt, 2008: 6-7): *For musical*

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231 In his doctoral thesis Tarikci (2010) used fractal dimension calculations and two different methods in order to determine whether makams have their own fractal dimension. His results showed that makams have special fractal dimensions, which can be a source of information for the irregularity of the melody, and the importance of the duration of the notes (Tarikci, 2010: 79). For more information regarding the subject see Tarikci (2010).

232 Bozkurt (2008: 1-13); Gedik and Bozkurt (2008: 1-10); Gedik and Bozkurt (2010: 1049-1063); Gündüz and Gündüz (2005: 565-592).

233 For this research Gedik and Bozkurt (2010) used the following makams: *rast, segâh, hüzzam, saba, hicaz, hüseyni, uşşak, kürdi, hicazkar* and *nihavend*.

fundamental frequency analysis, various logarithmic units like cents and commas are used (Gedik and Bozkurt, 2010: 1055).

The *Tonic* or *Karar*[234] (first degree of the mode) of each makam is a reference point which can be used to make a distinction between the makams. The melody in the makam composition always ends in a karar, as the last note.

The Tonic in Western music is the first scale degree, the tone by which the scale gets its name, for example the tone C is tonic in C major. In the modal system, it is called the finalis because of the tendency of the melody to end on the finalis (Devčić, 1974: 587). The first degree of the makam mode is called the *karar* (METCC[235]). Dominant is the fifth scale degree, which is, after the tonic, the most important tone in a scale, because the melody moves mostly around it. In the modal authentic system, it is the fifth tone of the scale, and in Gregorian psalmody, a major part of the recitation is on this dominant tone (Vidaković, 1974: 463). Likewise, in the makam modal system the fifth degree is called the *güçlü* and is the most prominent tonal center where the stops of varying lengths occur (METCC). These two tones, the first and fifth tone of the scale, are important in terms of the harmonic structure, as the dominant chord requires a resolution which is then on the tonic chord. If the melody is descending, then a fifth scale degree is created from the tonic downwards.

In this thesis, analysis was made by observing score sheet music, makam specificities from audio recordings and combining music theory analysis knowledge with the known frequencies of pitches. The procedure was as follows:

234 Karar is referred to as tonic and as the last note of the composition on which the melody finishes. The Latin word used for the ending tone is finalis, which is found in modal music (Kovačević, 1974).
235 METCC – Multimedia Encyclopedia of Turkish Classical Music.

Makam sheet music examples were taken from the classical makam archives on the neyzen.com website, written in the form of *peşrev*[236] and *saz semaisi*[237] because of their mutual similarity in form. These forms are used in Turkish Art Music[238].

Peşrev as a form has been known since the 12th century, from the Mevlevi order under the name *"son peşrev"* (final peşrev). Usually, p*eşrev* uses a very long rhythm cycles, stretching over many measures as opposed to *saz semai*si, the other major form of instrumental music, which has a simpler *usul*.[239] *Peşrevs* are composed of movements called *hane* at the end of which there is always an unchanging particle introducing the *teslim* (mülazime, refrain). *Peşrevs* are named after the makams used in the first hane and usually end with this makam. In Turkish classical music theory, they are said to be "bound" to this makam. There are always modulations to other makams in the hane(s), but with the refrain (teslim), the piece always regains the principal mode. At the end of each hane, a pause is made on the strong degree of its makam, forming a semi-cadenza. This is called the *yarım karar* or *nim karar*. *Peşrevs* usually have 4 hanes, and occasionally they also have 2,5,6 hanes.[240]

The following makam sheet music examples were taken: Buselik (4), Buzurk (3), Hicaz (5), Hüseyni (3), Isfahan (6), Neva (5), Rast (6), Rehavi (3), Saba (5) and Uşşak (5), total of 45 examples. Composers who lived up to the year 1900 were chosen. The analyzed examples are mostly from the early Ottoman times, but there were few earlier examples, including one of al-Farabi from the 9th century.

236 Peşrev – in classical Turkish music- an overture played at the beginning of a song, translated as overture, see http://www.sozluk.net/index.php?word=pe%C5%9Frev&sozluk=ingilizce.

237 Saz semaisi – lit. A poetic form (favored by folk poets and used to create songs which are sung according to a certain usul), http://www.sozluk.net/index.php?word=saz+semai&sozluk=ingilizce.

238 The score sheets of the analyzed makams are in the appendix, as well as the papers of the analysis procedure.

239 For more details about instrumental Turkish music forms, see Signell (2008: 16-19) and the Multimedia Encyclopedia of Turkish Classical Music.

240 Multimedia Encyclopedia of Turkish Classical Music.

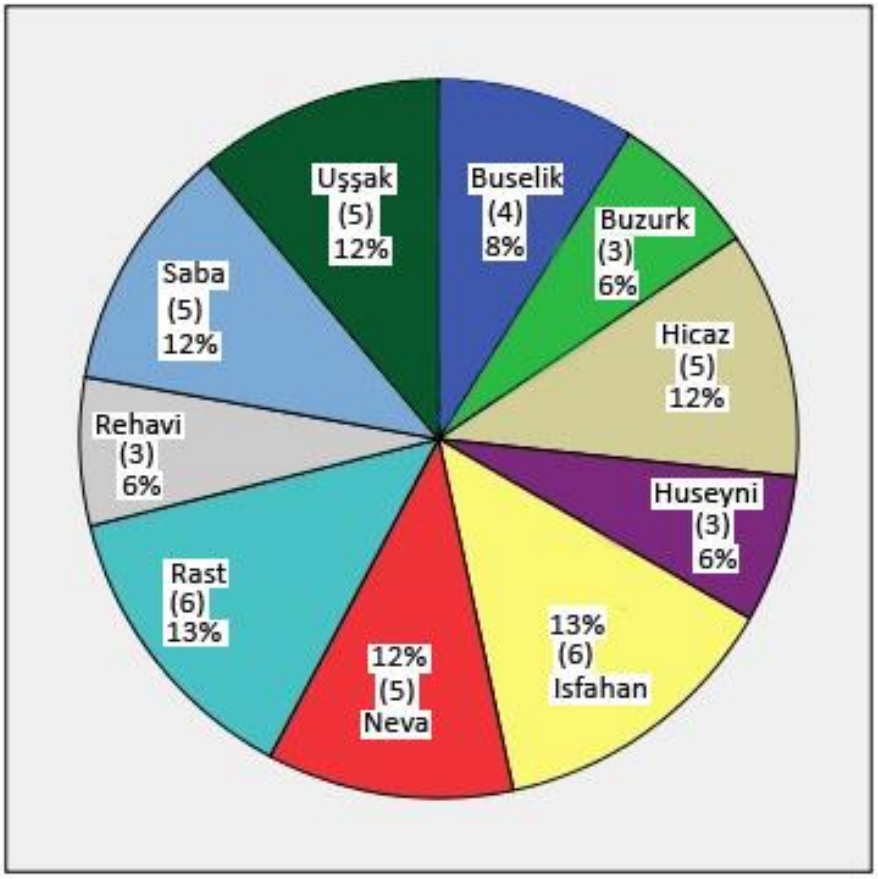

Figure 65 Distribution of the 45 makams used for analysis

The figure shows the total number of makam compositions used in analysis, 45 examples of 10 different makams were analyzed. When choosing the makam modes, those described in the works of al-Farabi, al-Kindi and Safiyuddin Urmevi (8 makams) were obtained, and the score sheet examples from compositions up to the year 1900 were used.

During the research some analysis software programs were tried [241]. Unfortunately, they did not give usable or trustworthy results, so the idea of counting notes in each composition to find out the repetition of each note came up as the solution. The works since al-Farabi onwards describing the "healing potential" of makams did not present any measurable explanation of the

[241] Analysis Center 2013; Audacity 2.0.4.; AudioAnalyser 2010.12; EFxHist (Mark Huckvale, London, UCL Division of psychology and language sciences); Frequency Analyzer v.2.0; Solo Explorer (Recognisoft); Tartini v. 1.2 (Philip McLeod, New Zealand, Department of Computer Science, University of Otago). For the websites from which the programs were downloaded see bibliography-web sources.

healing elements of the makam. For that reason, this research has come up with the idea of isolating one of the parameters, the frequency.

The problem with the software analysis programs was the following: software works on the system of analyzing audio recordings using preset information. The input for the programs was an audio recording, which includes several instruments (sometimes only two), and the analytical data could not extract each instrument. Also, as the melodies were rich in tones, it was not possible to get the peaks, only the range could be acquired, which was insufficient for the data needed. So, the main question was, how to extract the most repetitive tones in one song? The initial assumption was to take some written scores and manually count the number of time each note is used, taking into account the measure, repetition of the bars and smallest notated value in the composition as a basic value for the count (eight notes/quaver or sixteen notes/semiquaver). The idea was to count the notes in one composition, in order to find out which notes are the most repetitive. The most repetitive ones were the basis of the analysis, to determine where the tones are positioned within the scale and their frequencies. The most repetitive tones are the most emphasized ones within the composition and within the makam. The melody is built around the emphasized tones, highlighting their significance. The tones which are most repetitive stand out in a composition, which means that the frequencies of those tones make a mark on the auditory system, and therefore, the brain.

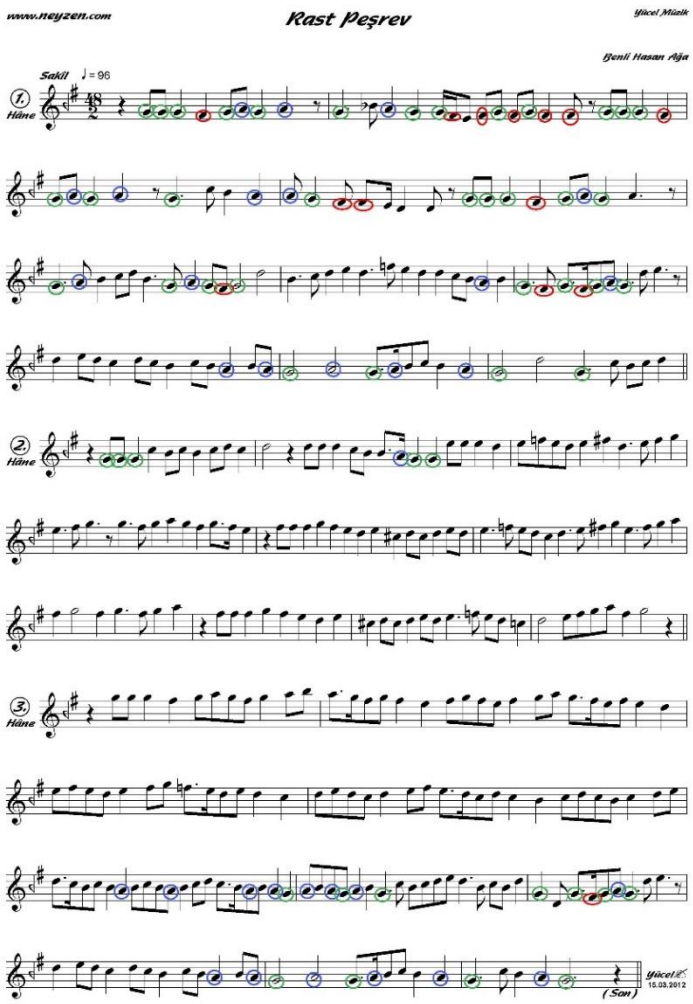

Figure 66 Example how notes were counted

Each score was observed and the measure, accidentals, number of bars including the repetitions were taken into consideration. Visually it was understandable which tones are mostly represented, so they were marked in color for the purpose of counting. Each part of the composition (*hane* and *teslim*) was counted separately and then summed up. Following this, all numbers were marked, and the counted data was entered in the Table of inputs (see Appendix II).

After acquiring all the results in the Table of inputs, they were entered into a table (see Table 13). The table was created in a way that the input was the makam-form-composer-notes by name-range-number of bars-measure-accidentals. All makams were sorted alphabetically, and the notes with the highest number of repetitions are marked. The column describing the table

also includes the range of each composition, where the actual lowest and highest note were marked-in brackets, while outside the brackets is the range of tones which are actually part of the melody (the lowest and highest note appear only a few times during the composition, as they are in the service and a result of the melodic line). The number of bars is also included, as well as the measure. In some compositions, the measure was changed, but then it would return to the original measure. Because of this, eighth notes (quaver) and sixteen notes (semiquaver) were chosen to get a more accurate result.

The tones with the highest number of repetitions were marked for each composition. This data was then entered and processed in the IBM SPSS Statistics 22.0. program, in order to make a descriptive analysis (Fig. 62) to show the correlation of the notes, peaks of the most repetitive notes and to show the mean value of all variables, which were all the notes entered. In the descriptive analysis table, several notes had the highest peak, from which it was concluded that those are the significant ones. Also, these peak notes matched with the data inserted into the table.

The makams which are used for the analysis were based on the list of al-Farabi and other scholars mentioned before. From this list the Buselik, Büzürk, Hicaz, Hüseyni, Isfahan, Neva, Rast, Rehavi, Saba and Uşşak makams were used, 45 in total. A table was created to show the list of the composers whose compositions were used for the analysis, along with the years when they lived, and the makams which were taken.

Table 12 Table of composers in alphabetical order

Composers in alphabetical order	**Makams (used in analysis)**
Bâyezîd ll (Sultan, Han, Velî, Sofu) (Ekim 1450 — 26/05/1512)	Neva
Behrâm Ağa (Nefîrî) (? — 1560?)	Hüseyni, Neva
Çoban Devlet Giray (Nûreddin Ahmed) (? — 1630?)	Rast
Emin Ağa (Tanbûrî, Ser-Müezzin, Denizoğlu) (1750? — 1814)	Isfahan
Fârâbî (Ebû-Nasr Muhammed b. Muhammed b. Tarhan b. Uzluğ) (870 – Aralık 950)	Isfahan, Rast, Rehavi
Gazi Giray Han II. (Bora, Ebu'l -Feth, Tatar) (1554 — Aralık 1607)	Hicaz, Hüseyni
Hamza Ağa (Kemani, Mevlevî Hamza Efendi) (? — 1830?)	Saba
Hasan Ağa (Benli, Tanburi, Musâhib-i Şehryârî) (1607 — 1662)	Rast
Hasan Cân Çelebi (1490? — 1567)	Hüseyni
Hüseyin Sâdeddin Arel (18/12/1880 — 06/05/1955)	Hicaz
İbrahim Vefâ Efendi (Ferâizci-zâde, Kol Ağası) (1871 —1903)	Isfahan
İsak Efendi (Tanbûrî) (İzak Fresco Monaro) (1745? – 1814)	Buselik, Isfahan, Rehavi

İsmâil Hakkı Bey (Muallim, Hoca, Ser-Hânende) (1866 – 1927)	Buselik, Rehavi
İsmet Ağa (b.1870)	Buzurk
Kantemiroğlu (Prens Dimitrius Cantemir) (1673 — 1727)	Isfahan
Kâtip Çelebi (1608 — 1656)	Hicaz
Mahmud I. (Gaazî Sultân Mahmûd Hân-ı Evvel) (1696 —1754)	Buselik
Mehmed Çelebî (Kanbosoğlu) (? — 1700?)	Uşşak
Nayi Osman Dede (1652-1730), mevlevî şeyhidir	Buzurk
Nûri Bey (Bolâhenk, Neyzen, Eyyûbî, Mehmed) (1834 — 1910)	Buselik
Osman Bey (Tanbûrî, Büyük) (1816 — 01/10/1885)	Saba
Osman Dede (Nâyi, Şeyh,) (1652? — 1730)	Rast, Saba, Uşşak
Sâlih Dede (Neyzenbaşı, Kaymakam) (1818? — 1888)	Isfahan, Saba, Uşşak
Selim lll. (Han, Sultan, Gazi, Neyzen, "İlhâmî") (1761 —1808)	Buzurk, Hicaz, Uşşak
Solak-zâde (Mıskaalî Mehmed Hemdemî Çelebî) (? — 1658)	Neva, Rast, Uşşak
Zaharya (Zaccharias, Tanburi, Küçük, Mîr Cemil) (? — 1740?)	Saba

The following table of the analysis data shows a list of all the analyzed makams. The notes which were the most repetitive in each composition are marked in yellow. Even at first glance, it can be seen that the same notes are the ones that repeat the most in each makam.

Table 13 Analysis data 1

makam name		form name	composer	h mal	c1	d1	e1	f1	f#	g1	g#	a	a#	hb	h	h#	C	C#	D	D♭	D#	E2	E♭	f♯	F♮	F#	G2	G#	A2	Ab2	Hb	H	C3	D3	E3	range	measure	no of bars	accidentals
43	buselik	peşrev	tanburi_isak_ney							75	21	247		24	117		188		228		13	240		20	40	73	142	21	126		45	3	11	10	1	G1-E3	88/2	100	
44	buselik	peşrev	bolahenk_nuri_ney			4	17	3	13	43		88			58	21	161	4	111	16		109	3		35	31	49	8	46	8	5	26	34	10		D1-D3	28/4	126	
45	buselik	saz semai	sultan_1_mahmud							108	14	189			141		228		142			118			8	16	18		24			9	3	1		G1-D3	10/8	56	
46	buselik	saz semai	ismail_hakki				4	2	25	66	16	81			103	1	196	2	148		27	242		18	23	64	51	13	46			5	1			E1-C3	10/8	58	
1	buzurk	peşrev	ismet aga				3	6		15		18	2		6	24	41	1	53			70			21	36	57		36							D1-E2	24/4	60	#
2	buzurk	peşrev	nayi osman dede				12	1	17	39	14	65			67		116		117			105			12	60	66		44		24		20	4		E1-D3	32/4	108	-
3	buzurk	saz semai	sultan 3 selim				1/2		1/2	5		7			19		48	1	54			61			2	36	37		24		2	4	2	2	1	G1-A2 (E1-E2)	10/8 6/8	42	-
21	hicaz	peşrev	gazi_giray_han					1	18	83	4	147		170	10		123		165			75			11	3	2	7	12			2	2			G1-A2 (F#1-C3)	20/4	128	♭#
22	hicaz	peşrev	katip_celebi						7	54		104		102			102		67			51		7	2	12	10	8	10			2				G1-A2 (F#1-H3)	24/4 (20/4)	56	♭#
23	hicaz	peşrev	sultan 3 selim						27	73		147		128			154		145			73	14		25	14	22		19		4		3	1		F#1-A2 (D3)	28/4	96	♭##
24	hicaz	saz semai	sadettin_arel						7	23		47		36	1		60		59			58			20	13	14	8	32		3	4	3	2		G1-A2 (F#1-D3)	10/8 (10/16)	61	♭##
25	hicaz	saz semai	sultan 3 selim						10	47		104		77			76		103			54			18		10									F#1-G2	10/8 (6/4)	51	♭##
14	hüseyni	peşrev	behram aga									66		12			49		75			50				29	59		42		19		29	8	1	A1-D3 (E3)	10/8	61	♮♯
15	hüseyni	peşrev	gazi_giray_no1							5		96		52			69		85			63			1	58	80		81		48		44	5		G1-D3	60/8	60	♮♯
16	hüseyni	peşrev	hasan_can					1	1	18		85		79			111		173			231		50	2	164	249		264		90		65	17	4	G1-D3 (F#1-E3)	8/8	190	♮♯
26	isfahan	peşrev	isak_tanburi						6	52	2	254		258	62		340	158	510			321	#4		180	58	164		94		26		16	10		G1-A2 (F#1-D3)	88/4	320	♮
27	isfahan	peşrev	ibrahim_vefa_efendi_feraiz			2	3	1	21	24		47		64	7		81	32	172	14		127			13	63	69		47		4		2			F#1-A2 (E1-C3)	28/4	96	♮
28	isfahan	peşrev	kantemiroglu_prens_dimitrius_cantemir							92		606		184	2	66	266	130	368	28		160			18	98	80		50		24		4			G1-A2 (C3)	28/8	186	♮
29	isfahan	peşrev	neyzen_salih_dede									29		24	7		43	28	95			77			24	13	29		23		8		3	3		A1-A2 (D3)	28/4	48	♮
30	isfahan	saz semai	farabi									58		32	28		69	41	145			105			37	13	31		8		3					A1-G2 (B3)	10/8	36	♮
31	isfahan	saz semai	emin_aga_tanburi						1	8		63		36		18	41	35	138			97			10	49	23		25		6		1	1		A1-A2 (F#1-D3)	10/8	28	♮
12	neva	peşrev	bayezid_2							15		48		60			65		142			48				43	21		11			1				G1-A2	8/8	70	♮♯
52	neva	peşrev	behram_aga_nefiri						9	9		29		33			44		56			31			1	15	11		6		2					G1-A2 (F#1-D2)	14/8	18	♮♯
53	neva	peşrev	behram_aga_nefiri v2						9	9		32		32			43		52			29			2	12	10		4			9				F#1-A2(H2)	28/8	51	♮♯
54	neva	peşrev	solakzade mısakaali mehmed hemdemi celebi							36		112		122			154		188			78		80	4		68		30		4		2	2		G1-B2 (D3)	88/4	100	♮♯
55	neva	peşrev	solakzade mısakaali mehmed hemdemi celebi v2							17		65		73			90		113			51			2	50	42		2		1		1	1		G1-G2 (D3)	88/8	120	♮♯
5	rast	peşrev	mechul dusems			3	21		28	87		50		44			40		47			36			2	33	49		37		26		25	9	3	D1-E3	16/4	30	♮♯
6	rast	peşrev	coban giray			2				63		75		120			99		58			21			6		5									D1-G2	28/4	54	♮♯

7	rast	peşrev	benli_hasan_aga			4	1		15	97		52		53			44	6	87			65			5	45	49		11		1					D1-A2(B2)	48/2	30	♭♯
8	rast	peşrev	nayi osman dede			3	6		26	131		95	9	162			85	4	142			51				55	98		81							D1-A2	3/2 4/4	108	♭♯
9	rast	peşrev	solakzade_mehmed_hemdemi_celebi				8		21	54		70	1	77	20		105	35	119			68			13	26	42		13							E1-A2	20/4	72	♭♯
10	rast	saz semai	benli_hasan_ney			8	11		7	69		57		83	4		64	2	84			45			8	33	36		18		10		6	6	2	D1-E3	10/8	56	♭♯
47	rehavi	peşrev	tanburi_isak_ney			41	58		87	222		161		133	10	25	132	48	254			166		17	63	73	100		56		21		25	5	2	D1-E3	120/4	114	
48	rehavi	saz semai	farabi			18	18		25	227		164	20	225			94		59			16	6		8	4										D1-F#2	10/8 6/8	56	
49	rehavi	saz semai	ismail_hakki_bey			109	97		57	148		99	4	111			65	4	95			28			7	7	21		9			3	2			D1-C2	12/8	80	
38	saba	peşrev	kemani_hamza_mevlana							27		71			130		230		83			58			57		59		11		2					G1-B2	2/4	94	
39	saba	peşrev	tanburi_buyuk_osman						2	14		54		41	4	8	130	15	85	35		80			97		99		57	31	31		15	8		G1-D3	28/4	96	
40	saba	peşrev	salih_dede			2	2		29	67		174		188		4	276	4	256			190			59	54	206		96		41		36	14		D1-D3	28/4	182	
41	saba	saz semai	osman_dede							60		133		146		4	232	40	153	112		147	20		63	78	70	8	30							G1-A2	10/8 3/4	84	
42	saba	saz semai	zaharya							20		125		92			147		54	4		58			42	8	27		26	7		16	18	4		G1-D3	10/8 6/8	37	
32	uşşak	peşrev	mehmet celebim kanbosogl			5	4	10	8	91		162		142	8	9	165	8	245			262			171	45	141		80		24		13	2		D1-B2 (D3)	16/4	44	♭
33	uşşak	peşrev	nayi osman							16		56		67		33	145	1	213			123			45		16		4		2					G1-G2 (B2)	28/4	94	
34	uşşak	peşrev	solakzade_no_1						4	52		170		158			156		164			80			36		14		32		8		10	8		G1-A2 (F#1-D3)	14/8	192	
35	uşşak	saz semai	salih_dede_ney							56		151		141			158		181			130			76	16	48		21		3		2	1		G1-A2 (D3)	6/4	48	
36	uşşak	peşrev	sultan 3 selim			6	6		10	52		85		74		3	79	6	53			19			7		1									D1-G2	28/4	56	

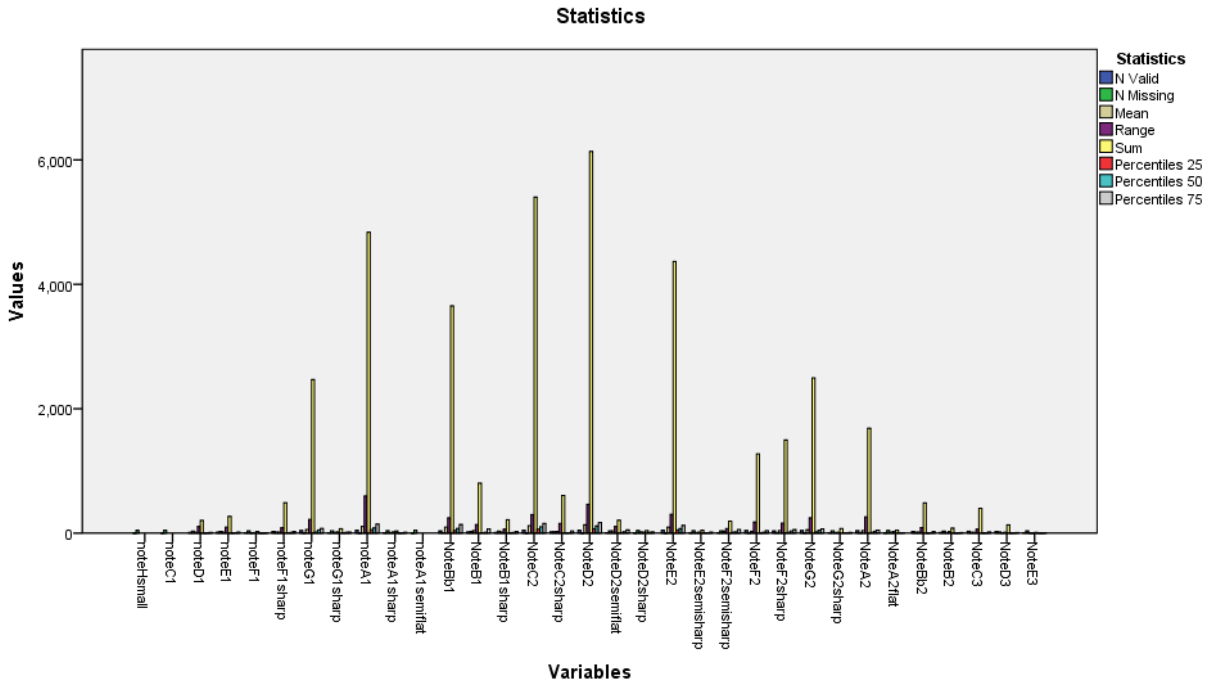

Figure 67 Descriptive statistical analysis

As can be seen on the above chart, the most repetitive notes are D2, C2, Bb1, E2, A1 and equal repetition of G1 and G2. The intervals between A1-D2 and G1-C2 are prefect fourths and a perfect fifth is between G1-D2[242]. As an interval, in physical terms, is the ratio between two sonic frequencies, the perfect fourth has a frequency ratio of 4:3, whereas the perfect fifth has a frequency ratio of 3:2.

According to Truax (2001: 61), each tone is understood as a sound signal, and the carrying information binds the community together and contributes to its character. The repetitive sound signals (or the ones that occur at regular intervals) may remain in the background of the listener's attention. In conjunction with the acoustics of the space, it forms a soundscape which has an impact on the listener. Research regarding the acoustics of the space will be shown in the following Chapter 5.2. Acoustic analysis.

[242] For the explanation of the harmonic series and intervals see Figure 60 in Chapter 3.1.

In addition to the calculations, audio recordings of the Tümata group[243] were used, and during live performances it was noticed that the accompanying instrument (mostly bağlama or saz) played the interval of the fifth constantly throughout the composition, like a *bordun*[244] or *drone*[245] which enhances the healing effect during the composition's duration.

As was mentioned in Chapter 3.1. on the history of makams, where the names of the notes were described from the Turkish Music Encyclopedia, in the results that are obtained through analysis, the following are the corresponding names G1=RAST, A1=DUGAH, C2=ÇARGAH, D2=NEVA, E2=HÜSEYNI and G2=GERDANIYE.

To show the frequency of the results, the old proposed standard of A=432 Hz is used, since Turkish music is microtonal and non-tempered, so it is more suitable for the purpose of this research. The frequencies of A=440 Hz will be shown equally for comparison. One of the results of the analysis is that all compositions are either -in G or -in A (the term scale is not the best solution because of the harmonic implications, as it depends on the intervals and accidentals), for the reasons of the range. The relation between the tones is accordingly made, since each mode has its own specificities, which are marked with accidentals. However, the repeating notes, as seen in the table, are the "clear" ones, without any accidental marks, and are A, C, D, E and G.

The calculation of the frequencies is made with the following formula: if A=432 Hz is taken as a value, then to get the C for example, the following equation 432*4/3=518.4 will be made. This is how any frequency from any pitch can be calculated[246]. The shown frequencies in Table 14 are claimed to have a healing effect, based on the repetition of tones within one composition.

---

243 A set of recorded CDs' from Tümata for each makam was listened to, and a life performance of TÜMATA at the seminar "Kalpten Tıbba, Tıptan Kalbe" held in Edirne, Turkey, 2011. Another similar experience was in Ankara during a seminar in 2012.

244 Bordun – a deep tone which constantly sounds on some instrument while playing. It was used on string instruments during the Middle Ages (Kuntarić, 1974: 221).

245 A drone is a harmonic or monophonic effect or accompaniment where a note or a chord is continuously sounded throughout most of a piece or all of it, a deep sustained monotonous sound (Webster's 3rd New International Dictionary, 1966: 693; Webster's Seventh New Collegiate Dictionary 1971: 254)

246 For more details about the calculation of ratios and frequencies see http://www.kylegann.com/Octave.html and http://www.sengpielaudio.com/calculator-centsratio.htm.

Some studies so far (Foffani et al., 2003; Wieser, 2003; Benabid et al., 2009; Thut and Miniussi, 2009; Tsang et al., 2012) have shown the impact of frequency usage in therapy for some tumor treatments and Parkinson's disease in particular, focusing on the brain information processing in all scales. From the frequencies shown in Table 11 in Chapter 4., the corresponding tuning pitch "A" of the planet Earth is 432,10 Hz, one of the main tuning standards used today. The above-mentioned research for the impact of frequency usage in therapy of Parkinson's disease did not use the same frequencies as the ones gained with this research, but the ones in the lower octave, up to 100 Hz. It would be interesting to explore the impact of these frequencies, as one of the results of Thut and Miniussi's (2009: 183-185) study states that *"high frequency stimulation can result in excitatory changes in the stimulated area"*.[247]

Table 14 Frequencies of the tones with different main tuning standards

A=432Hz			A=440HZ		
Pitch (tone)	Ratio	Frequency	Pitch (tone)	Ratio	Frequency
g		378 Hz			385 Hz
A	1:1	432 Hz	A	1:1	440 Hz
(Bb)	16:15	460.8 Hz	(Bb)	16:15	469.3 HZ
C	4:3	518.4 Hz	C	4:3	586.6 Hz
D	3:2	648 Hz	D	3:2	660 Hz
E	5:3	720 Hz	E	5:3	733.3 Hz
G	7:4	756 Hz	G	7:4	770 Hz

This research did not include the rhythmic structure and tempo of the instrumental compositions. The author made an assumption that these elements are also influential, most probably in connection with al-Farabi's, Ibn Sina's, Safiyüddin Urmevi's and Gevrekzade Hasan Efendi's idea of effectiveness of the individual makams according to the time of day

[247] In this research, electrical currents in sinusoidal waveform with different frequencies up to 250 Hz during stimulation were applied at low intensities to achieve cortical activity. For more information see Thut and Miniussi (2009).

when they should be performed for treatment. This remains an open question for further research.

Evaluating the gained results and the data, the most repetitive notes of the makams with their respective frequencies have a healing effect as the continuous sound forms the *ostinato*[248] or the *drone*, which proves the first hypothesis that makams have a healing effect and that the Turkish traditional concept of a healing effect strongly depends on specific frequencies and the harmonic intervals of the perfect fourth and perfect fifth of the makam scale.

5.2. Acoustic analysis

The second analysis was acoustic, with the results obtained from a 3D model of one of the hospitals which was part of the research – the Divriği Great Mosque and Hospital. As one of the most important complexes of the Anatolian Seljuk period, built in 1228/1229 by Ahmet Şah and his wife Melike Turan, this mosque complex is the only one preserved from that time and, according to Kuban "there is no other example of mosque and hospital in a rectangular block and under one roof" (Kuban, 1999: 40). For this work, the focus was only on the hospital and its architectural and acoustic characteristics.

Architectural features

The hospital was built as a madrasa plan featuring in the center a pool and a stage under the main iwan. The dome which arises above the pool was closed in the 18th century with a brick roof. The outside characteristics of the hospital and the whole complex are limestone carved ornaments, a real masterpiece of Seljuk architecture. The entrance of the hospital features

248 Ostinato is a persistently repeated musical figüre (Webster's Seventh New Collegiate Dictionary, 1971: 597)

portraits of Ahmet Şah and his wife Melike Turan (shown in Chapter 1.2.4., Figure 20), as a memento and reminiscence of the traditional story about Ferhat and Şirin (Eser, 2017).[249]

The central hospital area has an area of mean volume of 1965 m^3 and a mean surface area 958 m2. The surface area includes the floor and the walls, excluding the windows, doors and openings. Its size is 13.6 x 15 m with a mean height of 9.63 m.[250] The calculation excluded the dome as this was not an original part of the hospital in the 13^{th} century but added in the later centuries. The interior is spacious and there is no visual and auditory obstruction. It is a design consisting of multiple parts such as iwans, arcades, rooms and stairs leading from the ground floor to the first floor. The step to the main iwan, which is on the east, is 50 cm, while the height of the iwan is 7.5 m and length 8.66 m. On the south and north side there are also iwans, while the main entrance door is on the north. In the center position is the pool which was filled with water in the Seljuk time. Its inner dimensions are 2.47 x 2.52 m, and the surface is 6 m2.

The gallery, on which spaces and rooms are situated, due to the size of the windows was not significant in the calculation of the acoustics. The position of the stairs situated at the back door was also not significant in terms of acoustic calculations. The lateral surfaces of the hospital were made from limestone and its coefficient was used for the calculations.

All the ornamentation inside is engraved in limestone, only the dome has some wooden construction elements, which was not significant for the acoustic parameter, as the original building did not have the roof coverage. The calculation was based on the original plan.

[249] In his book, prof. Eser gave a new perspective regarding the ornamentation of the hospital portal, including portraits of Ahmet Şah and Melike Turan, stating the idea of the whole ornamentation as "a little piece of heaven captured inside stone". For more information see Eser, 2017.

[250] The mean values have been taken because of the range of the slope height, which was not significant for the calculation, so the mean value could be taken for the calculation.

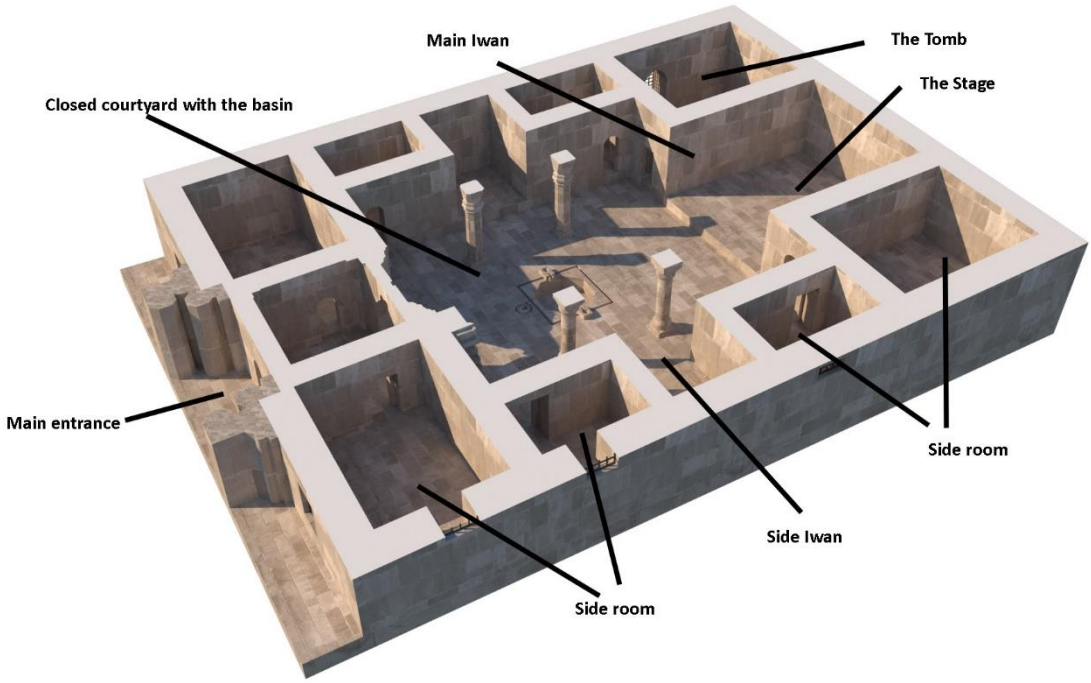

Figure 68 Cross-section of the Divriği hospital 3D model

The main objective of this analysis was to determine if the people equally hear and understand the sound coming from the main iwan stage in the Divriği hospital regardless of their standing position, by simulating the sound in a reconstructed acoustical environment[251]. The acoustical environment within the room was assessed through acoustical indicators: Reverberation Time[252] (RT), Early Decay Time (EDT) and Clarity. Reverberation time and Clarity are the two major perceptions which define the quality of the acoustic space.

Research method

Today with technological developments, acoustical assessment of space in the design phase is easier to do with computer simulation, using certain software to analyze acoustical properties even before the actual construction, which can then be used and integrated in architectural design. As Schmidt and Kirkegaard (2004) explained: "Computer simulation has proven to be a viable tool in designing music buildings such as concert halls, opera houses and multi-purpose

251 The Divriği hospital is the only example with a covered courtyard from the Anatolian Seljuk architecture and as such the best preserved one. The complex of the Sultan Bayezid mosque and hospital in Edirne (1488) is believed that follows the Divriği's architectural style example.

252 Reverberation is easiest to notice as it is heard when music stops and sound travels, and it is possible to hear it as the music is playing. It is important for music as it makes the harmonics smooth and turns aliquots into harmony.

auditoria. These not only minimize unexpected acoustic problems, but they also allow many alternatives to be tested in a short time span" (Sü and Yilmazer, 2008: 23).

The acoustic design has as its goal for the desired stimulus to arrive to the receiver without undesired noise, and optimal methods for controlling sound waves and audio signals have been developed by architectural acoustics and audio engineering (Truax, 1984: 12).

The hospital is the space within which music is a soundscape. As sound spreads relatively slowly, acoustic information comes to the listener at the various arrival times, making the audible image a little bit different (Truax, 1984: 15). This important feature of connecting the acoustics of the space and music which was performed for healing purposes is associated with the sound signals.

In setting up the research of architecture as a sound space, it is necessary to clarify certain parameters as referent points in the analysis.

The parameter of the height[253] is treated as a sound source level which determine the soundscape. Makams are understood as a sound source within a soundscape. The keynotes are frequencies which came from repetitive sound signals of the makams.

Computer simulation of the Divriği hospital was carried out using the EASERA software[254] and ODEON room acoustic software[255]. The Odeon room acoustic program also takes into account the statistical properties of the room's geometry and absorption (Rindel, 2000).

The hospital was 3D modeled in the SketchUp software for 3D design[256] and then the calculation of the geometries within the hospital were taken into consideration. Columns and

253 For the purpose of calculations, the parameter of the height was important for the closure of the space and for the calculation of the reverberation time of the space/hospital.

254 AFMG EASERA 1.2.13 – Electronic and acoustic system evaluation and response analysis.

255 Odeon software was used for modeling the impulse response of the space. Here I would like to thank Prof. Dr. Siniša Fajt and Dr. Miljenko Krhen from the University of Zagreb, Faculty of Electrical Engineering and Computing, Department of Electroacoustics, for acoustical calculations in the aforementioned programs. Also I would like to thank Luka Grubišić-Čabo for his help and clarification of the obtained results.

256 SKETCHUP PRO 16, Trimble Inc. I would like to thank Mario Goleš from Goleš design, for making a 3D model of the Divriği hospital.

galleries were not significant for the obstruction of the sound, since the volume of the space was quite sufficient for the acoustic absorption of the sound.

From the 3D model the impulse response was modeled in Odeon (in the form of a gunshot wav file). The distance between the omnidirectional sound source and omnidirectional microphone was 10.23 m.

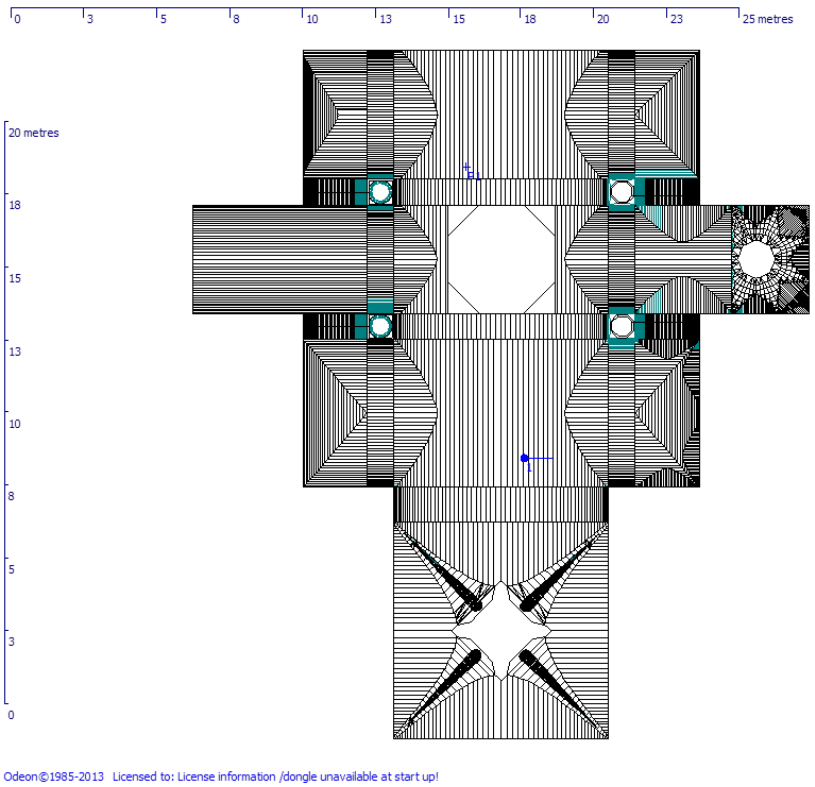

Figure 69 Inside plan of the hospital, showing the position of the sound source[257] and microphone

The impulse response (IR) was modeled in Odeon and then analyzed in the Easera software. For calculation purposes, length, width, height, volume, water, area and coefficient of absorption were taken into consideration in order to calculate the Reverberation Time (RT), Early Decay Time (EDT), and Clarity (C).

[257] The sound source was a gunshot. As this was simulation in a 3D model, a wave file (raw uncompressed lossless audio) of the gunshot was used.

Table 15 Coefficient of sound absorption in the 125-4000 Hz range

Frequency	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
α stone	0.01	0.01	0.01	0.01	0.02	0.02
α limestone	0.02	0.02	0.03	0.04	0.05	0.05
α openings	1	1	1	1	1	1
α water	0.008	0.008	0.013	0.015	0.020	0.025

The coefficients of absorption are quantity important for measuring the sound absorption of the material and defined as the ratio of energy absorbed by the material to the energy incident upon its surface. This is needed to calculate mainly the reverberation time of the room as well as other relevant parameters of the acoustic calculations. Together with the following information about the surface area (Table 16), the formula can be used to calculate the parameters.

Table 16 Surface area of Divriği hospital in meters

Surface in meters			
S stone /limestone	958.84 m^2	Width	15.00 m
S openings (doors and windows)	20 m^2	Length	13.60 m
S water	5.40 m^2	Volume (mean)	1965 m^3

In order to calculate the acoustic surface, Sabine's formula was used RT=0.16 V/A, where RT is the reverberation time, V is the volume of the room and A is total absorbing power. The formula used for the absorbing power was $A_n = \alpha_s^n \times S_s + \alpha_o^n \times S_o + \alpha_w^n \times S_w$ where *n* was the corresponding frequency from the absorption table coefficient.

The results showed a longer reverberation time in the lower frequencies, and shorter in the higher frequencies.

The hypothesis is that the hospital venue is suitable for healing purposes; the architectural characteristics of the venue support the circularity of the sound, where people were standing and/or sitting around the pool area, while the musicians were positioned in the main iwan, playing music. The number of people is variable, so it was not included as an absorption factor[258].

258 However, as an example, the author of this thesis was present during one performance of a sound presentation during one of the study visits in 2014, when one performer climbed up on the stage and sang a short melody from six points of the stage, facing the iwan and facing the audience, in order to show how the same amount of sound came to the listener, regardless from which point of the stage it is performed.

The results obtained from the EASERA software are showed in the following figures.

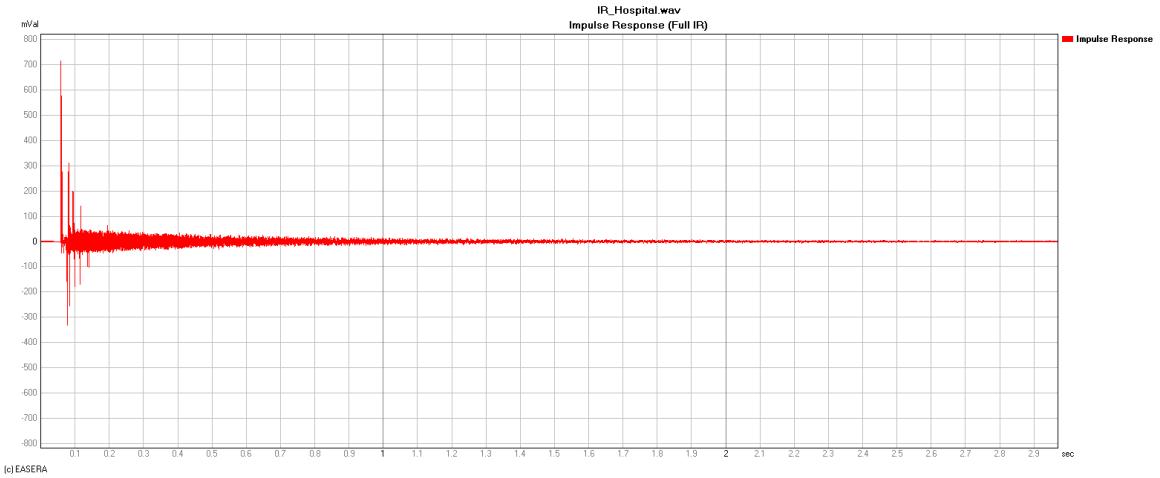

Figure 70 Impulse response

In this figure it can be seen that the length of the impulse response of the gunshot was 2.9 s.

The Easera software calculated the following results shown in the table:

Table 17 Impulse response (Full IR)

C7	C50	C80	D	L7	L50	L80	Center time	ST1	ST2	Arrival time
dB	dB	dB		dBFS	dBFS	dBFS	ms	dB	dB	ms
-9.7	-4.9	-2.9	0.242	-0.7	3.3	4.8	305.33	4.8	7	59.68

C7 is the direct sound measure for the sensation of the directness and nearness of the sound source and is one of the sound-source criteria (Easera manual-appendix, 2012: 6). In correlation to the distance from the sound source-listener[259] should not fall below a range of -10 to -15 dB. In our calculation the result is -9.7 dB which is satisfactory for this criterion.

C50 is the clarity measure relevant to speech performance. The higher the value, the higher the intelligibility.

C80 is the clarity measure (according to ABDEL ALIM) which is relevant for the temporal clarity and the register clarity of music performance. There are no normative room acoustical

[259] For this calculation, listeners were not actually included, but measurement setting instead.

rules, however, it is stated that less then -5dB for sacral music is acceptable, and up to -1.6 dB for classical music is acceptable (Easera manual, appendix, 2012: 34, 35). Therefore, our result of -2.9 dB is acceptable and satisfactory for the clarity in the hospital.

D is for "definition" and is a room-acoustical criterion for the intelligibility quality of speech performances (Easera manual-appendix, 2012: 17). The recommended value is less than 0.5. In this work's the calculation value is 0.242 which is satisfactory for this "seat-related listener criteria".

L is for level function and is used to calculate the sound pressure levels from an impulse response. The results show the quantities of levels 7 (L7), 50 (L50) and 80 (L80) ms.[260]

The Center Time is the point where the energy received before the time is equal to the energy received after the time. For satisfactory speech intelligibility it should be below 130 ms. For music, a partially delayed response is rather acceptable or even desirable (soft sound build-up)[261]. Our results show the 305.33 ms, which suggests a soft sound build-up for the music.

Support ST is a measure for the acoustical support by the sounding room in the stage area, where ST1 is a measure for mutual hearing on the stage and ST2 is a measure showing the room response[262].

The Arrival Time is the period between start of the measurement and the arrival of the signal, which means a certain level above noise[263]. In our case, this arrival time is 59.68 ms.

260 Easera tutorial, 2012: 134
261 Easera tutorial, 2012: 135
262 Easera tutorial, 2012: 133
263 Easera tutorial, 2012: 129

Specific measurements

Reverberation Time

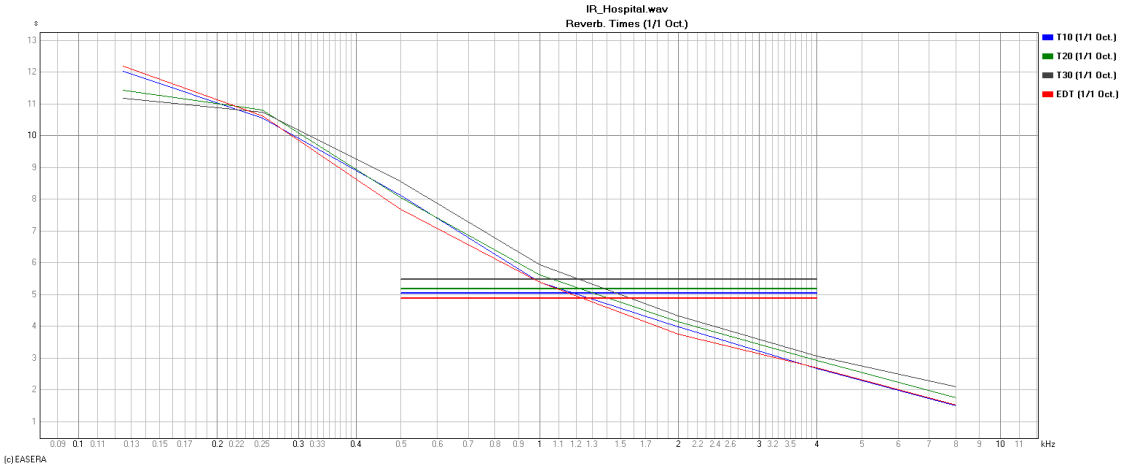

Figure 71 Reverberation Time

The Reverberation Time is the global quantitative criterion of the sound field in a room which gives fullness and richness to the music. But, in order to get the accurate results, two types are measured-Early Decay Time and Reverberation Time as T10, T20 and T30 (T10 represents even sound distribution in the room and approximately 20 sound reflections within 10 ms, T20 within 20 ms and T30 within 30 ms).[264][265] They are "overall parameters" in the assessment of the room-acoustic quality.[266] RT is determined by these parameters where the ISO 3382[267] across the energy ranges is -5 dB to -15 dB (for T10), -5 dB to -25 dB (for T20) and -5 dB to -35 dB (for T30)[268].

Table 18 Reverberation Time

	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
	s	s	s	s	s	s	s
EDT	12.18	10.63	7.68	5.39	3.76	2.69	1.53
T10	12.03	10.56	8.13	5.39	3.98	2.68	1.51
T20	11.44	10.81	8.06	5.61	4.15	2.93	1.76
T30	11.19	10.74	8.57	5.94	4.32	3.08	2.10

264 http://www.bnoack.com/index.html?http&&&www.bnoack.com/acoustic/concerthall.html

265 Easera manual-appendix 2012: 8

266 Easera manual-appendix 2012: 6

267 Kürer, R., Kürzer, A. 1967-68. Integrationsverfahren zur Nachhallauswertung (Integration procedure for evaluating reverberation), *Acustica 19*: 313.

268 Easera manual-appendix, 2012: 14

The early part of sound decay determines better how the audience perceives music, and a measure for this is Early Decay Time (EDT).[269] It is calculated by measuring the amount of time it takes sound energy to decay the first 10 dB and multiplying that by six. The shorter EDT improves clarity, and longer RT provides liveness of music. The results of the analysis in the table show that in the lower frequencies the Early Decay Time (EDT) and decay time 10-30 seconds have a longer response. The Reverberation Time is the time that passes after an acoustic source in a room has been turned off, until the sound energy density has decreased to 1/1.000.000 of the initial value or until the sound pressure has decayed to 1/1000, i.e. by 60 dB.[270]

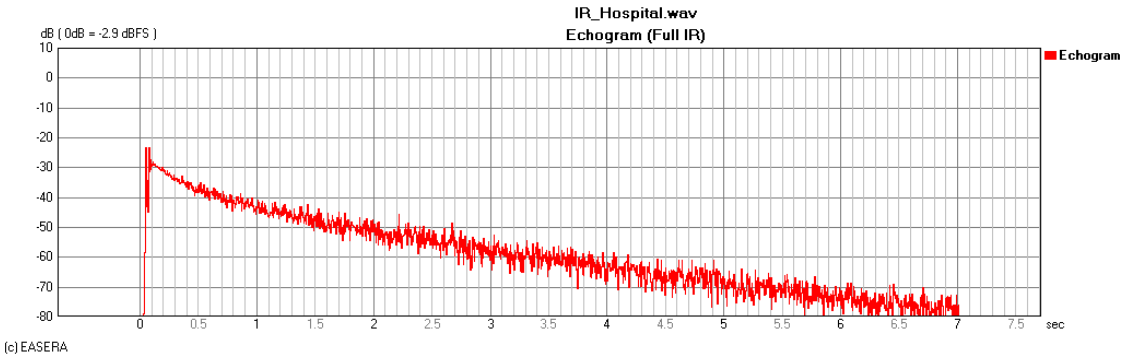

Figure 72 Echogram

In contrast with the Reverberation Time, where RT is the sound travelling from the source to a certain point, echo is a sound which is a result of the bouncing of the sound coming to a certain point. If the echo is too large, there will be distortion of sound; if it is too small, the sound will be "dry". The results show fast decay of the echo, meaning that it is not too large and therefore, is not distorting the sound.

269 http://www.concerthalls.org/?page_id=84

270 Easera manual appendix, 2012: 7. For more detailed information and formulas see the Easera manual appendix.

Clarity measures

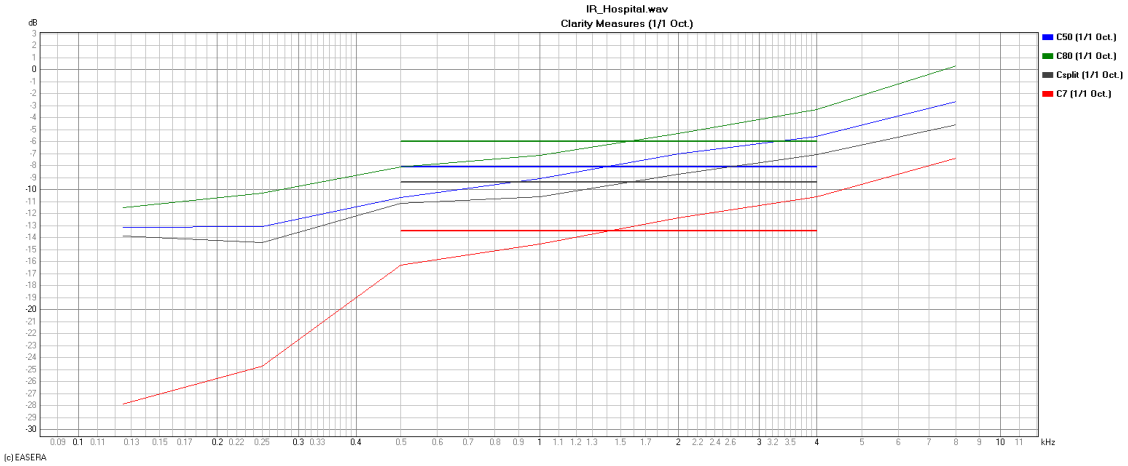

Figure 73 Clarity measures

The measurement of Clarity is the ratio of the energy in the early sound which is heard in the first 80 ms after the arrival of the direct sound, compared to the ratio of the energy in the reverberant sound, expressed in decibels (dB). It shows the degree to which the individual sounds stand apart from one another.[271]

Table 19 Clarity measures

	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
	dB	dB	dB	dB	dB	dB	dB
C7	-27.8	-24.7	-16.3	-14.5	-12.4	-10.6	-7.4
C50	-13.1	-13.1	-10.6	-9.1	-7	-5.6	-2.7
C80	-11.5	-10.3	-8.1	-7.1	-5.3	-3.3	0.3
C split	-13.8	-14.4	-11.1	-10.6	-8.7	-7.1	-4.6

Clarity depends on the physics of the space and will be reduced for the effort of increasing the reverberation. But, as can be seen in the table, C80 in the low frequency clarity goes from -11.5 dB to -7.1 dB, which means that clarity is understandable for music and also for speech. As the neural mechanism is time-dependent for detecting harmonic coherence, the long reverberation time and low clarity provide richness of sound, thus making the sound experience stronger and more significant.

271 http://www.bnoack.com/index.html?http&&&www.bnoack.com/acoustic/concerthall.html

The frequency response (amplitude frequency characteristic in the reception site) was calculated (from the impulse response with Fourier's transformation of frequency response) for an answer regarding whether the space supports or annulate specific frequencies. The value expressed as dBFS refers to decibels full scale which means that it has a defined maximum peak level [272].

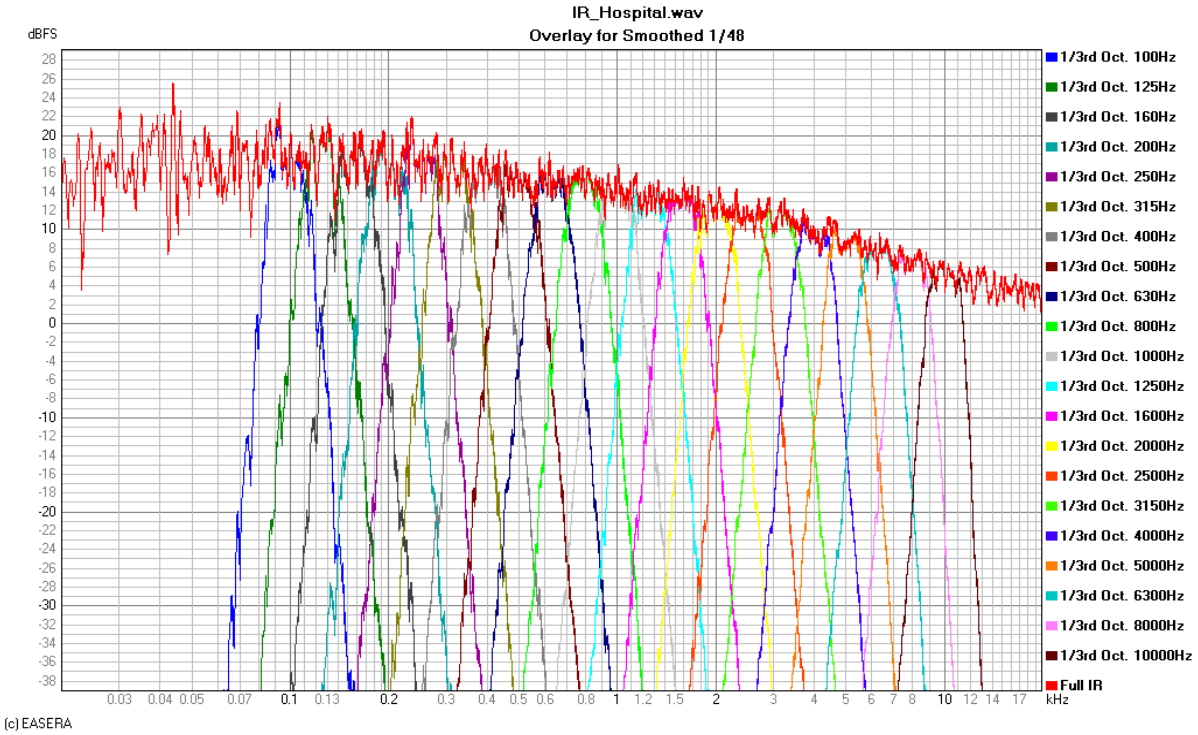

Figure 74 Overlay of the impulse response

Specific frequencies can be observed on this graph, corresponding with the peak tones retrieved from the makam analysis (G=378/385 Hz, A=432/440 Hz, Bb=460.8/469.3 Hz, C=518.4/586.6 Hz, D=648/660 Hz, E=720/733 Hz). This result shows dB full scale, where 0 dBFS represents the highest possible level in the digital gear with no clipping of the frequencies.[273]

The graph shows that specific frequencies peak with the impulse response, indicating a smoothing decay in the higher frequencies.

[272] Retrieved from http://www.audiomasterclass.com/newsletter/what-is-the-difference-between-0-db-and-0-dbfs on 20/5/2018.

[273] For detailed information regarding dBFS see http://www.jimprice.com/prosound/db.htm; For the noise level see chart https://www.noisehelp.com/noise-level-chart.html

As the frequency raises, the response time shortens, which can be observed in the next figures of the spectrogram and waterfall.

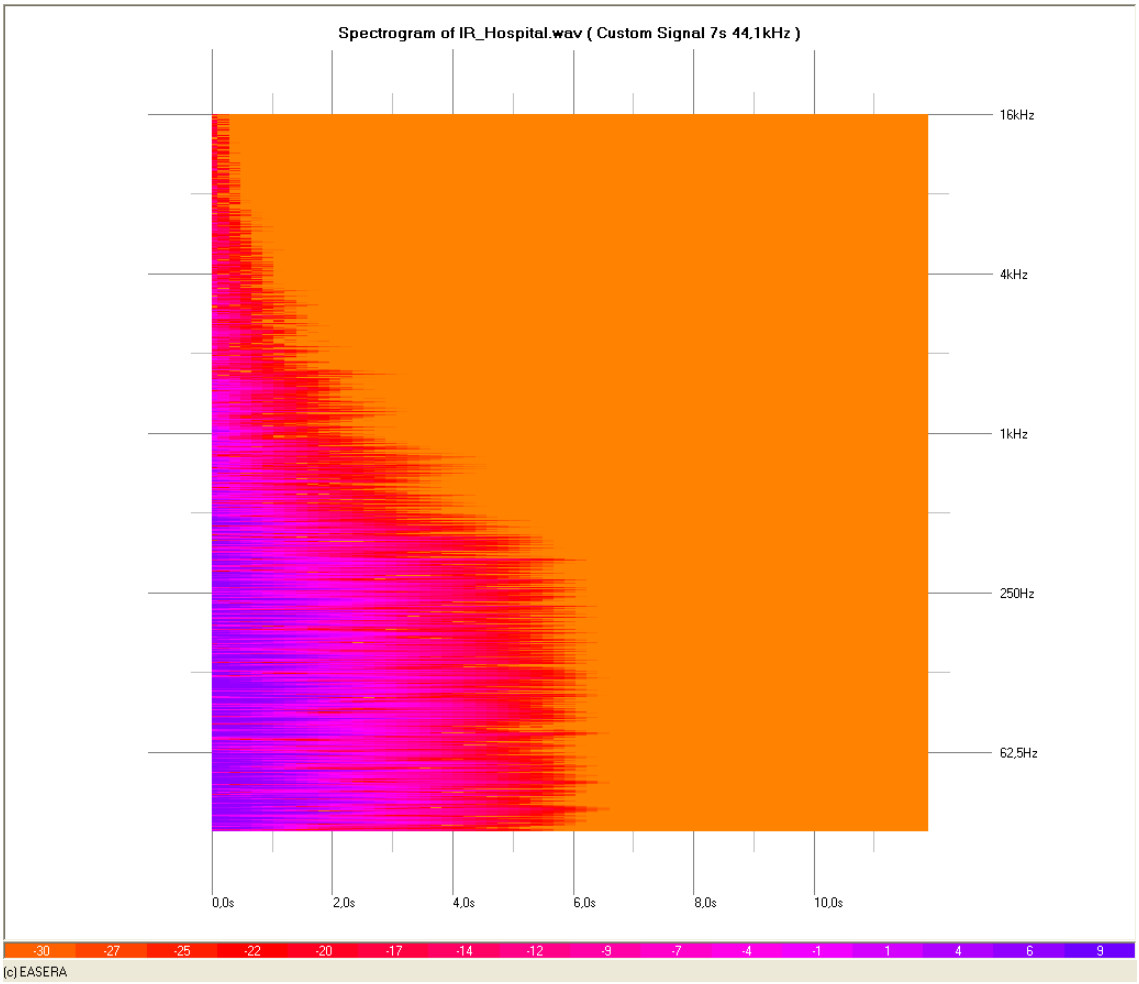

Figure 75 Impulse response spectrogram

The minimal criterion to ensure a balance between various sounds is that their spectral energy is distributed over different parts of the audible frequency range (Truax, 1984: 73), which is visible on this example of the Divriği Hospital.

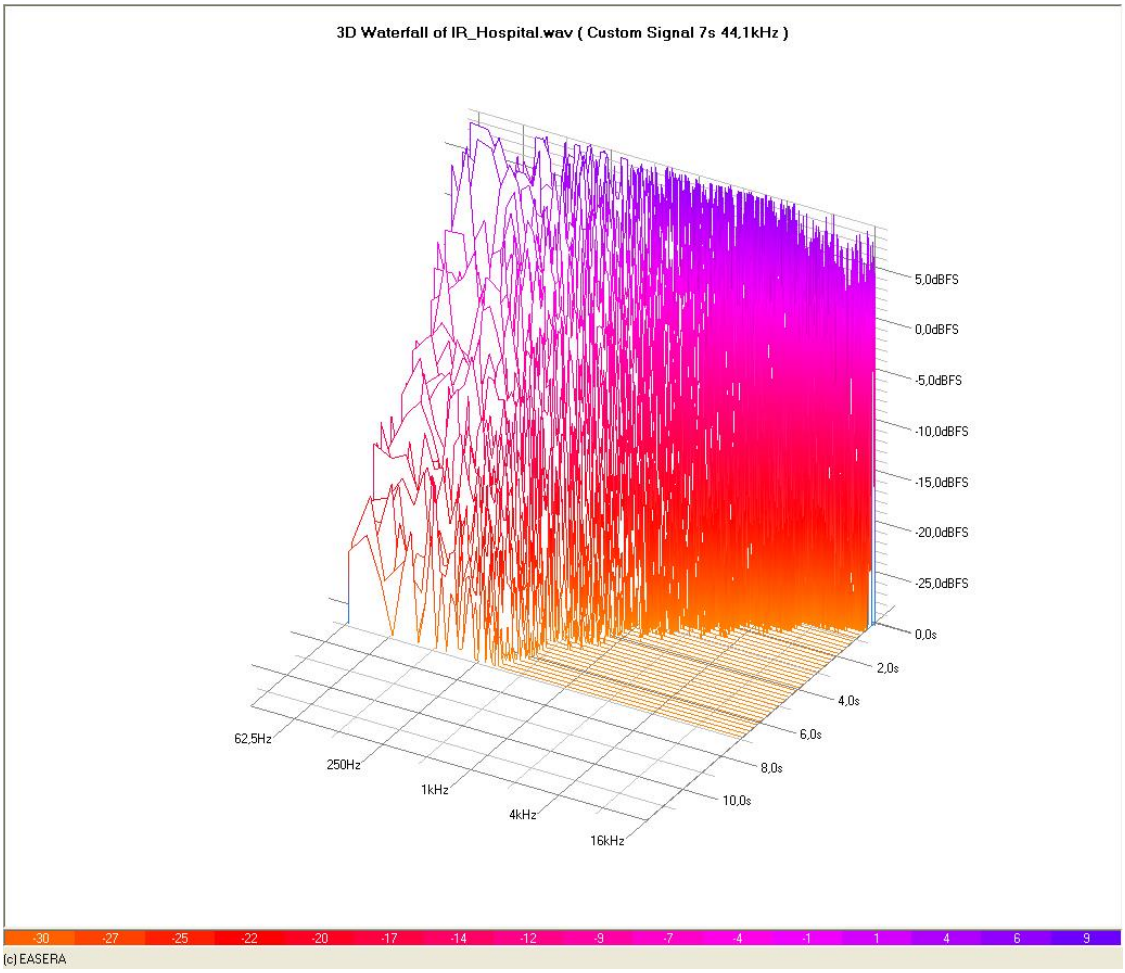

Figure 76 3D waterfall of impulse response

When the cross section of all the results given above is observed, it can be seen that the room response is satisfactory for music standard measurement (C80, RT, EDT, T10, T20, T30). As Reverberation time is determined by measuring the sound level decay in a range from -5dB to -35dB for T30, and the Early decay time and T10 range 0 dB to -10 dB are more in conformity with subjective assessment of the duration of reverberation, especially at low-level volumes, it can be seen that the results of clarity measures and reverberation time are meeting the given standards of the room-acoustic parameters. It can be concluded that architectural characteristics of the Divriği hospital fulfill the acoustic standards for the good reception of the sound for the audience. From this acoustic analysis it can be concluded that Divriği hospital venue supports the hypothesis of being suitable for the healing purposes.

For the confirmation of the second hypothesis that the architectural structure of the complex and sound events in that venue support the healing effect, acoustic analysis has shown that the sound realization could take place in the hospitals which were designated to support it, and to support the environmental soundscape in conjunction with the sounding makams.

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6. CONCLUSION

The hypotheses set in this work were the following: The first hypothesis is that makams have a healing effect manifested in the makam's produced sound events which includes specific frequencies of the harmonic perfect fourth and perfect fifth intervals of the makam scale and that the Turkish traditional concept of healing effect strongly depends on those specific frequencies.

The second hypothesis is that the architectural structure of the Seljuk hospital and sound events in that venue support the healing effect and that the Turkish traditional healing concept is understood in a way that the healing effect depends on the architectural structure of the hospital and produced sound events in such architectural structures. The hypotheses were proved by musical analysis of the makam examples and acoustic analysis on the 3D model of the Seljuk hospital in Divriği.

As the architecture of the hospitals in the Anatolian Seljuk period followed the madrasa plan, and acoustic research until now had been conducted only on examples of the Ottoman mosques, the acoustic research and analysis in this work is the first research conducted on an example of a Seljuk hospital.

The methods used in elaborating the hypotheses considered the interdisciplinarity of the research topics which cover the disciplines of ethnomusicology, ethnology, anthropology, music history, music therapy, art history, history of architecture and acoustics, as well as methods of analysis and synthesis, structural music-theoretical analytical method and deductive method.

The historical frame of the Anatolian Seljuk State and its cultural context show over 200 years of architectural tradition and way of life and trade. The architecture of the hospitals from the Anatolian Seljuk period presents the most important and mostly preserved hospitals, along with consistency of architectural style. For understanding the music from that period, music style development was followed together with the settlement on the Anatolian plateau, development of religious ideas which were growing and were part of everyday life. The music tradition was developing alongside with settlement, enriching the cultural life of the community.

The analysis for confirming the first hypothesis was musical analysis of the makam examples which included music-frequency analysis of the specific tones of the selected makams.

The results have shown that all analyzed sheet score examples had mutual the same five tones with their respective frequencies which were repetitive and same for each makam melody analyzed. The descriptive statistics showed the peaks of the most repetitive notes, same as observed in the excel table.

Acoustic analysis of the Divriği hospital was also conducted in order to prove the second hypothesis. The results have shown that the reverberation time and clarity are similar to concert halls and therefore create a suitable soundscape, supporting the music therapy's healing effect.

The results have shown that hospitals from the Anatolian Seljuk period had characteristics of concert halls and were built as acoustic (music) venues. The music therapy which was conducted in those venues had acoustical support in the construction, and some building examples show a pool in the middle of a closed courtyard, where water was in constant flow, which was very important for the community for religious and health reasons.

It is confirmed that makams which were claimed to have had healing effects in the works from as early as al-Farabi and al-Kindi, have common repetitive tones. The analysis showed that those repetitive tones have five frequencies. These frequencies in conjunction with the acoustic design of the venue form a positive soundscape which has a mild and healing effect on the listeners/patients.

According to Pythagoras there are three purposes of music: 1) Adaptation: music must correspond with the personality of each person whilst the individual must gradually learn to adapt him/herself to various sorts of music. It doesn't matter what his/her specific taste is; he must learn to adapt; 2) Change: music has the power to influence a person's deep state of mind. It can promote the individual's use of skills and his/her profound acceptance of oneself; 3) Purification: music can liberate the mind and body from everyday stress. Pythagoras discovered that the pitch of one half of a string gives a one octave higher note and based on this, musical intervals are shown by frequency ratios. Another concept which should be included in the musical scale is the cent, which is a tool for comparing the size of intervals and is based on the logarithms which correspond to multiplying frequency ratios (1 octave equals 1200 cents). The Pythagorean 17-tone scale was used in the Islamic world at the end of the medieval era (Catalani, 2015: 68-70). The systems which were based and developed on the Pythagorean scale

and were used in Turkish music are the Safiyuddin Urmevi and Arel-Ezgi system, from which the latter is the one mostly used today.[274]

The Pythagoras's system, as well as the Fibonacci series correspond in terms of ratios, and frequencies can be calculated, as seen in the example in Chapter 4. Many musicologist and music theorists constantly attempt to explain the building of the makams, to make new systems, to simplify the way of usage so that it can be accessible to people who are not familiar with the non-tempered system and accidentals (çeşni-the word which is used when explaining the "taste" of the makam melody).

Music, or rather melodies used for music therapy are definitely based on the cultural context and musical preferences of the patients. If the music is familiar to the ear, brain and cultural context, the patient will have no problem in "absorbing" it to their system and it will find it appealing. By contrast, if music/melodies which are not familiar to the patients are used, the patients will respond either positively or negatively to the stimulus. However, if only specific frequencies are used, non-related to any melodies or music style, but as isolated tones or sets of tones, the presumption is that patients will have a positive reaction regardless of their cultural or ethnical background as the brain will respond accordingly to these frequencies and the healing effect will be accomplished. Such presumption is based on the recent brain research showing the impact of frequency usage in therapy for some tumor treatments and Parkinson's disease in particular[275].

The question of culture is all-important in approaching and understanding the healing power of music and related practices. As a cultural phenomenon, a person's experience with music relates to the physiological, psychological, emotional, social and spiritual domain of a being. If the healing music is at the same time connected with a spiritual experience, transcendent levels of consciousness can be accessed (Koen, 2009: 25-26), as shown by an example within the Sufi community (the whirling dervishes).

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274 For more detailed information about the theoretical discussions on the systems see Can (2001).

275 As mentioned in Chapter 5.1., the recent research refers to the impact of frequency usage in therapy. For more information see Foffani et al., 2003; Wieser, 2003; Benabid et al., 2009; Thut and Miniussi, 2009; Tsang et al., 2012.

As this work explored the makam music, which has origins and tradition since the 8th century, one of the conclusions is that, even though they were not aware of the frequencies, the healers of that time by personal estimate and according to astronomy, astrology, mathematics, religion and, it could even be said, a hunch, knew exactly what they were doing and how to help people.

In the early Islamic culture, there is a strong connection between life and religion, intercrossed with astronomy (Farmer, 1926). The works of theorists Ibn Sina and al-Farabi lay down the foundations of music therapy, as they were the first theoretical written sources which date back to the 8th and 9th century. Followed by the works of Urmevi in the 13th century, Hasan Efendi in 18th century, to Ezgi and Arel in the 20th century and the contemporary theorists who are still discussing today (Bozkurt, Karaosmanoğlu, Yarman), the conclusion is that this subject is still wide open for discussion and that the final conclusions are yet to be made.

If other healing aspects are considered, from different cultures, similar examples can be found in terms of the healing process, especially in the alternative methods of the medical treatment. As the beliefs and cultural practices are studied within the scope of ethnology and anthropology, alternative methods are considered as part of individual culture and customary practice. Some of those do not have a scientific background in terms of research, some of them do, but all of them have many examples of good praxis and results from the actual treatments and can be considered as worthy.

Many different explanations of makams have been observed, different theories of how makams are built, and a conclusion is that unlike the modes in Western Music, makams have a much more complicated construction and building system. Moreover, the microtonal division into commas and cents and the ongoing discussion on the division within one octave, makes them even more complicated.

Today, microtonalists are successful in constructing the instruments in order to achieve the original sounds from the past and to introduce the old/new sound to the audience. Different tuning of the instrument can completely change the timbre and experience of the sound, as the relations between notes are more natural, but this is just one of many theories. In Turkish Art music, the *ney* instrument's notes are determined when the ney is produced. The range (diapason) is limited and adjusted to the human ear so it is not too low or too high, in one word – "pleasant" to the ear. As the research and analysis showed, this has a lot in common with the

frequencies of the tones, which is also compatible with other research from different fields on the influence of frequencies on the brain, exposed to in other ways, not only music.

Contemporary science enables the exploration of why the traditional healing method gave results, and why it still works today.

Today's scientific knowledge enables analyses which were made for the purposes of this work and shows the frequency incidence as an answer to something which was only known and used as a belief in the Middle Ages. The geographical context in this work is Central Anatolia, but in fact wider, because of the turbulent period of the Middle Ages. Similarities between populations and the wish to expand knowledge brought about the intellectual explosion at the beginning of the Middle Ages.

The doctrine of psychic unity is shown in this thesis as music therapy where music is a universal language without any boundaries, fastly spreading through settlement and cultural life, which was happening around palaces, as well as on the main trade routes of the Middle Ages.

In this thesis, a connection between healing methods and beliefs which gave results connects makams with tradition, while research proves the specific frequency incidence in makams which is claimed to have a healing effect.

The makams are understood as a sound source within the soundscape and the keynote frequencies show the healing potential.

This dissertation tried to propose that, as music is understood as universal language, when set to its basics and parsed to the "atom" of sound which is frequency, it is understood that it has a healing effect as part of music therapy. The subject was focused on the Anatolian Seljuk times and makam music, but it is definitely a possibility that this approach can be applied on any music scale in any part of the world and any civilization. The common thing for all societies is music; the difference is the wrapping of the melodies into different scales, but the base or ratios are same regardless of the era and style.

In this work the ideas and theories presented in the works of al-Farabi and al-Kindi regarding the efficiency and healing effects of the makams is confirmed through common characteristics in specific frequencies.

7. GLOSSARY OF TERMS

Arazi: l*it.* "lands."; the sale of lands. Tombs are not included in the sale of lands. A place or station for casting the harvest is not considered to be amongst the rights and advantages of land, and therefore does not enter into the sale of it.

Atabey: vizier who educates the regent or independent ruler of a province.

Babai İsyanı: the biggest Turkmen rebellion in the history of the Anatolian Seljuk State.

Bani: patron of the constructing of the building.

Belagat: rethorics

Beylerbeyi: leader of the Sanjak bey, governor of the province.

Burç: defense tower of rectangular or angular shape.

Çarh: bow (and arrow)

Çetr/Çetir: round element similar to umbrella which east rulers were wore on the head; symbol of reign.

Darülhadis: religious school which studies Hadis.

Darüşşifa: hospital in Islamic countries.

Divan: big meeting hall in a palace.

Divit: pencase with inkwell.

Ferman: written form with written orders of the ruler.

Fıkıh: Islamic law

Funduk: inn, restaurant, han, hotel

Hadis: Muhamad’s sayings.

Hafiz: a term used by Muslims for people who have completely memorized the Qur'an.

Halef: someone who takes place of their antecedent; successor, heir, heritor

Han: building in the city for temporary residence.

Hanefi: one of four recognized law schools.

Hanikâh/Hankâh: building which in the Anatolian Seljuk times was used as a temporary residence of spiritual leaders, especially dervishes.

Hat Sanatı: calligraphy, art of fine writing.

Hutbe: prayer and homily in the Islamic world, which the Imam preaches from a minber during prayer on Fridays and on candlemans.

İkta: giving of the state land (which can not become private property) and incomes or taxes to military persons or civilians in exchange for service.

Kadı: official who deals with court work.

Kitabe: text, which was written on a building, mentioning the date of the building construction, patron and/or master.

Külliye: building complex.

Maristan: name for a hospital in the Islamic world.

Medrese: Islamic school equivalent to today's high school and university education, university.

Mescid: small mosque without a minber (pulpit).

Mezhep: branches of a religion which appear with distinctions in opinion, interpretation and understanding of the faith.

Minber: liturgical position in the mosque in the shape of stairs on which the Imam stands during the Hutbe. Showed in the Umayyad period. Positioned on the right side of the mihrab. It is made of stone, marble, wood or ceramic tiles.

Mutasavvıf: mystic

Mülk arazi: all state land.

Müşrif-i Memalik: minister of internal affairs.

Naip: regent – person who rules the country in the name of the reign.

Namazgah: elevated place outdoors reserved for adoration.

Nevbet: military music which was played in specific places at a specific time.

Öşür: 10% tax on agricultural products which was collected from the peasants.

Pervane: military commander.

Reaya: nation under a reign's rule.

Sancak: flag

Sikke: minted coin

Suk: market, often covered.

Tarikat: path of approaching God.

Tasavvuf: one of the ways of approaching God in the Islamic world.

Tecvid: used in the Turkish language, in Arabic it is written as tajwid. It refers to the rules governing the pronunciation during recitation of the Qur'an.

Tefsir: to comment, to explain.

Tekke: Tarikat building or religious complex.

Vakıf: endowment**.**

Vakfiye: Legal text which determines the list of real estate and movable estate isolated for endowment and rules of their usage in the future.

Pronunciation of Turkish letters;

C, c = as in Jim

Ç, ç = as in church

Ğ, ğ = silent, like *gh* in borou*gh*

I, ı = similar to *u* in thug

İ, ı = like *in*

J, j = ž, like in French *Jean*

Ö, ö = like umlaut *ö* or French *eu* in *peu*

Ş, ş = like in *ship*

Ü, ü = like umlaut *ü*, or French *u* in *pur*

Y, y = like *you*

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SUMMARY

The Anatolian Seljuk State existed in the Middle Ages, from period 1078-1310. The aim of the research conducted in this work is to prove the healing effects of makams used in that period and their connection with the architectural structure and acoustic characteristic of the hospitals where they were performed.

The research of the literature included the settlement of the Anatolian Seljuks, their building activities and cultural life, as well as showing the migrations and integrations of the communities existing in the area and the upcoming ones during the quests and through trade routes. Hospitals with the same architectural characteristics are presented and the general properties of the hospital buildings are given with the emphasis on architectural and acoustic design.

One of the main aspects in this work is music, healing and music therapy. The overview of the music in the Middle Ages in Turkey has been given with the Turkish music history timeline, from the Proto-Turkish culture to Sufism, showing also the development of the notation system and early Islamic scholars, as well as religious music and the ideas of healing and music therapy which were based on the works from the 9th century scholars al-Farabi and al-Kindi.

The makams, as the main subject of the research, are presented from a historical point of view, their intervallic structure and the construction of the scale. The types of intervals by sounding within the makam are also explained, and that the previous researches studied makam as melody while the focus of this thesis is on the vertical makam.

This led to the first hypothesis that makams have a healing effect manifested in the makam's produced sound events which includes specific frequencies of the harmonic perfect fourth and perfect fifth intervals of the makam scale and that the Turkish traditional concept of a healing effect strongly depends on those specific frequencies.

Score sheet examples of composers ranging from the 8th century to 1900 are analysed and the results show the common repetitive tones with their respective frequencies.

The second hypothesis is that the architectural structure of the complex and sound events in the venue support the healing effect. The acoustic analysis of the Divriği hospital as a representative sample of the Anatolian hospital is made. The results show that the architectural structure and acoustic design are a suitable soundscape which supports the healing effect of the produced

sound events in the form of makams, which was proved by frequency analysis of the specific tones and intervals.

In this work the ideas and theories presented in the works of al-Farabi and al-Kindi regarding the efficiency and healing effects of the makams is confirmed through the makam's produced sound events which includes specific frequencies of the harmonic perfect fourth and perfect fifth intervals of the makam scale, which is confirmed by the frequency analysis of the specific tones and intervals, which are frequently repeated in the performance of the makams.

Key words: Anatolia; Frequency; Healing; Makam; Music therapy; Seljuks

SAŽETAK

Srednjovjekovna država anatolijskih Seldžuka postojala je u razdoblju 1078-1310. godine.

Za proučavanje navedenog razdoblja istražena je literatura koja uključuje naseljavanje anatolijskih Seldžuka na prostor središnje Anatolije, njihove graditeljske aktivnosti i kulturni život, te migracije i integracije zajednica koje su živjele na tom području sa zajednicama koje su dolazile tijekom osvajanja i trgovačkim putovima.

S obzirom da je cilj ovoga rada - dokazati liječidbene efekte makama korištenih u tom razdoblju te njihovu vezu s arhitektonskom strukturom i akustičkim karakteristikama bolnica u kojima su bili izvođeni - posebno su predstavljene bolnice istih arhitektonskih značajki koje su građene tlocrtno kao medresa te opće značajke građevina bolnica s naglaskom na arhitektonski i akustički dizajn. Po prvi je puta u ovome radu provedeno akustičko istraživanje i analiza na primjeru seldžučke bolnice. Dosadašnja akustička istraživanja rađena su samo na Osmanskim džamijama.

S obzirom na interdisciplinarnost postavljenih tema istraživanja koje uključuju discipline etnomuzikologije, etnologije, antropologije, povijesti glazbe, muzikoterapije, povijesti umjetnosti, povijesti arhitekture i akustike, u radu su korištene povijesna metoda, metoda analize i sinteze, strukturalna glazbeno-teorijska analitička metoda, deskriptivna analiza te deduktivna metoda.

Glavnina ovog rada odnosi se na glazbu, glazbenu kulturu te liječenje glazbom, odnosno muzikoterapiju. Za razumijevanje glazbeno-kulturnog konteksta iz razdoblja anatolijskih Seldžuka, rad daje pregled glazbe srednjeg vijeka u Turskoj te kronologiju povijesti glazbe od proto-Turske kulture do Sufizma. Također je prikazan i razvoj notacije te razmišljanja ranih islamskih znanstvenika, kao i religijska glazba te ideje liječenja i muzikoterapije koje su bile utemeljene na djelima znanstvenika al-Farabija i al-Kindija iz devetog stoljeća. Spomenuti znanstvenici pisali su o blagotvornim učincima makama ističući specifičnosti svakog pojedinog makama, te se istraživanjem pristupilo znanstvenom potvrđivanju njihovih ideja.

Makami, kao glavni subjekt istraživanja, predstavljeni su s povijesnog gledišta, uključujući njihovu intervalsku strukturu i način na koji se gradi ljestvični niz. Kako je riječ o vrsti koja je vrlo slična modalnoj glazbi, konstrukcija ljestvice je objašnjena primjerima kako bi se ukazalo na način tvorbe makamskog modusa. Također je objašnjeno da se radi o zvučećem odnosu

intervala unutar makama, te da su se dosadašnja istraživanja bazirala na melodijskim intervalima makama, odnosno na melodiji, dok se ovo istraživanje bavi harmonijskim intervalima makama, poglavito intervalima čiste kvarte i čiste kvinte koji su ostinato melodije makama.

Ovo je istraživanje dovelo do dvije hipoteze. Prva je hipoteza da makami imaju liječidbeni efekt koji se očituje kroz zvučanja makama koja uključuju specifične frekvencije harmonijskih intervala čiste kvarte i čiste kvinte makamske ljestvice te da turski tradicionalni koncept znatno ovisi o tim specifičnim frekvencijama .

Analizirani su notni primjeri skladatelja koji su u svojim skladbama koristili najupotrebljavanije makame iz vrlo širokog vremenskog razdoblja - od osmog stoljeća pa do zaključno godine 1900. Rezultati analize su pokazali pet zajedničkih tonova koji se ponavljaju s njihovim određenim frekvencijama.

Druga je hipoteza proizašla iz analize arhitektonskih struktura bolnica te glasi da arhitektonska struktura kompleksa građevine i zvučna događanja u tom prostoru podupiru liječidbeni efekt. U tu je svrhu napravljena akustička analiza bolnice u Divriğiju koja je uzeta kao reprezentativni uzorak. Akustička je analiza izrađena na 3D modelu bolnice te su računalnim programom za akustiku napravljene analize evaluacije elektronskog i akustičkog sustava i analize odziva prostora. Ova se bolnica nalazi u kompleksu sa džamijom te ima zatvoreno dvorište koje se nalazi unutar bolnice te je kao takva jedini seldžučki primjer gradnje u Anatoliji. Rezultati su pokazali da su arhitektonska struktura i akustički dizajn pogodan *soundscape* koji podržava liječidbeni efekt proizvedenih zvukovnih događaja.

U ovom je radu potvrđena ideja i teorija koje su u svojim djelima iznijeli al-Farabi i al-Kindi o učinkovitosti i liječidbenim efektima makama kroz specifična intervalska zvučanja unutar makama koja uključuju karakteristike određenih frekvencija intervala harmonijske čiste kvarte i čiste kvinte makamske ljestvice, a što je potvrđeno analizom frekvencija pojedinih tonova odnosno intervala koji se učestalo pojavljuju kod izvedbe makama.

Ključne riječi: Anatolija; frekvencija; makami; liječenje; muzikoterapija; Seldžuci

LIST OF TABLES

LIST OF FIGURES

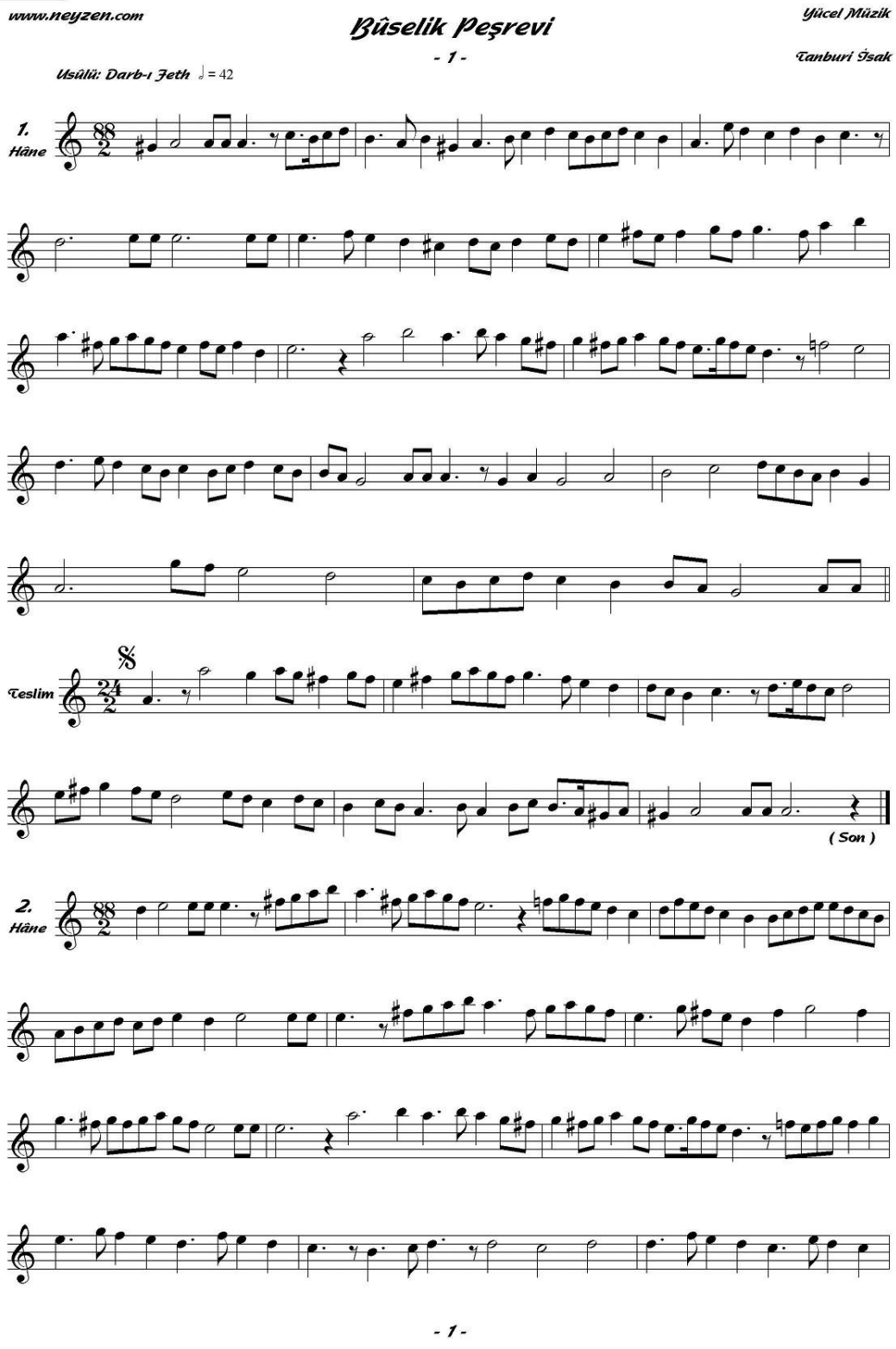
BIOGRAPHY

Ivana Mihaljinec was born in Zagreb, on 11 August 1973. She finished the XVI. Gymnasium and the Elly Bašić Music School in Zagreb in 1992 and graduated from the Music Academy, Department for Music Culture in Zagreb in 1996 where she obtained a degree as professor of music culture and graduated music therapist. Since 1997 she has been working as an advisor for music in the City Office for Culture, City of Zagreb. In 2010 she enrolled in postgraduate doctoral studies of humanities at the University of Zadar.

She was a member of the administrative council of the International Folklore Festival, leader of the Communication Board of the Jeunesses Musicales International (2008-2010), Vice-president for South-East Europe of Les Rencontres Association (2006-2010), National Research Coordinator for the project EXTEND (2004), organizer of various meetings and events for the City of Zagreb in the field of culture, participated as a guest (2009-2014) and a team member at the Divriği excavation (2016). She is a member of the Croatian Performer's Rights Collecting Society and the Croatian Musicians Union.

APPENDIX I – SCORE SHEET EXAMPLES

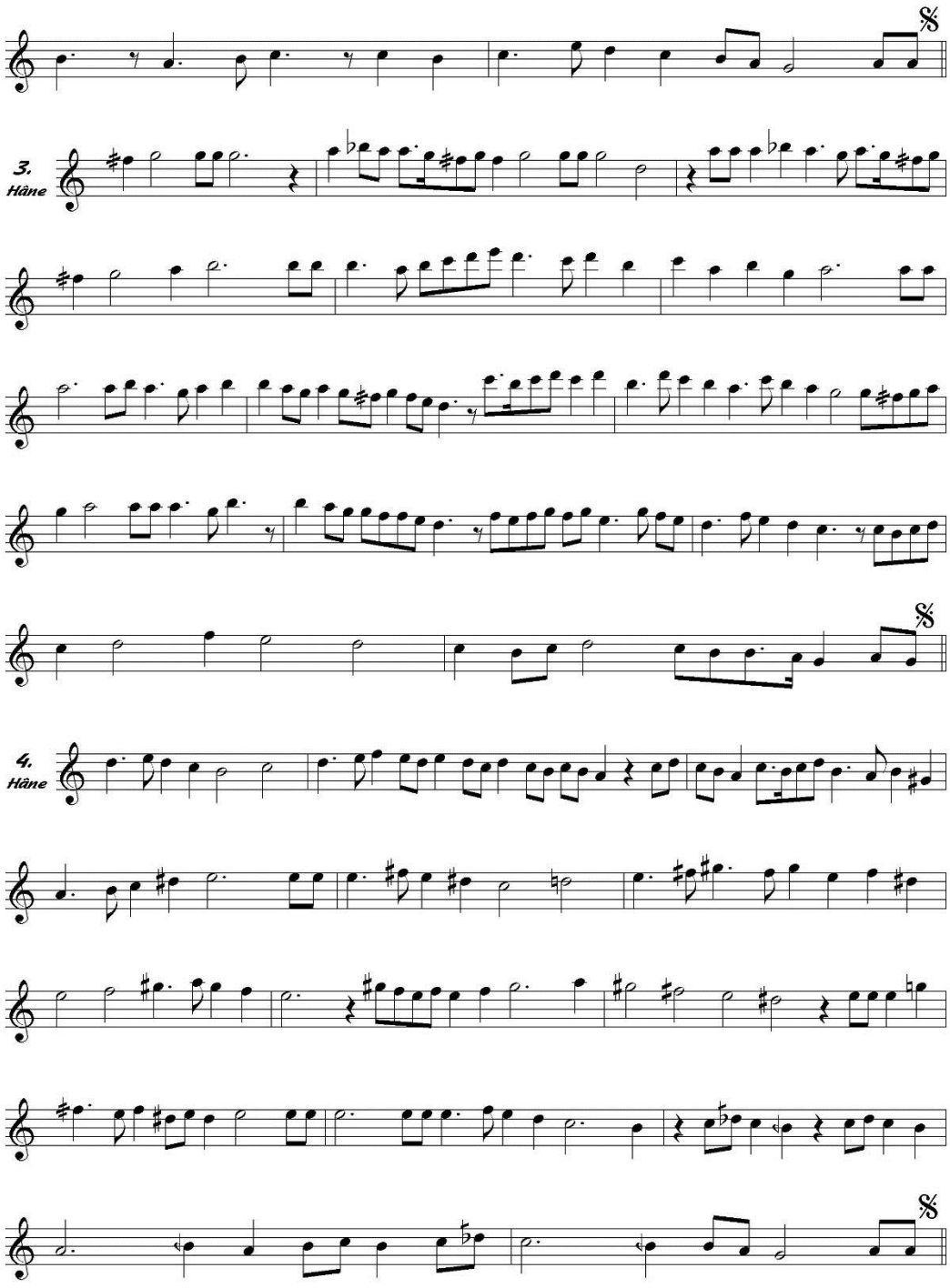
Example 1



Bûselik Peşrevi

Yücel Müzik

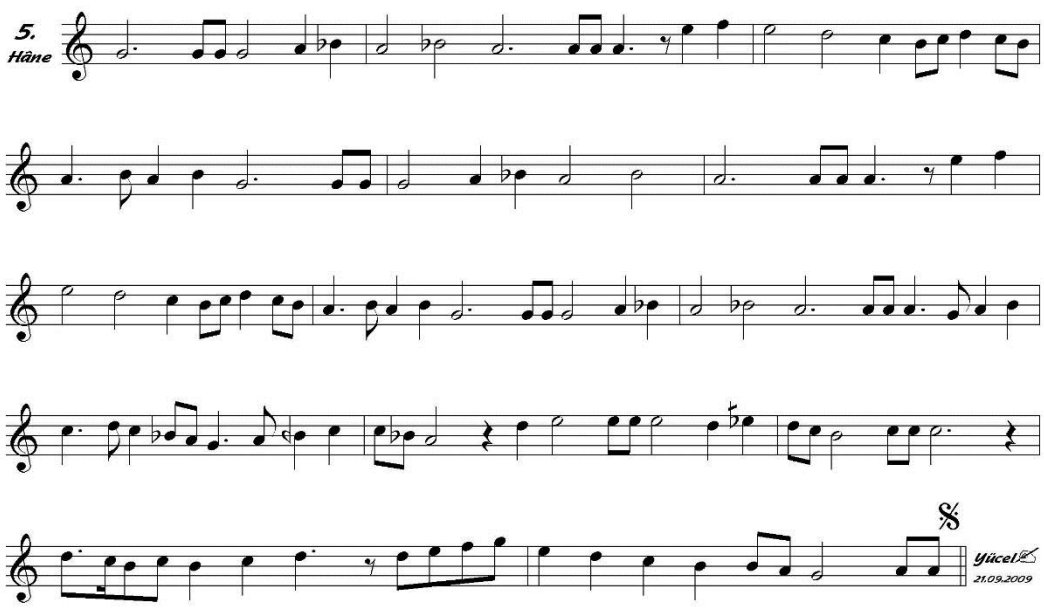
Tanburi İsak



Bûselik Peşrevi

Yücel Müzik

Tanburi İsak



Example 2

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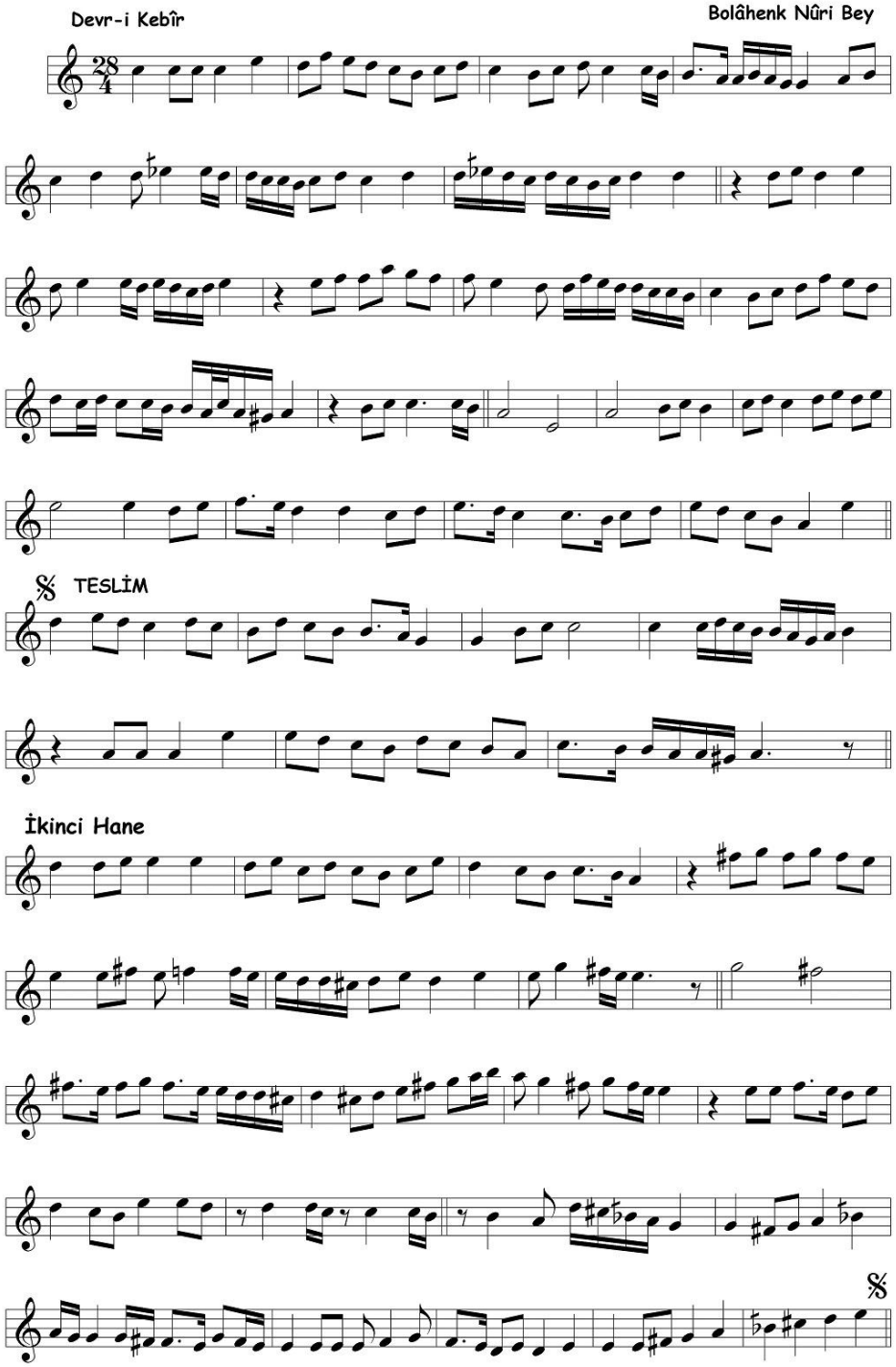
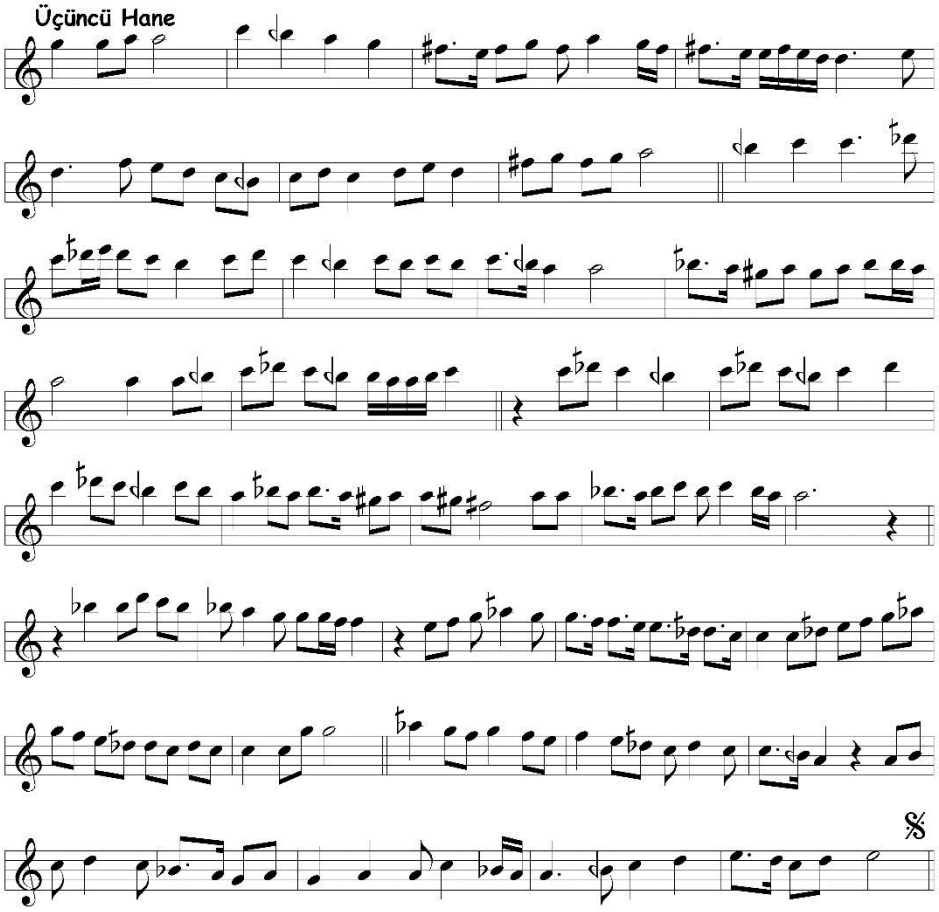
BÛSELİK PEŞREV

Devr-i Kebîr

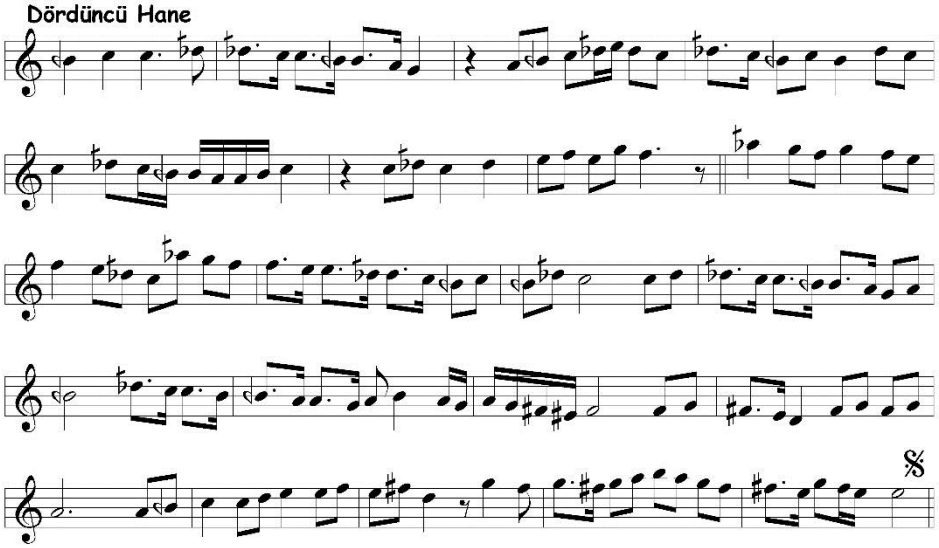
Bolâhenk Nûri Bey



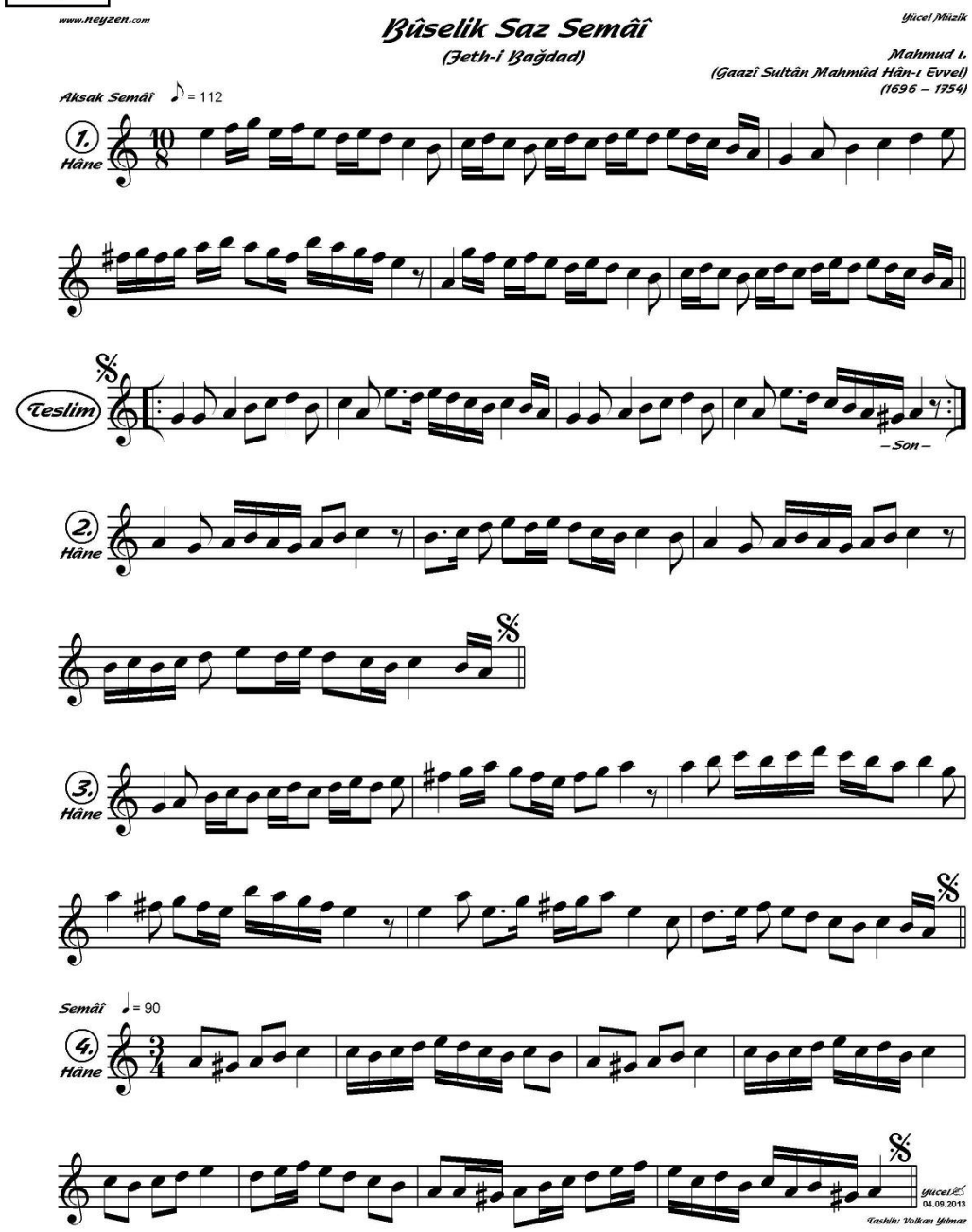
Üçüncü Hane



Dördüncü Hane



Example 3


www.neyzen.com
Yücel Müzik
Bûselik Saz Semâî
(Feth-i Bağdad)
Mahmud I.
(Gaazî Sultân Mahmûd Hân-ı Evvel)
(1696 – 1754)
Aksak Semâî ♪ = 112
1. Hâne
Teslim
– Son –
2. Hâne
3. Hâne
Semâî ♩ = 90
4. Hâne
Yücel
04.09.2013
Yazılım: Volkan Yılmaz

Example 4

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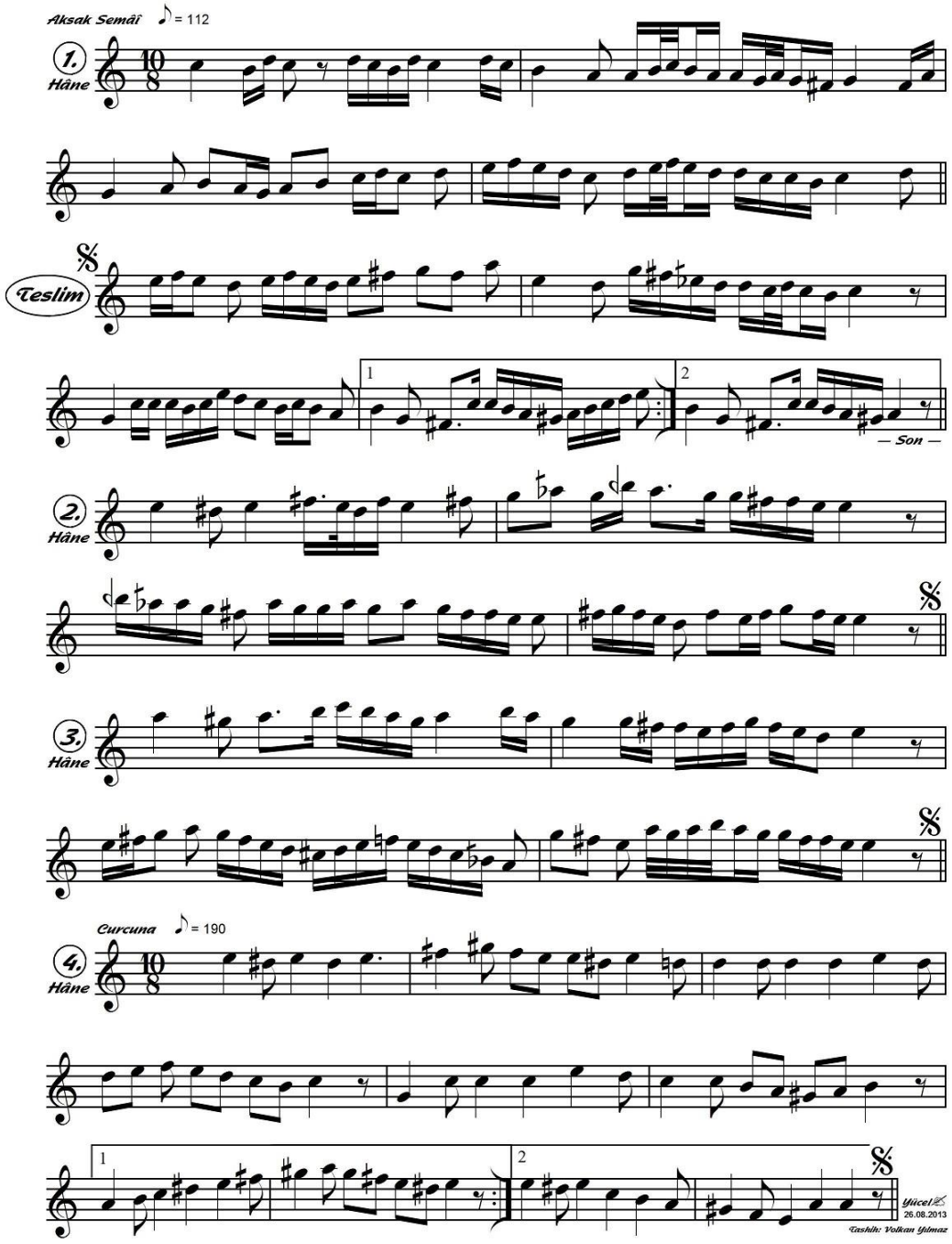
Bûselik Saz Semâî

Yücel Müzik

İsmâil Hakkı Bey (Muallim,
Hoca, Ser-Hânende) (1866 – 30.12.1927)



Example 5

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Büzürk Peşrevi

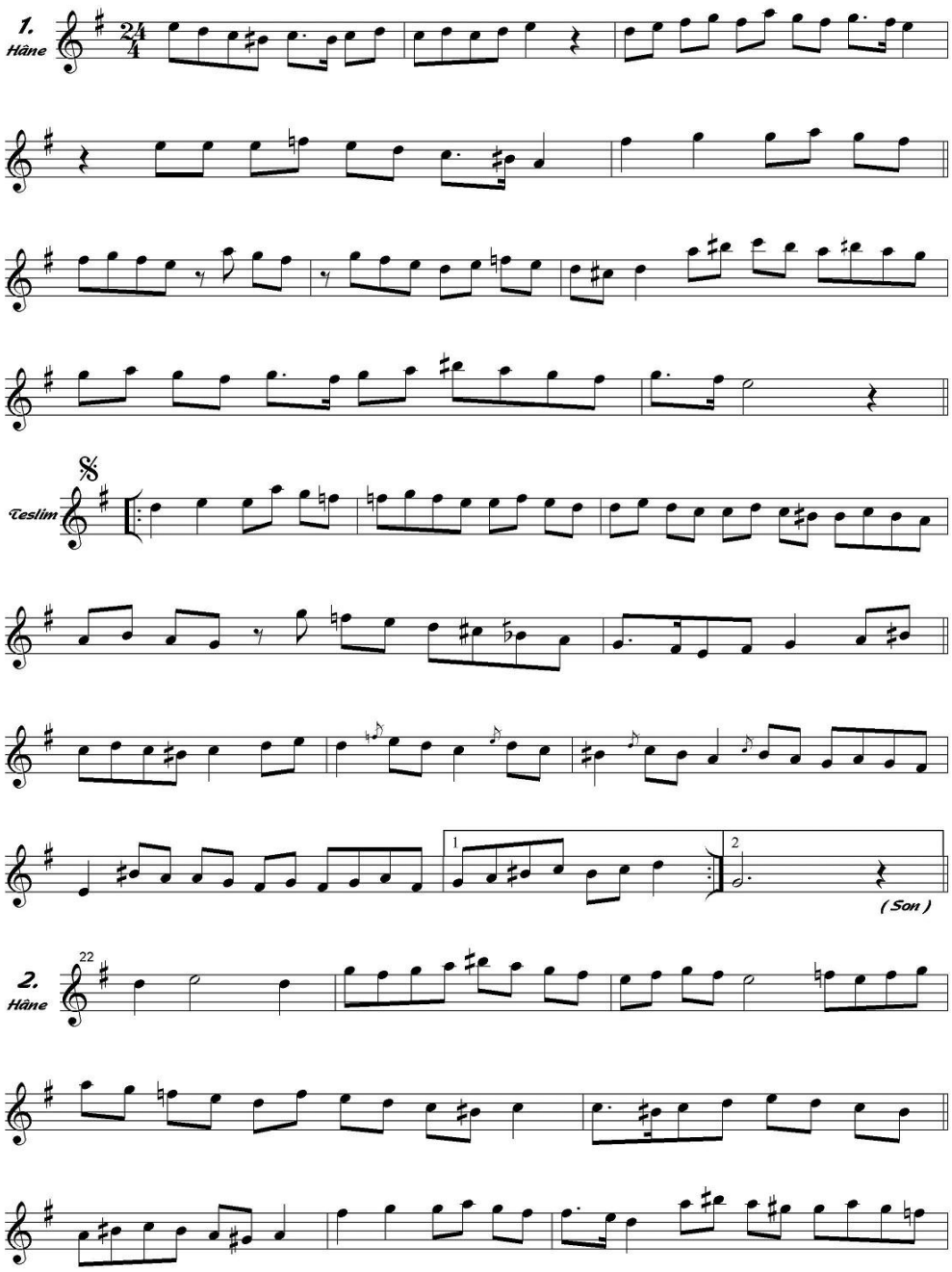
- 1 -

Gülşah Aykaç
Nota Arşivi

İsmet Ağa

Usûlü: Çember

1. Hâne



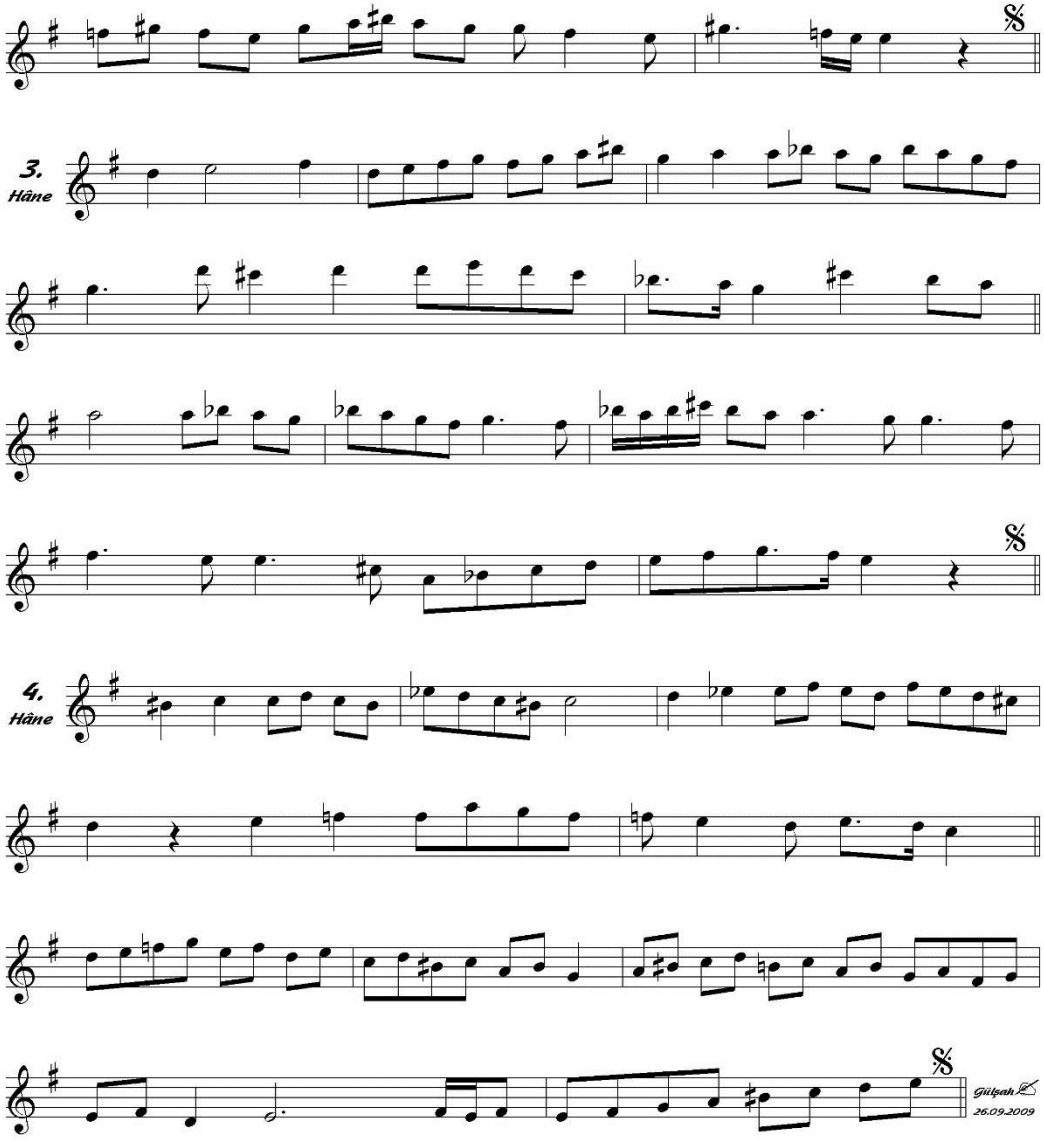
2. Hâne

- 1 -

Büzürk Peşrevi

Gülşah Aykaç
Nota Arşivi

İsmet Ağa



Example 6

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BÜZÜRK

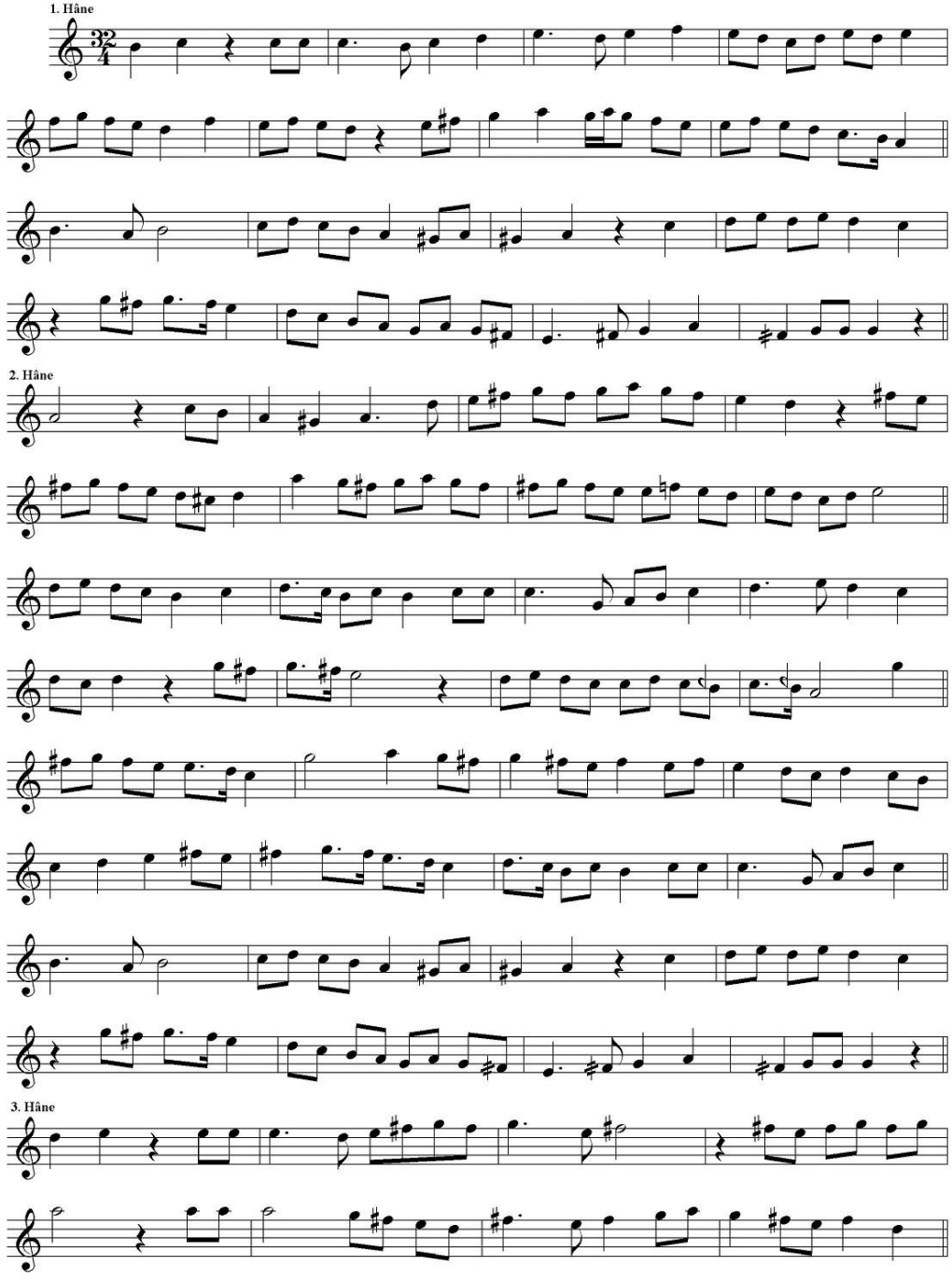
Peşrev - 1

Tolga Göyenç
nota arşivi

Usûlü:Muhammes

Beste:Nâyi Osman Dede

1. Hâne

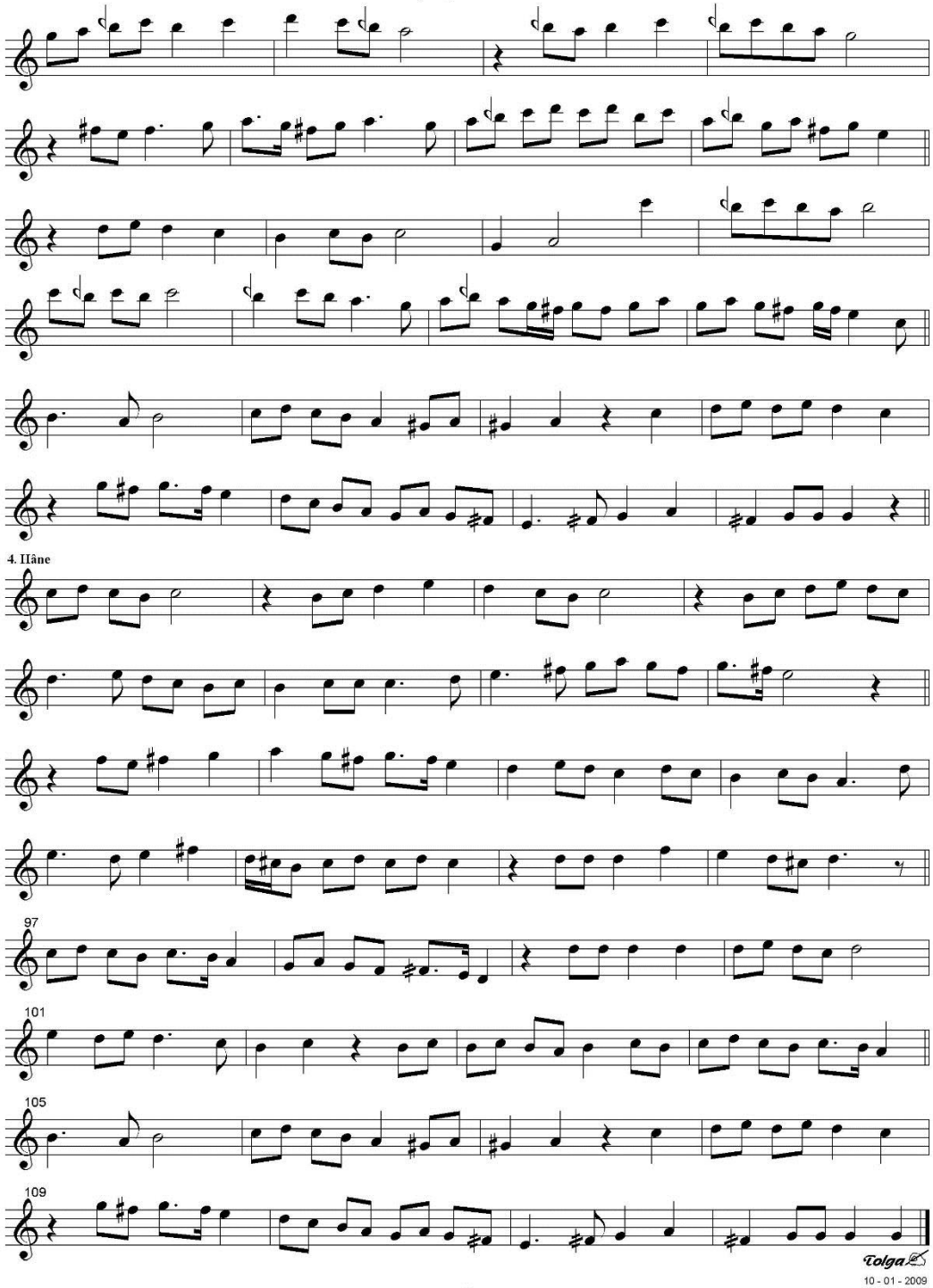


2. Hâne

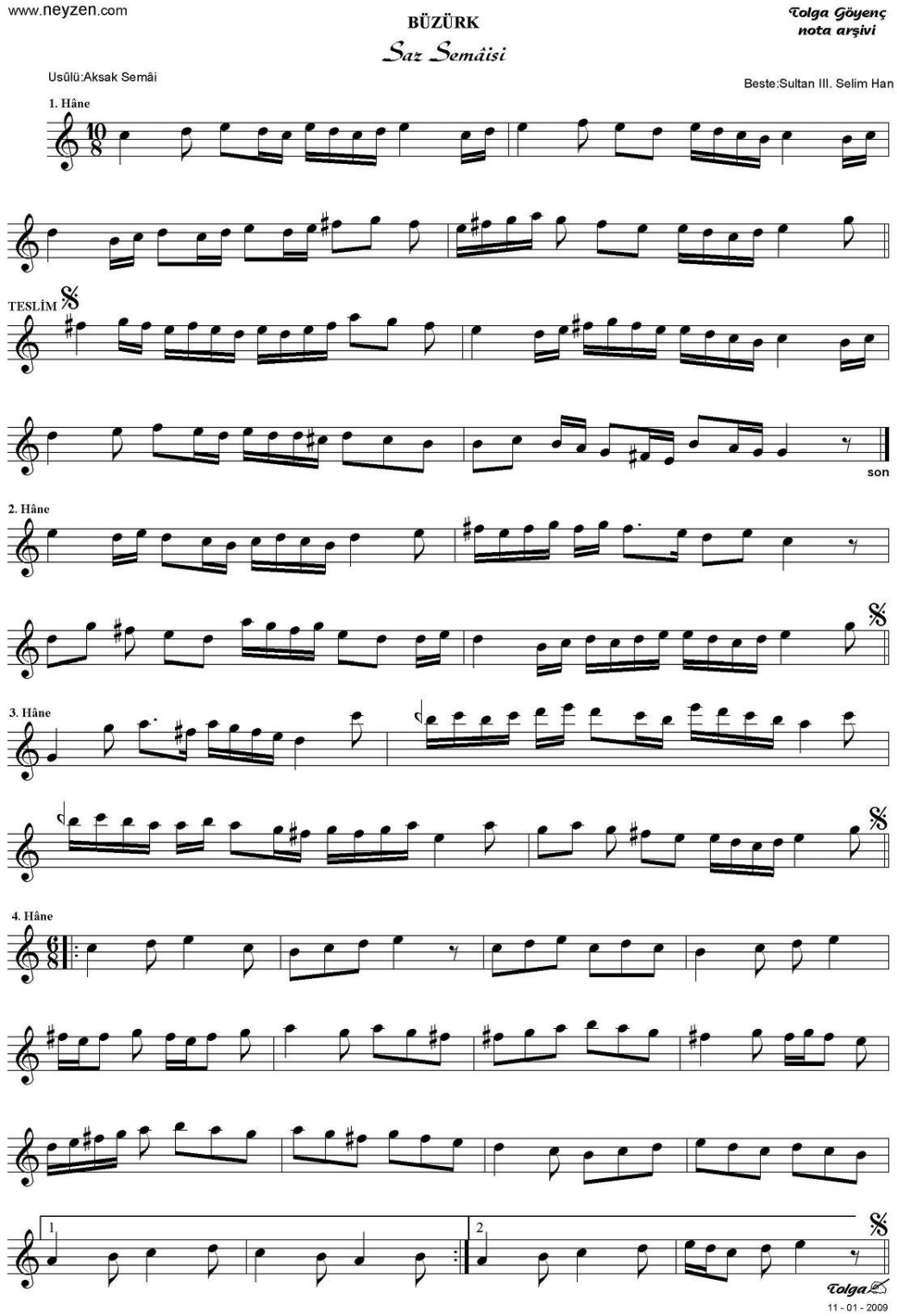
3. Hâne

BÜZÜRK

Peşrev - 2



Example 7



Hicaz (8-12 (5),

Example 8

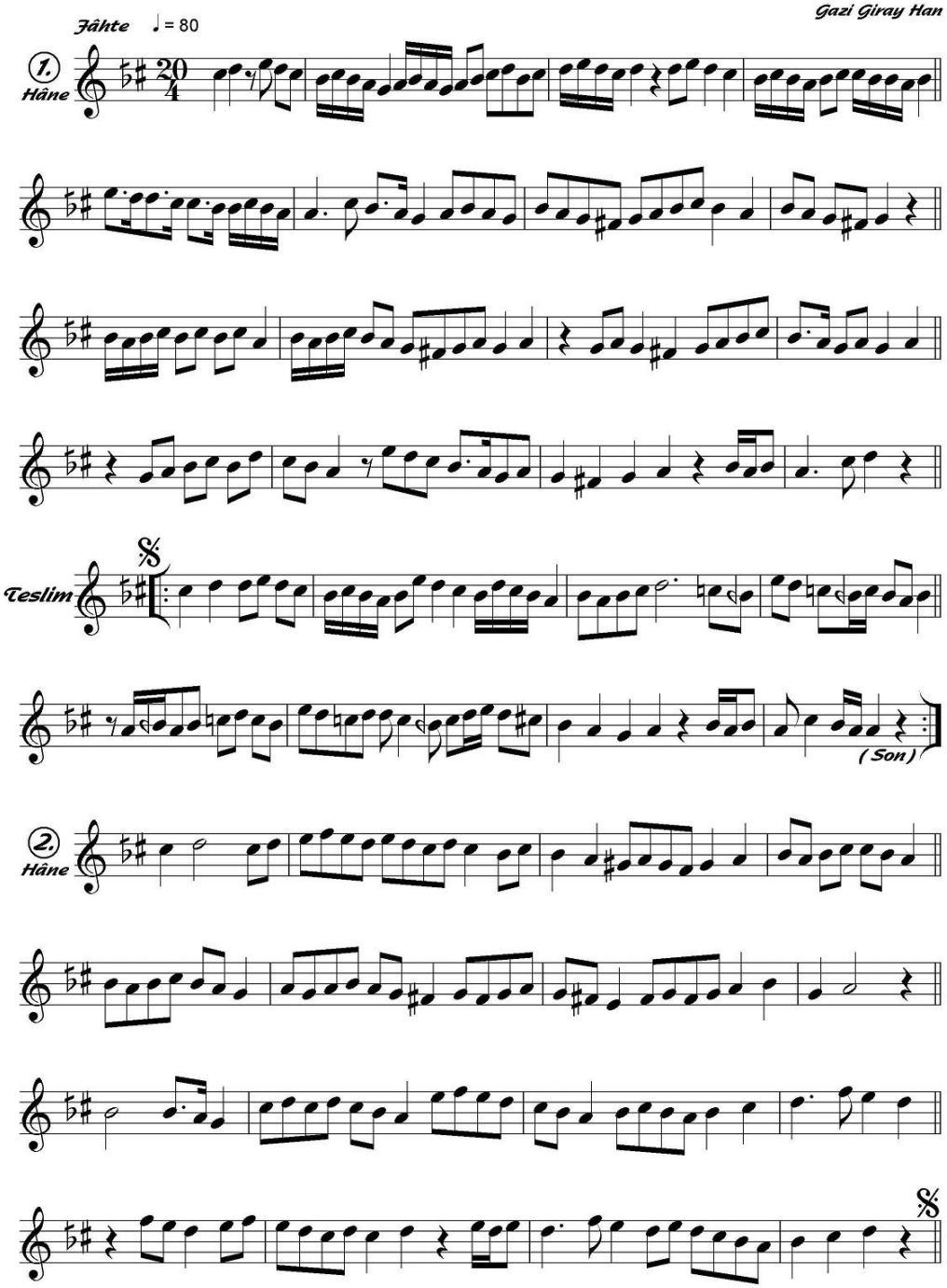
www.neyzen.com

Hicâz Peşrev

- 1 -

Yücel Müzik

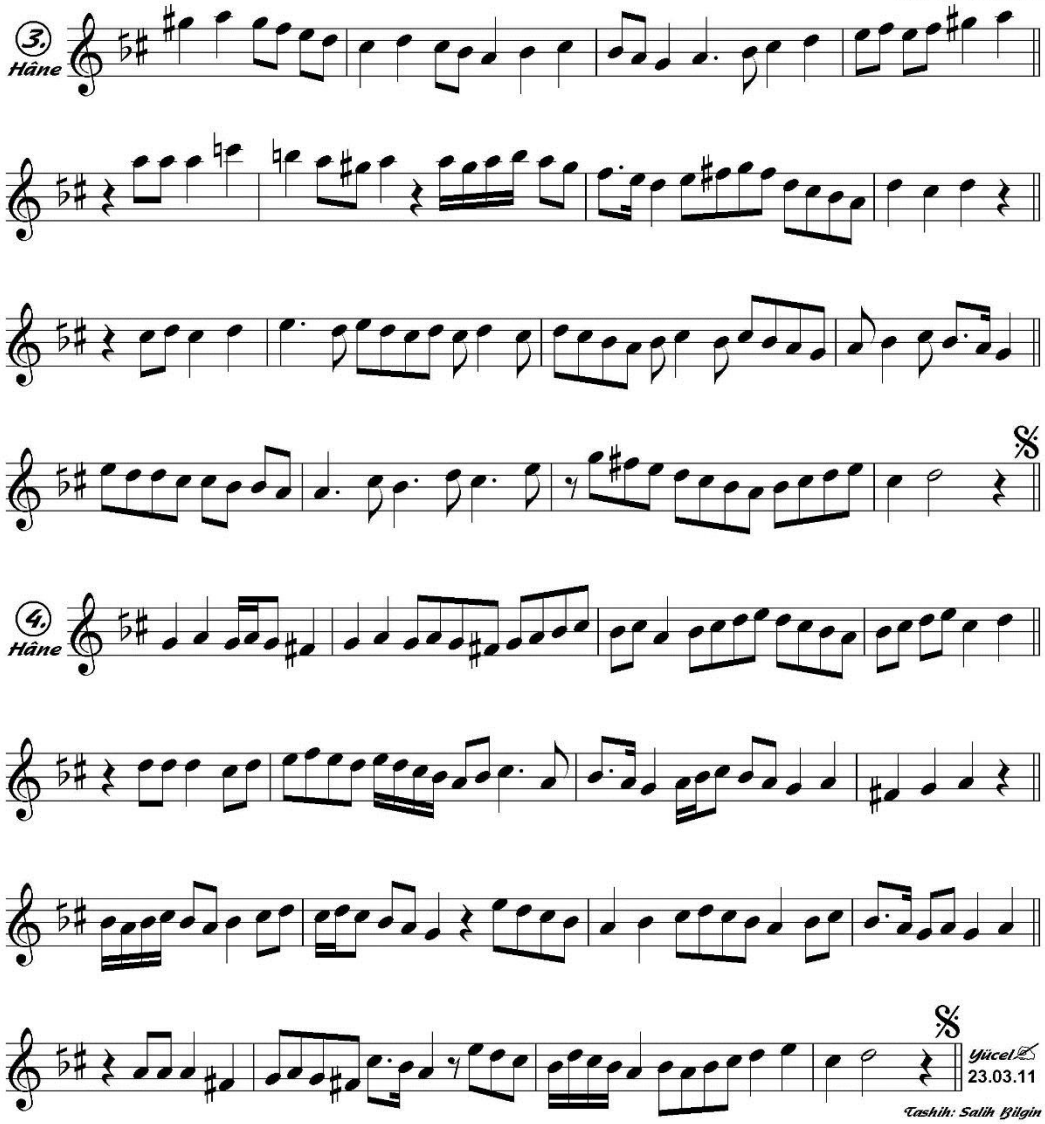
Gazi Giray Han



Hicâz Peşrev

- 2 -

Gazi Giray Han



Tashih: Salih Bilgin

Example 9

www.neyzen.com

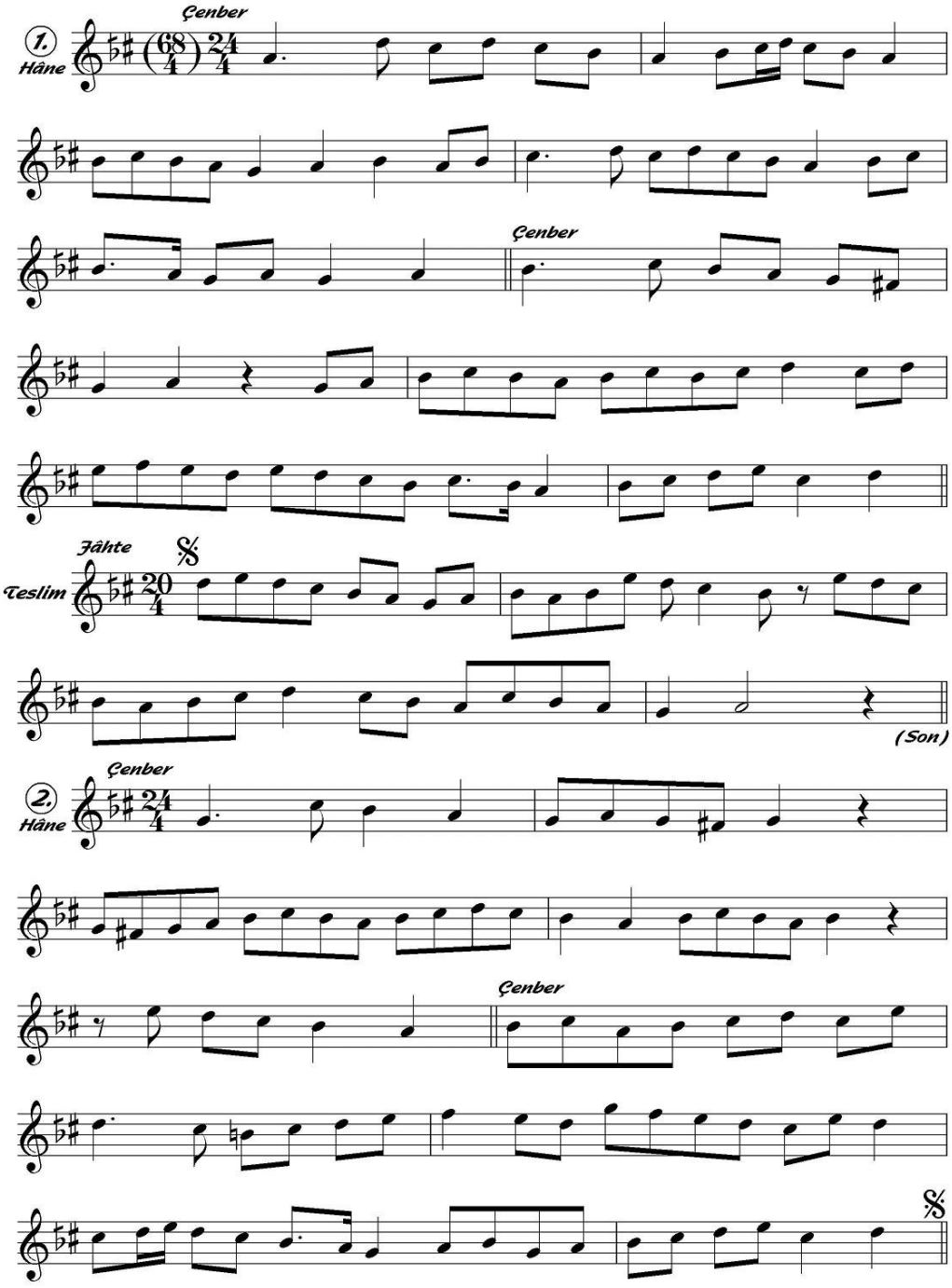
Hicâz Peşrev

- 1 -

Yücel Müzik

Darbeyn ♩= 96

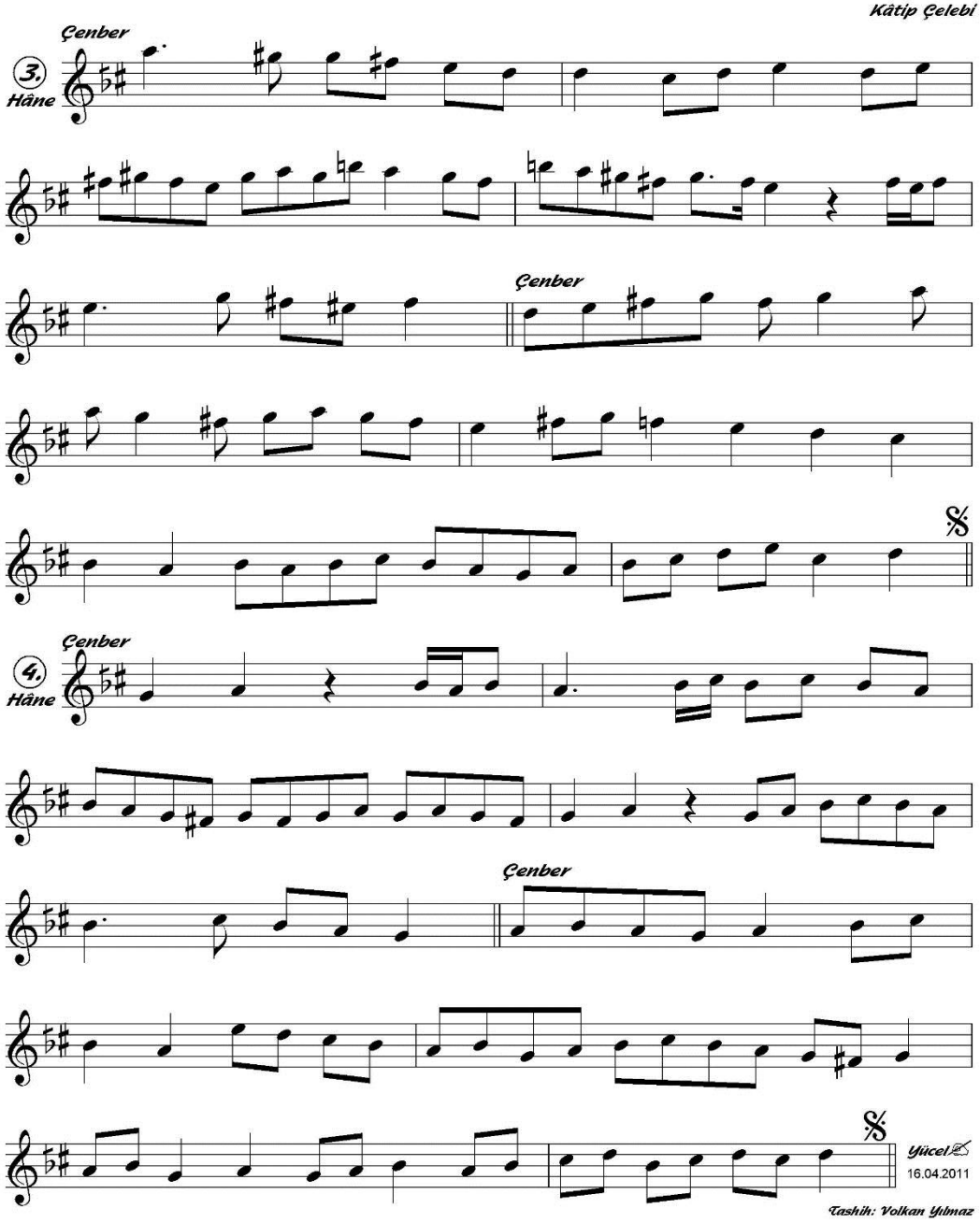
Kâtip Çelebi



Hicâz Peşrev

- 2 -

Kâtip Çelebi



Yücel
16.04.2011

Tashih: Volkan Yılmaz

Example 10

www.neyzen.com

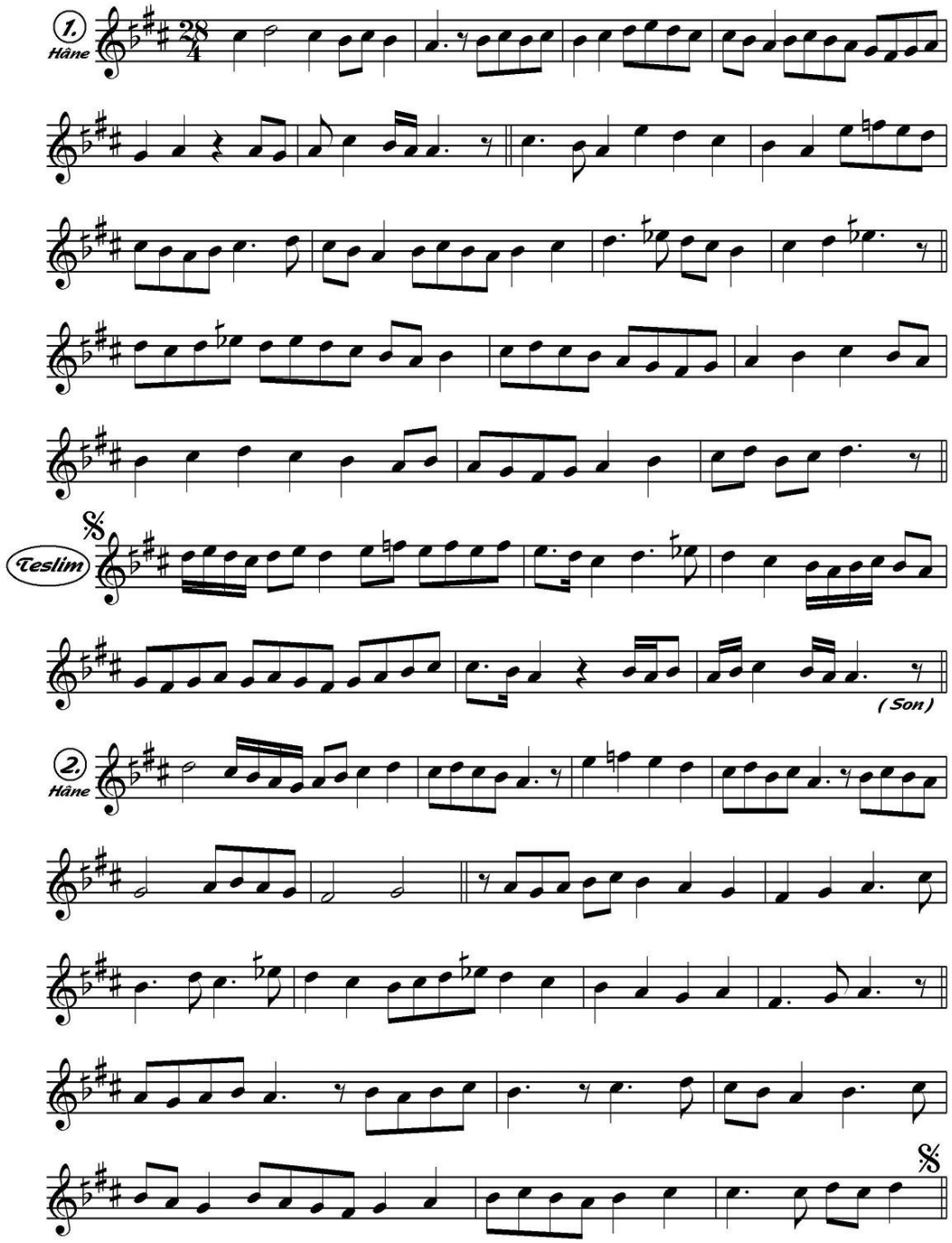
Hicâz Peşrev

- 1 -

Yücel Müzik

Devr-i Kebîr ♩= 84

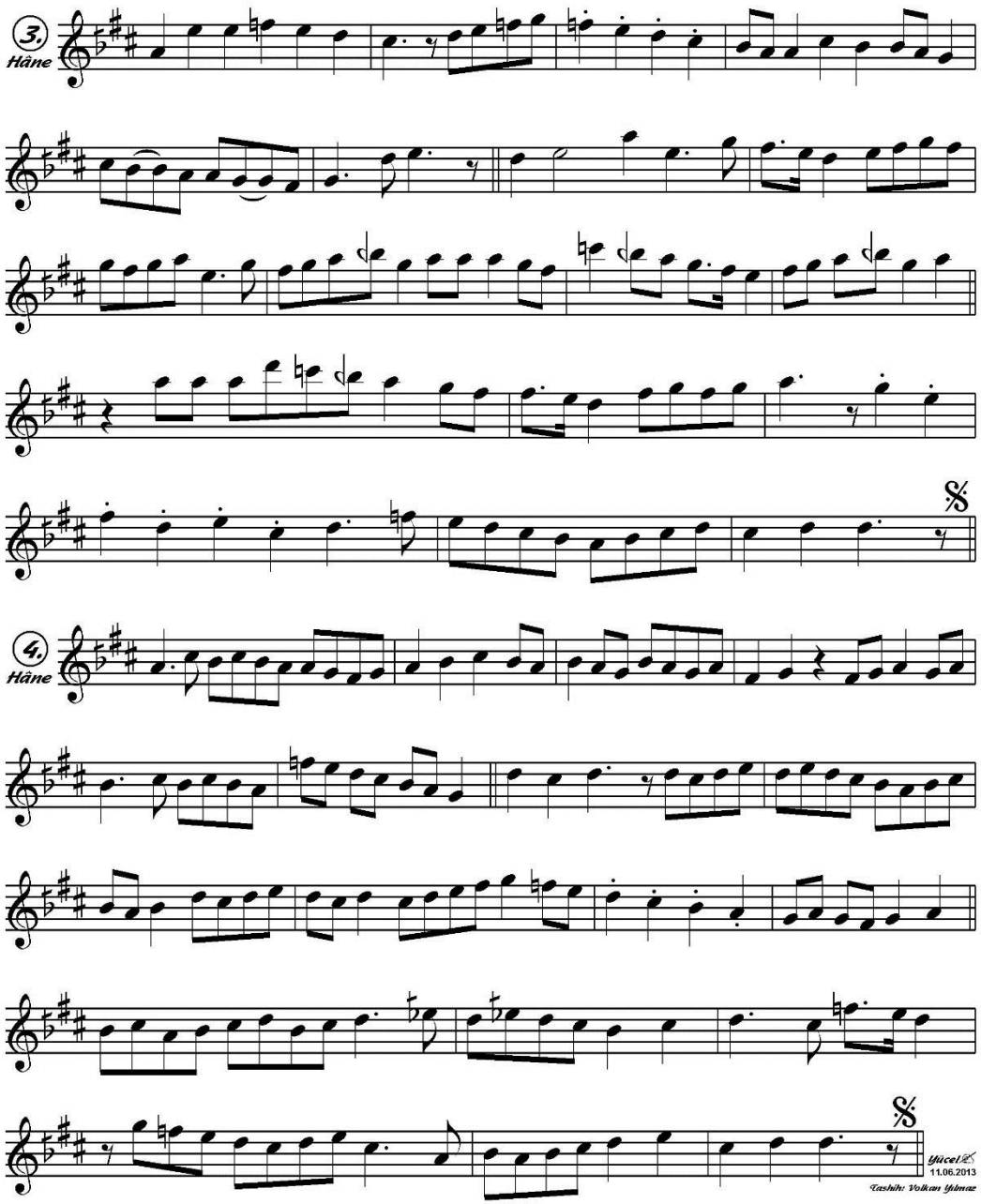
Sultan III. Selim Han (Şîhâmî)
(1761 — 1808)



Hicâz Peşrev

- 2 -

Sultan III. Selim Han (Ilhâmî)
(1761 – 1808)



Example 11

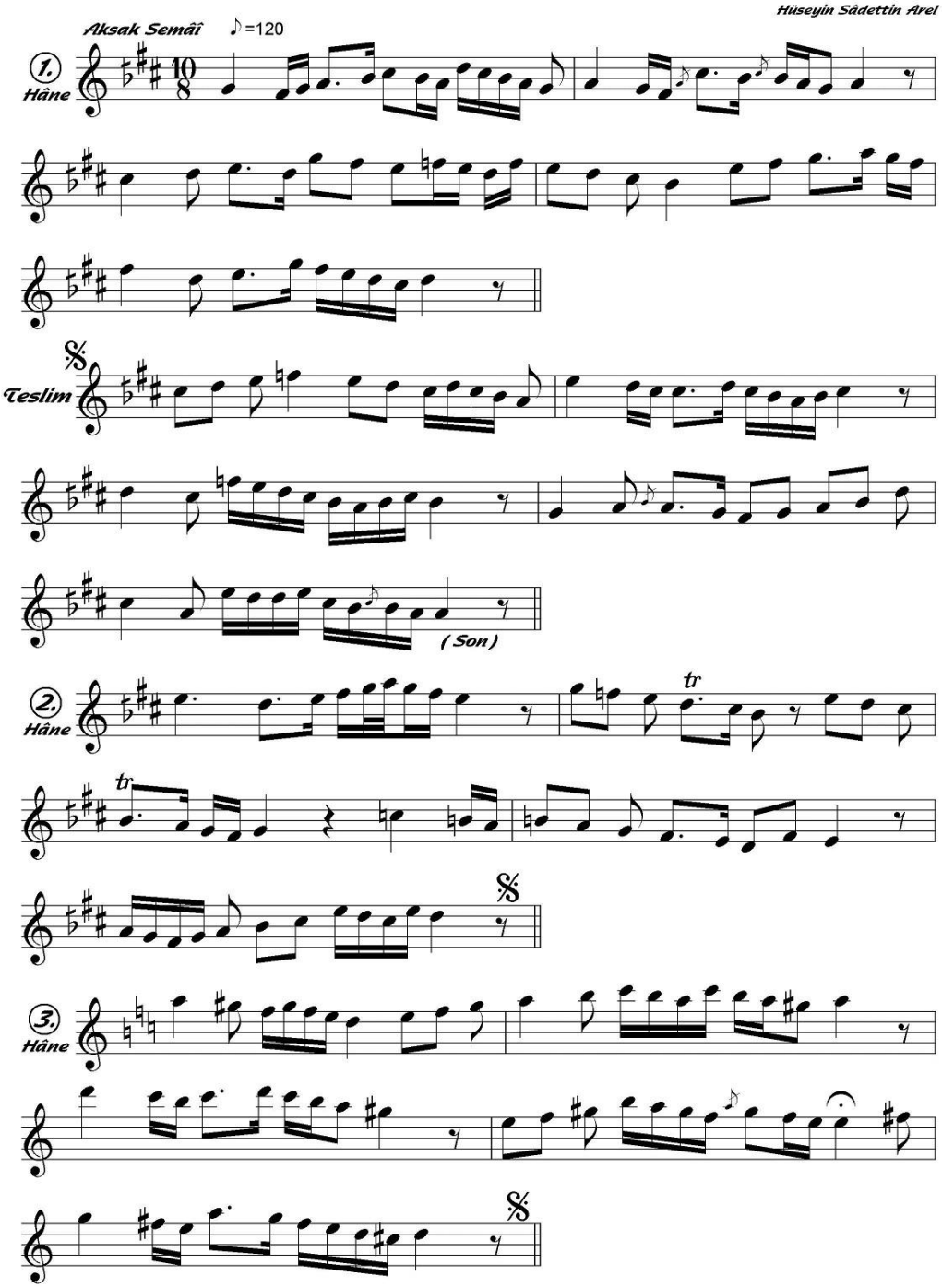
www.neyzen.com

Hicâz Saz Semâî

- 1 -

Yücel Müzik

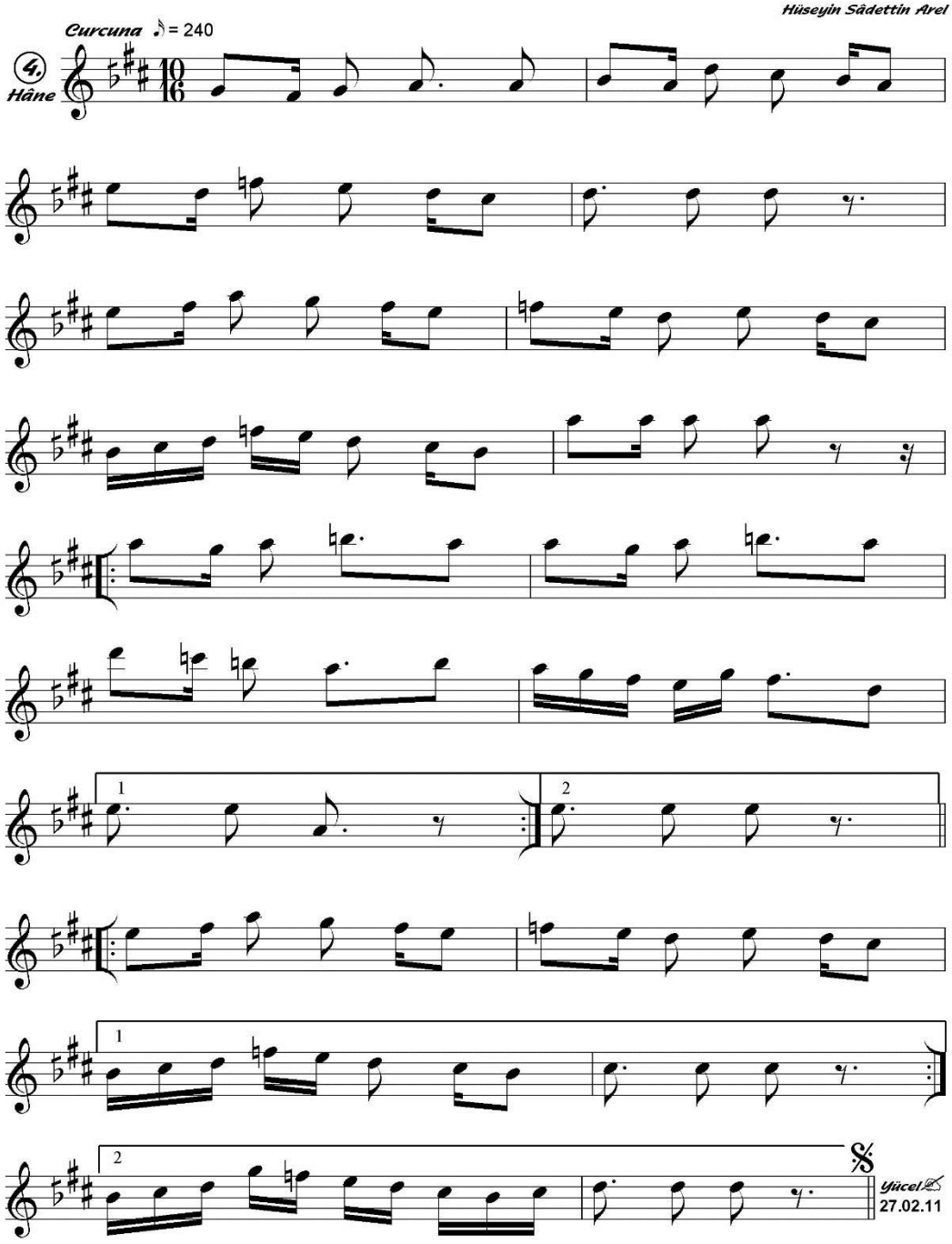
Hüseyin Sâdettin Arel



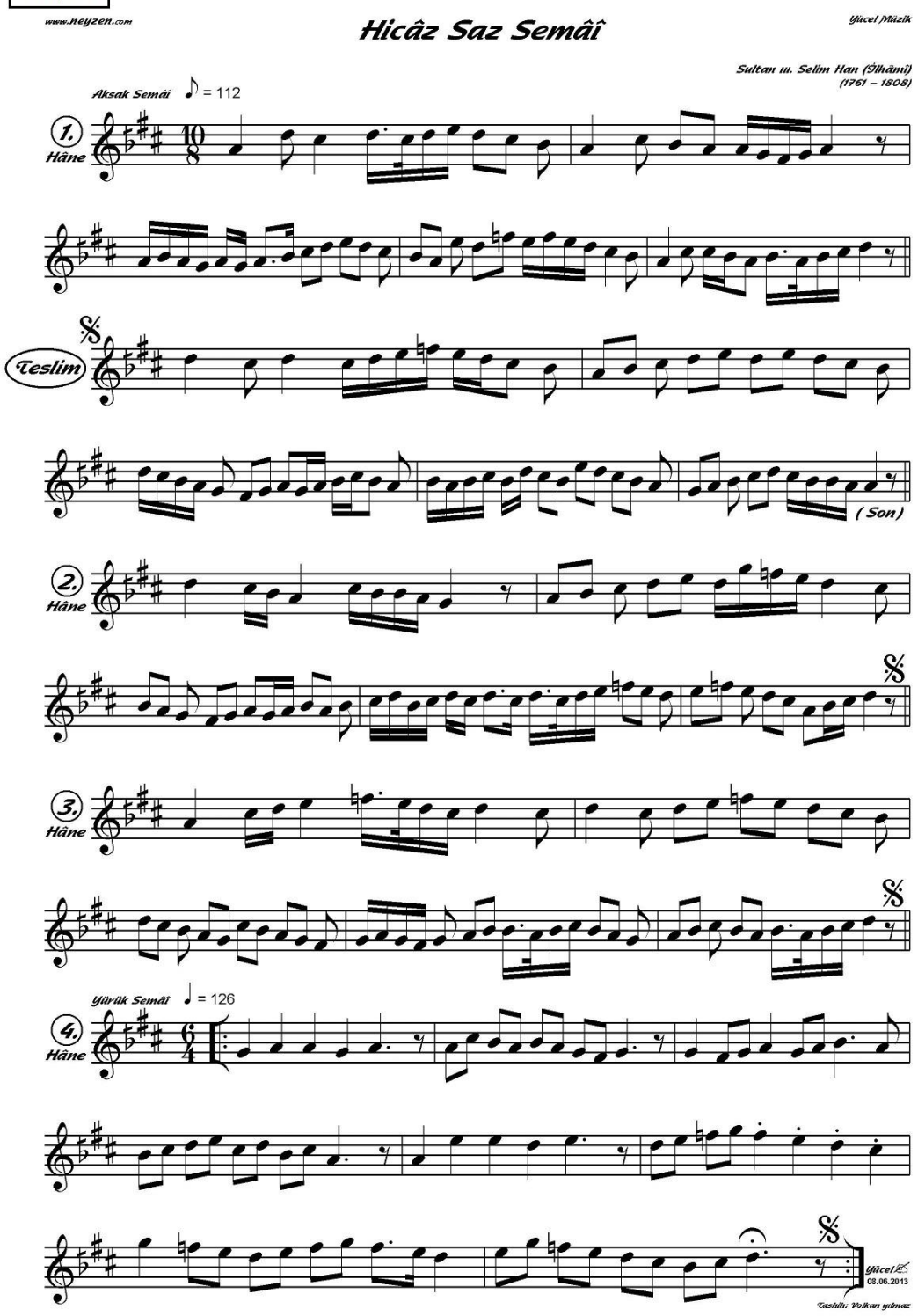
Hicâz Saz Semâî

- 2 -

Hüseyin Sâdettin Arel



Example 12



Hüseyni (13- 15 (3),

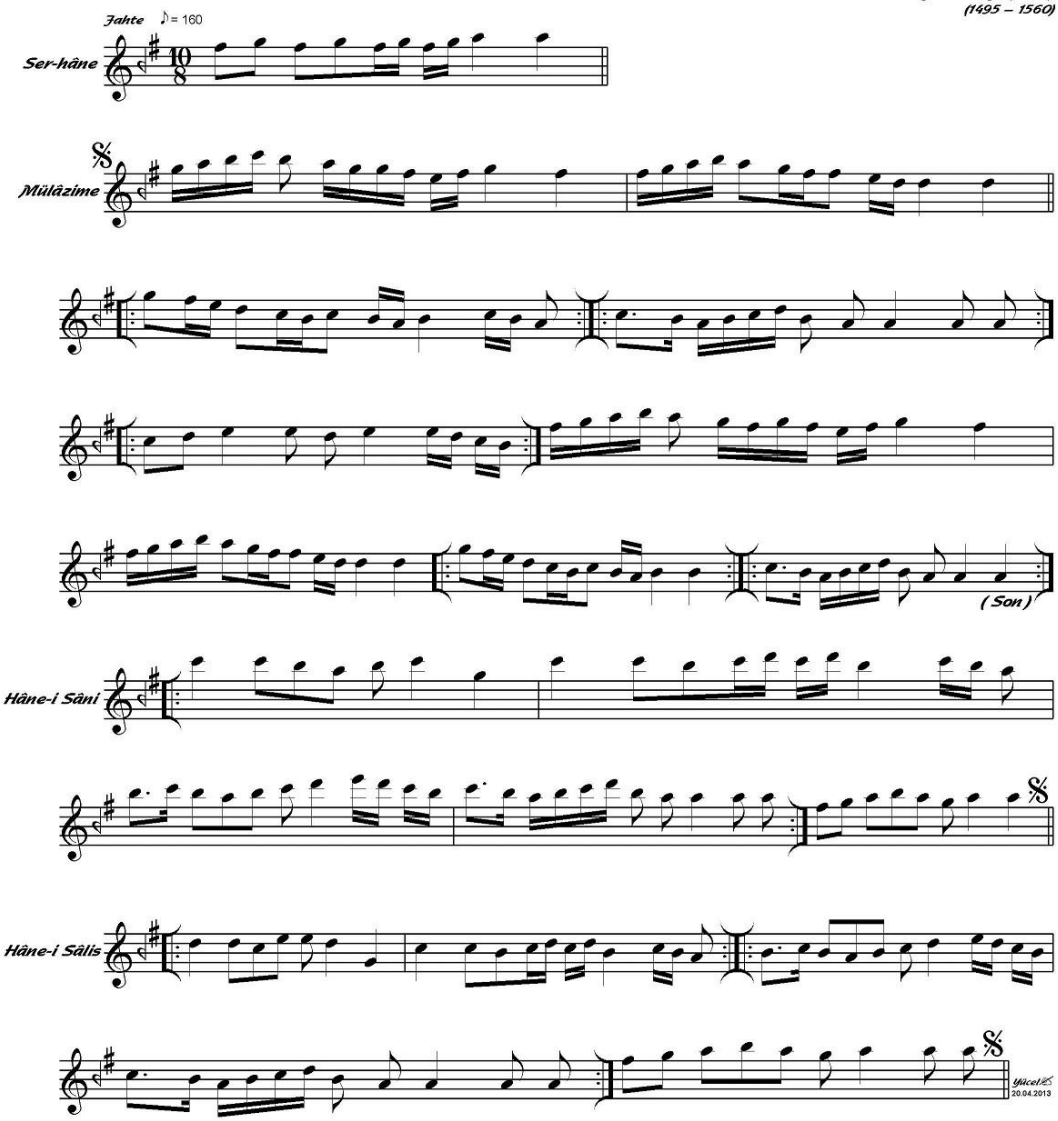
Example 13

www.neyzen.com

Hüseynî Peşrev

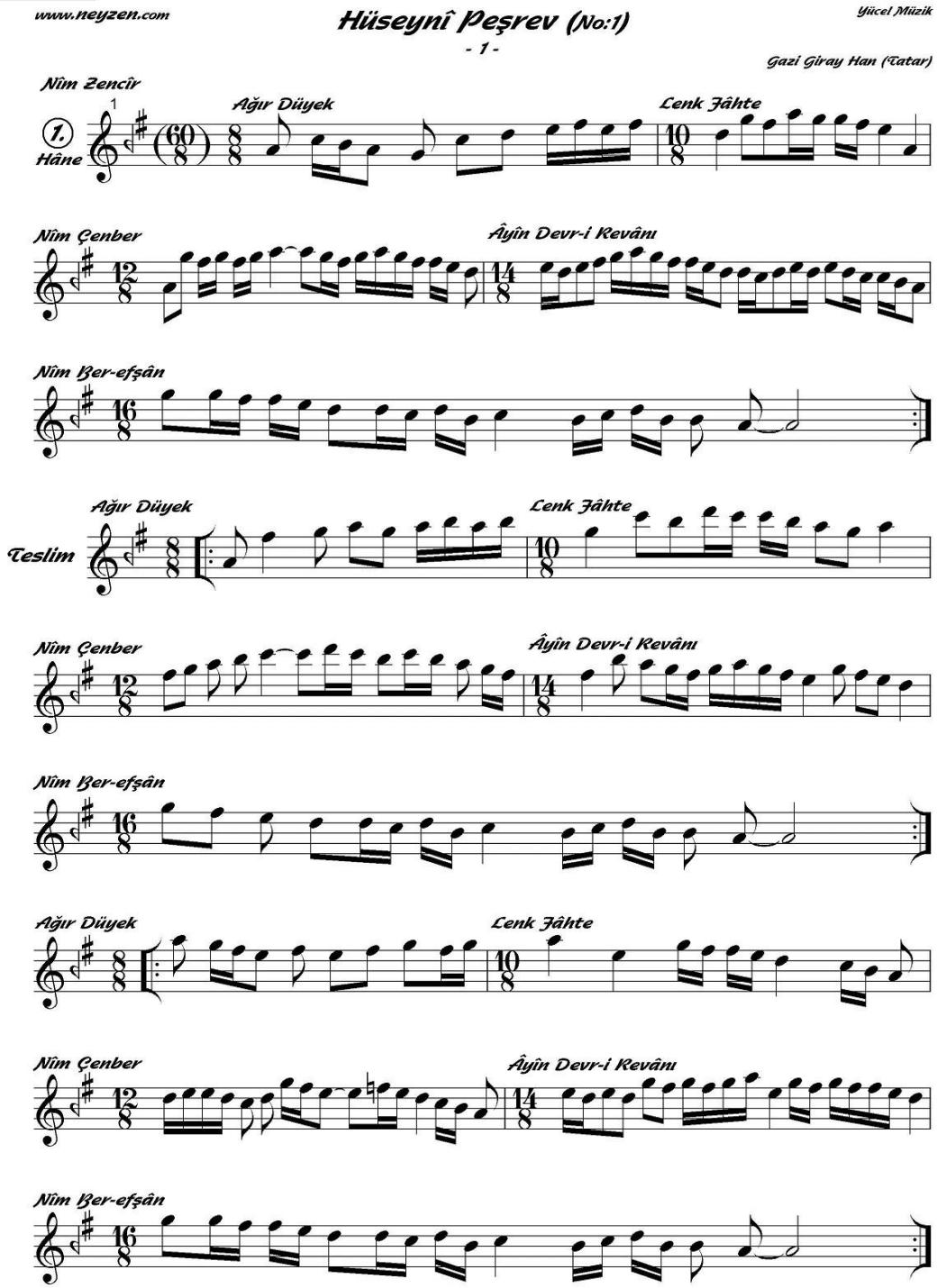
Yücel Müzik

Behram Ağa (Nefiri)
(1495 – 1560)



Not: Elimizde olan tek kaynaktır.
Eserin gerçek usûl'ü fahte'dir, ancak bu kaynakta "aksak semâî" olarak kaleme alınmıştır.
Daha doğru versiyonu sizde mevcutsa bize bildiriniz...

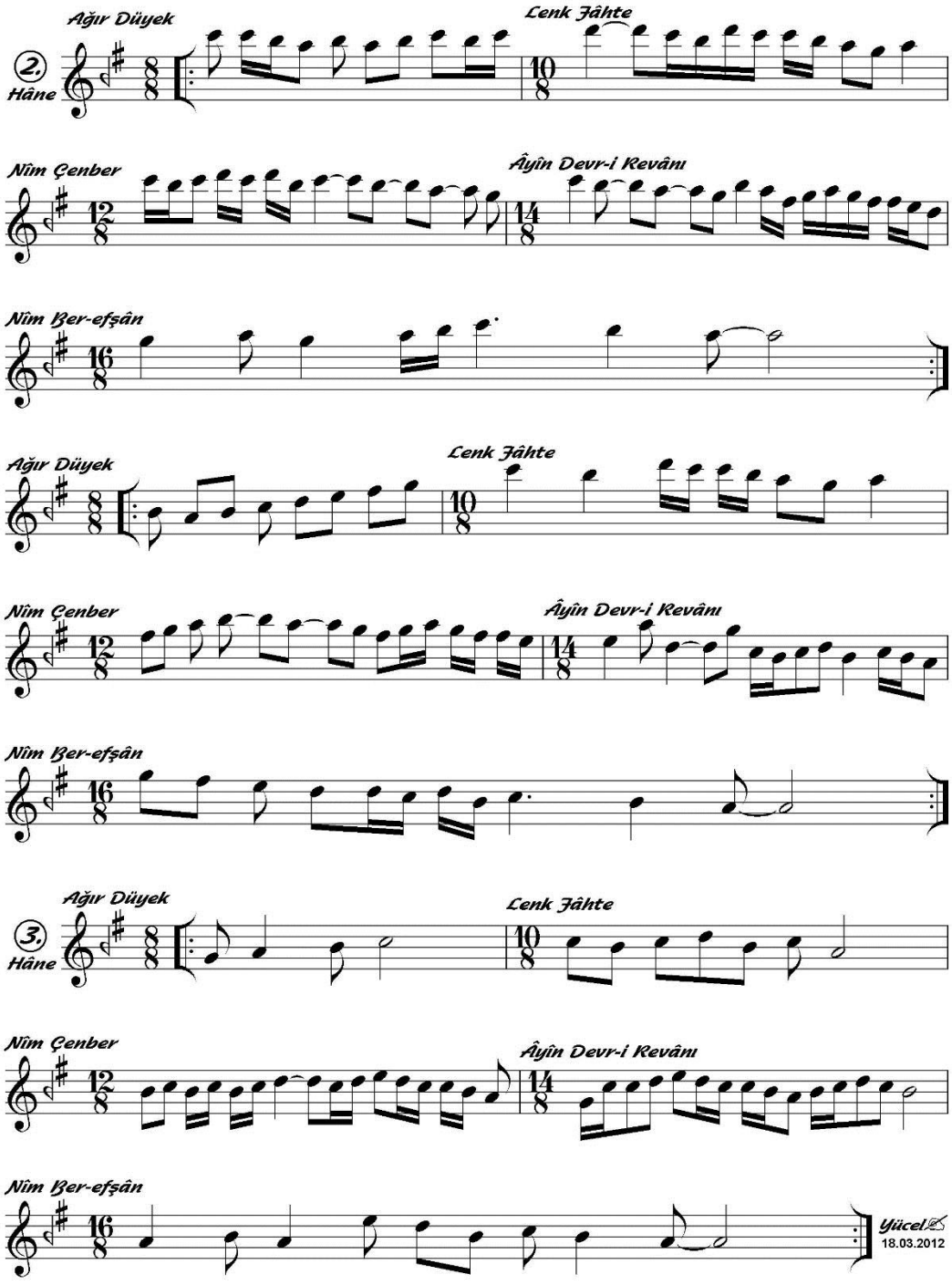
Example 14


www.neyzen.com
Hüseynî Peşrev (No:1)
- 1 -
Yücel Müzik
Gazi Giray Han (Tatar)
Nîm Zencîr
Ağır Düyek
Lenk Fâhte
1.
Hâne
Nîm Çenber
Âyîn Devr-i Revânı
Nîm Ber-efşân
Teslim
Ağır Düyek
Lenk Fâhte
Nîm Çenber
Âyîn Devr-i Revânı
Nîm Ber-efşân
Ağır Düyek
Lenk Fâhte
Nîm Çenber
Âyîn Devr-i Revânı
Nîm Ber-efşân

Hüseynî Peşrev (No:1)

- 2 -

Gazi Giray Han (Tatar)



Example 15

www.neyzen.com

Hüseynî Peşrev

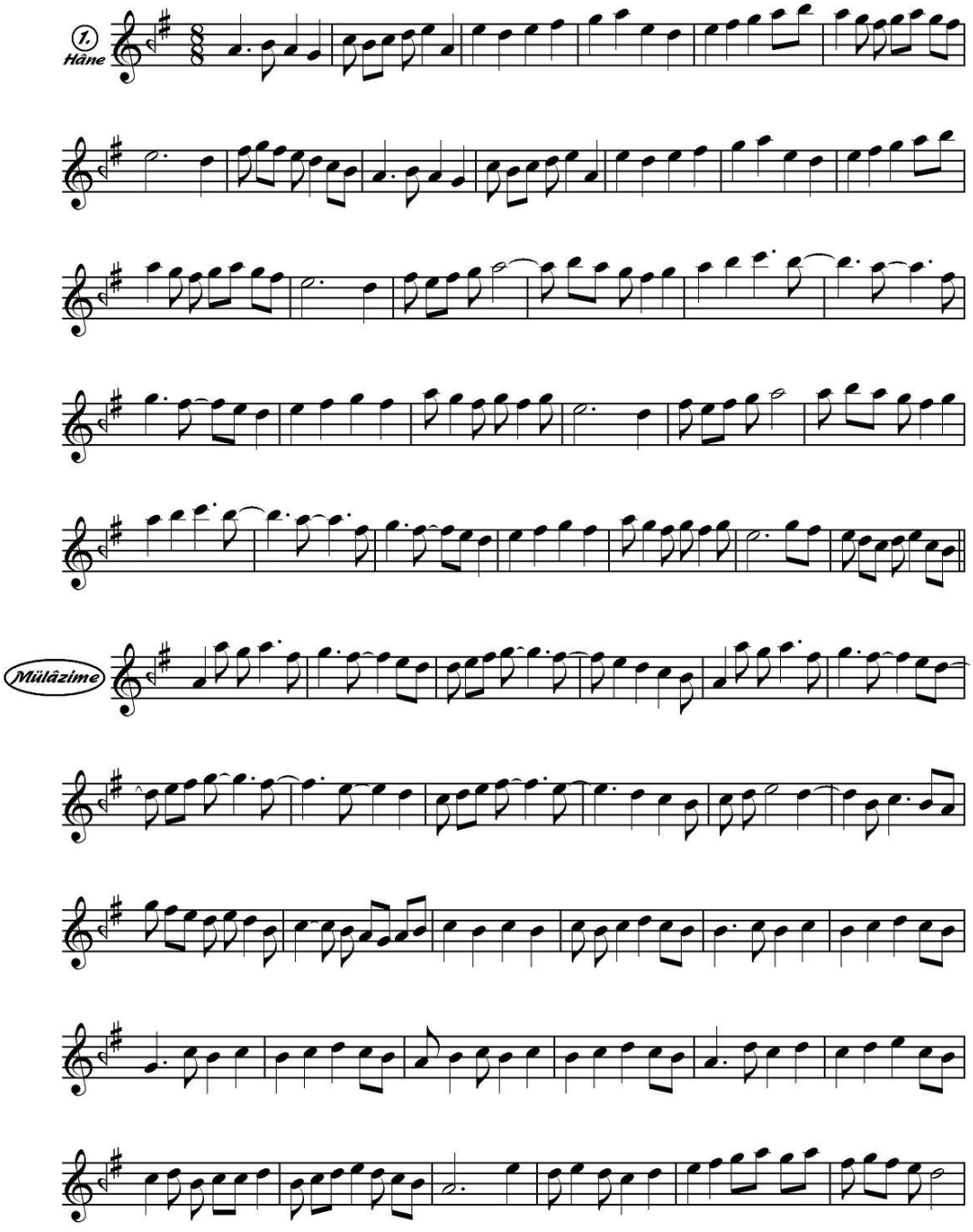
— 1 —

Yücel Müzik

Hasan Cân Çelebi
(1490? — 1567)

Düyek

1. Hâne

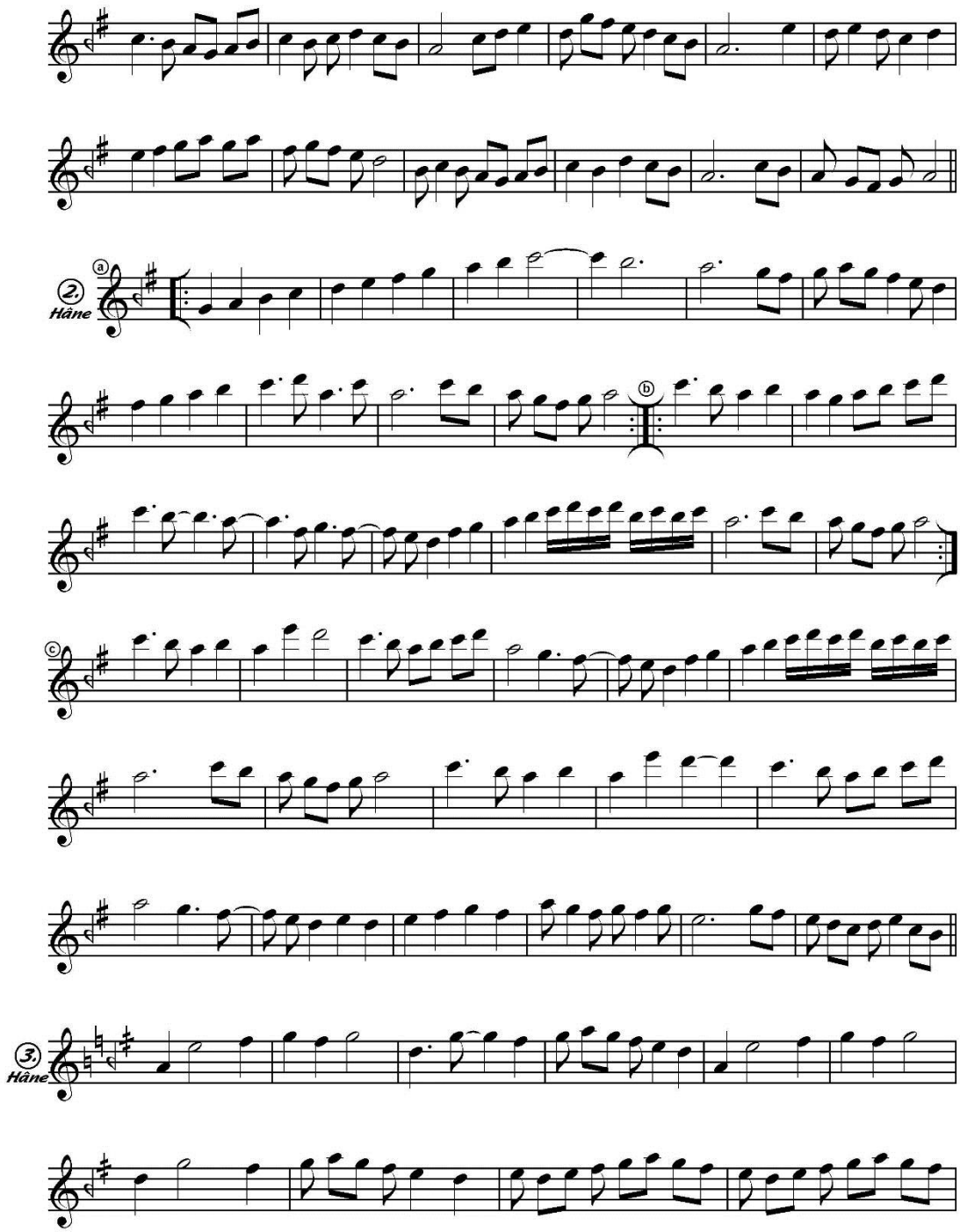


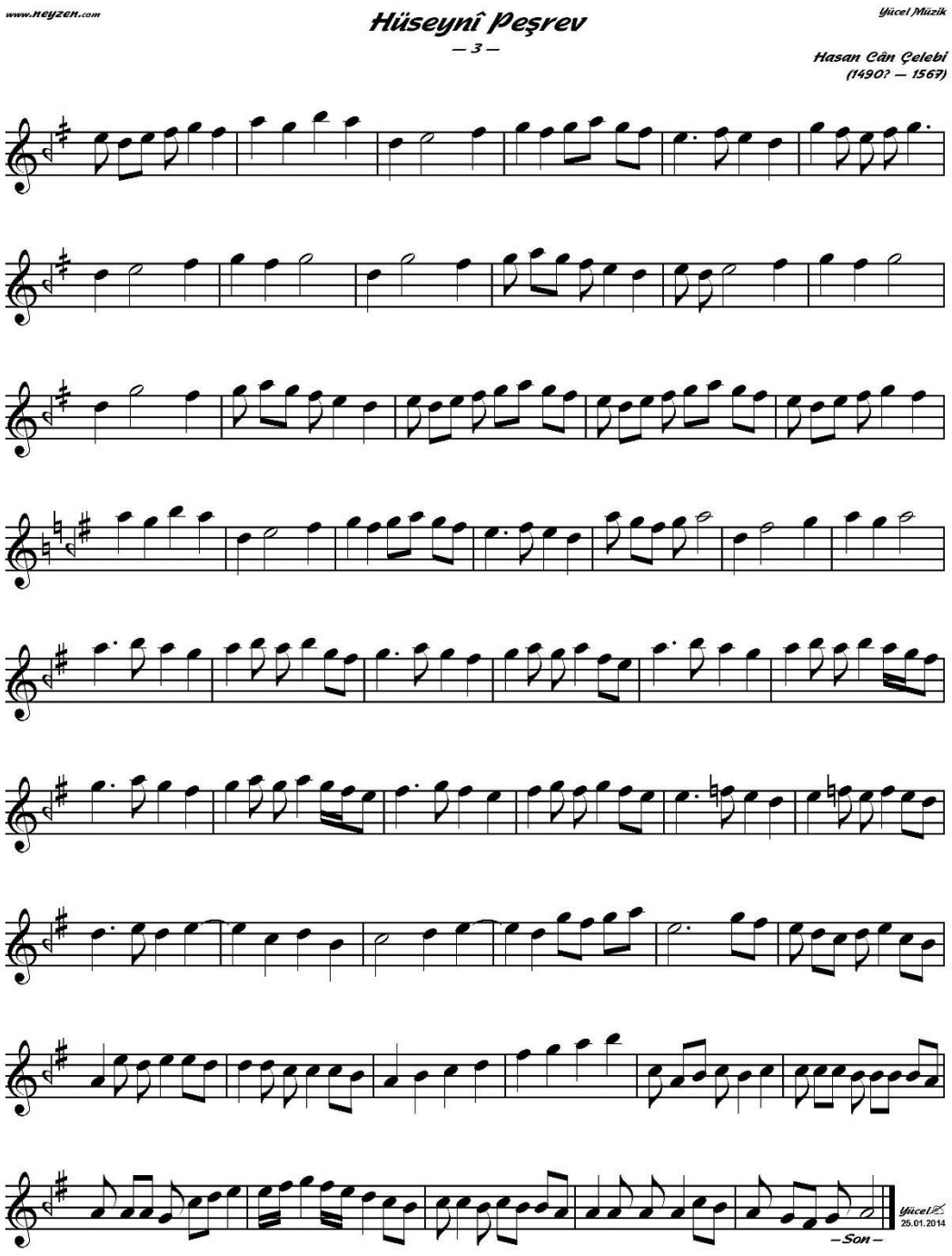
Mülâzime

Hüseynî Peşrev

— 2 —

Hasan Cân Çelebi
(1490? — 1567)





Isfahan (16-21 (6),

Example 16

www.neyzen.com

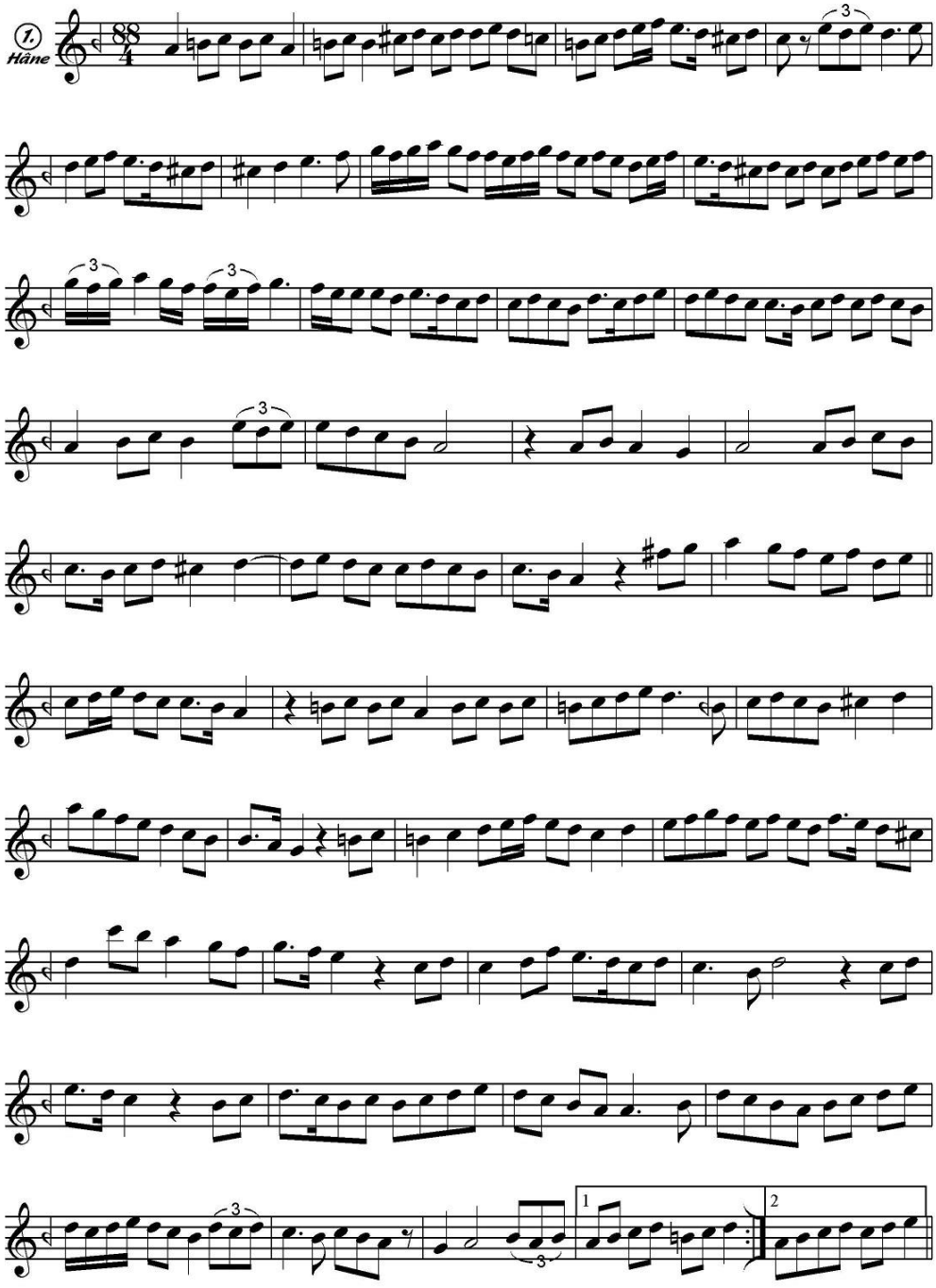
Isfahân Peşrev

— 1 —

Yücel Müzik

İsak Efendi (Tanbûrî)
(Izak Fresco Monaro)
(1745? — 1814)

Darb-ı Fetih ♩ = 88

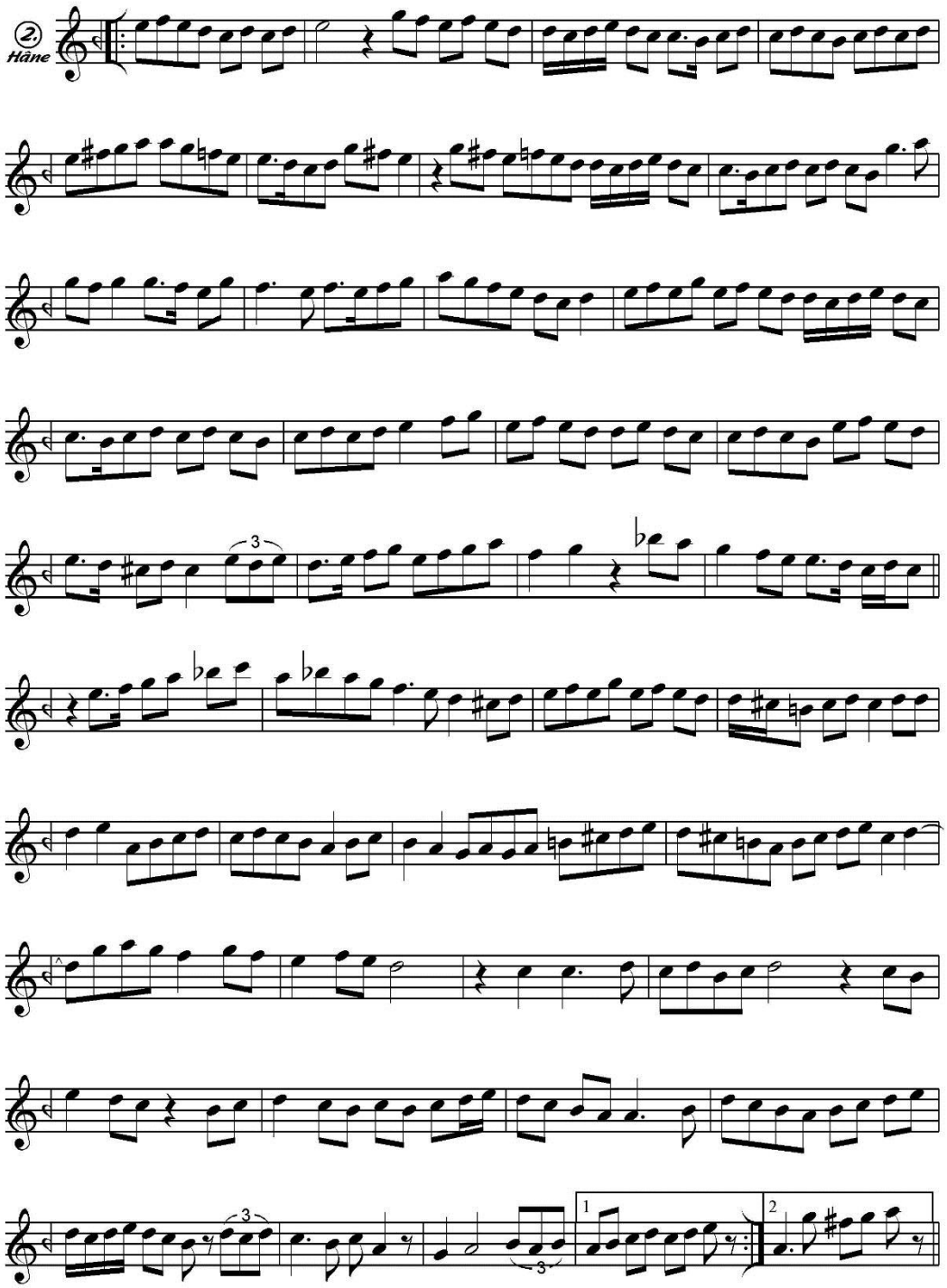


Isfahân Peşrev

— 2 —

Yücel Müzik

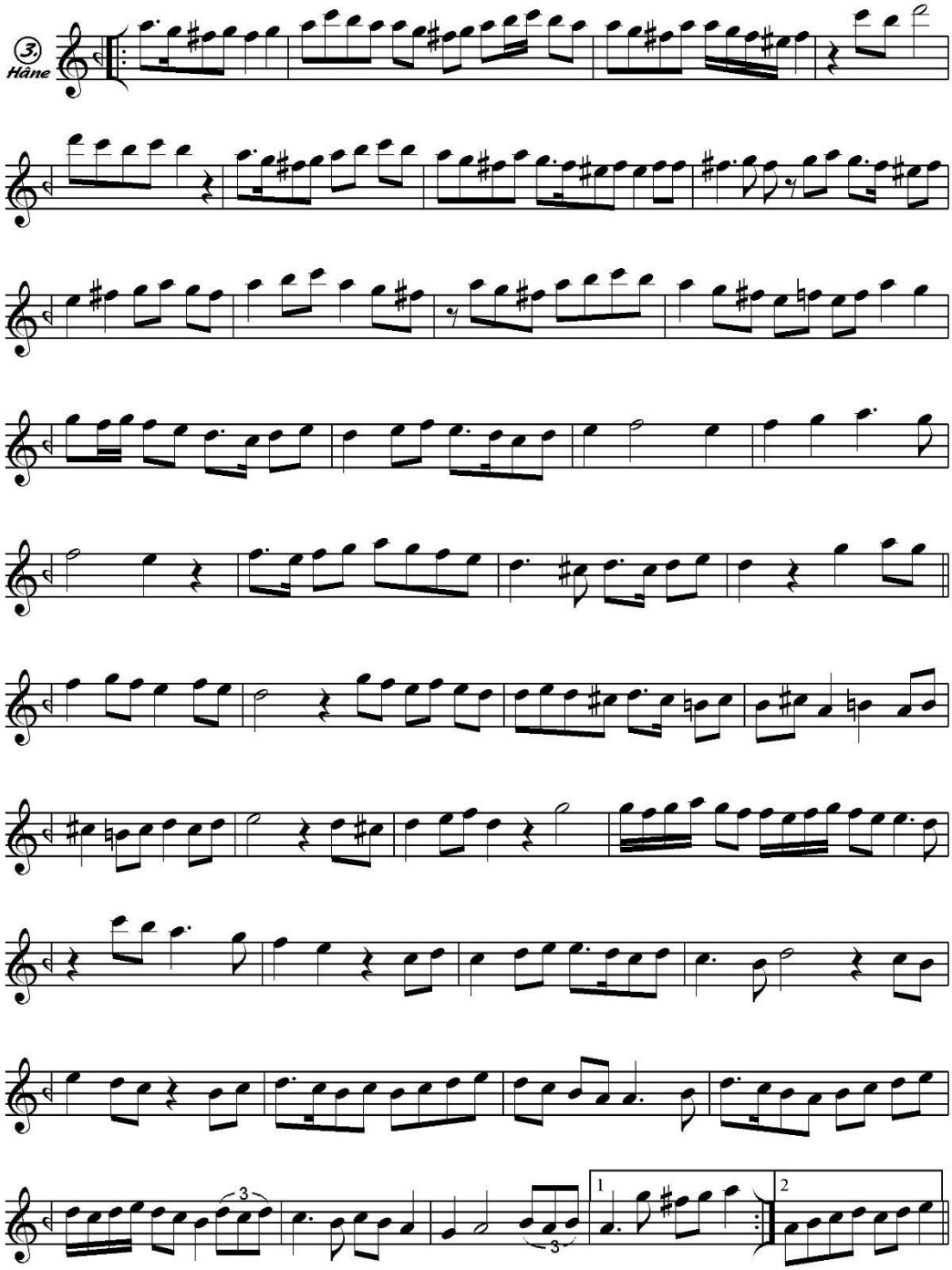
İsak Efendi (Tanbûrî)
(Izak Fresco Monaro)
(1745? — 1814)



Isfahân Peşrev

— 3 —

İsak Efendi (Tanbûrî)
(Izak Fresco Monaro)
(1745? — 1814)

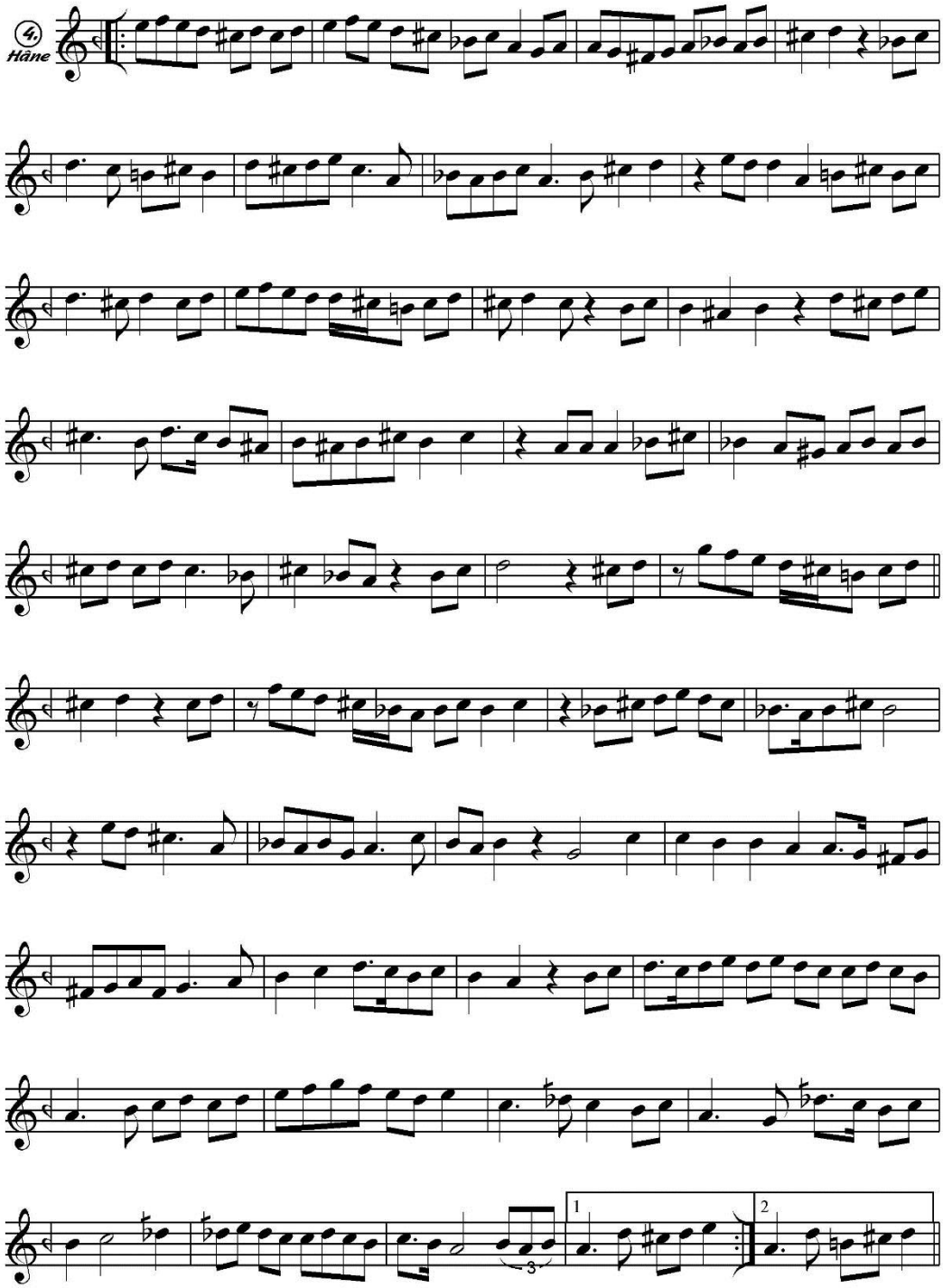


Isfahân Peşrev

— 4 —

Yücel Müzik

İsak Efendi (Tanbûrî)
(Izak Fresco Monaro)
(1745? — 1814)



Isfahân Peşrev

— 5 —

Yücel Müzik

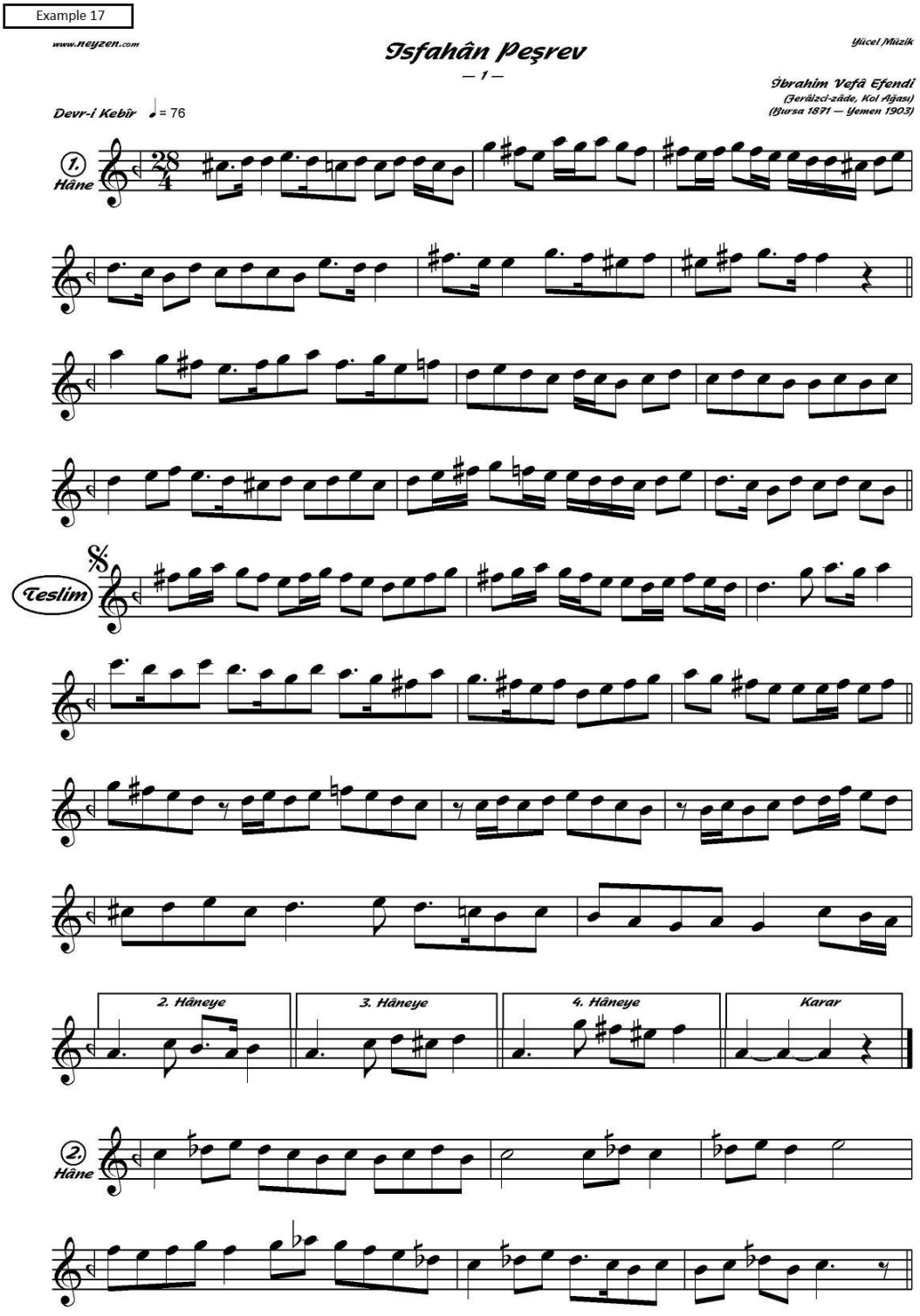
İsak Efendi (Tanbûrî)
(Izak Fresco Monaro)
(1745? — 1814)

5. Hâne

— Son —

Yücel
02.01.2016

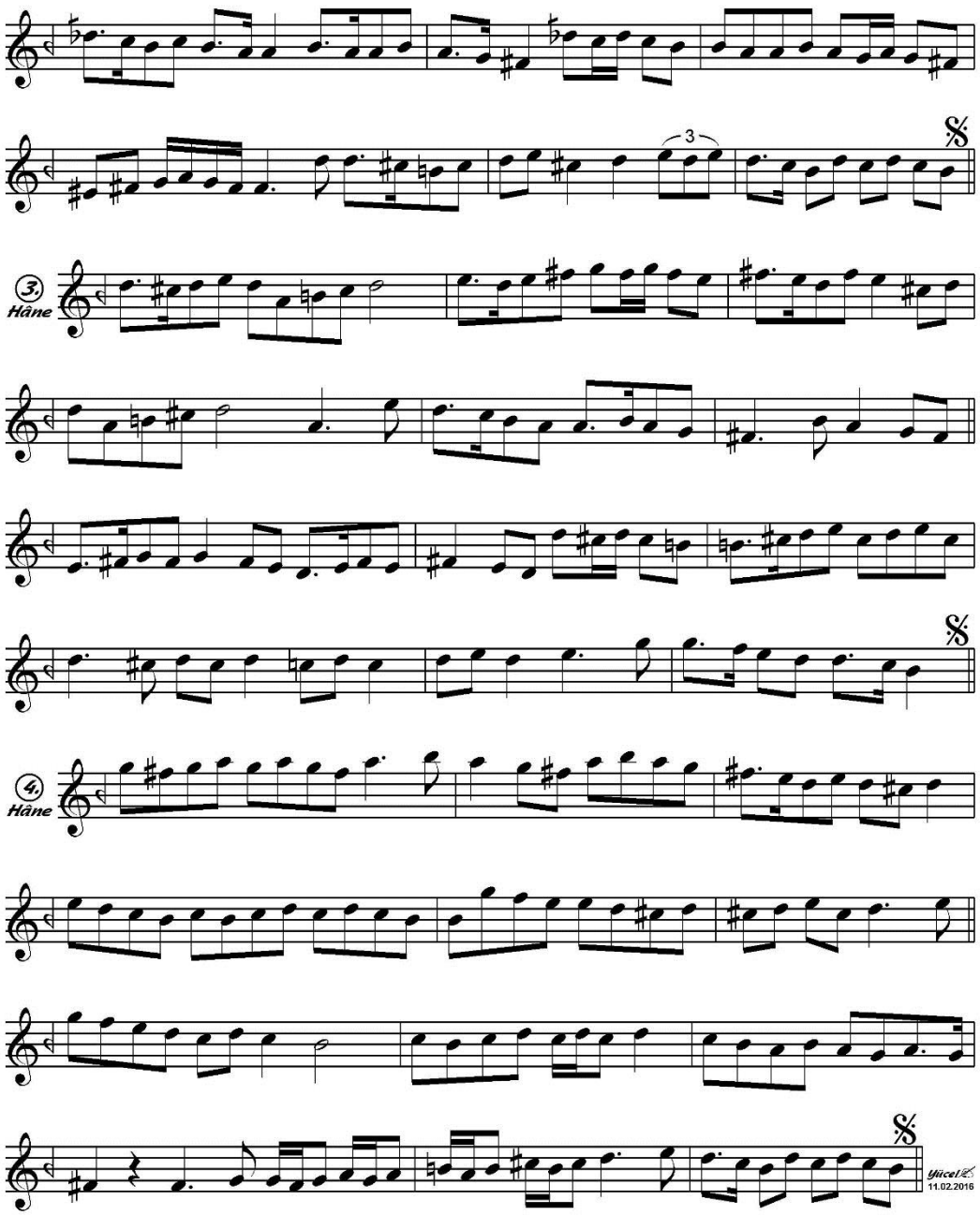
Example 17


www.neyzen.com
Isfahân Peşrev
— 1 —
Yücel Müzik
İbrahim Vefâ Efendi
(Serâlzcı-zâde, Kol Ağası)
(Bursa 1871 — Yemen 1903)
Devr-i Kebîr ♩= 76
1. Hâne
Teslim
2. Hâneye
3. Hâneye
4. Hâneye
Karar
2. Hâne

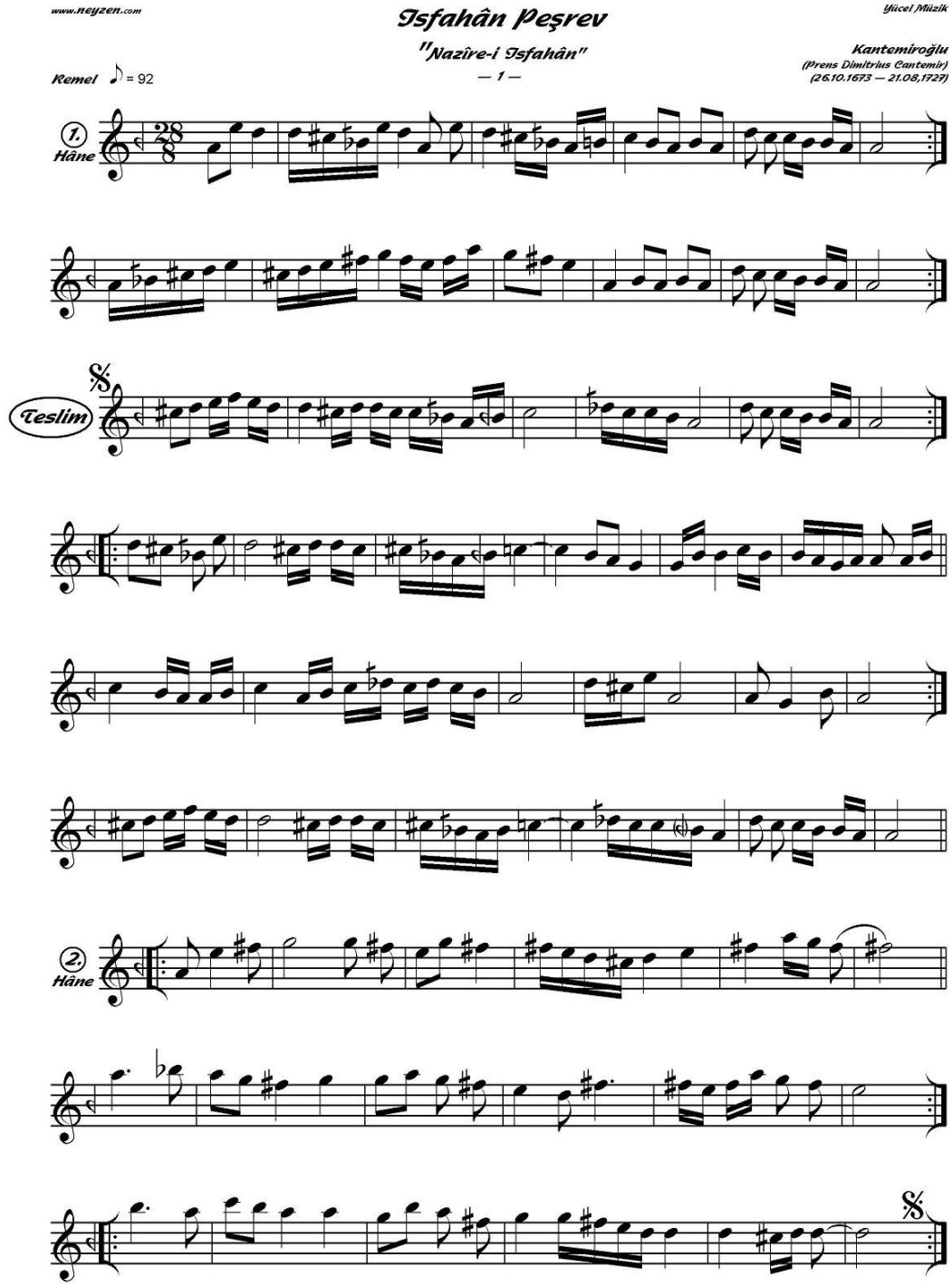
Isfahân Peşrev

— 2 —

İbrahim Vefâ Efendi
(Serâzci-zâde, Kol Ağası)
(Bursa 1871 — Yemen 1903)



Example 18


www.neyzen.com
Isfahân Peşrev
"Nazîre-i Isfahân"
— 1 —
Yücel Müzik
Kantemiroğlu
(Prens Dimitrius Cantemir)
(26.10.1673 — 21.08.1727)
Remel ♪ = 92
1. Hâne
Teslim
2. Hâne

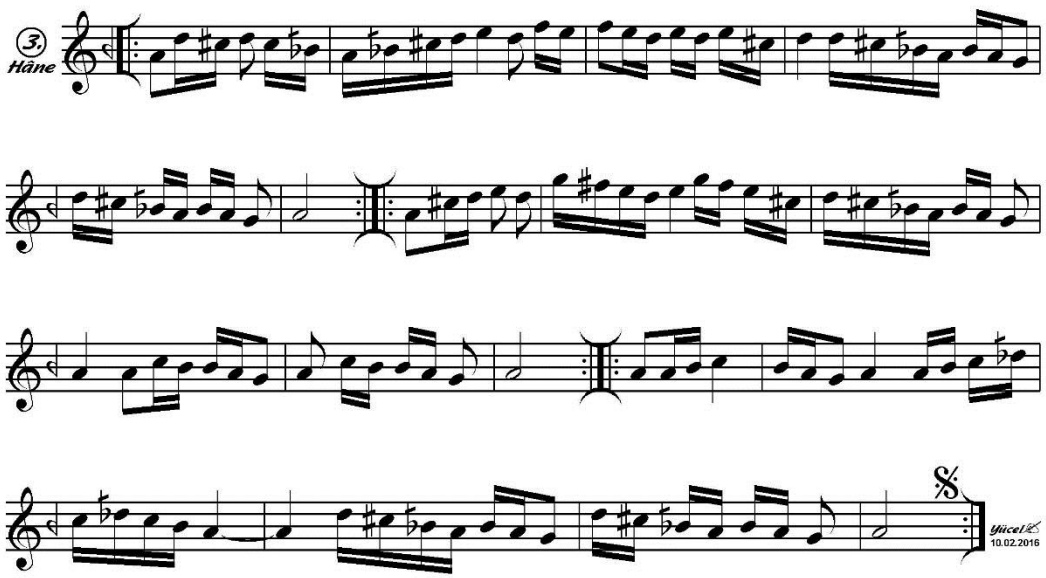
Isfahân Peşrev

"Nazîre-i Isfahân"

— 2 —

Yücel Müzik

Kantemiroğlu
(Prens Dimitrius Cantemir)
(26.10.1673 — 21.08.1727)



Example 19

www.neyzen.com

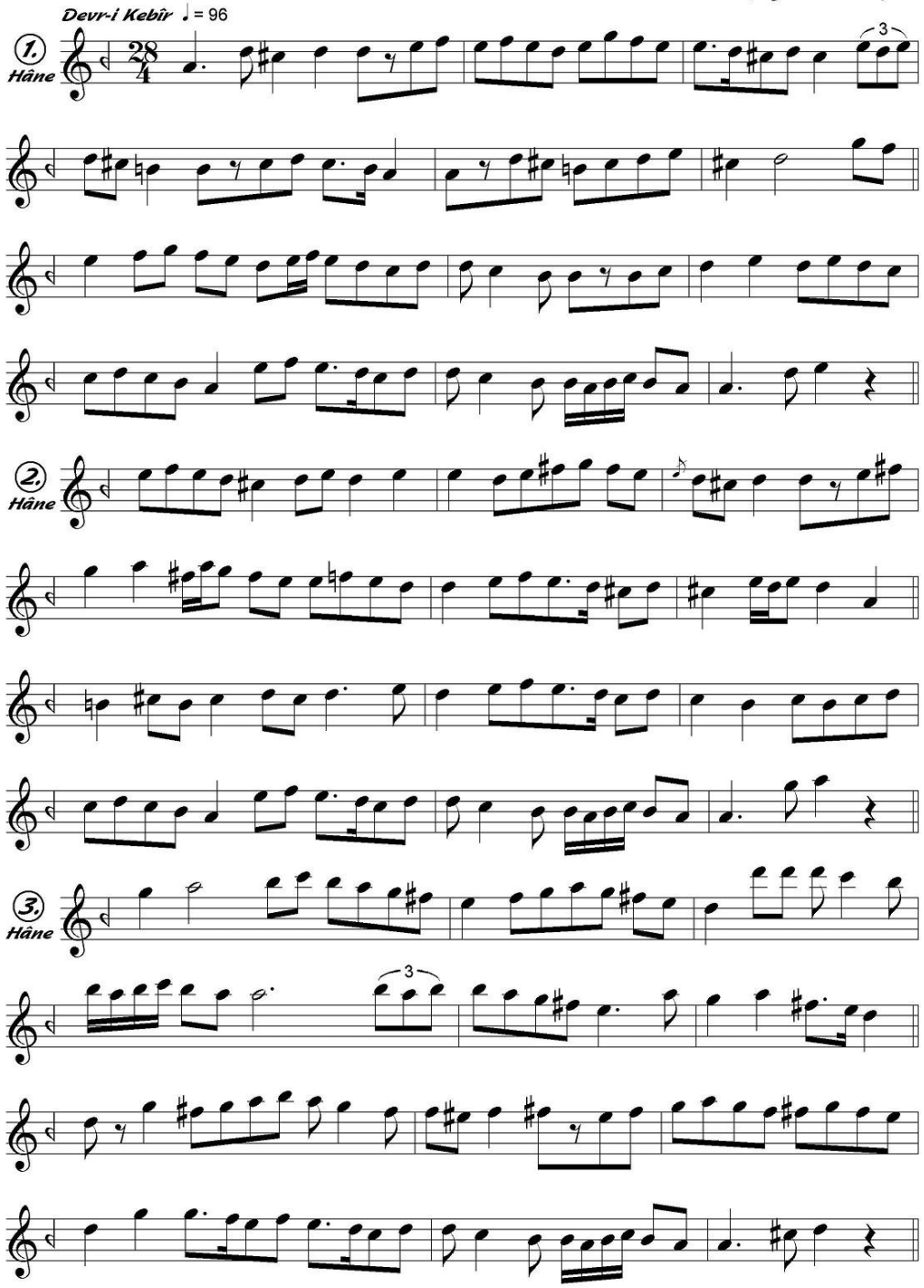
Isfahân Peşrev

- 1 -

Yücel Müzik

Nâyi Dede Salih Efendi

Devr-i Kebîr ♩ = 96



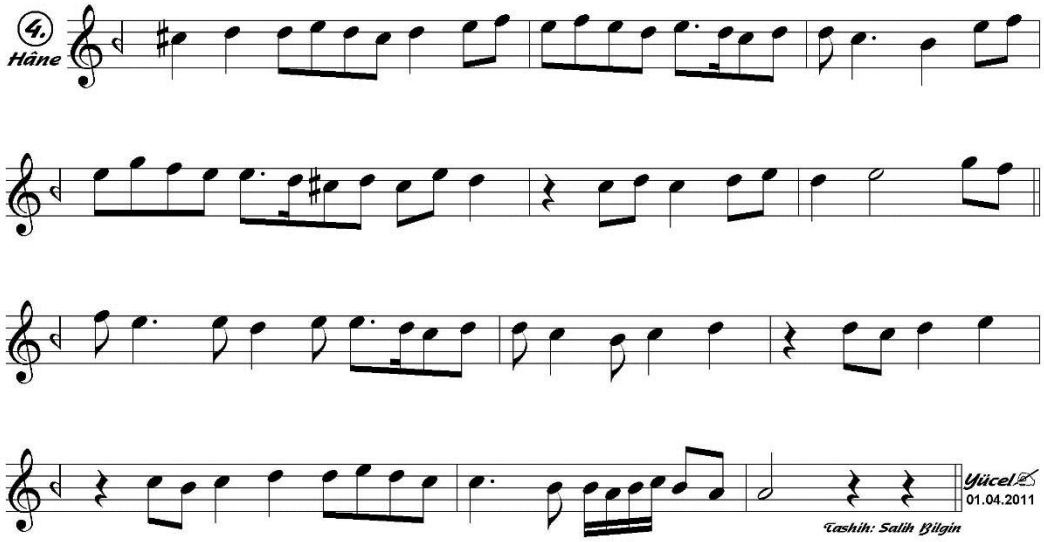
www.neyzen.com

Isfahân Peşrev

- 2 -

Yücel Müzik

Nâyi Dede Salih Efendi



Example 20

www.neyzen.com

Isfahân Saz Semâî

Yücel Müzik

Farâbi

Aksak Semâî ♪= 120

1. Hâne

Teslim

(Son)

2. Hâne

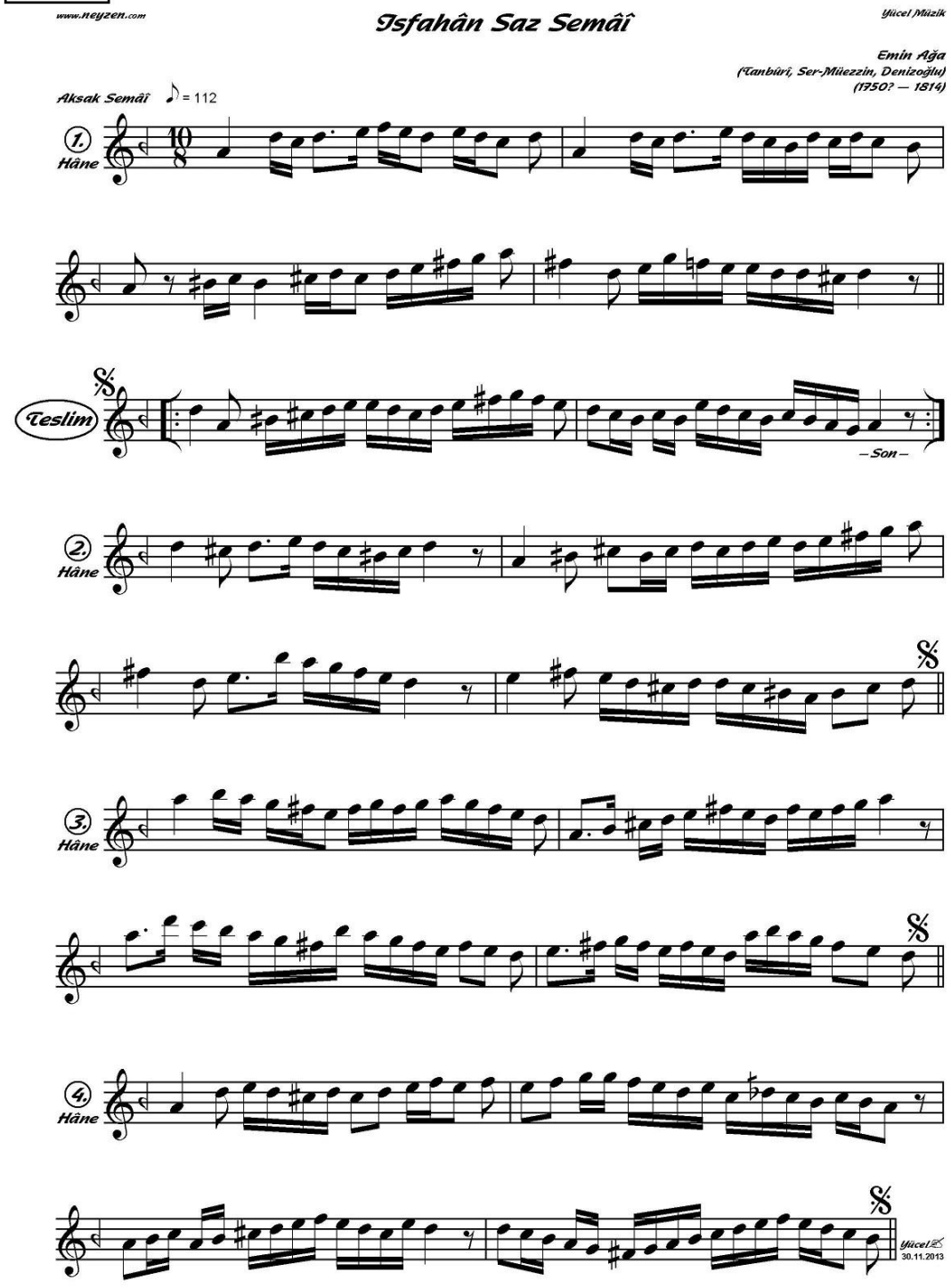
3. Hâne

Yürük Semâî ♪= 192

4. Hâne

Yücel
02.11.2011

Example 21



Neva (22-26 (5),

Example 22

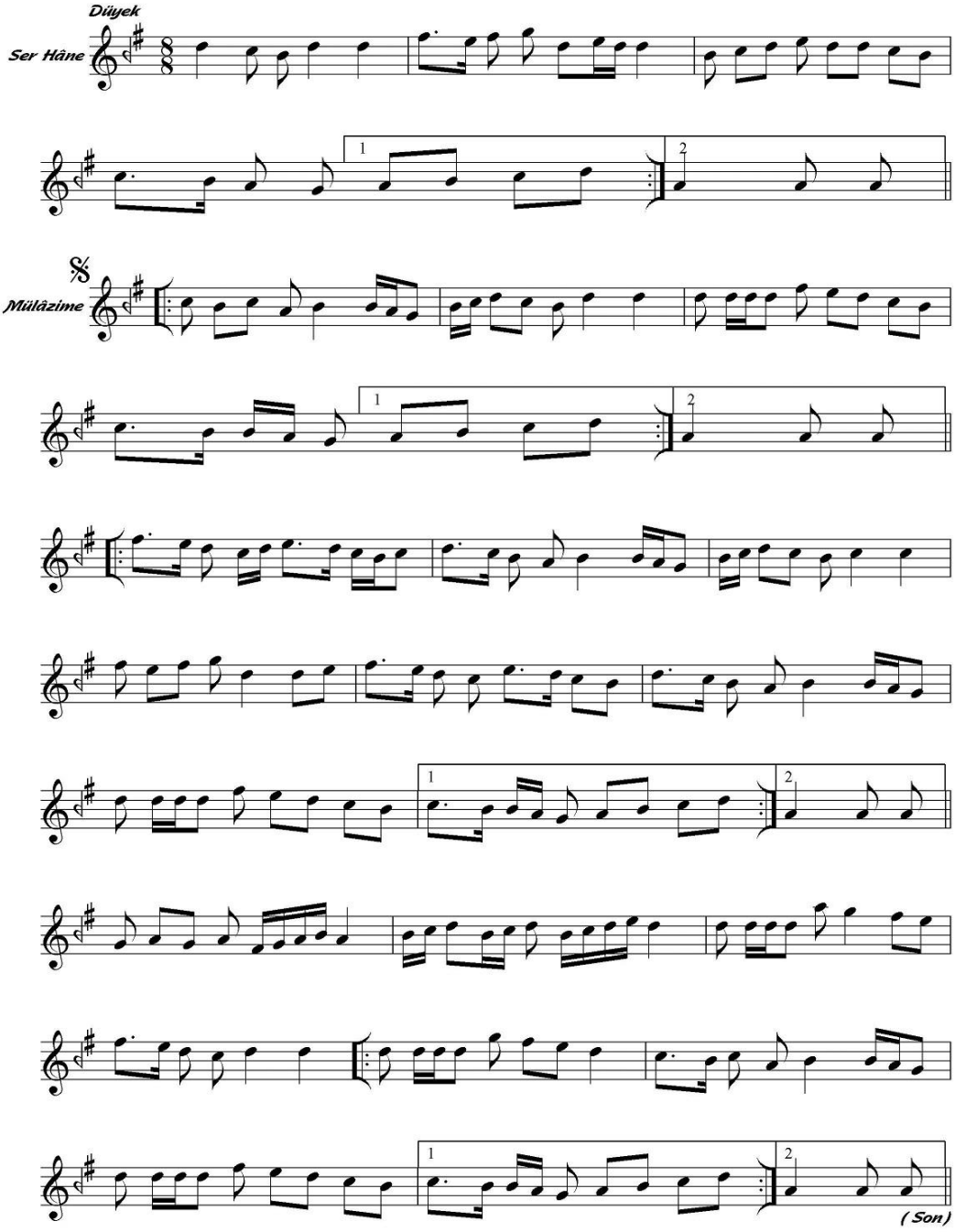
www.neyzen.com

Nevâ Peşrev

- 1 -

Yücel Müzik

Sultan II. Bayezid



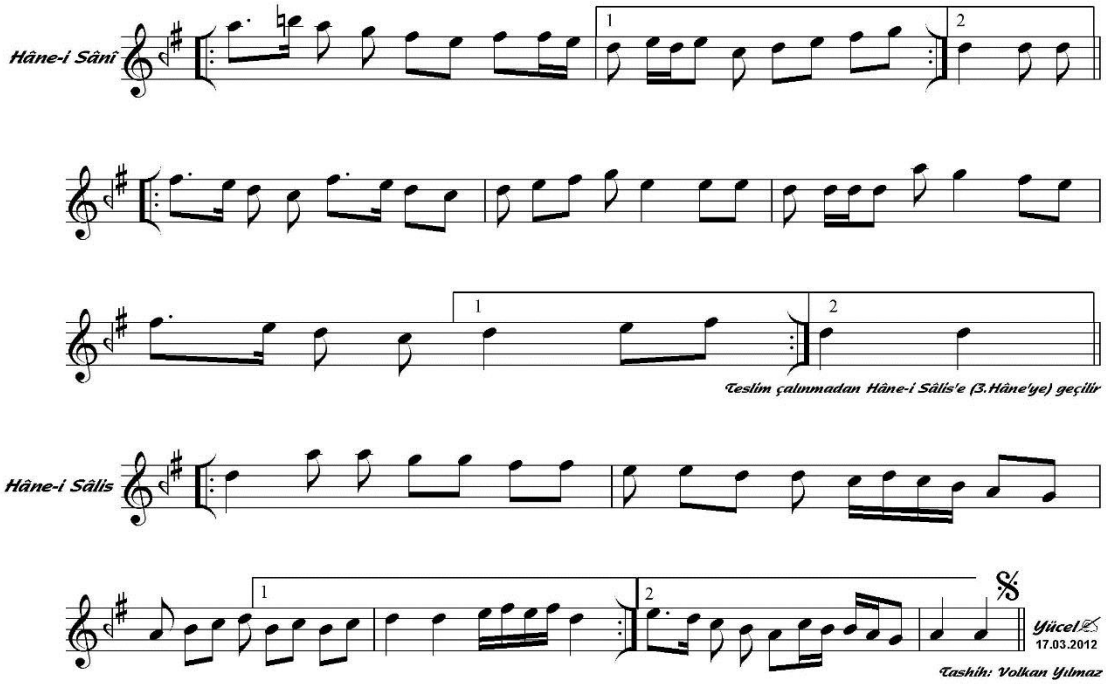
www.neyzen.com

Nevâ Peşrev

- 2 -

Yücel Müzik

Sultan II. Bayezid



Example 23

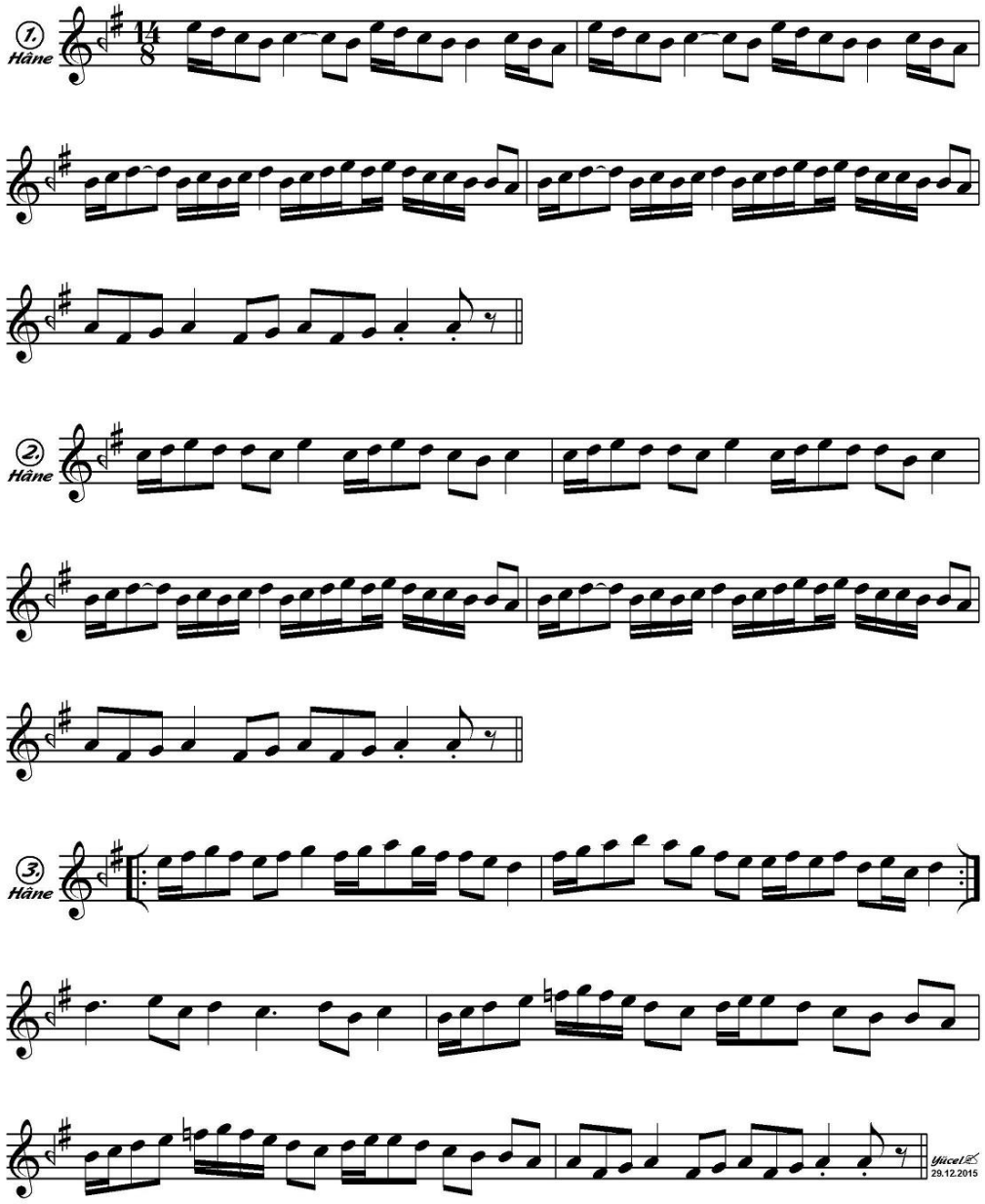
www.neyzen.com

Nevâ Peşrev

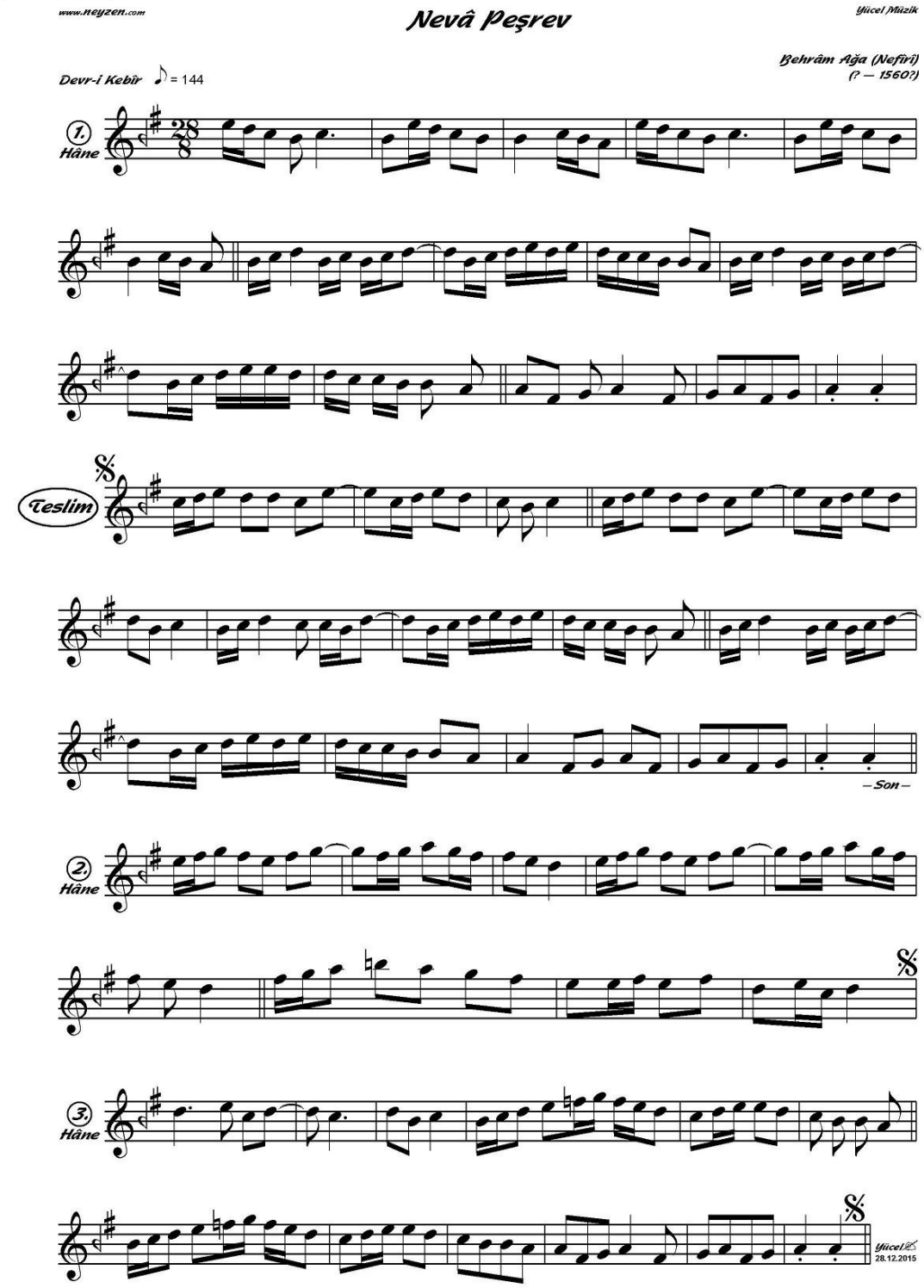
Yücel Müzik

Behrâm Ağa (Nefîrî)
(? – 1560?)

Âyîn Devr-i Revânı ♪ = 144



Example 24


www.neyzen.com
Nevâ Peşrev
Yücel Müzik
Behrâm Ağa (Nefîrî)
(? – 1560?)
Devr-i Kebîr ♪ = 144
1. Hâne
Teslim
– Son –
2. Hâne
3. Hâne
Yücel
28.12.2015

Example 25

www.neyzen.com

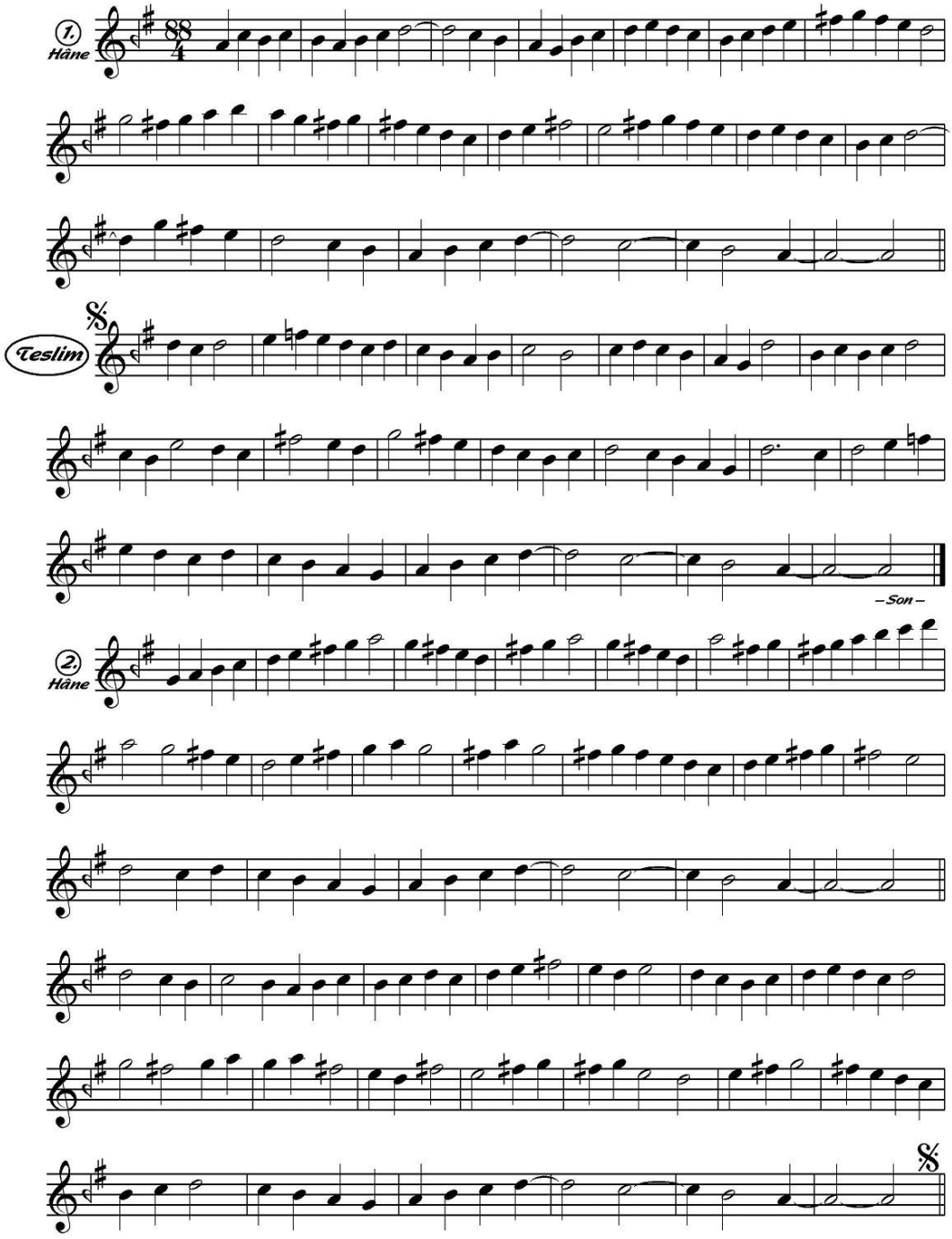
Nevâ Peşrev

— 1 —

Yücel Müzik

Solak-zâde
(Miskaalî Mehmed Hemdemî Çelebi)
(? — 1658)

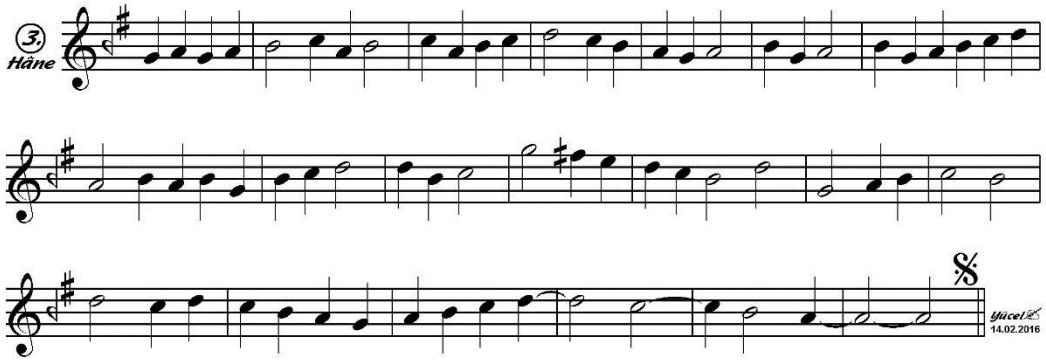
Darb-ı Fetih ♩ = 144



Nevâ Peşrev

— 2 —

Solak-zâde
(Miskaali Mehmed Hemdemî Çelebi)
(? — 1658)



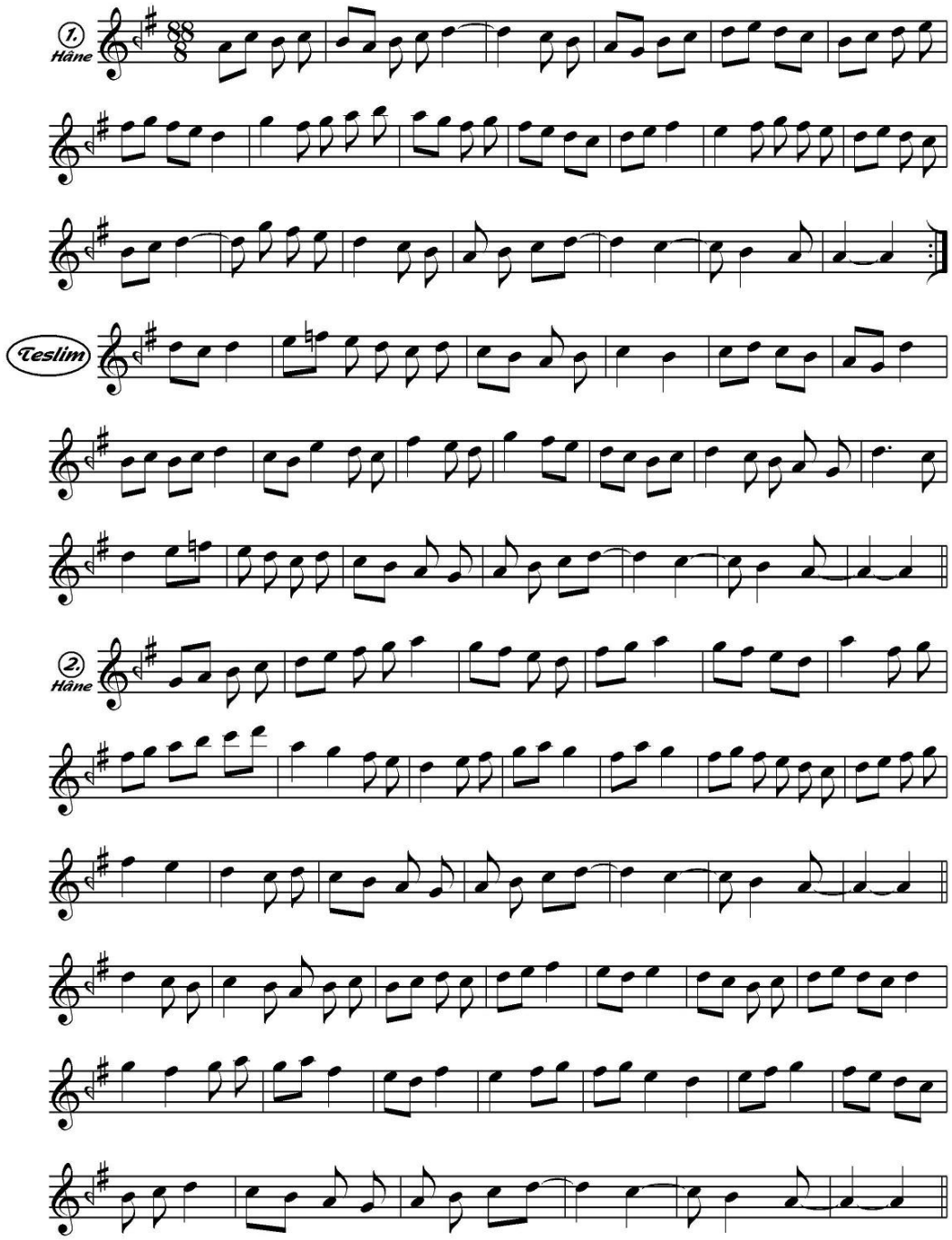
Example 26

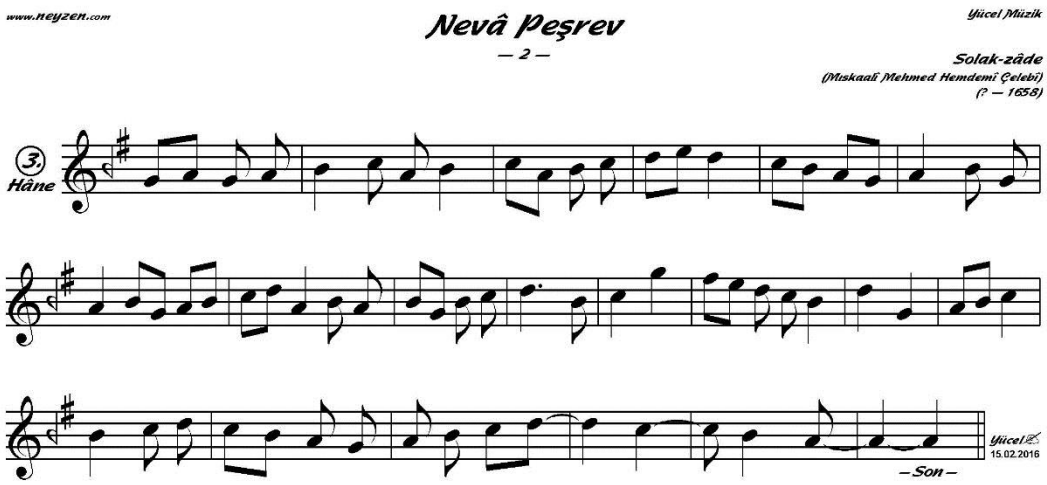
Nevâ Peşrev

— 1 —

Solak-zâde
(Miskaali Mehmed Hemdemî Çelebi)
(? — 1658)

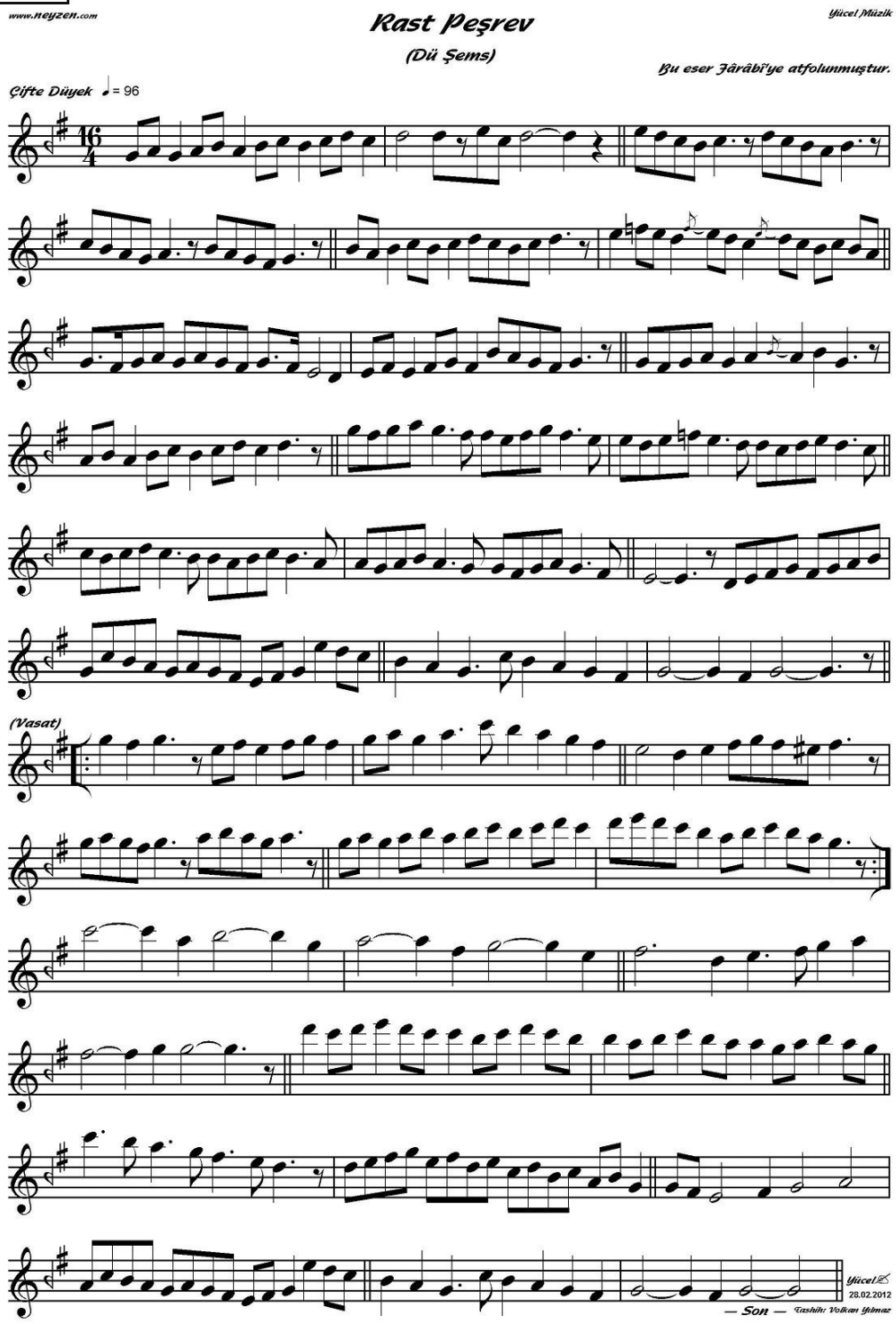
Darb-ı Fetih ♪ = 144



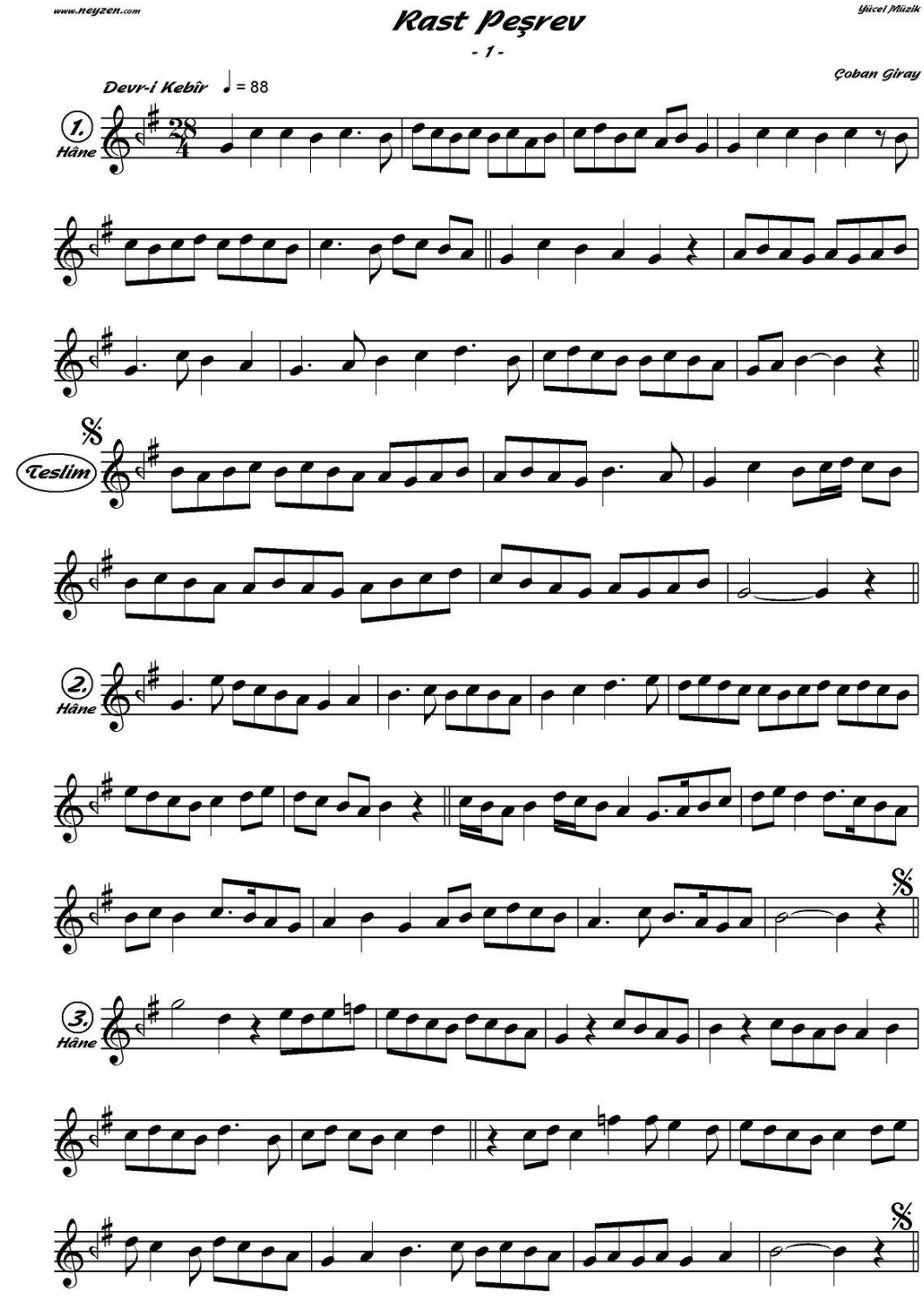

www.neyzen.com
Nevâ Peşrev
— 2 —
Yücel Müzik
Solak-zâde
(Mıskaalî Mehmed Hemdemî Çelebi)
(? — 1658)
3.
Hâne
Yücel
15.02.2016
– Son –

Rast (27-32 (6),

Example 27


www.neyzen.com
Rast Peşrev
(Dü Şems)
Yücel Müzik
Bu eser Fârâbî'ye atfolunmuştur.
Çifte Düyek ♩ = 96
(Vasat)
Yücel
28.02.2012
— Son —
Tashih: Volkan Yılmaz

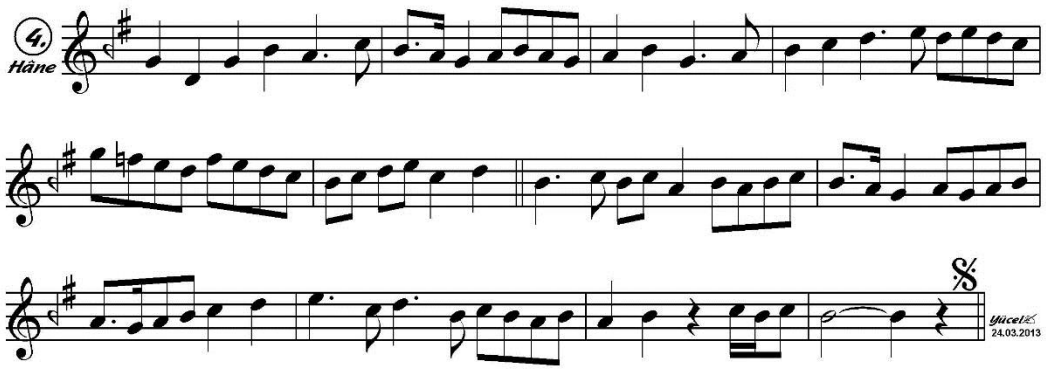
Example 28


www.neyzen.com
Rast Peşrev
- 1 -
Yücel Müzik
Çoban Giray
Devr-i Kebîr ♩ = 88
1. Hâne
Teslim
2. Hâne
3. Hâne

Rast Peşrev

- 2 -

Çoban Giray



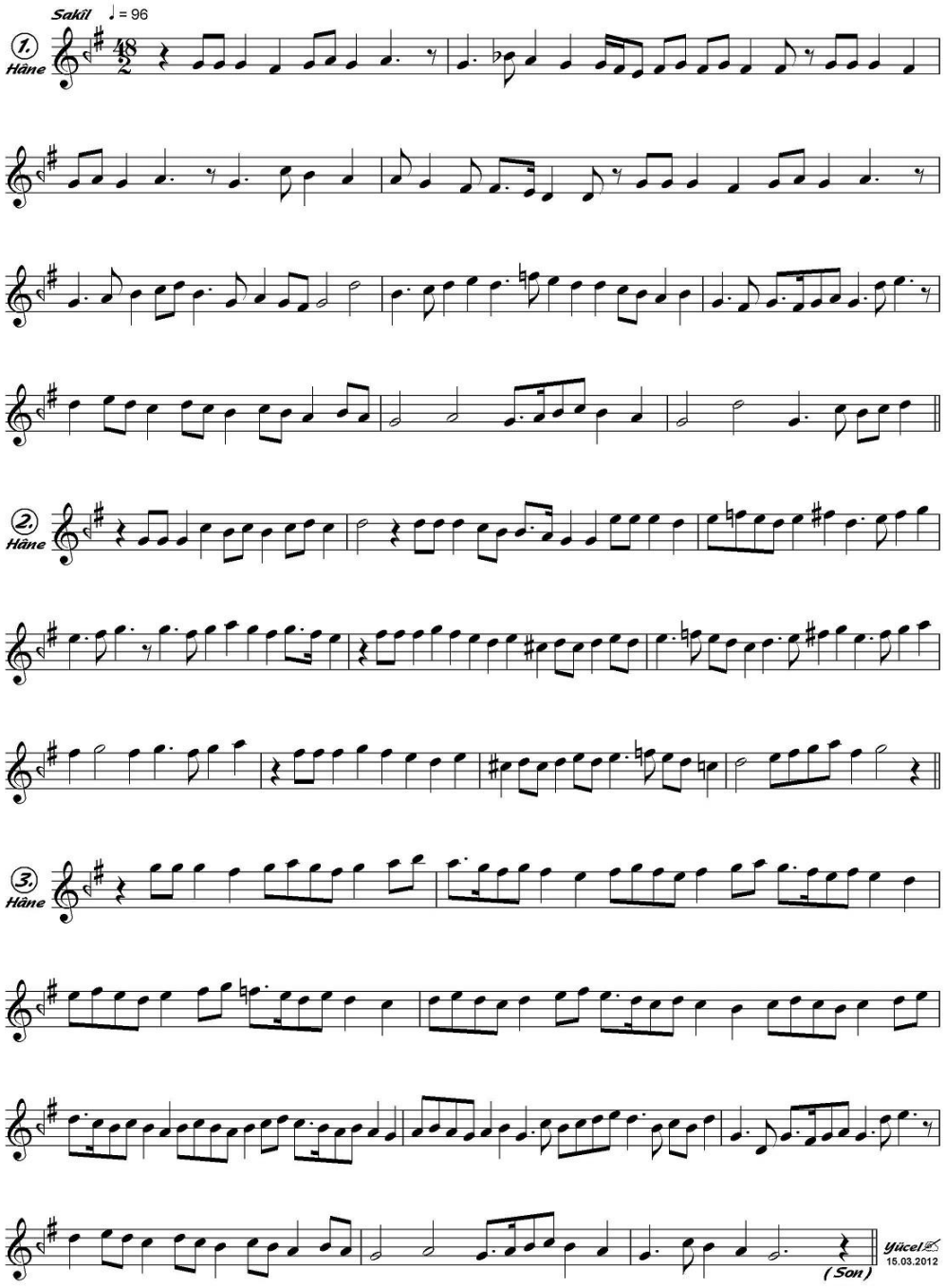
Example 29

www.neyzen.com

Rast Peşrev

Yücel Müzik

Şenli Hasan Ağa



Example 30

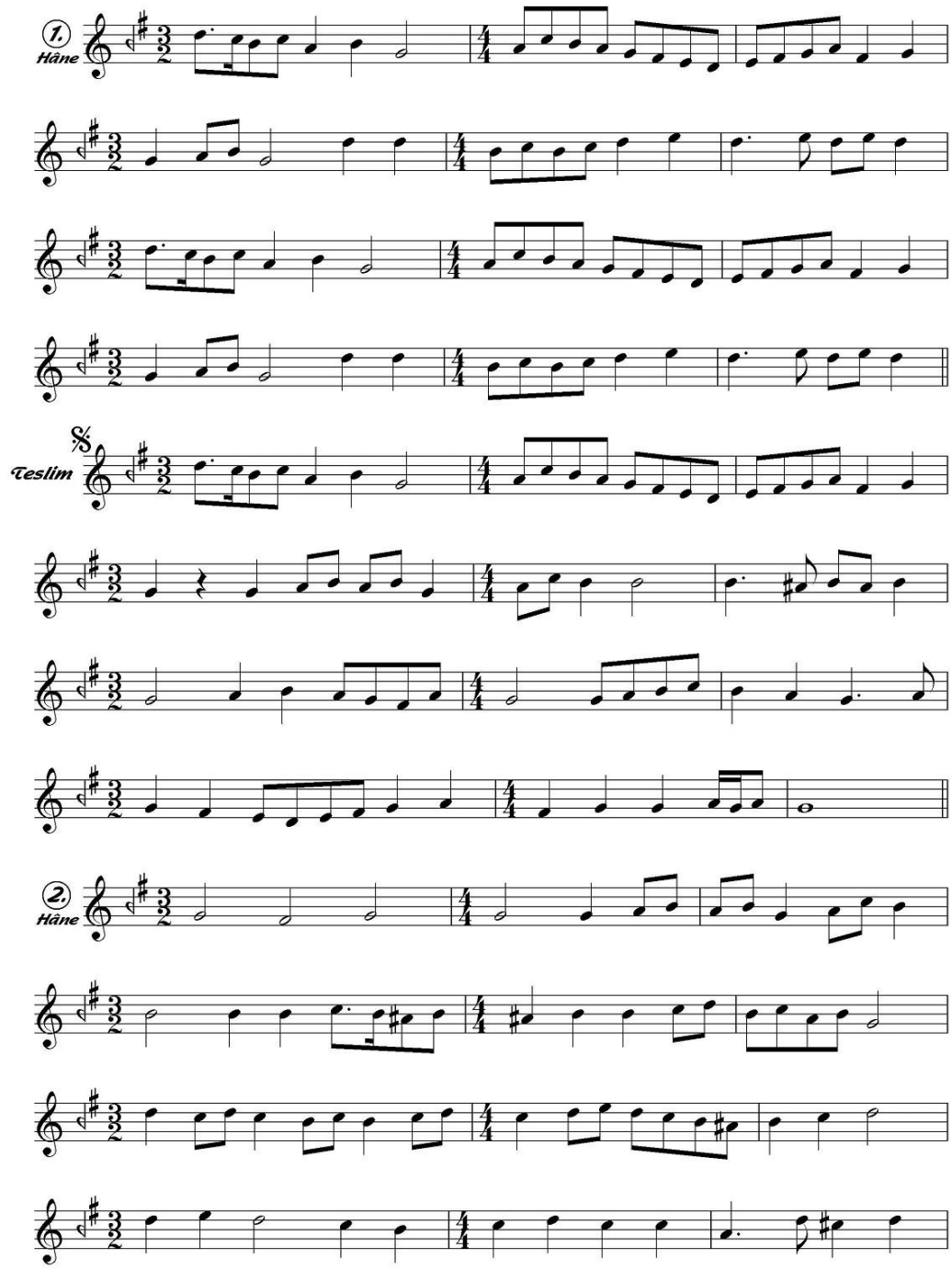
www.neyzen.com

Rast Peşrev

- 1 -

Yücel Müzik

Nayi Osman Dede

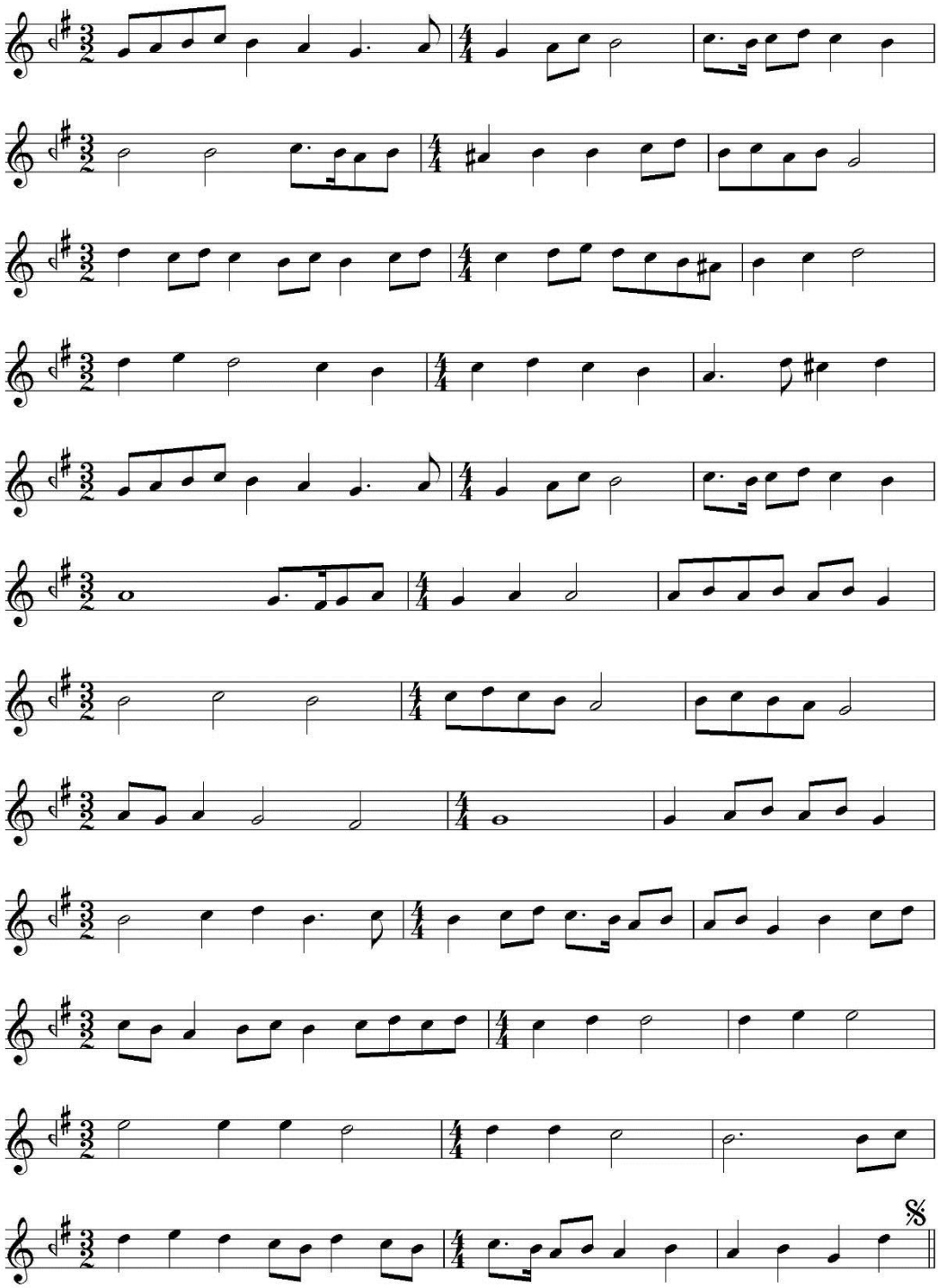


Rast Peşrev

- 2 -

Yücel Müzik

Nayi Osman Dede

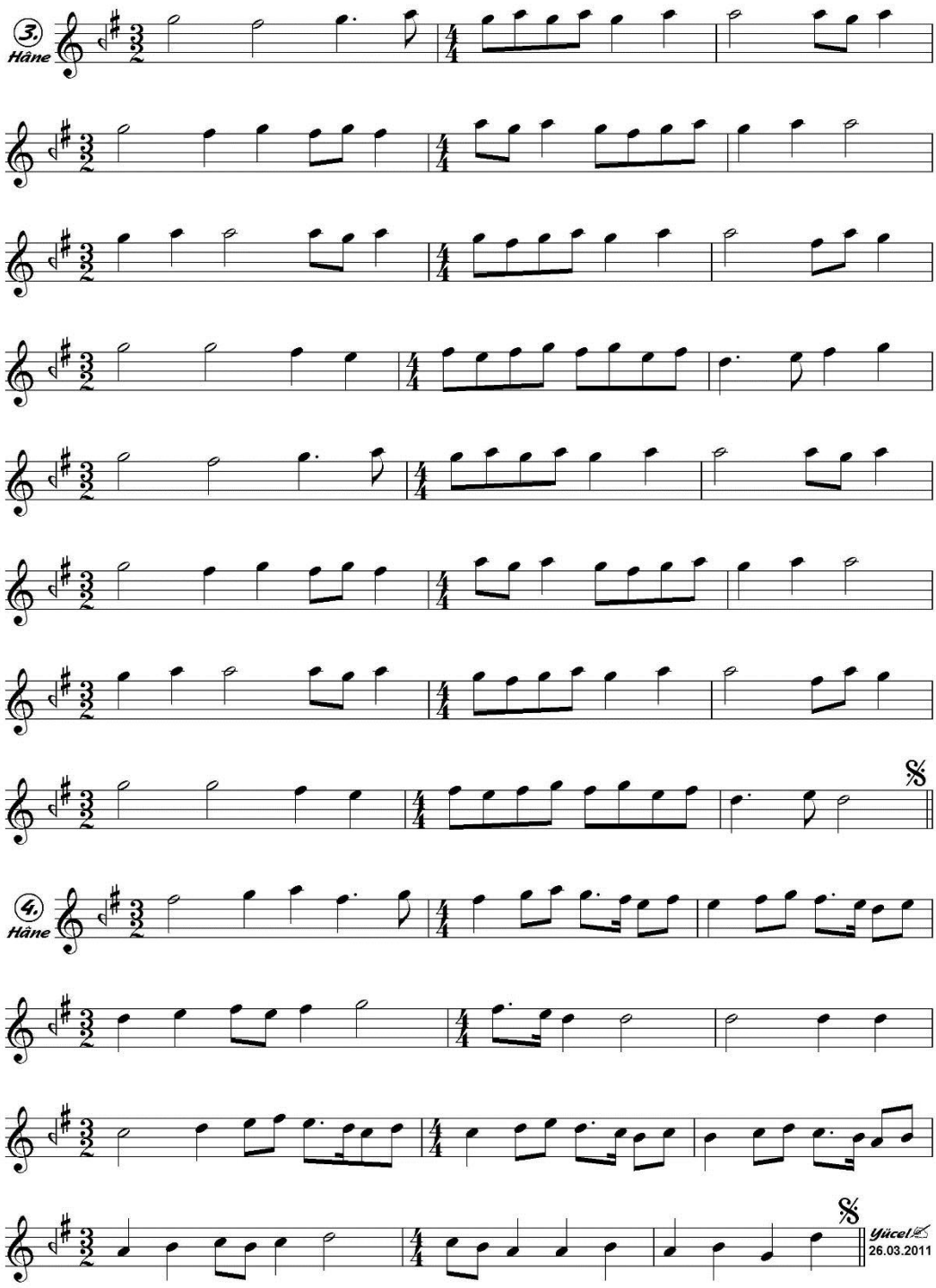


Rast Peşrev

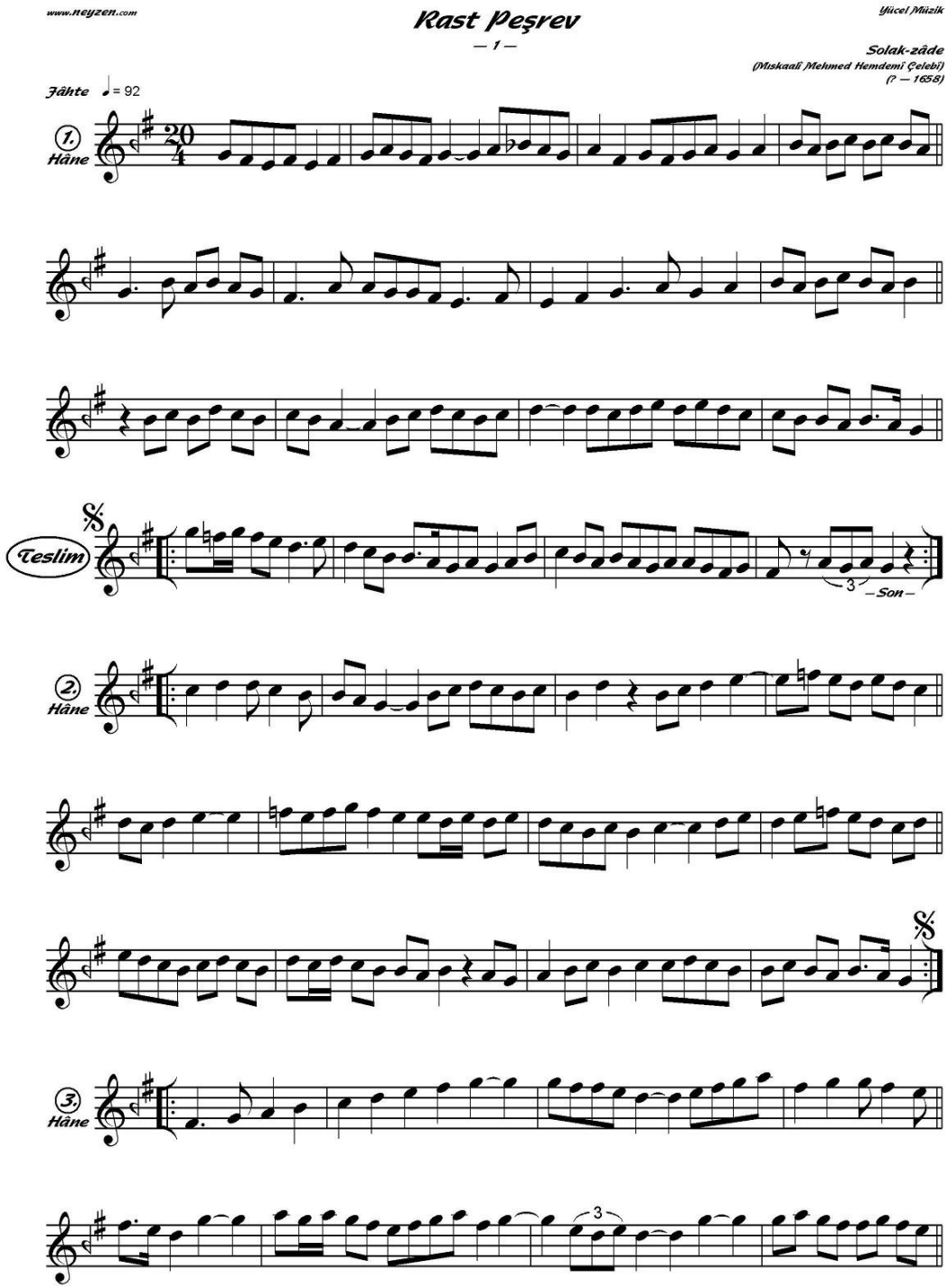
- 3 -

Yücel Müzik

Nayi Osman Dede



Example 31

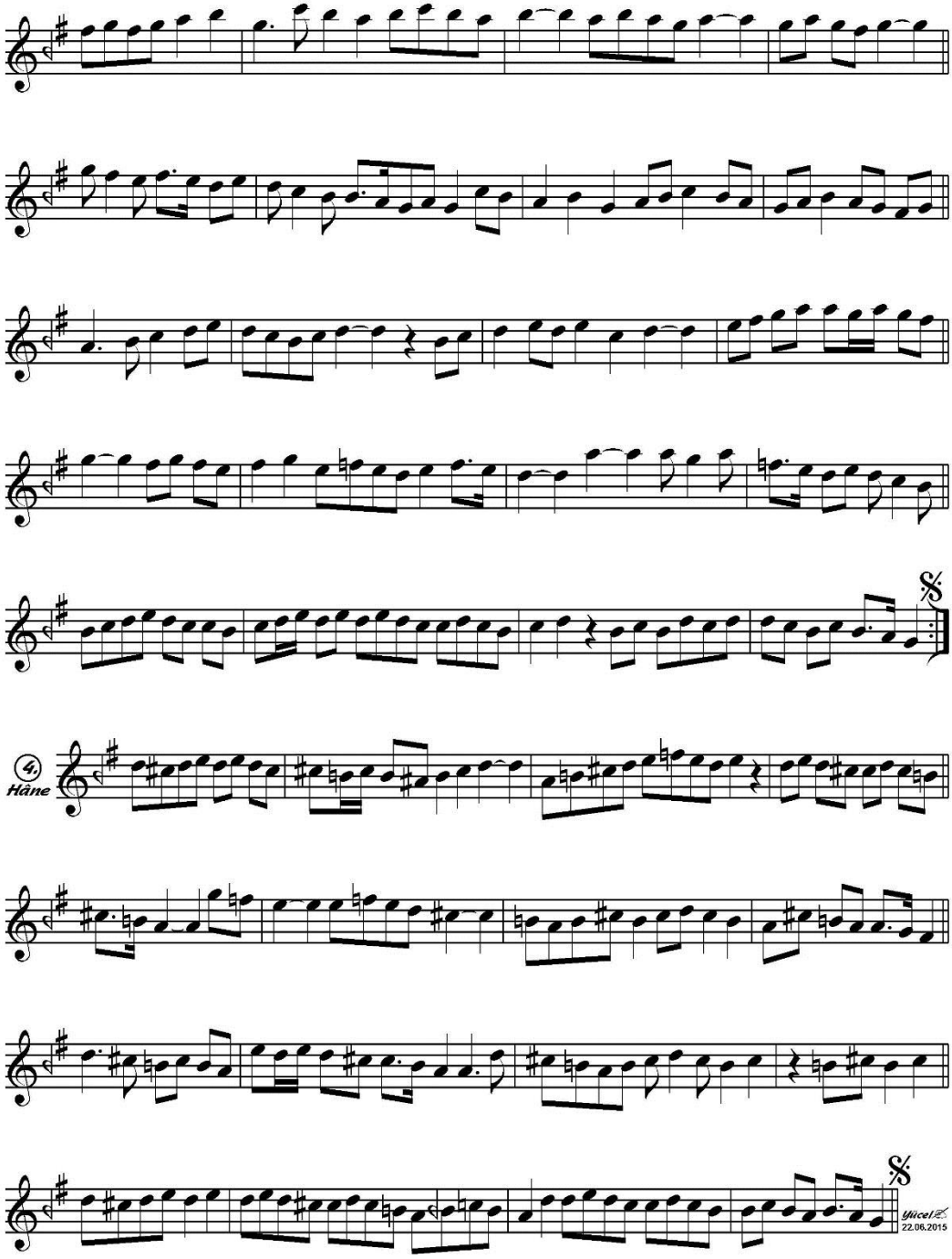

www.neyzen.com
Rast Peşrev
— 1 —
Yücel Müzik
Solak-zâde
(Miskaali Mehmed Hemdemî Çelebi)
(? — 1658)
Fâhte
♩= 92
1.
Hâne
Teslim
3
– Son –
2.
Hâne
3.
Hâne
3

Rast Peşrev

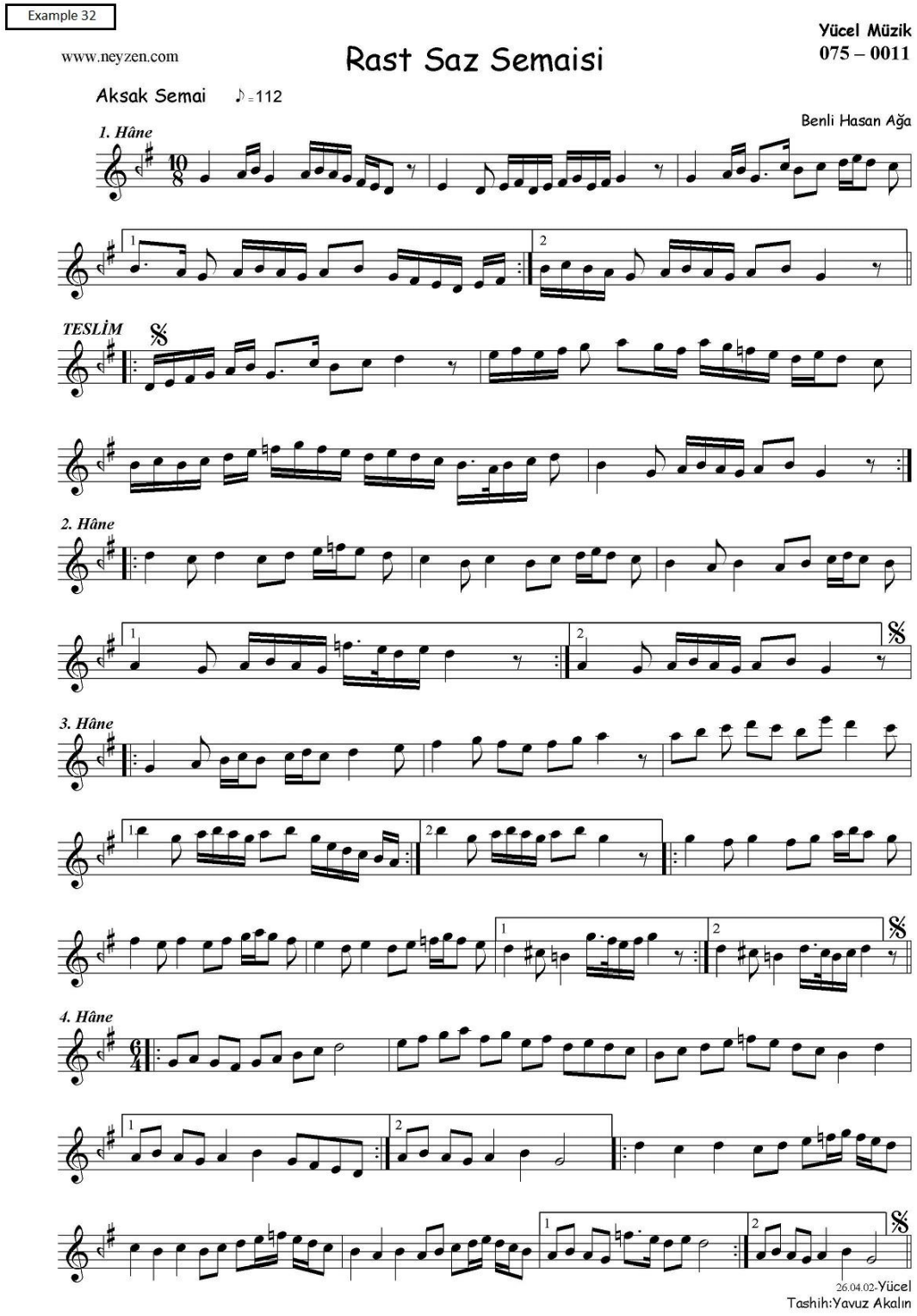
— 2 —

Yücel Müzik

Solak-zâde
(Mıskaalî Mehmed Hemdemî Çelebi)
(? — 1658)



Example 32



Rehavi (33-35 (3),

Example 33

www.neyzen.com

REHÂVÎ

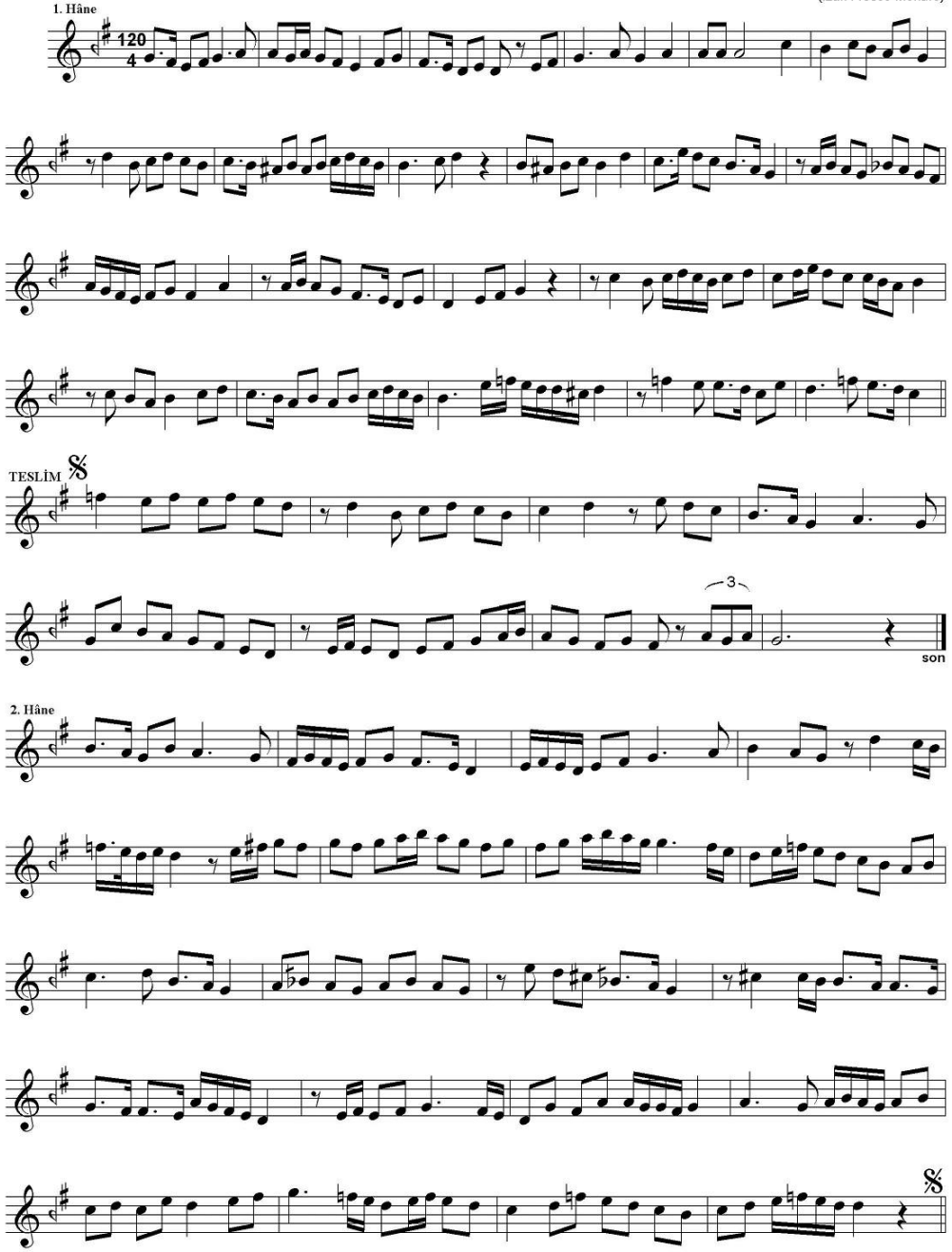
Peşrev - 1

Tolga Göyenç
nota arşivi

Usûlü:Zencir

Beste:Tanburi İsak
(İzak Fresco Monaro)

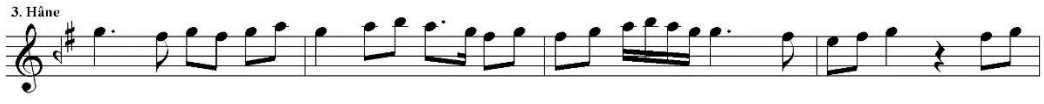
1. Hâne

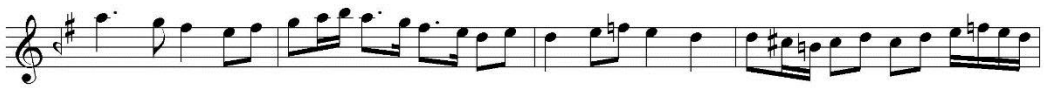


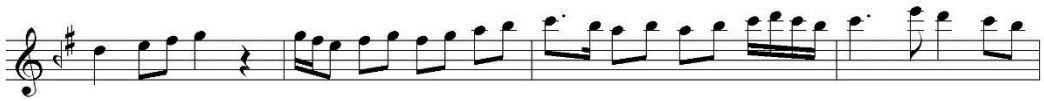
REHÂVÎ

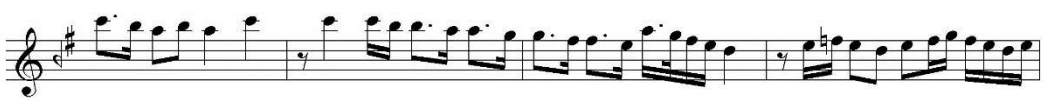
Peşrev - 2

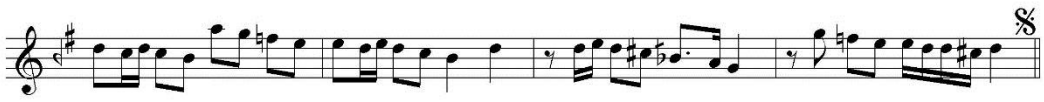
3. Hâne



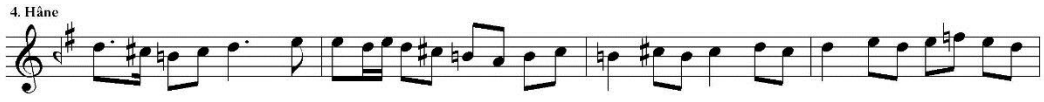


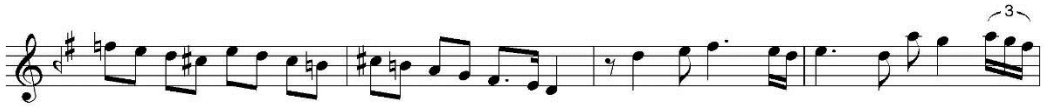


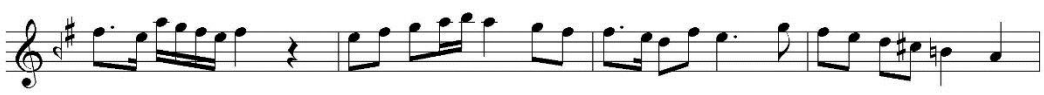


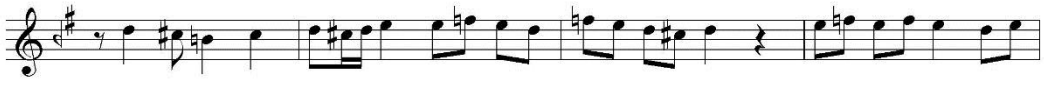


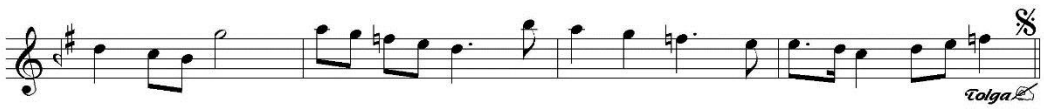
4. Hâne







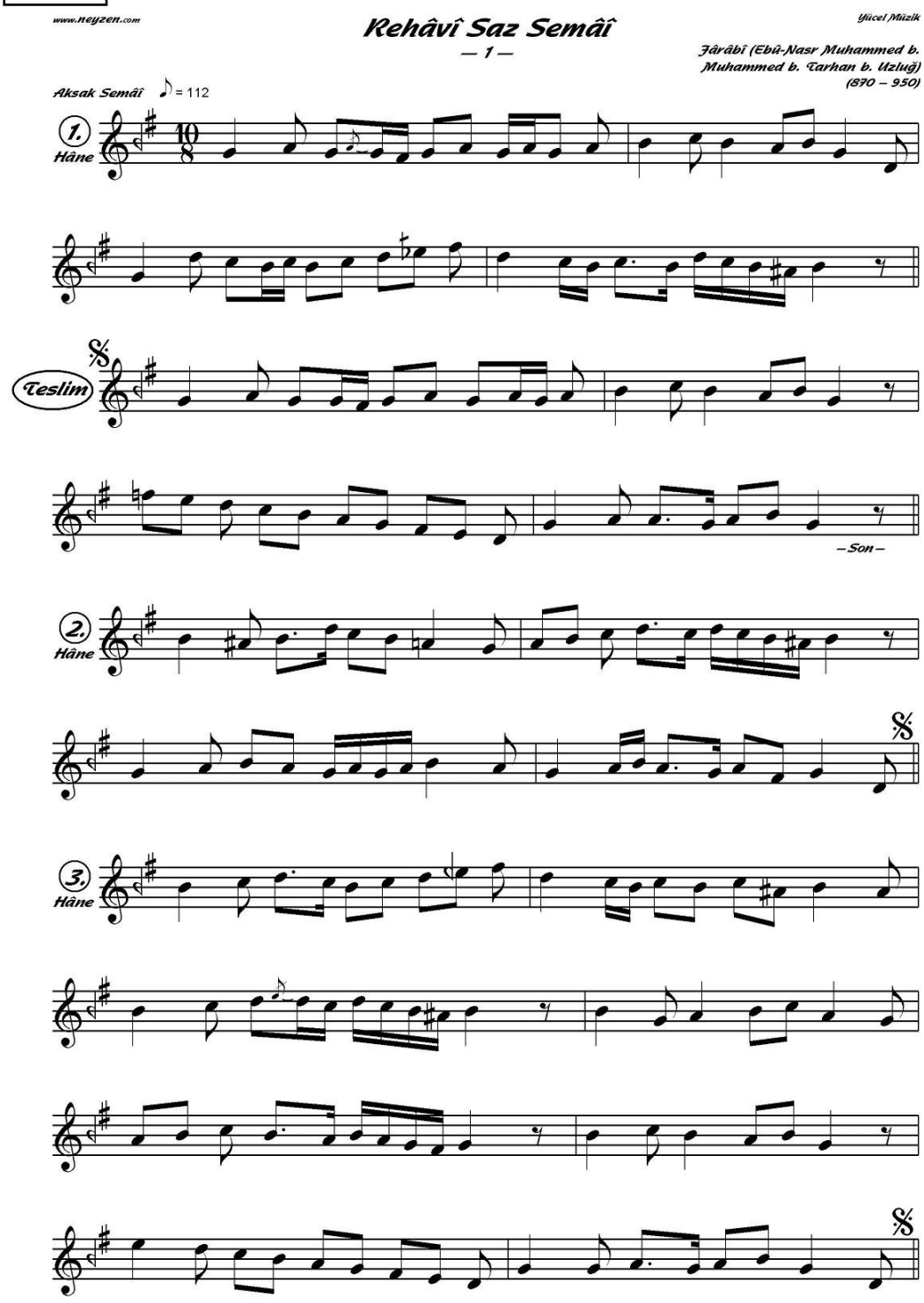




Tolga

02 - 03 - 2009

Example 34


www.neyzen.com
Rehâvî Saz Semâî
— 1 —
Yücel Müzik
Fârâbî (Ebû-Nasr Muhammed b. Muhammed b. Tarhan b. Uzluğ) (870 – 950)
Aksak Semâî
♪ = 112
1.
Hâne
Teslim
– Son –
2.
Hâne
3.
Hâne

Rehâvî Saz Semâî

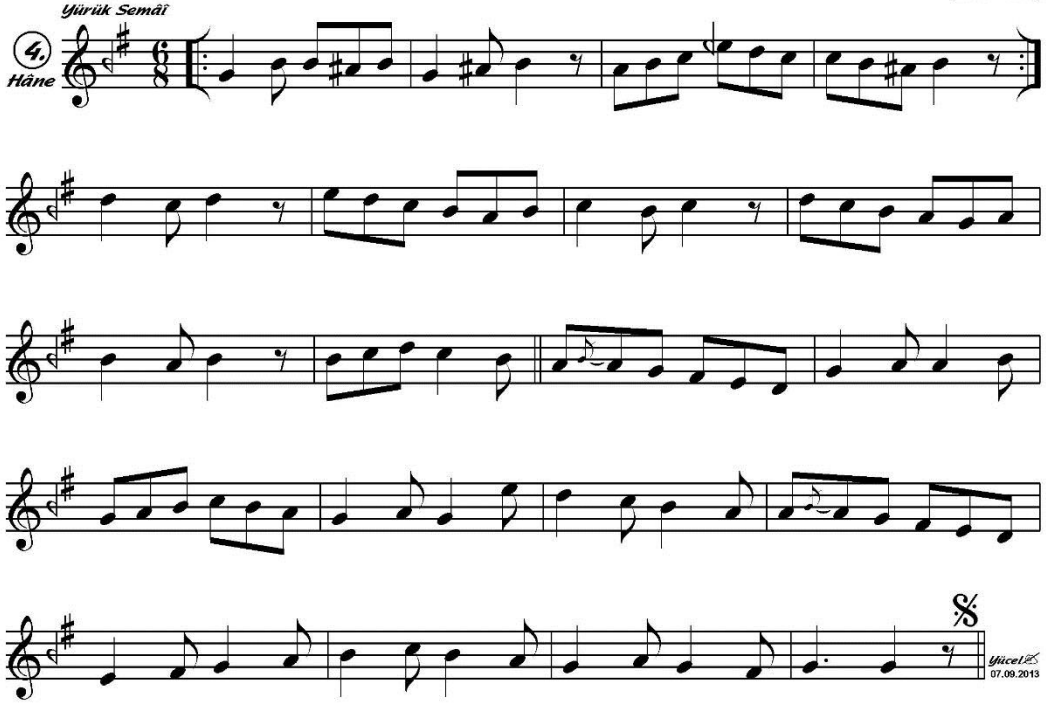
— 2 —

Yücel Müzik

Farâbî (Ebû-Nasr Muhammed b. Muhammed b. Tarhan b. Uzluğ) (870 – 950)

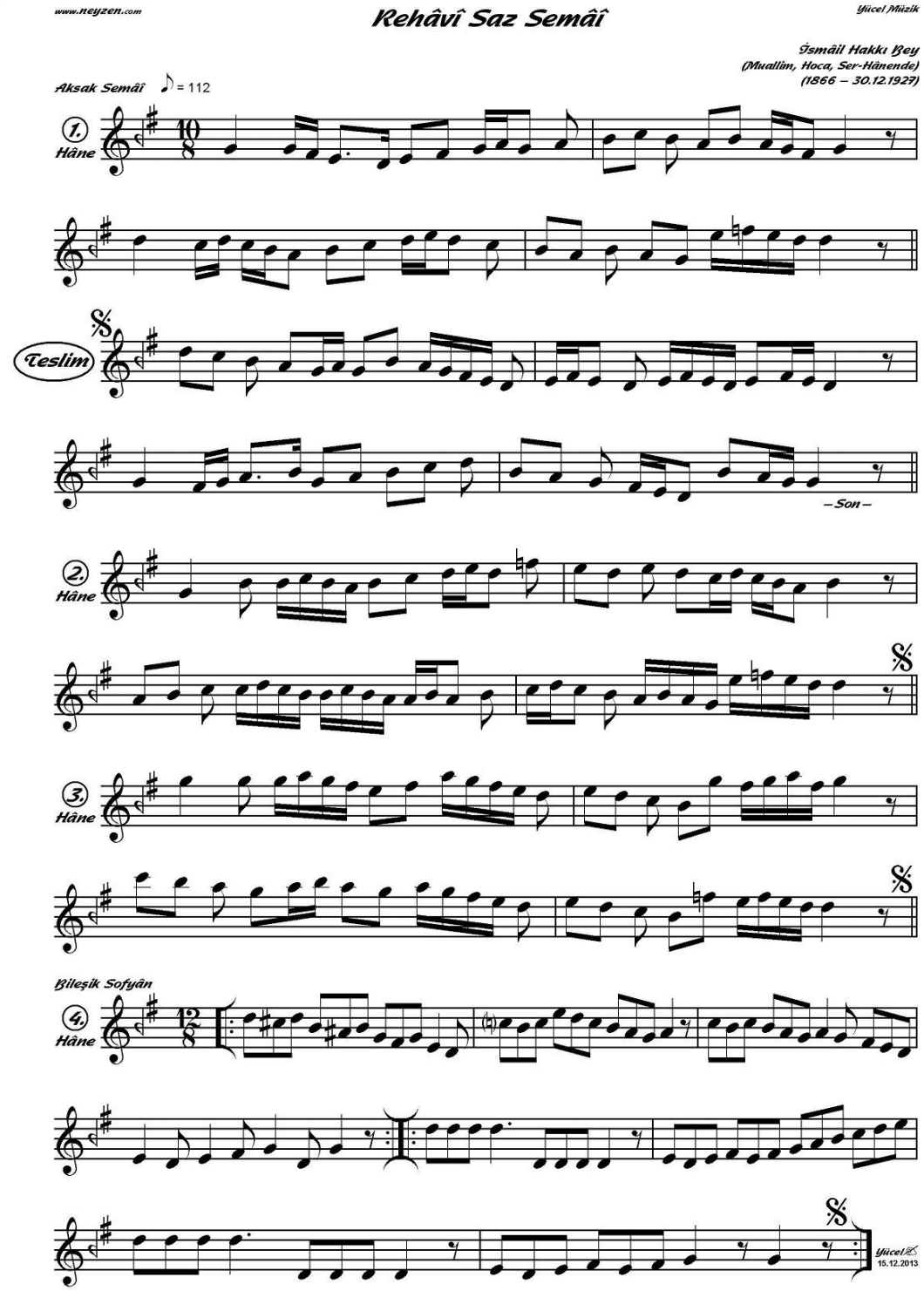
Yürük Semâî

4. Hâne



Kaynak: Neyzen Ulvi Erguner

Example 35



Saba (36-40 (5)

Example 36

www.neyzen.com

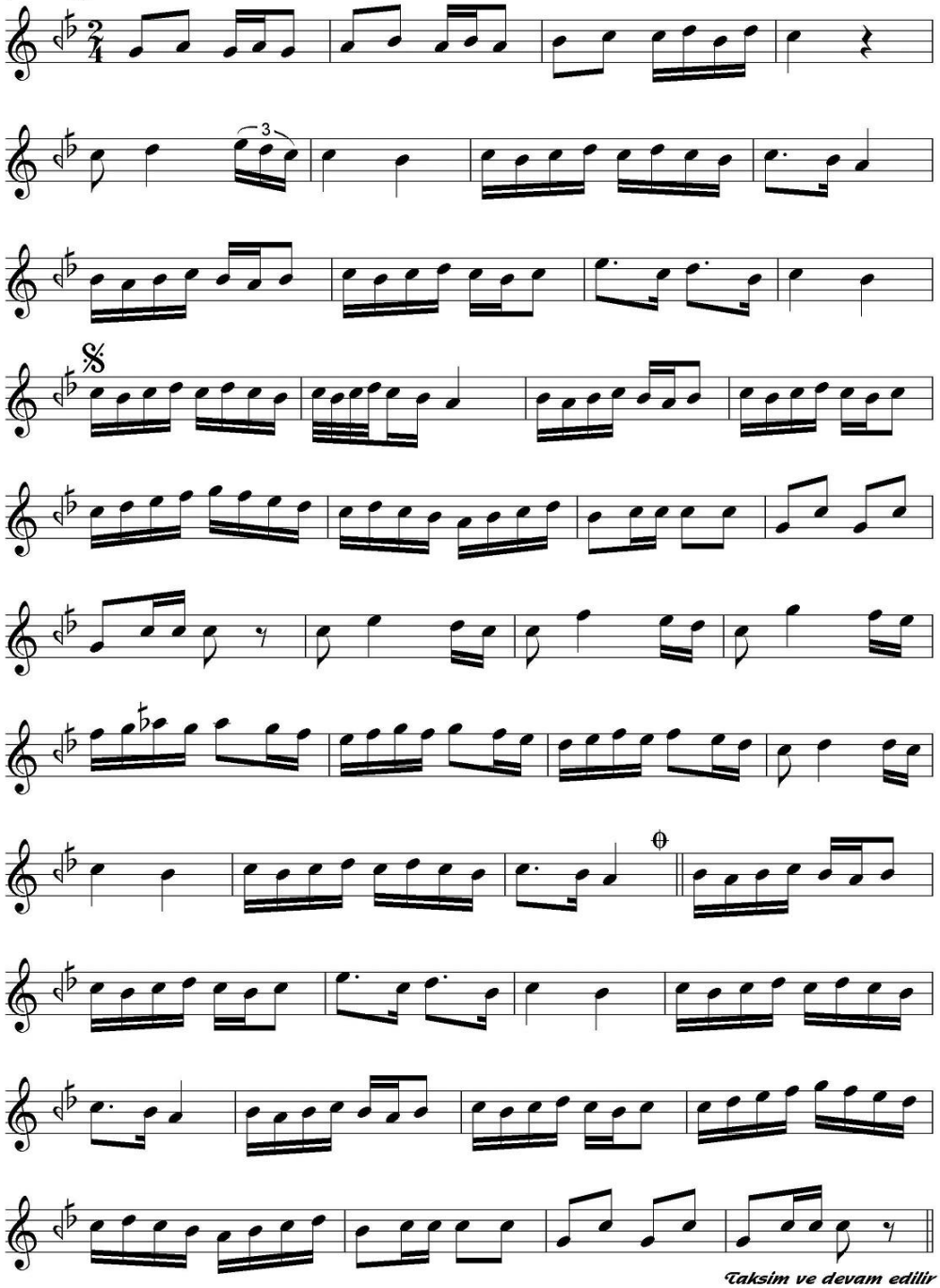
Sabâ Mevlânâ Peşrevi

- 1 -

Yücel Müzik

Nim Sofyân ♩ = 80

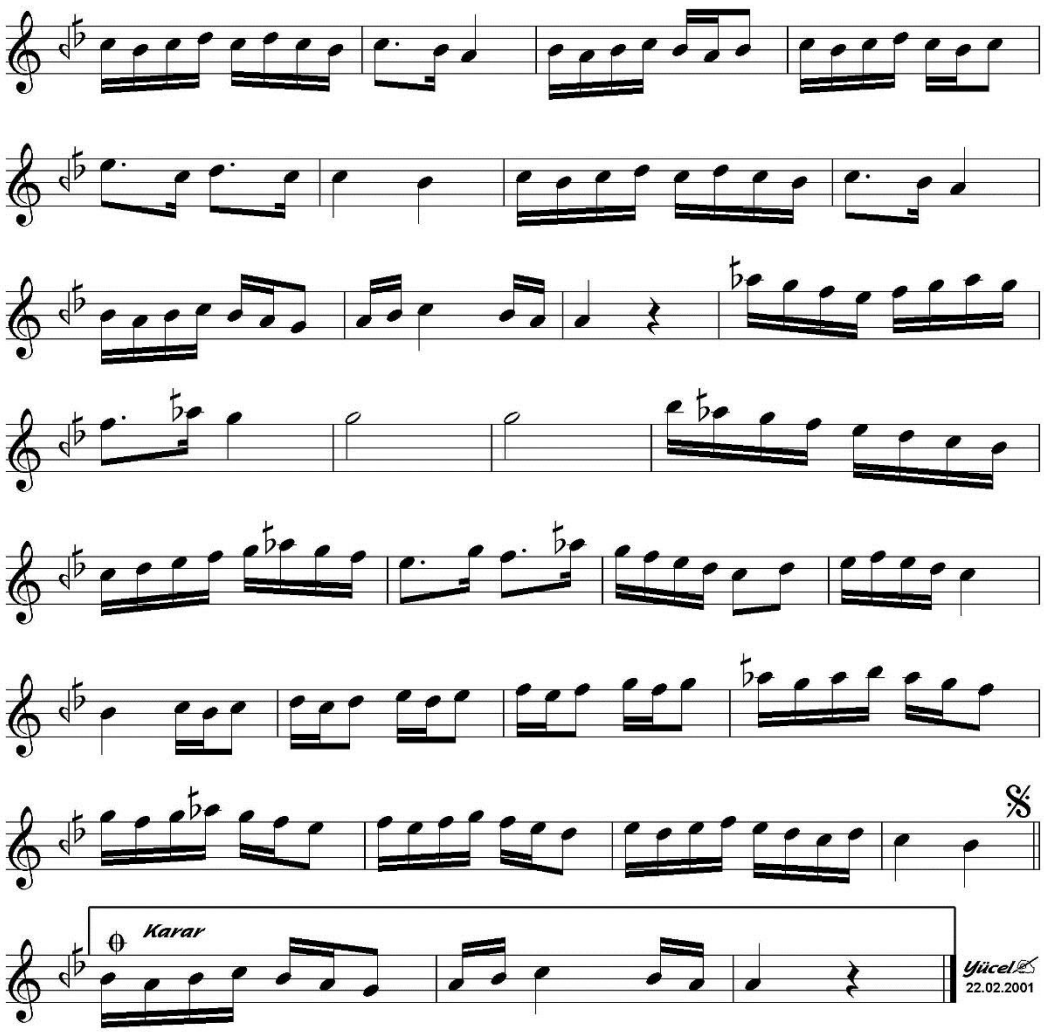
Kemâni Hamza



Sabâ Mevlânâ Peşrevi

- 2 -

Kemâni Hamza



Example 37

www.neyzen.com

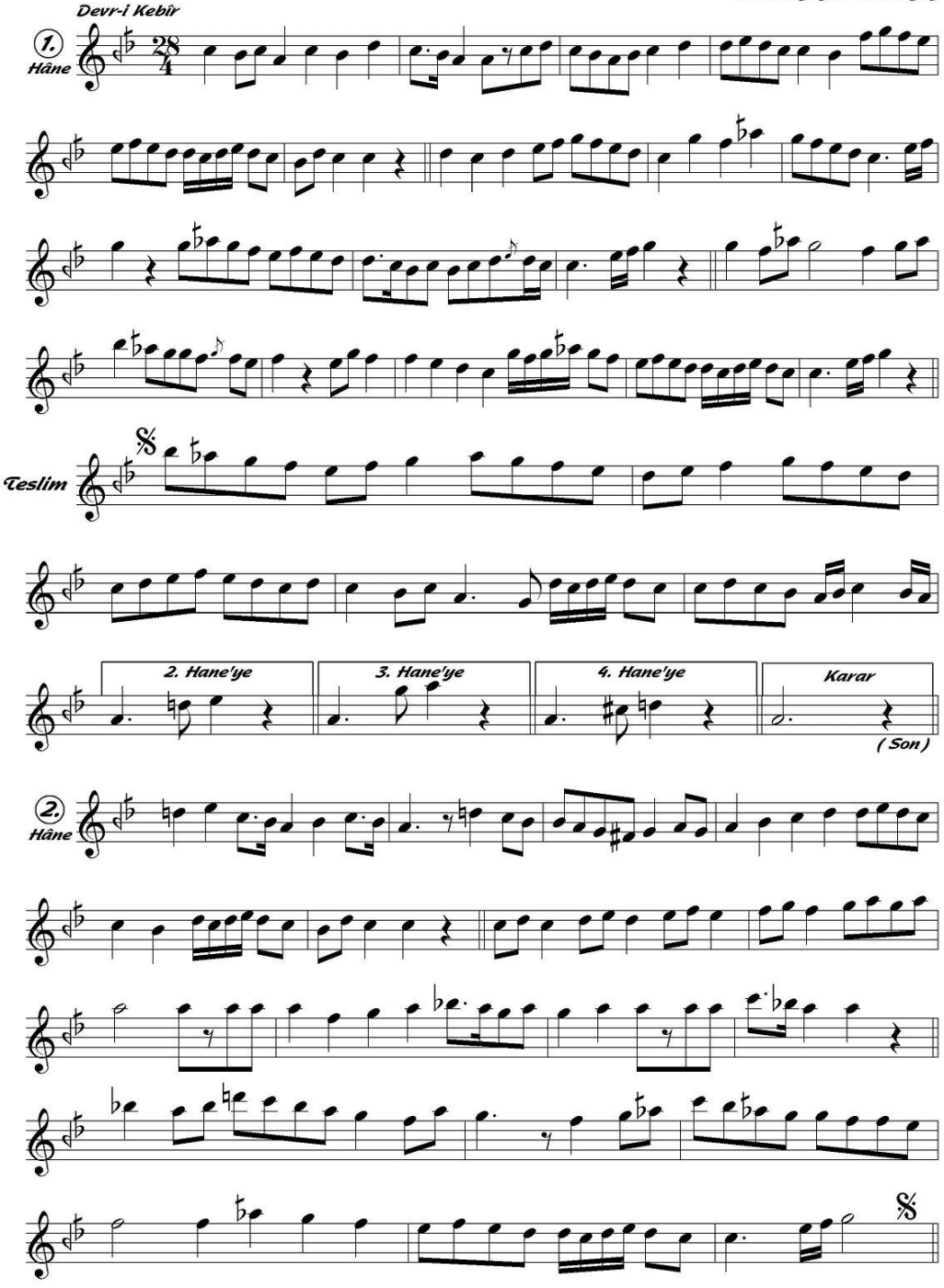
Sabâ Peşrev

- 1 -

Yücel Müzik

Tanburi Büyük Osman Bey

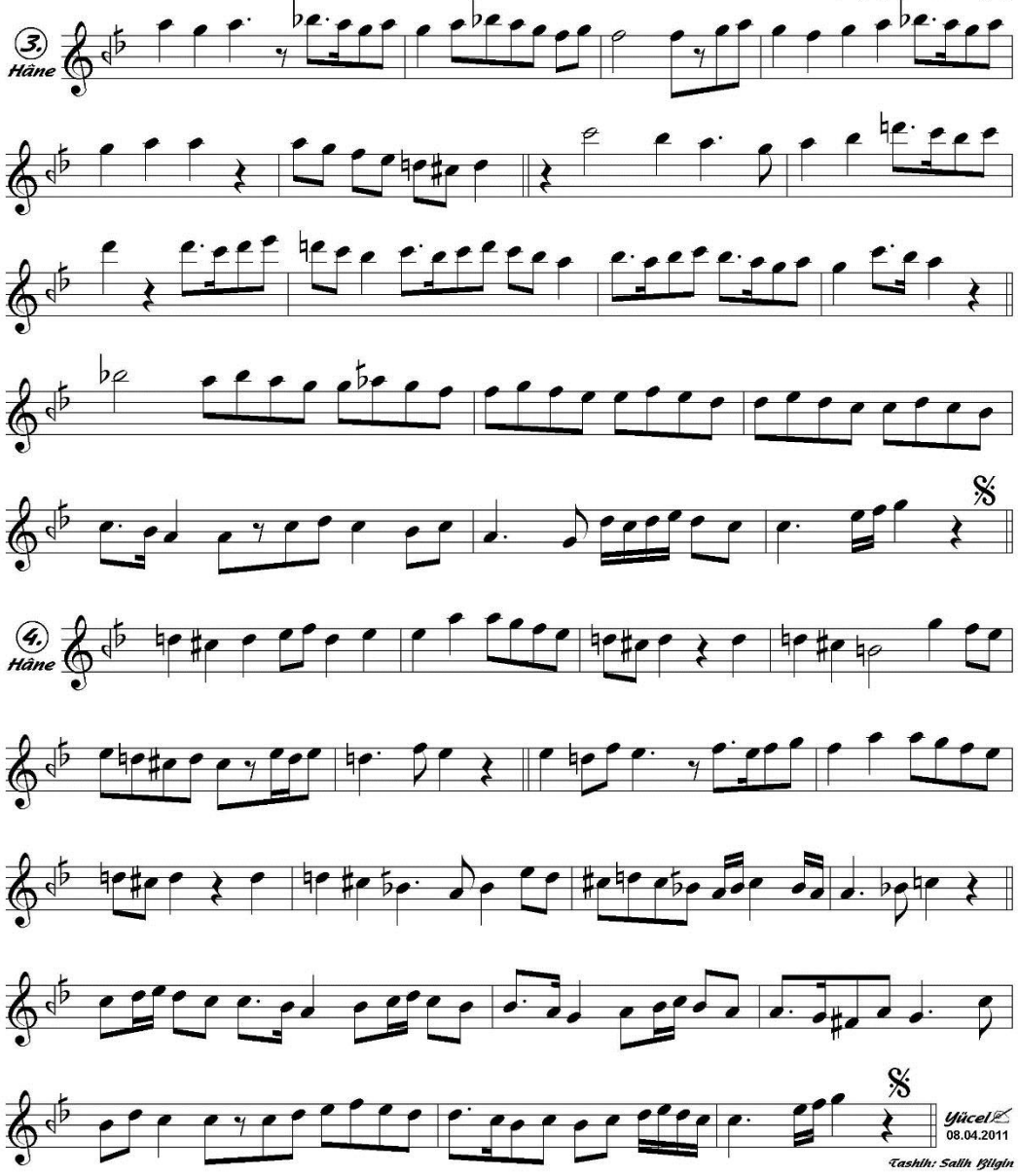
Devr-i Kebîr



Sabâ Peşrev

- 2 -

Tanburi Büyük Osman Bey



Example 38

www.neyzen.com

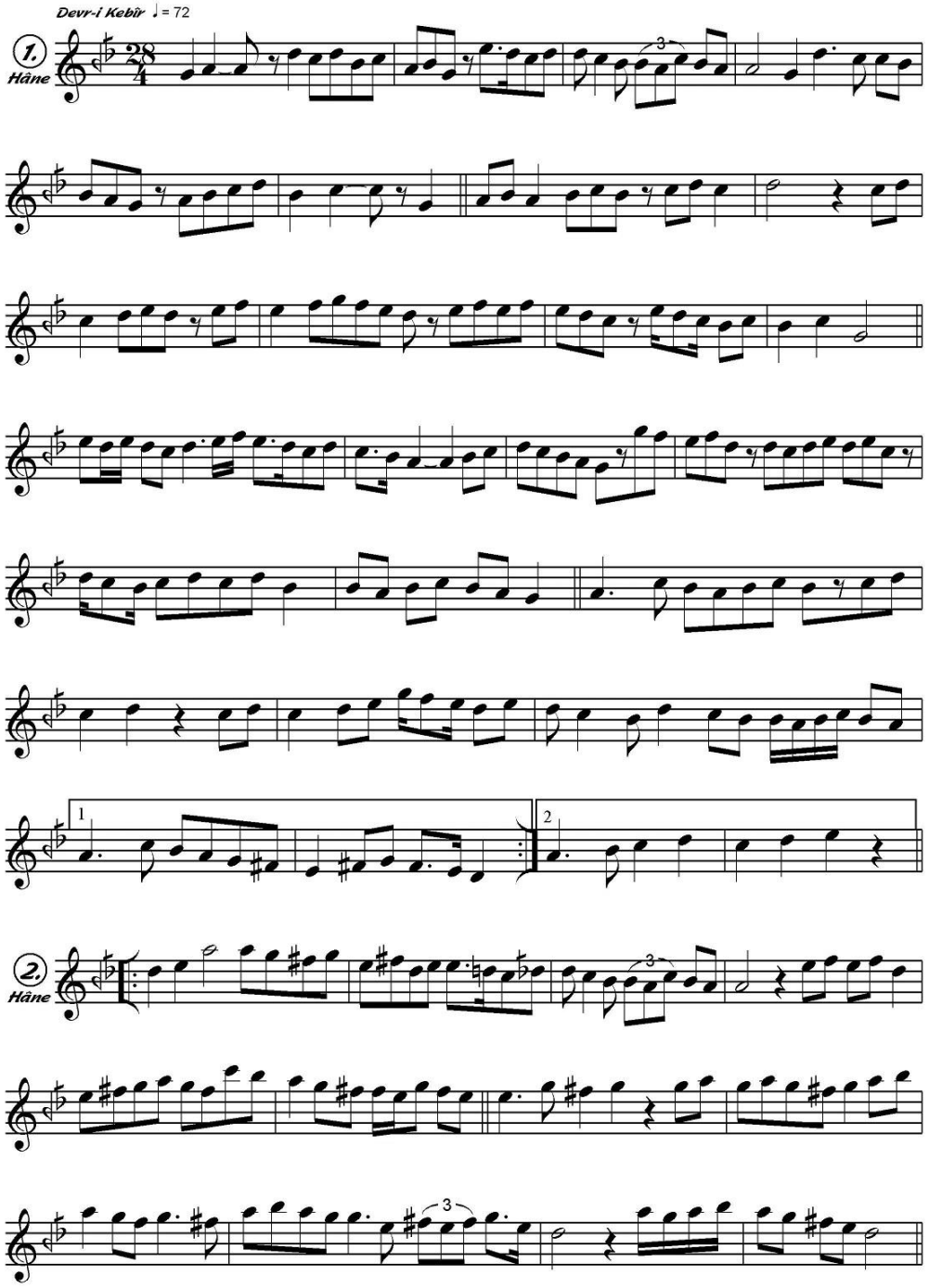
Sabâ Peşrev

- 1 -

Yücel Müzik

Salih Dede (Neyzen)
(1823 – 1886)

Devr-i Kebîr ♩= 72

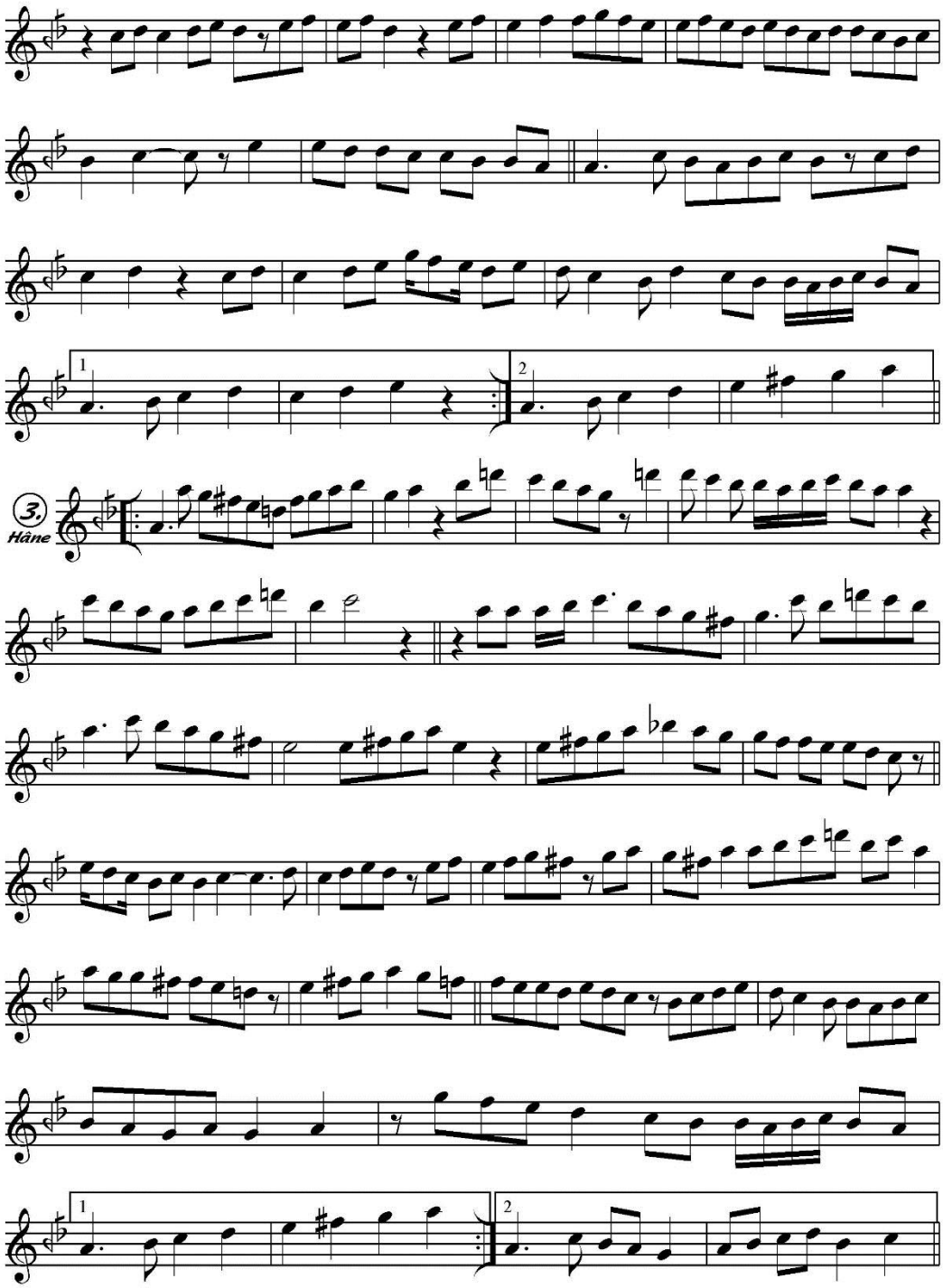


Sabâ Peşrev

- 2 -

Yücel Müzik

Salih Dede (Neyzen)
(1823 – 1886)

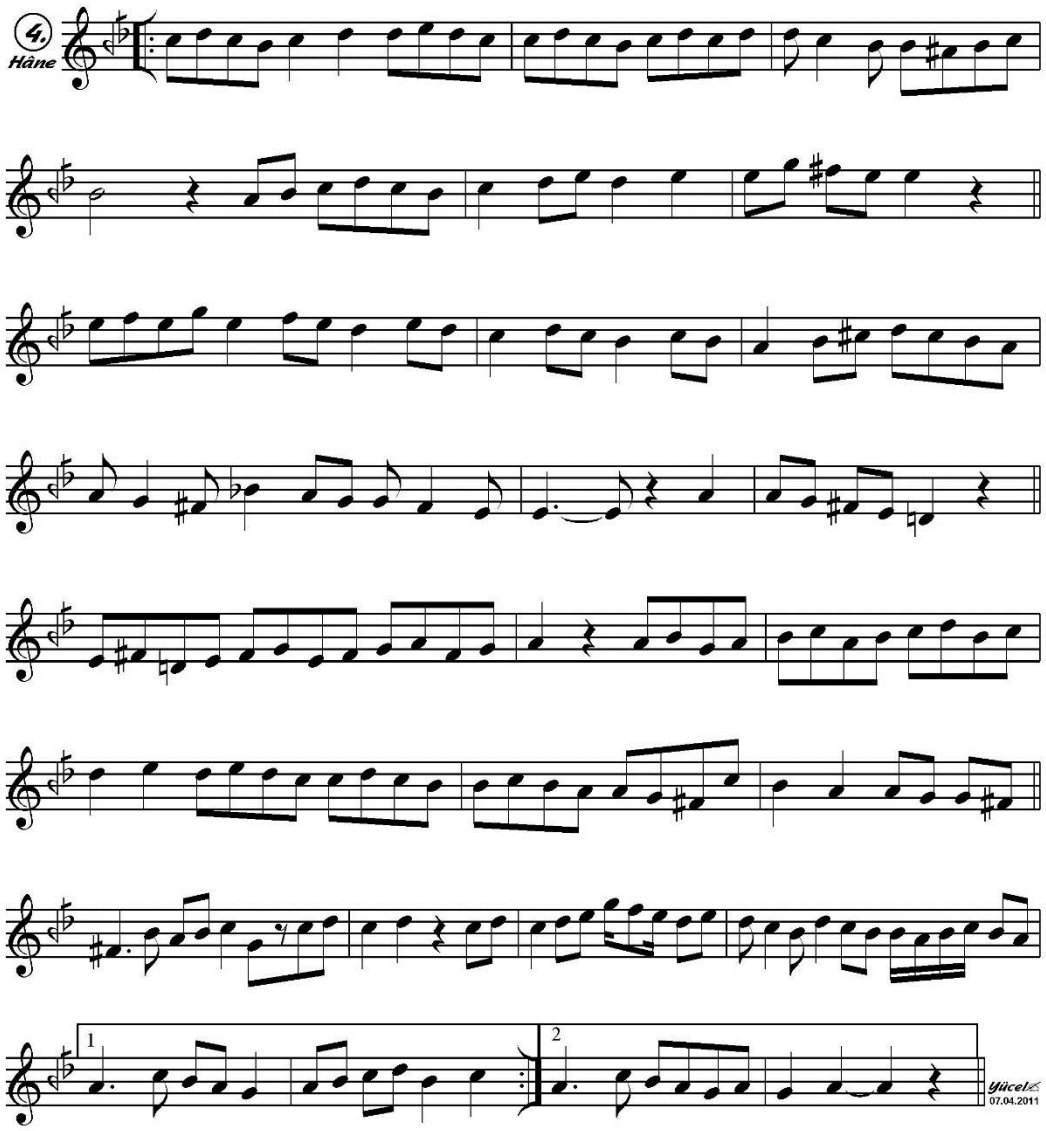


Sabâ Peşrev

- 3 -

Yücel Müzik

Salih Dede (Neyzen)
(1823 – 1886)



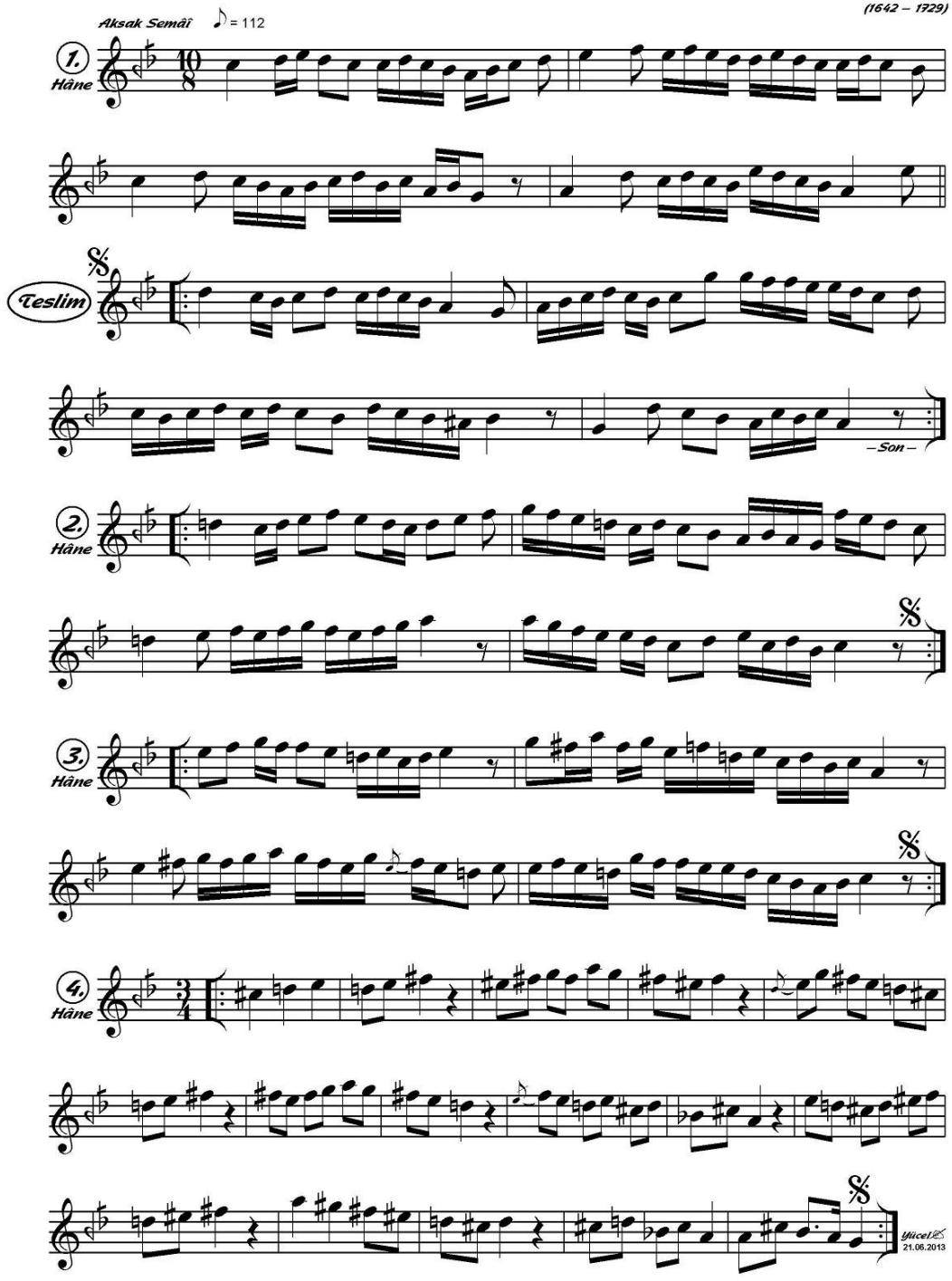
Example 39

www.neyzen.com

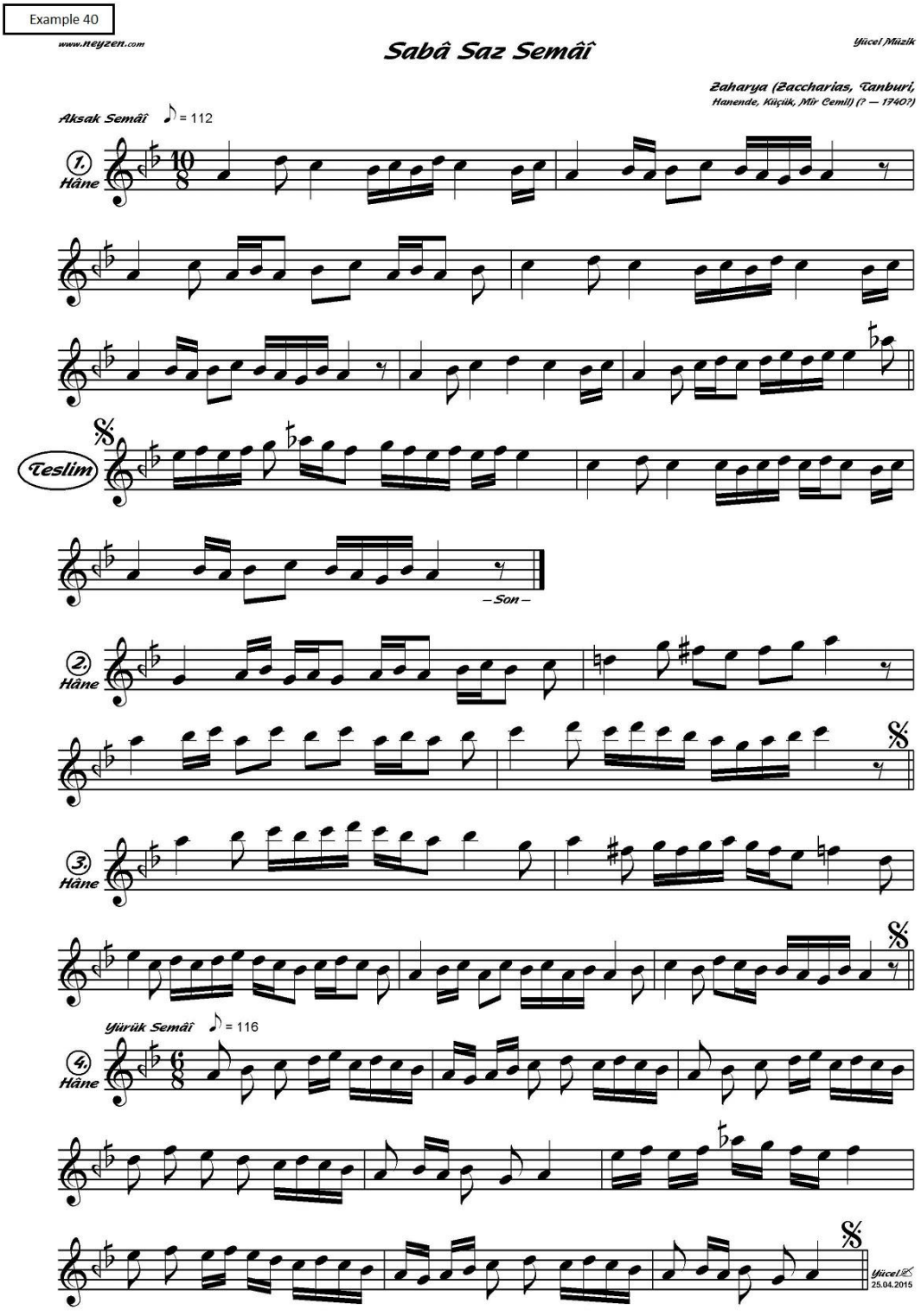
Sabâ Saz Semâî

Yücel Müzik

Osman Dede (Nâyî, Şeyh)
(1642 – 1729)

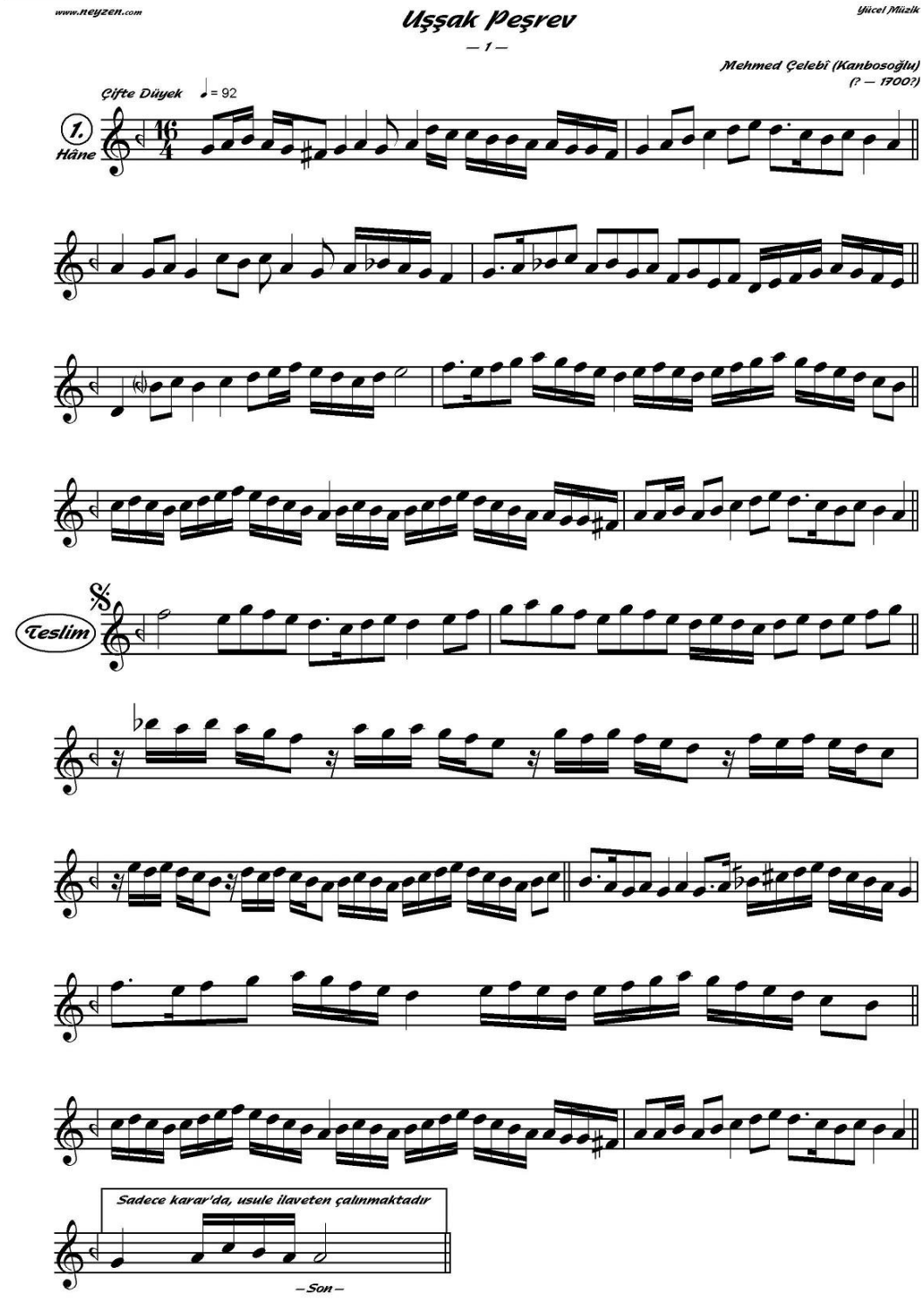


Example 40



Uşşak (41-45 (5)

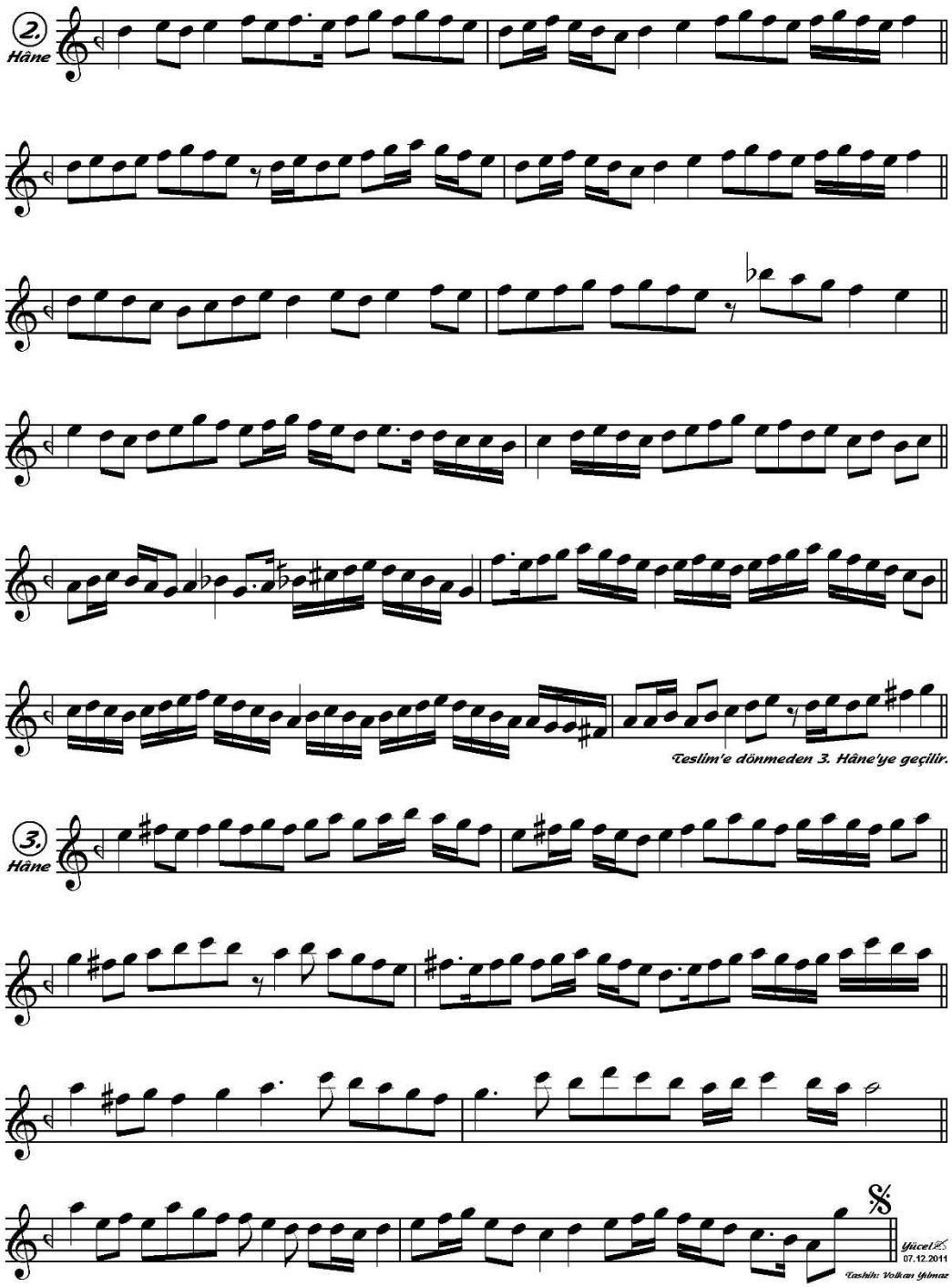
Example 41


www.neyzen.com
Uşşak Peşrev
— 1 —
Yücel Müzik
Mehmed Çelebî (Kanbosoğlu)
(? — 1700?)
Çifte Düyek
♩= 92
1.
Hâne
Teslim
Sadece karar'da, usule ilaveten çalınmaktadır
— Son —

Uşşak Peşrev

— 2 —

Mehmed Çelebî (Kanbosoğlu)
(? — 1700?)



Example 42

www.neyzen.com

Yücel Müzik

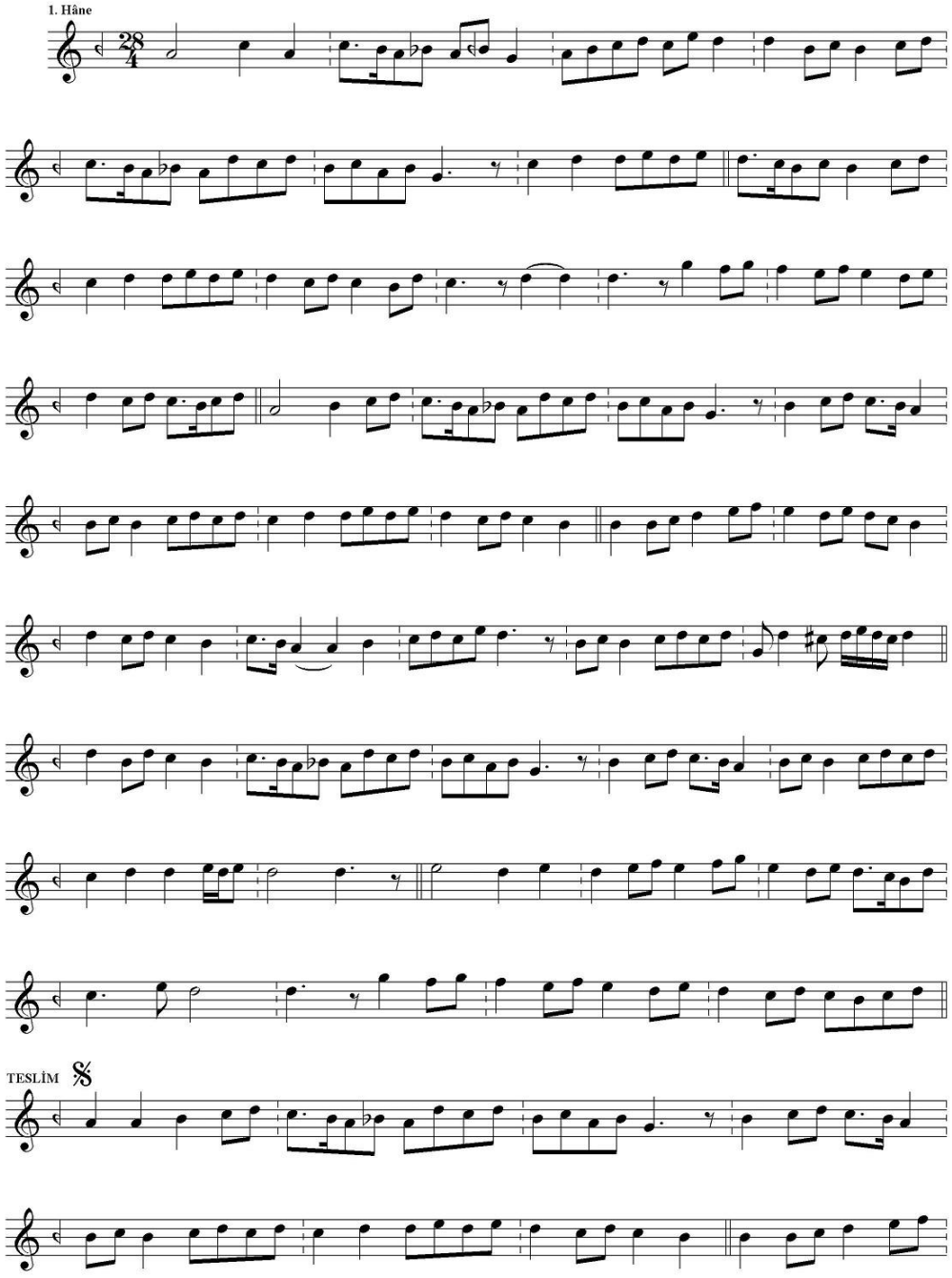
UŞŞAK PEŞREV

- 1 -

Usûlü:Devr-i Kebir

Nayi Osman Dede

1. Hâne

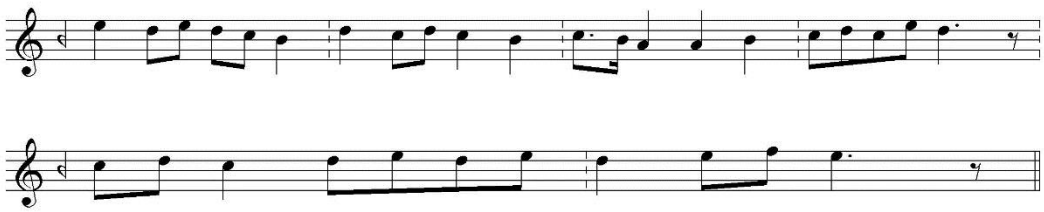


- 1 -

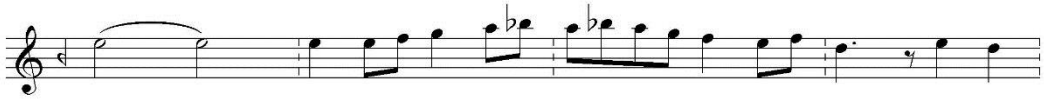
UŞŞAK PEŞREV

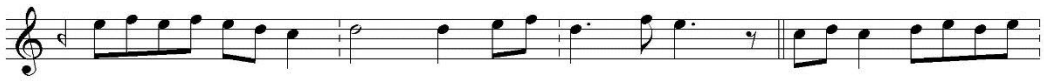
- 2 -

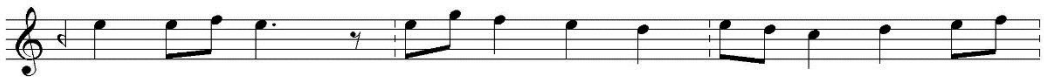
Nayi Osman Dede

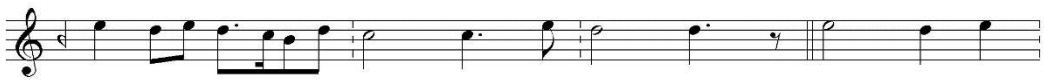


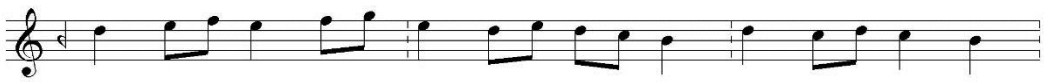
2. Hâne







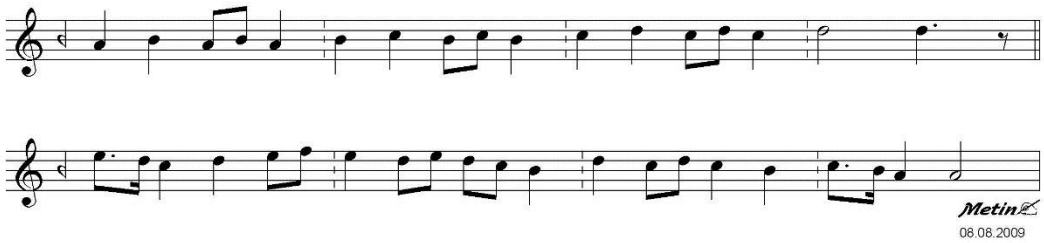




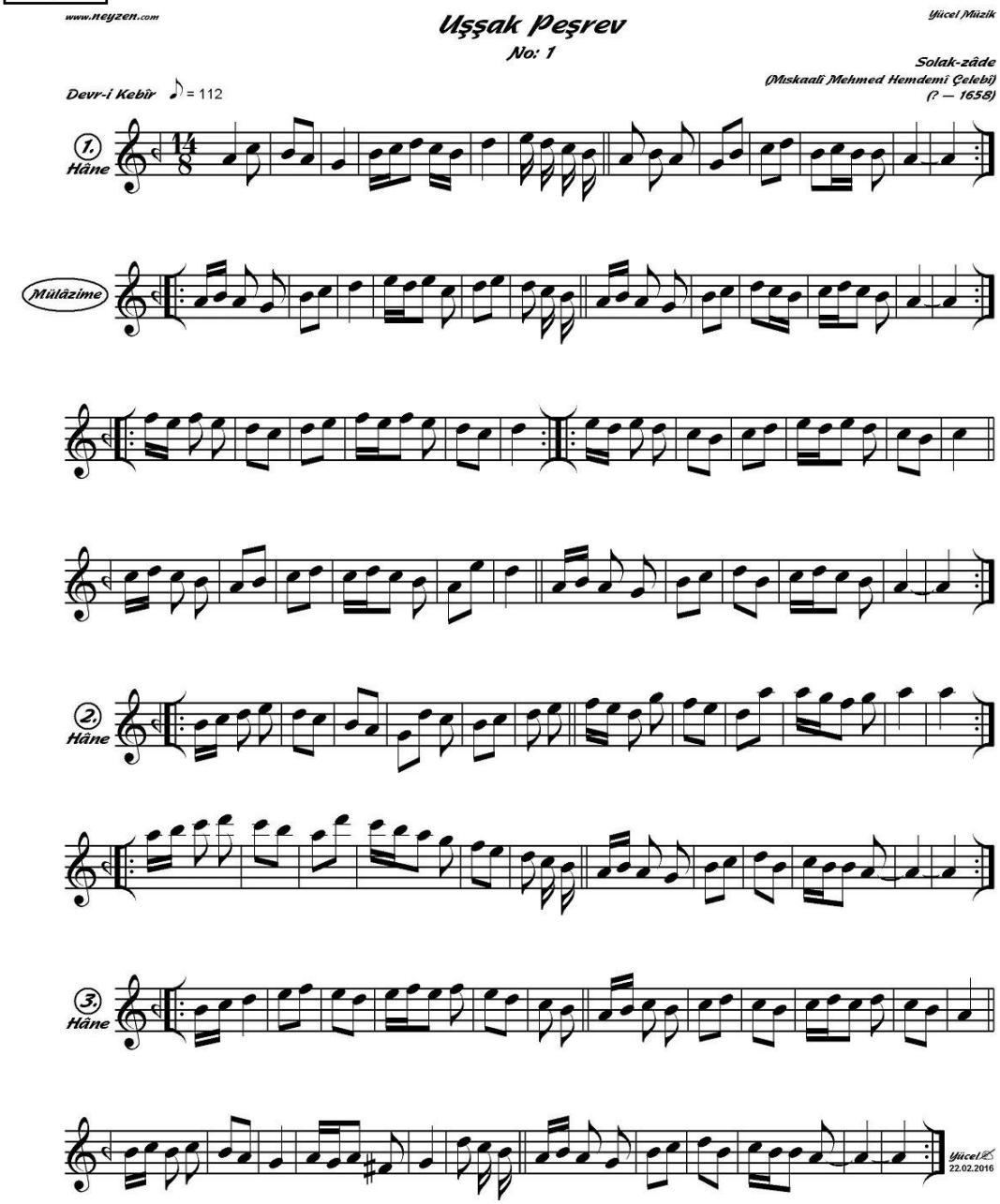
UŞŞAK PEŞREV

- 3 -

Nayi Osman Dede



Example 43


www.neyzen.com
Uşşak Peşrev
No: 1
Yücel Müzik
Solak-zâde
(Miskaalî Mehmed Hemdemî Çelebi)
(? — 1658)
Devr-i Kebîr
= 112
1.
Hâne
Mülâzime
2.
Hâne
3.
Hâne
Yücel
22.02.2016

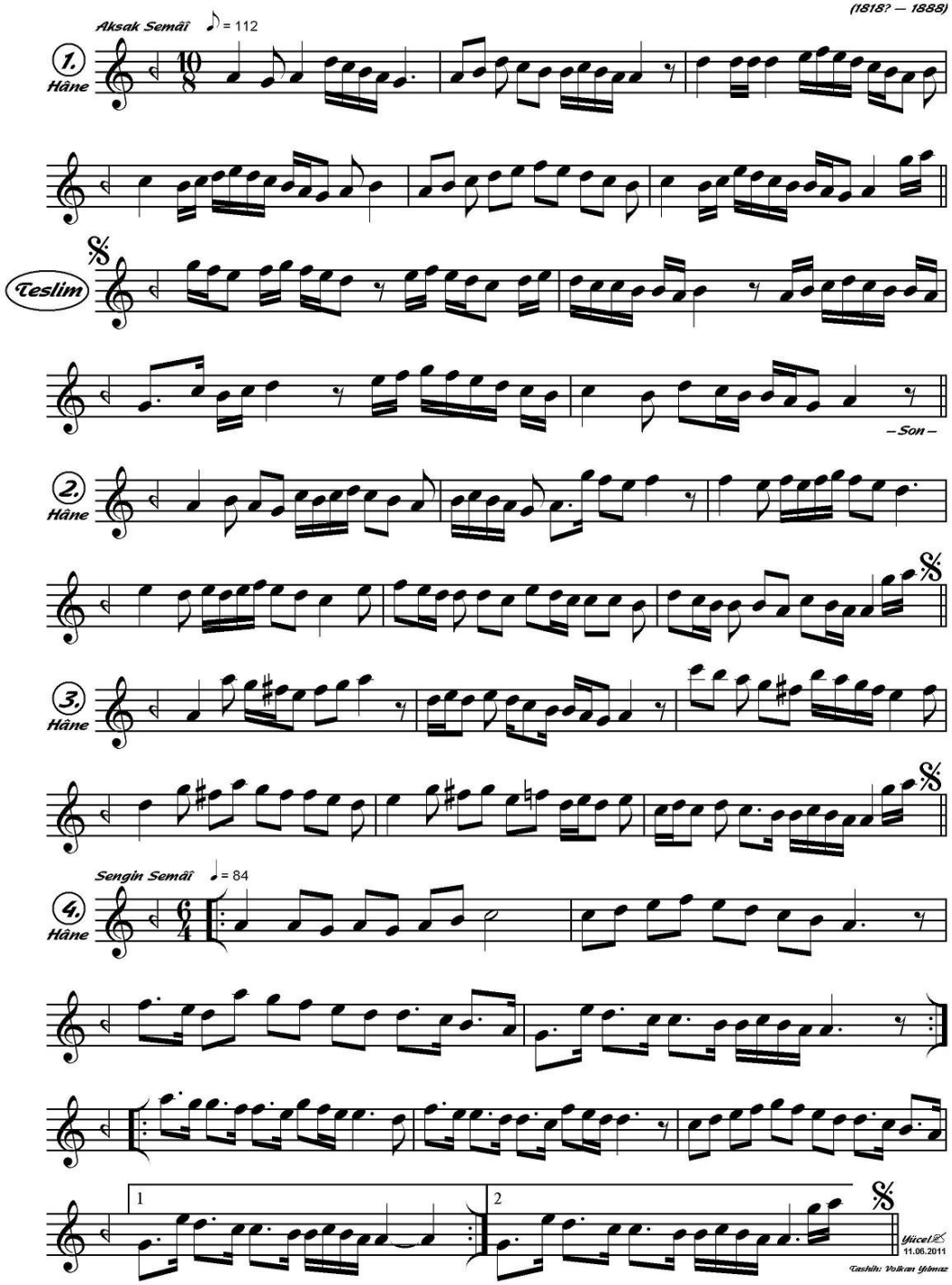
Example 44

www.neyzen.com

Uşşak Saz Semâî

Yücel Müzik

Sâlih Dede (Neyzenbaşı, Kaymakam)
(1818? – 1888)



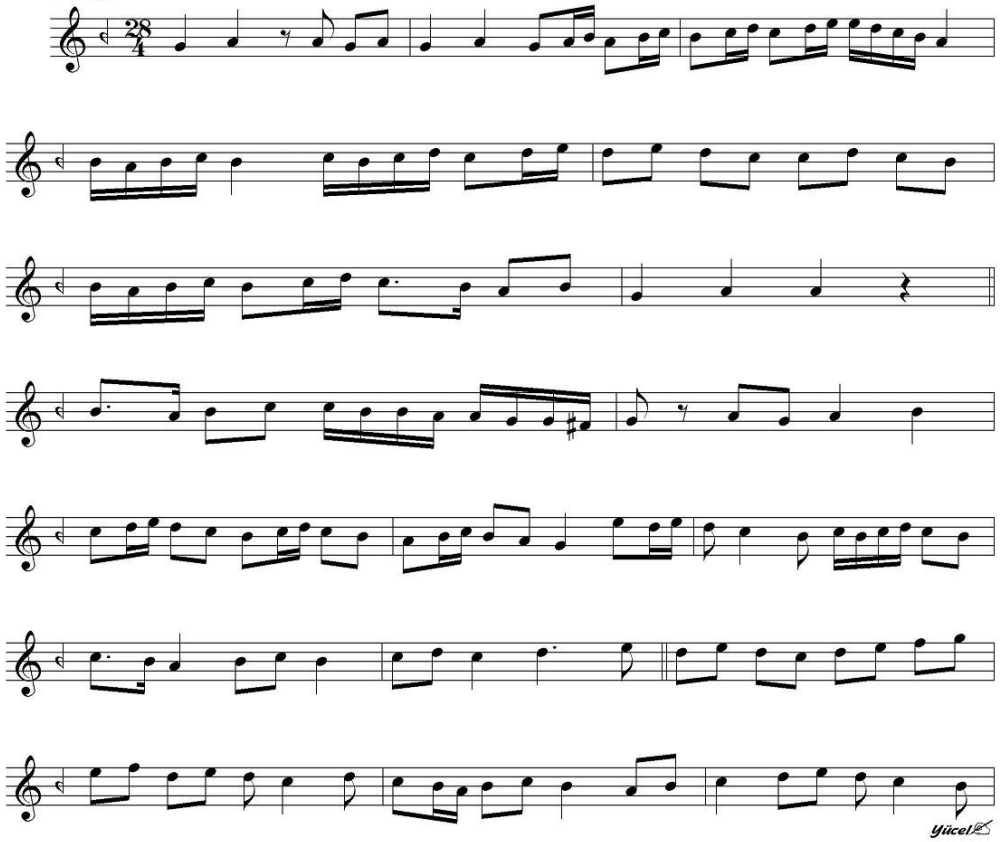
Example 45

UŞŞAK PEŞREV

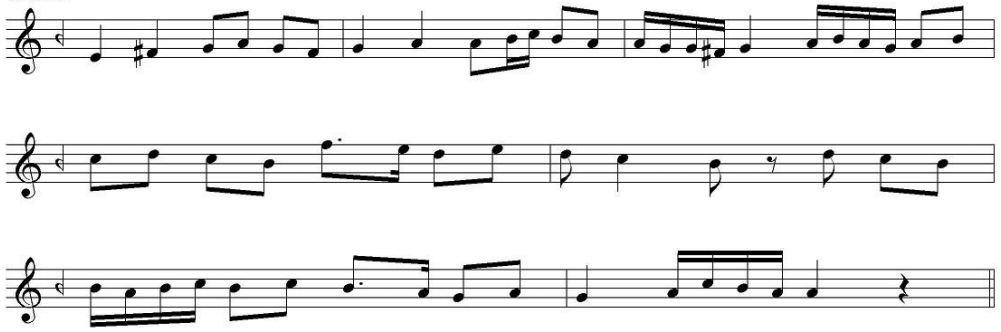
Usûlü: Devr-i Kebir

III. Selim Han

1. Hâne



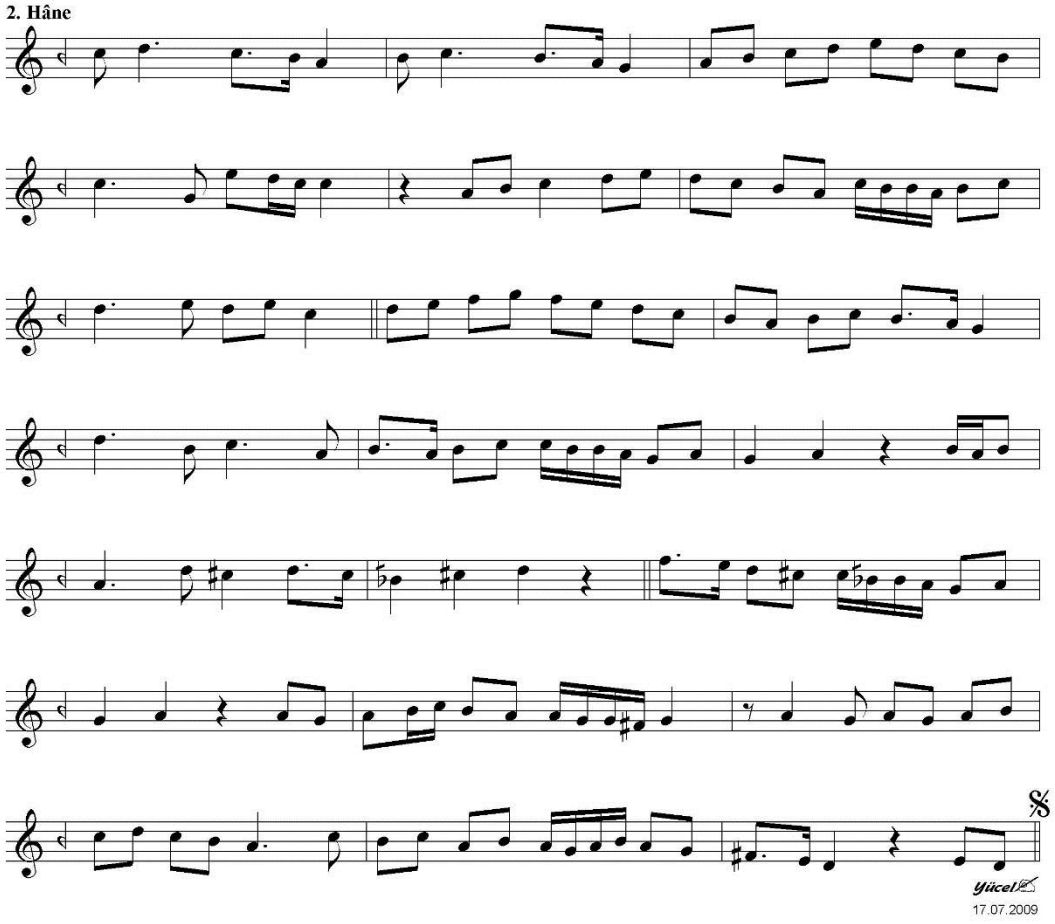
TESLİM



UŞŞAK PEŞREV

III. Selim Han

2. Hâne



APPENDIX II – NOTES COUNTING TABLE

Example 1 Peşrev Buselik (Tanburi Işak)

Range G1-E3 number of bars 100 measure 88/2 ♪

1 HANE 14		TESLIM 6 (x5)		2 HANE 14		3 HANE 14		4 HANE 14		5 HANE		TOTAL100
H2	7			H2	5	H2	33 b3					45
A2	16	A2	6	A2	24	A2	54	A2	2	A2	-	126
G2	11	G2	11	G2	27	G2	46	G2	2 #21	G2	1	142 #4
F#2	14	F#2	8	F#2	18	F#2	#11	F#2	1	F#2	-	73 #11
F2	6	F2	-	F2	11	F2	7	F2	11 #9	F2	5	40 #9
E2	40	E2	7	E2	60	E2	13	E2	65	E2	27	240
D2	38	D2	15	D2	42	D2	27	D2	20 #13 ♭3	D2	26	228 #13
C2	27 #3	C2	10	C2	31	C2	11	C2	39	C2	30	188
H#1	-	H#1	-	H#1	-	H#1	-	H#1	-	H#1	-	-
H 1	26	H 1	8	H 1	15	H 1	4	H 1	15	H 1	17	117
Hb1	-	Hb1	-	Hb1	-	Hb1	-	Hb1	𝅗𝅥 12	Hb1	b21 𝅗𝅥 2	𝅗𝅥 24
A1	43	A1	21	A1	7	A1	1	A1	19	A1	72	247
G1	20 #4	G1	- #3	G1	4	G1	3	G1	4 #2	G1	44	75 #21
F#1	-	F#1	-	F#1	-	F#1	-	F#1	-	F#1		
F1	-	F1	-	F1	-	F1	-	F1	-	F1		
E1	-	E1	-	E1	-	E1	-	E1	-	E1		
D1	-	D1	-	D1	-	D1	-	D1	-	D1		
C1	-	C1	-	C1	-	C1	-	C1	-	C1		
						C3 D3 E3	11 10 1		-			

Example 2 Pesrev Buselik (Bolahenk Nuri Bey)

RANGE D1-D3 number of bars 126 measure 28/4 ♪

1 HANE 21		TESLIM 7 (4x)		2 HANE 21		3 HANE 35		4 HANE 21		TOTAL 126
A2	1	A2	-	A2	1/2	A2	44 ♭2	A2	1 ♭ 3	46 ♭ 8
G2	1	G2	-	G2	13	G2	24 #4	G2	11	49 #4
F#2	-	F#2	-	F#2	14	F#2	12	F#2	5	31
F2	8	F2	-	F2	3	F2	12	F2	12	35
E2	28 ♭ 3	E2	4	E2	33	E2	17	E2	15	109 ♭ 3
D2	40	D2	7	D2	24	D2	16	D2	3 ♭ 16	111 ♭ 16
C2	38	C2	15	C2	8 #4	C2	22	C2	33	161 #4
H#1	-	H#1	-	H#1	♭ 6	H#1	𝅗𝅥 3	H#1	𝅗𝅥 18	𝅗𝅥 21
H 1	14	H 1	10	H 1	4	H 1	-	H 1	-	58
Hb1	-	Hb1	-	Hb1	-	Hb1	2	Hb1	-	-
A1	15	A1	10	A1	7	A1	11	A1	15	88
G1	3	G1	5	G1	12	G1	3	G1	5	43
F#1	-	F#1	-	F#1	4	F#1	-	F#1	9	13
F1	-	F1	-	F1	3	F1	-	F1	-	3
E1	4	E1	-	E1	12	E1	-	E1	1	17
D1	-	D1	-	D1	2	D1	-	D1	2	4
C1	-	C1	-	C1	-	C1	-	C1	-	1 𝅗𝅥 26 ♭ 5
						H2	♭ 5 𝅗𝅥 18		1	♭ 6 𝅗𝅥 18

						C3	34			34
						D3	♭ 10			10

Example 3 Saz semaisi Buselik (Sultan Mahmud I)

RANGE G1-D3 number of bars 56 measure 10/8 𝅘𝅥𝅯

1 HANE 6		TESLIM 8 (x4)		2 HANE 4		3 HANE 6		4 HANE 8		TOTAL 56
A2	4	A2	-	A2	-	A2	20	A2	-	24
G2	6	G2	-	G2	-	G2	12	G2	-	18
F#2	4	F#2	-	F#2	-	F#2	12	F#2	-	16
F2	4	F2	-	F2	-	F2	2	F2	2	8
E2	24	E2	14	E2	6	E2	21	E2	11	118
D2	22	D2	22	D2	10	D2	9	D2	13	142
C2	26	C2	36	C2	12	C2	12	C2	29	228
H#1	-	H#1	-	H#1	-	H#1	-	H#1	-	-
H 1	14	H 1	22	H 1	16	H 1	6	H 1	17	141
Hb1	-	Hb1	-	Hb1	-	Hb1	-	Hb1	-	-
A1	8	A1	36	A1	17	A1	3	A1	17	289
G1	2	G1	24 #2	G1	6	G1	4	G1	#6	108 #14
F#1	-	F#1	-	F#1	-	F#1	-	F#1	-	-
F1	-	F1	-	F1	-	F1	-	F1	-	-
E1	-	E1	-	E1	-	E1	-	E1	-	-
D1	-	D1	-	D1	-	D1	-	D1	-	-
C1	-	C1	-	C1	-	C1	-	C1	-	-
						H2	9			31
						C2	3			3
						D3	1			1

Example 4 Saz semaisi Buselik (Ismail Hakki)

RANGE E1-C3 number of bars 58 measure 10/8 𝅘𝅥𝅯

1 HANE 4		TESLIM 8 (x4)		2 HANE 4		3 HANE 4		4 HANE 14		TOTAL 58
A2	-	A2	4	A2	11	A2	17	A2	2	46
G2	-	G2	6	G2	14	G2	13 #3	G2	- #10	51 #13
F#2	-	F#2	10	F#2	14 #2	F#2	10	F#2	- „16	64 #18
F2	2	F2	4	F2	-	F2	1	F2	4	23
E2	4	E2	26 ♭ 2	E2	27	E2	17	E2	90	242
D2	13	D2	20	D2	2 #3	D2	5	D2	48 #24	148 #27
C2	24	C2	30	C2	-	C2	- #2	C2	52	196 #2
H#1	-	H#1	-	H#1	-	H#1	♭ 1	H#1	-	81
H 1	13	H 1	17	H 1	-	H 1	-	H 1	22	103
Hb1	-	Hb1	-	Hb1	-	Hb1	-	Hb1	-	-
A1	11	A1	11	A1	-	A1	2	A1	24	81
G1	10	G1	12 #2	G1	-	G1	-	G1	8 #8	66 #16
F#1	1	F#1	6	F#1	-	F#1	-	F#1	-	25
F1	-	F1	-	F1	-	F1	-	F1	2	2
E1	-	E1	-	E1	-	E1	-	E1	4	4
D1	-	D1	-	D1	-	D1	-	D1	-	-
C1	-	C1	-	C1	-	C1	-	C1	-	-
				H2	𝅗𝅥 2	H2	𝅗𝅥 3			5
						C3	1			1

Example 5 Peşrev Buzurk (Ismet Aga)

RANGE F1-A2 number of bars 100 measure 24/4 ♪

1 HANE 10		TESLIM 20 (x3)		2 HANE 10		3 HANE 10		4 HANE 10		TOTAL 100
A2	9	A2	1	A2	7	A2	18	A2	1	38
G2	17	G2	3	G2	18	G2	17	G2	2	63
F#2	13	F#2	-	F#2	9	F#2	12	F#2	2	36
F2	2	F2	5	F2	9	F2	-	F2	7	33
E2	22	E2	10	E2	18	E2	11	E2	9	90
D2	10	D2	15	D2	10	D2	4	D2	14	83
C2	6 #1	C2	13	C2	4	C2	2	C2	16 #1	67 #2
H#1	2	H#1	10	H#1	4	H#1	-	H#1	8	44
H 1	3	H 1	1	H 1	-	H 1	1	H 1	2	9
Hb1	-	Hb1	-	Hb1	-	Hb1	-	Hb1	-	-
A1	2 #2	A1	13	A1	2	A1	1	A1	-	44 #2
G1	-	G1	14	G1	-	G1	-	G1	-	42
F#1	-	F#1	6	F#1	-	F#1	-	F#1	-	18
F1	-	F1	3	F1	-	F1	-	F1	-	9
E1	-	E1	-	E1	-	E1	-	E1	-	-
D1	-	D1	-	D1	-	D1	-	D1	-	-
C1	-	C1	-	C1	-	C1	-	C1	-	-

Example 6 Peşrev Buzurk (Nayi Osman Dede)

RANGE E1-D3 number of bars 108 measure 32/4 ♪

1 HANE 16		2 HANE 28		3 HANE 32		4 HANE 32		TOTAL 108
A2	2	A2	6	A2	33	A2	3	44
G2	6	G2	23	G2	28	G2	9	66
F#2	2	F#2	21	F#2	28	F#2	9	60
F2	9	F2	1	F2	-	F2	2	12
E2	20	E2	33	E2	23	E2	29	105
D2	16	D2	34	D2	15	D2	52	117
C2	18	C2	42 c#1	C2	15	C2	41 #5	116
H#1	-	H#1	-	H#1	-	H#1	-	-
H 1	12	H 1	20	H 1	12	H 1	23	67
Hb1	-	Hb1	-	Hb1	-	Hb1	-	-
A1	12	A1	24	A1	10	A1	19	65
G1	8 3	G1	9 G#5	G1	10 G#3	G1	12 #3	39 #14
F#1	4	F#1	4	F#1	4	F#1	#5	#17
F1	-	F1	-	F1	-	F1	1	1
E1	3	E1	3	E1	3	E1	3	12
D1	-	D1	-	D1	-	D1	-	-
C1	-	C1	-	C1	-	C1	-	-
				Hb2	24			24
				C3	20			20
				D3	4			4

Example 7 Saz Semaisi Buzurk (Sultan Selim 3 Han)

RANGE G1-A2 (E1-E2) number of bars 42 measure 10/8 (6/8) ♪

1 HANE 4		TESLIM 4		2 HANE 4		3 HANE 4		4 HANE 26		TOTAL 42
A2	1/2	A2	1	A2	1/2	A2	8	A2	14	27
G2	3	G2	2	G2	4	G2	6	G2	22	37
F#2	2	F#2	5	F#2	4	F#2	3	F#2	22	36
F2	1	F2	1	F2	-	F2	-	F2	-	2
E2	12	E2	7	E2	11	E2	6	E2	25	61
D2	9	D2	6	D2	12	D2	3	D2	24	54
C2	8	C2	4 #1	C2	5	C2	1/2	C2	31	48
H#1	-	H#1	-	H#1	-	H#1	-	H#1	-	-
H 1	1	H 1	4	H 1	1	H 1	-	H 1	13	19
Hb1	-	Hb1	-	Hb1	-	Hb1	-	Hb1	-	-
A1	-	A1	11	A1	-	A1	-	A1	6	7
G1	-	G1	3	G1	-	G1	2	G1	-	5
F#1	-	F#1	1/2	F#1	-	F#1	-	F#1	-	1/2
F1	-	F1	-	F1	-	F1	-	F1	-	-
E1	-	E1	1/2	E1	-	E1	-	E1	-	1/2
D1	-	D1	-	D1	-	D1	-	D1	-	-
C1	-	C1	-	C1	-	C1	-	C1	-	-
						H2	𝅗𝅥 2	H2	𝅗𝅥 4	6
						C3	4			4
			𝄭			D3	2			2
						E3	1			1

Example 8 Peşrev Hicaz (Gazi Giray Han)

RANGE G1-A2 (F#1-C3) number of bars 128 measure 20/4 ♪

1 HANE 16		TESLIM 16 (X4)		2 HANE 16		3 HANE 16		4 HANE 16		TOTAL 128
A2	-	A2	-	A2	-	A2	12	A2	-	12
G2	-	G2	-	G2	-	G2	2 #7	G2	-	2 #7
F#2	-	F#2	-	F#2	-	F#2	3	F#2	-	3
F2	-	F2	-	F2	6	F2	4	F2	1	11
E2	5	E2	9	E2	14	E2	12	E2	8	75
D2	16	D2	17	D2	29	D2	30	D2	22	165
C2	20	C2	16 C# 6	C2	#23	C2	#32	C2	24	123
H#1	-	H#1	-	H#1	-	H#1	-	H#1	-	-
H 1	-	H 1	𝅗𝅥 10	H 1	-	H 1	-	H 1	-	10
Hb1	29	Hb1	18	Hb1	26	Hb1	20	Hb1	23	170
A1	14	A1	14	A1	26	A1	15	A1	36	147
G1	27	G1	4	G1	13 #4	G1	5	G1	22	83 #4
F#1	7	F#1	-	F#1	3	F#1	-	F#1	8	18
F1	-	F1	-	F1	1	F1	-	F1	-	1
E1	-	E1	-	E1	-	E1	-	E1	-	-
D1		D1	-	D1	-	D1	-	D1	-	-
C1	-	C1	-	C1	-	C1	-	C1	-	-
						H2	2		-	2
						C3	2		-	2

Example 9 Peşrev Hicaz (Katip Çelebi)

RANGE G1-A2 (F#1-H2) number of bars 56 measure 24/4 (20/4) ♪

1 HANE 10		TESLIM 4 (x4)		2 HANE 10		3 HANE 10		4 HANE 10		TOTAL 56
A2	-	A2	-	A2	-	A2	10	A2	-	10
G2	-	G2	-	G2	1	G2	9 #8	G2	-	10 #8
F#2	-	F#2	-	F#2	-	F#2	7	F#2	-	-
F2	1	F2	-	F2	3	F2	10	F2	-	14
E2	4	E2	3	E2	7	E2	17	E2	1	51
D2	12	D2	6	D2	15	D2	11	D2	5	67
C2	#20	C2	7	C2	17	C2	7	C2	9	102
H#1	-	H#1	-	H#1	-	H#1	-	H#1	-	-
H 1	-	H 1	-	H 1	1	H 1	-	H 1	-	-
Hb1	♭22	Hb1	♭8	Hb1	♭18	Hb1	♭6	Hb1	♭24	102
A1	22	A1	9	A1	13	A1	5	A1	28	104
G1	9	G1	3	G1	12	G1	1	G1	20	54
F#1	1	F#1	-	F#1	2	F#1	-	F#1	4	7
F1	-	F1	-	F1	-	F1	-	F1	-	-
E1	-	E1	-	E1	-	E1	-	E1	-	-
D1	-	D1	-	D1	-	D1	-	D1	-	-
C1	-	C1	-	C1	-	C1	-	C1	-	-
						H2	2			2

Example 10 Peşrev Hicaz (Sultan Selim 3 Han)

RANGE F#1-A2 (D3) number of bars 96 measure 28/4 (20/4) ♪

1 HANE 18		TESLIM 6 (x4)		2 HANE 18		3 HANE 18		4 HANE 18		TOTAL 96
A2	-	A2	-	A2	-	A2	19	A2	-	19
G2	-	G2	-	G2	-	G2	19	G2	3	22
F#2	-	F#2	-	F#2	-	F#2	13	F#2	1	14
F2	1	F2	3	F2	2	F2	6	F2	4	25
E2	5 ♭ 6	E2	6 ♭ 1	E2	4 ♭ 2	E2	30	E2	10 ♭ 2	73 ♭ 14
D2	27	D2	9	D2	20	D2	24	D2	38	145
C2	#42	C2	9	C2	31	C2	14	C2	31	154
H#1	-	H#1	-	H#1	-	H#1	-	H#1	-	-
H 1	-	H 1	-	H 1	-	H 1	-	H 1	-	-
Hb1	♭ 37	Hb1	6	Hb1	31	Hb1	8	Hb1	28	128
A1	31	A1	11	A1	37	A1	9	A1	26	147
G1	9	G1	5	G1	23	G1	7	G1	14	73
F#1	3	F#1	2	F#1	10	F#1	1	F#1	5	27
F1	-	F1	-	F1	-	F1	-	F1	-	-
E1	-	E1	-	E1	-	E1	-	E1	-	-
D1	-	D1	-	D1	-	D1	-	D1	-	-
C1	-	C1	-	C1	-	C1	-	C1	-	-
						H2	4			4
						C3	3			3
						D3	1			1

Example 11 Saz semaisi Hicaz (Sadettin Arel)

RANGE G1-A2 (F#1-D3) number of bars 61 measure 10/8 (10/16) ♪

1 HANE 5		TESLIM 5 (x4)		2 HANE 5		3 HANE 5		4 HANE 26		TOTAL 61
A2	1/2	A2	-	A2	1/4	A2	10	A2	22	332
G2	3	G2	-	G2	1	G2	2 #8	G2	8	14 #8
F#2	5	F#2	-	F#2	1	F#2	2	F#2	5	13
F2	1	F2	2	F2	1	F2	4	F2	6	20
E2	7	E2	5	E2	8	E2	5	E2	18	58
D2	7	D2	6	D2	6	D2	4	D2	18	59
C2	#6	C2	10	C2	3	C2	#1/2	C2	11	60
H#1	-	H#1	-	H#1	-	H#1	-	H#1	-	-
H 1	-	H 1	-	H 1	1	H 1	-	H 1	-	1
Hb1	♭ 4	Hb1	♭ 6	Hb1	♭ 3	Hb1	-	Hb1	♭ 5	36
A1	7	A1	8	A1	3	A1	-	A1	5	47
G1	5	G1	3	G1	4	G1	-	G1	2	23
F#1	1	F#1	1	F#1	2	F#1	-	F#1	1/2	7
F1	-	F1	-	F1	-	F1	-	F1	-	-
E1	-	E1	-	E1	2	E1	-	E1	-	2
D1	-	D1	-	D1	1	D1	-	D1	-	1
C1	-	C1	-	C1	-	C1	-	C1	-	-
						H2	3	H2	4	7
						C3	3			3
						D3	2			2

Example 12 Saz Semaisi Hicaz (Sultan Selim 3 Han)

RANGE F#1-G2 number of bars 51 measure 10/8 (6/4) ♪

1 HANE 5		TESLIM 5 (x4)		2 HANE 5		3 HANE 5		4 HANE 16		TOTAL 51
A2	-	A2	-	A2	-	A2	-	A2	-	-
G2	-	G2	-	G2	1/2	G2	-	G2	10	10
F#2	-	F#2	-	F#2	-	F#2	-	F#2	-	-
F2	1	F2	-	F2	2	F2	1	F2	14	18
E2	3	E2	4	E2	5	E2	4	E2	30	54
D2	8	D2	11	D2	13	D2	10	D2	28	103
C2	10	C2	9	C2	6	C2	8	C2	16	76
H#1	-	H#1	-	H#1	-	H#1	-	H#1	-	-
H 1	-	H 1	-	H 1	-	H 1	-	H 1	-	-
Hb1	6	Hb1	10	Hb1-	6	Hb1	9	Hb1	16	77
A1	13	A1	-	A1	8	A1	9	A1	38	104
G1	2	G1	3	G1	4	G1	5	G1	24	47
F#1	1/2	F#1	1	F#1	1	F#1	1	F#1	4	10
F1	-	F1	-	F1	-	F1	-	F1	-	-
E1	-	E1	-	E1	-	E1	-	E1	-	-
D1	-	D1	-	D1	-	D1	-	D1	-	-
C1	-	C1	-	C1	-	C1	-	C1	-	-

Example 13 Peşrev Hüseyni (Behram aga)

RANGE A1-D3 (E3) number of bars 61 measure 10/8 ♪

SER HANE		MULAZIME 14 (x3)		HANE-I SANI 9		HANE-I SALIS 9		TOTAL 61
A2	4	A2	5	A2	17	A2	6	42
G2	3	G2	16	G2	6	G2	2	59
F#2	3	F#2	8	F#2	1	F#2	1	29
F2	-	F2	-	F2	-	F2	-	-
E2	-	E2	15	E2	-	E2	5	50
D2	-	D2	19	D2	-	D2	18	75
C2	-	C2	14	C2	-	C2	7	49
H#1	-	H#1	-	H#1	-	H#1	-	-
H 1	-	H 1	-	H 1	-	H 1	-	-
Hb1	-	Hb1	4	Hb1	-	Hb1	-	12
A1	-	A1	22	A1	-	A1	-	66
G1	-	G1	-	G1	-	G1	-	-
F#1	-	F#1	-	F#1	-	F#1	-	-
F1	-	F1	-	F1	-	F1	-	-
E1	-	E1	-	E1	-	E1	-	-
D1	-	D1	-	D1	-	D1	-	-
C1	-	C1	-	C1	-	C1	-	-
		H2	2	H2	12	H2	1	19
		C3	1/2	C3	28		-	30
				D3	8		-	8
				E3	1		-	1

Example 14 Peşrev Hüseyni (Gazi Giray Han)

RANGE G1-D3 number of bars 60 measure 60/8 ♪

1 HANE 10		TESLIM 20		2 HANE 20		3 HANE 10		TOTAL 60
A2	9	A2	24	A2	48	A2	-	81
G2	16	G2	34	G2	30	G2	-	80
F#2	16	F#2	30	F#2	12	F#2	-	58
F2	-	F2	1	F2	-	F2	-	1
E2	15	E2	32	E2	10	E2	6	63
D2	20	D2	32	D2	16	D2	17	85
C2	8	C2	16	C2	14	C2	31	69
H#1	-	H#1	-	H-#1	-	H#1	-	-
H 1	-	H 1	-	H 1	-	H 1	-	-
Hb1	6	Hb1	12	Hb1	14	Hb1	20	52
A1	22	A1	26	A1	14	A1	34	96
G1	2	G1	-	G1	-	G1	3	5
F#1	-	F#1	-	F#1	-	F#1	-	-
F1	-	F1	-	F1	-	F1	-	-
E1	-	E1	-	E1	-	E1	-	-
D1	-	D1	-	D1	-	D1	-	-
C1	-	C1	-	C1	-	C1	-	-
		H2	12	H2	36		-	48
		C3	12	C3	32		-	44
		D3	2	D3	3		-	5

Example 15 Peşrev Hüseyni (Hasan Can)

RANGE G1-D3 (F#1-E3) number of bars 190 measure 8/8 ♪

32		MULAZIME 42		2 HANE 53		3 HANE 63		TOTAL 190
A2	38	A2	12	A2	158	A2	56	264
G2	42	G2	24	G2	70	G2	113	249
F#2	43	F#2	20	F#2	58	F#2	33	164
F2	-	F2	-	F2	-	F2	50	50
E2	56	E2	41	E2	38	E2	96	231
D2	24	D2	59	D2	28	D2	62	173
C2	7	C2	68	C2	8	C2	28	111
H#1	-	H#1	-	H#1	-	H#1	-	-
H 1	-	H 1	-	H 1	--	H 1	-	-
Hb1	6	Hb1	49	Hb1	6	Hb1	18	79
A1	14	A1	42	A1	4	A1	25	85
G1	4	G1	8	G1	4	G1	2	18
F#1	-	F#1	1	F#1	-	F#1	1	2
F1	-	F1	-	F1	-	F1	-	-
E1	-	E1	-	E1	-	E1	-	-
D1	-	D1	-	D1	-	D1	-	-
C1	-	C1	-	C1	-	C1	-	-
H2	16	H2	-	H2	60	H2	14	90
C3	6	C3	-	C3	59			65
				D3	17			17
				E3	4			4

Example 16 Peşrev Isfahan (Isak Tanburi)

RANGE G1-A3 (F#1-D3) number of bars 320 measure 88/4

♪

1 HANE 80		2 HANE 80		3 HANE 80		4 HANE 80		TOTAL 320
A2	5	A2	21	A2	68	A2	-	94
G2	24	G2	56	G2	80	G2	4	164
F#2	2	F#2	7	F#2	49	F#2	-	58
F2	42	F2	62	F2	62	F2	14	180
E2	84	E2	113	E2	80 #4	E2	44	321 #4
D2	155	D2	148	D2	94	D2	113 ♭ 10	510 ♭ 10
C2	124 #28	C2	108 #24	C2	46	C2	62 #106	340 #158
H#1	-	H#1	-	H#1	-	H#1	-	-
H 1	29	H 1	8	H 1	10	H 1	15	62
Hb1	60	Hb1	45	Hb1	33	Hb1	120	258
A1	72	A1	44	A1	34	A1	104	254
G1	12	G1	8	G1	4	G1	28 #2	52
F#1	-	F#1	-	F#1	-	F#1	6	6
F1	-	F1	-	F1	-	F1	-	-
E1	-	E1	-	E1	-	E1	-	-
D1	-	D1	-	D1	-	D1	-	-
C1	-	C1	-	C1	-	C1	-	-
		H2	6	H2	24			30
		C3	2	C3	16			18
		D3		D3	10			10

Example 17 Peşrev Isfahan (Ibrahim Vefa Efendi)

RANGE F#1-A2 (E1-C3) number of bars 96 measure 88/4 ♪

1 HANE 12		TESLIM 12 (x4)		2 HANE 12		3 HANE 12		4 HANE 12		TOTAL 96
A2	2	A2	9	A2	b1	A2	-	A2	9	47
G2	10	G2	11 +1	G2	3	G2	3	G2	8	69
F#2	12	F#2	13 +3	F#2	-	F#2	5	F#2	4	63
F2	2	F2	1	F2	5	F2	-	F2	2	13
E2	15 #2	E2	19 +1	E2	12	E2	15	E2	8	127
D2	27	D2	19 +3	D2	9 ♭ 14	D2	32	D2	25	172 ♭ 14
C2	14 #5	C2	6 #2 +1+1	C2	24 #3	C2	5 #9	C2	14 #5	81 #32
H#1	-	H#1	-	H#1	-	H#1	-	H#1	-	-
H 1	-	H 1	-	H 1	1	H1	4	H 1	2	7
Hb1	9	Hb1	5 +3	Hb1	15	Hb1	4	Hb1	13	64
A1	-	A1	2+3+3+3+6	A1	9	A1	10	A1	5	47
G1	-	G1	3	G1	3	G1	5	G1	4	24
F#1	-	F#1	-	F#1	7	F#1	9	F#1	5	21
F1	-	F1	-	F1	-	F1	-	F1	-	-
E1	-	E1	-	E1	#1	E1	3	E1	-	3 #1
D1	-	D1	-	D1	-	D1	2	D1	-	2
C1	-	C1	-	C1	-	C1	-	C1	-	-
		H2	2					H2	2	4
		C3	2							2

Example 18 Peşrev Isfahan (Kantemiroglu)

RANGE G1-A2 (C3) number of bars 186 measure 28/8 ♪

1 HANE 24		TESLIM 30 (x3)		2 HANE 36		3 HANE 36		TOTAL 186
A2	2	A2	-	A2	48	A2	-	50
G2	12	G2	-	G2	64	G2	4	80
F#2	10	F#2	-	F#2	84	F#2	4	98
F2	-	F2	4	F2	-	F2	6	18
E2	30	E2	16	E2	50	E2	32	160
D2	38	D2	78 ♭ 8	D2	54	D2	42 ♭ 4	368 ♭ 28
C2	20 #8	C2	76 #32	C2	#4	C2	18 #22	266 #130
H#1	6	H#1	♭ 12	H#1	-	H#1	♭ 24	66
H 1	2	H 1	-	H 1	-	H 1	-	2
Hb1	24	Hb1	48	Hb1	-	Hb1	16	184
A1	72	A1	138	A1	4	A1	116	606
G1	-	G1	20	G1	-	G1	32	92
F#1	-	F#1	-	F#1	-	F#1	-	-
F1	-	F1	-	F1	-	F1	-	-
E1	-	E1	-	E1	-	E1	-	-
D1	-	D1	-	D1	-	D1	-	-
C1	-	C1	-	C1	-	C1	-	-
				H2	24		-	24
				C3	4		-	4

Example 19 Peşrev Isfahan (Salih Dede)

RANGE A1-A2 (D3) number of bars 48 measure 28/4 ♪

1 HANE 12		2 HANE 12		3 HANE 12		4 HANE 12		TOTAL 48
A2	-	A2	2	A2	21	A2	-	23
G2	3	G2	5	G2	19	G2	2	29
F#2	-	F#2	3	F#2	10	F#2	6	13
F2	7	F2	5	F2	6	F2	24	24
E2	21	E2	21	E2	11	E2	29	77
D2	27	D2	28	D2	11	D2	20 #5	95
C2	10 #12	C2	10 #10	C2	3 #1	C2	-	43 #28
H#1	-	H#1	-	H#1	-	H#1	-	7
H 1	4	H 1	3	H 1	-	H 1	7	24
Hb1	7	Hb1	7	Hb1	3	Hb1	5	29
A1	12	A1	8	A1	4	A1	-	-
G1	-	G1	-	G1	-	G1	-	-
F#1	-	F#1	-	F#1	-	F#1	-	-
F1	-	F1	-	F1	-	F1	-	-
E1	-	E1	-	E1	-	E1	-	-
D1	-	D1	-	D1	-	D1	-	-
C1	-	C1	-	C1	-	C1	-	-
				H2	8	H2	-	8
				C3	3	C3	-	3
				D3	3	D3	-	2

Example 20 Saz semaisi Isfahan (**Al Farabi**)

RANGE A1-G2 (B2) number of bars 36 measure 10/8 ♪

1 HANE 4		TESLIM 2 (x4)		2 HANE 8		3 HANE 6		4 HANE 10		TOTAL 36
A2	1	A2	-	A2	3	A2	4	A2	-	8
G2	2	G2	1	G2	11	G2	13	G2	1	31
F#2	-	F#2	-	F#2	5	F#2	8	F#2	-	13
F2	8	F2	1	F2	15	F2	4	F2	6	37
E2	11	E2	6	E2	27	E2	21	E2	22	105
D2	28	D2	9	D2	27	D2	18	D2	36	145
C2	8 #6	C2	8 #2	C2	4 #8	C2	- #17	C2	25 #2	69 #41
H#1	-	H#1	-	H#1	-	H#1	-	H#1	-	-
H 1	3	H 1	1	H 1	6	H 1	15	H 1	-	28
Hb1	2	Hb1	4	Hb1	1	Hb1	-	Hb1	13	32
A1	5	A1	6	A1	9	A1	7	A1	13	58
G1	-	G1	-	G1	-	G1	-	G1	-	-
F#1	-	F#1	-	F#1	-	F#1	-	F#1	-	-
F1	-	F1	-	F1	-	F1	-	F1	-	-
E1	-	E1	-	E1	-	E1	-	E1	-	-
D1	-	D1	-	D1	-	D1	-	D1	-	-
C1	-	C1	-	C1	-	C1	-	C1	-	-
				H2	1	H2	2	H2	-	3

Example 21 Saz semaisi Isfahan (Emin Aga)

RANGE A1-A2 (F#1-D3) number of bars 28 measure 10/8 ♪

1 HANE 4		TESLIM 4 (x3)		2 HANE 4		3 HANE 4		4 HANE 4		TOTAL 28
A2	2	A2	-	A2	6	A2	17	A2	-	25
G2	2	G2	2	G2	4	G2	9	G2	2	23
F#2	5	F#2	4	F#2	16	F#2	16	F#2	-	49
F2	2	F2	-	F2	-	F2	-	F2	8	10
E2	8	E2	12	E2	24	E2	16	E2	13	97
D2	26	D2	20	D2	26	D2	9	D2	17	138
C2	9 #4	C2	8 #4	C2	- #12	C2	- #1	C2	8 #6	41 #35
H#1	5	H#1	2	H#1	7	H#1	-	H#1	-	18
H 1	-	H 1	-	H 1	-	H 1	-	H 1	-	-
Hb1	3	Hb1	8	Hb1	-	Hb1	1	Hb1	8	36
A1	10	A1	12	A1	5	A1	3	A1	9	63
G1	-	G1	2	G1	-	G1	-	G1	2	8
F#1	-	F#1	-	F#1	-	F#1	-	F#1	1	1
F1	-	F1	-	F1	-	F1	-	F1	-	-
E1	-	E1	-	E1	-	E1	-	E1	-	-
D1	-	D1	-	D1	-	D1	-	D1	-	-
C1	-	C1	-	C1	-	C1	-	C1	-	-
				H2	2	H2	4	H2	-	6
						C3	1	C3	-	1
						D3	1	D3	-	1

Example 22 Peşrev Neva (Sultan Bayezid II)

RANGE G1-A2 number of bars 70 measure 8/8 ♪

SER HANE 10		MÜLAZIME 38		HANE-I SANI 14		HANE-I SALIS 8		TOTAL 70
A2	-	A2	1	A2	6	A2	4	11
G2	2	G2	6	G2	9	G2	4	21
F#2	4	F#2	18	F#2	16	F#2	5	43
F2	-	F2	-	F2	-	F2	-	-
E2	4	E2	19	E2	19	E2	6	48
D2	25	D2	79	D2	22	D2	16	142
C2	9	C2	42	C2	7	C2	7	65
H#1	-	H#1	-	H#1	-	H#1	-	-
H 1	-	H 1	-	H 1	-	H 1	-	-
Hb1	7	Hb1	47	Hb1	-	Hb1	6	60
A1	7	A1	32	A1	-	A1	9	48
G1	2	G1	10	G1	-	G1	3	15
F#1	-	F#1	1/2	F#1	-	F#1	-	1/2
F1	-	F1	-	F1	-	F1	-	-
E1	-	E1	-	E1	-	E1	-	-
D1	-	D1	-	D1	-	D1	-	-
C1	-	C1	-	C1	-	C1	-	-

Example 23 Peşrev Neva (Behram Aga)

RANGE G1-A2 (F31-H2) number of bars 18 measure 14/8 ♪

1 HANE 5		2 HANE 5		3 HANE 8		TOTAL 18
A2	-	A2	-	A2	6	6
G2	-	G2	-	G2	11	11
F#2	-	F#2	-	F#2	15	115
F2	-	F2	-	F2	1	1
E2	4	E2	10	E2	17	31
D2	13	D2	20	D2	23	56
C2	17	C2	15	C2	12	44
H#1	-	H#1	-	H#1	-	-
H 1	-	H 1	-	H 1	-	-
Hb1	18	Hb1	9	Hb1	6	33
A1	11	A1	9	A1	9	29
G1	3	G1	3	G1	3	9
F#1	3	F#1	3	F#1	3	9
F1	-	F1	-	F1	-	-
E1	-	E1	-	E1	-	-
D1	-	D1	-	D1	-	-
C1	-	C1	-	C1	-	-
				H2	2	2

Example 24 Peşrev Neva (Behram Aga)

RANGE F#1-A2 (H2) number of bars 51 measure 28/8 ♪

1 HANE 15		TESLIM 15		2 HANE 9		3 HANE 12		TOTAL 51
A2	-	A2	-	A2	4	A2	-	4
G2	-	G2	-	G2	9	G2	1	10
F#2	-	F#2	-	F#2	12	F#2	-	12
F2	-	F2	-	F2	-	F2	2	2
E2	4	E2	10	E2	8	E2	7	29
D2	13	D2	20	D2	7	D2	12	52
C2	17	C2	15	C2	1/2	C2	11	43
H#1	-	H#1	-	H#1	-	H#1	-	-
H 1	-	H 1	-	H 1	-	H 1	-	-
Hb1	18	Hb1	8	Hb1	-	Hb1	6	32
A1	12	A1	10	A1	-	A1	10	32
G1	3	G1	3	G1	-	G1	3	9
F#1	3	F#1	3	F#1	-	F#1	3	9
F1	-	F1	-	F1	-	F1	-	-
E1	-	E1	-	E1	-	E1	-	-
D1	-	D1	-	D1	-	D1	-	-
C1	-	C1	-	C1	-	C1	-	-

Example 25 Peşrev Neva (Mehmet Çelebi)

RANGE G1-H2 (D3) number of bars 100 measure 88/4 ♪

1 HANE 20		TESLIM 20		2 HANE 40		3 HANE 20		TOTAL 100
A2	4	A2	-	A2	26	A2	-	30
G2	14	G2	4	G2	46	G2	4	68
F#2	-	F#2	4	F#2	-	F#2	-	4
F2	#20	F2	6	F2	#52	F2	#2	80
E2	22	E2	16	E2	38	E2	2	78
D2	42	D2	50	D2	66	D2	30	188
C2	30	C2	42	C2	48	C2	34	154
H#1	-	H#1	-	H#1	-	H#1	-	-
H 1	-	H 1	-	H 1	-	H 1	-	-
Hb1	22	Hb1	26	Hb1	30	Hb1	44	122
A1	18	A1	20	A1	32	A1	42	112
G1	-	G1	6	G1	6	G1	18	36
F#1	-	F#1	-	F#1	-	F#1	-	-
F1	-	F1	-	F1	-	F1	-	-
E1	-	E1	-	E1	-	E1	-	-
D1	-	D1	-	D1	-	D1	-	-
C1	-	C1	-	C1	-	C1	-	-
H2	2	H2	-	H2	2	H2	-	2
	-		-	C3	2		-	2
	-		-	D3	2		-	2

Example 26 Peşrev Neva (Mehmet Çelebi)

RANGE G1-G2 (D3) number of bars 100 measure 88/8 ♪

1 HANE 40		TESLIM 20		2 HANE 40		3 HANE 20		TOTAL 120
A2	2	A2	-	A2	13	A2	-	15
G2	16	G2	2	G2	21	G2	2	42
F#2	20	F#2	3	F#2	26	F#2	1	50
F2	-	F2	2	F2	-	F2	-	2
E2	20	E2	8	E2	21	E2	2	51
D2	42	D2	25	D2	32	D2	14	113
C2	30	C2	19	C2	24	C2	17	90
H#1	-	H#1	-	H#1	-	H#1	-	-
H 1	-	H 1	-	H 1	-	H 1	-	-
Hb1	22	Hb1	14	Hb1	15	Hb1	22	73
A1	18	A1	10	A1	16	A1	21	65
G1	2	G1	3	G1	3	G1	9	17
F#1	-	F#1	-	F#1	-	F#1	-	-
F1	-	F1	-	F1	-	F1	-	-
E1	-	E1	-	E1	-	E1	-	-
D1	-	D1	-	D1	-	D1	-	-
C1	-	C1	-	C1	-	C1	-	-
H2	2	H2	-	H2	1	H2	-	3
	-	C3	-	C3	1	C3	-	1
	-	D3	-	D3	1	D3	-	1

Example 27 Peşrev Rast (Du Şems)

RANGE D1-E3 number of bars 42 measure 16/4 ♪

No name 18		VASAT 6 (X2)		No name 12		TOTAL 42
A2	1	A2	18	A2	19	56
G2	6	G2	24	G2	23	77
F#2	7	F#2	14	F#2	20	55
F2	2	F2	-	F2	-	2
E2	16	E2	9 #1	E2	11	45 #2
D2	36	D2	2	D2	9	49
C2	35	C2	-	C2	5	40
H#1	-	H#1	-	H#1	-	-
H 1	-	H 1	-	H 1	-	-
Hb1	37	Hb1	-	Hb1	7	44
A1	38	A1	-	A1	12	50
G1	57	G1	--	G1	30	87
F#1	19	F#1	-	F#1	9	28
F1	-	F1	-	F1	-	-
E1	16	E1	-	E1	5	21
D1	3	D1	-	D1	-	3
C1	-	C1	-	C1	-	-
		H2	11	H2	15	37
		C3	8	C3	17	33
		D3	3	D3	6	12
		E3	1	E3	2	4

Example 28 Peşrev Rast (Çobhan Giray)

RANGE D1-G2 number of bars 54 measure 28/4 ♪

1 HANE 12		TESLIM 6 (x4)		2 HANE 12		3 HANE 12		4 HANE 12		TOTAL 54
A2	-	A2	-	A2	-	A2	-	A2	-	-
G2	-	G2	-	G2	-	G2	4	G2	1	5
F#2	-	F#2	-	F#2	-	F#2	-	F#2	-	2
F2	-	F2	-	F2	-	F2	4	F2	2	6
E2	-	E2	-	E2	6	E2	7	E2	8	21
D2	9	D2	1,5	D2	15	D2	18	D2	15	58
C2	34	C2	8	C2	20	C2	21	C2	16	99
H#1	-	H#1	-	H#1	-	H#1	-	H#1	-	-
H 1	-	H 1	-	H 1	-	H 1	-	H 1	-	-
Hb1	30	Hb1	7	Hb1	33	Hb1	25	Hb1	25	120
A1	12	A1	14	A1	18	A1	13	A1	18	75
G1	19	G1	13	G1	9	G1	9	G1	13	63
F#1	-	F#1	-	F#1	-	F#1	-	F#1	-	-
F1	-	F1	-	F1	-	F1	-	F1	-	-
E1	-	E1	-	E1	-	E1	-	E1	-	-
D1	-	D1	-	D1	-	D1	-	D1	2	2
C1	-	C1	-	C1	-	C1	-	C1	-	-

Example 29 Peşrev Rast (Benli Hasan Aga)

RANGE D1-A2 (H2) number of bars 30 measure 48/2 ♪

1 HANE 10		2 HANE 10		3 HANE 10		TOTAL
A2	-	A2	7	A2	4	11
G2	-	G2	35	G2	14	49
F#2	-	F#2	31	F#2	14	45
F2	1	F2	3	F2	1	5
E2	8	E2	37	E2	20	65
D2	25	D2	36	D2	26	87
C2	10	C2	11 #6	C2	23	44 #6
H#1	-	H#1	-	H#1	-	-
H 1	-	H 1	-	H 1	-	-
Hb1	22	Hb1	5	Hb1	26	53
A1	31	A1	-	A1	21	52
G1	60	G1	8	G1	29	97
F#1	15	F#1	-	F#1	-	15
F1	-	F1	-	F1	-	-
E1	1	E1	-	E1	-	1
D1	3	D1	-	D1	1	4
C1	-	C1	-	C1	-	-

Example 30 Peşrev Rast (Nayi Osman Dede)

RANGE D1-A2 number of bars 108 measure 3/2 (4/4) ♪

1 HANE 12		TESLIM 12		2 HANE 48		3 HANE 24		4 HANE 12		TOTAL 108
A2	-	A2	-	A2	-	A2	78	A2	3	81
G2	-	G2	-	G2	-	G2	88	G2	10	98
F#2	-	F#2	-	F#2	-	F#2	38	F#2	17	55
F2	-	F2	-	F2	-	F2	-	F2	-	-
E2	8	E2	-	E2	3 19	E2	10	E2	11	51
D2	26	D2	1	D2	22 54	D2	10	D2	29	142
C2	9	C2	4	C2	20 58 # 2+2	C2	-	C2	14	85 #4
H#1	-	H#1	-	H#1	-	H#1	-	H#1	-	-
H 1	-	H 1	-	H 1	-	H 1	-	H 1	-	-
Hb1	14	Hb1	21	Hb1	27 88	Hb1	-	Hb1	12	162
A1	12	A1	19 #2	A1	7 48 #4+3	A1	-	A1	9	95 #9
G1	28	G1	35	G1	20 46	G1	-	G1	2	131
F#1	8	F#1	10	F#1	4 4	F#1	-	F#1	-	26
F1	-	F1	-	F1	-	F1	-	F1	-	-
E1	4	E1	2	E1	-	E1	-	E1	-	6
D1	2	D1	1	D1	-	D1	-	D1	-	3
C1	-	C1	-	C1	-	C1	-	C1	-	-

Example 31 Peşrev Rast (Mehmed Çelebi)

RANGE E1-A2 number of bars 72 measure 20/4 ♪

1 HANE 12		TESLIM 4+4		2 HANE 12		3 HANE 28		4 HANE 10		TOTAL 72
A2	-	A2	-	A2	-	A2	13	A2	-	13
G2	-	G2	1	G2	1	G2	39	G2	1	42
F#2	-	F#2	-	F#2	-	F#2	26	F#2	-	26
F2	-	F2	1	F2	6	F2	3	F2	3	13
E2	2	E2	2	E2	18	E2	27	E2	19	68
D2	10	D2	5	D2	24	D2	46	D2	34	119
C2	12	C2	3	C2	28	C2	29	C2	- #35	105
H#1	-	H#1	-	H#1	-	H#1	-	H#1	-	-
H 1	-	H 1	-	H 1	-	H 1	-	H 1	20	20
Hb1	21	Hb1	5	Hb1	23	Hb1	22	Hb1	6	77
A1	24	A1	8	A1	6	A1	13	A1	19 „1	70
G1	25	G1	9	G1	7	G1	11	G1	2	54
F#1	15	F#1	-	F#1	-	F#1	4	F#1	2	21
F1	-	F1	-	F1	-	F1	-	F1	-	-
E1	8	E1	-	E1	-	E1	-	E1	-	8
D1	-	D1	-	D1	-	D1	-	D1	-	-
C1	-	C1	-	C1	-	C1	-	C1	-	-

Example 32 Saz semaisi Rast (Benli Hasan Aga)

RANGE D1-E3 number of bars 56 measure 10/8 ♪

1 HANE 8		TESLIM 8		2 HANE 8		3 HANE 16		4 HANE 16		TOTAL 56
A2	-	A2	3	A2	-	A2	13	A2	2	18
G2	-	G2	5	G2	-	G2	27	G2	4	36
F#2	-	F#2	3	F#2	-	F#2	24	F#2	6	33
F2	-	F2	3	F2	1	F2	-	F2	4	8
E2	1	E2	7	E2	4	E2	18	E2	15	45
D2	3	D2	12	D2	18	D2	10	D2	41	84
C2	6	C2	8	C2	18	C2	4 #2	C2	28	64 #2
H#1	-	H#1	-	H#1	-	H#1	-	H#1	-	-
H 1	-	H 1	-	H 1	-	H 1	4	H 1	-	4
Hb1	15	Hb1	14	Hb1	17	Hb1	2	Hb1	35	83
A1	14	A1	6	A1	11	A1	2	A1	24	57
G1	32	G1	10	G1	4	G1	4	G1	19	69
F#1	3	F#1	1	F#1	-	F#1	-	F#1	3	7
F1	-	F1	-	F1	-	F1	-	F1	-	-
E1	9	E1	1	E1	-	E1	-	E1	1	11
D1	6	D1	1	D1	-	D1	-	D1	1	8
C1	-	C1	-	C1	-	C1	-	C1	-	-
						H2	10			10
						C3	6			6
						D3	6			6
						E3	2			2

Example 33 Peşrev Rehavi (Tanburi Isak)

RANGE D1-E3 number of bars 114 measure 120/4 𝅘𝅥𝅯

1 HANE 22		TESLIM 8 (x4)		2 HANE 20		3 HANE 20		4 HANE 20		TOTAL 114
A2	-	A2	-	A2	5	A2	38	A2	13	56
G2	-	G2	-	G2	19	G2	55	G2	26	100
F#2	-	F#2	-	F#2	12	F#2	35	F#2	26	73
F2	7	F2	8	F2	7	F2	10	F2	24	63 17
E2	14	E2	8	E2	20	E2	37	E2	63	166
D2	36	D2	14	D2	38	D2	47	D2	77	254
C2	52 #1	C2	12	C2	21 #7	C2	5 #8	C2	6 #32	132 #48
H#1	-	H#1	-	H#1	-	H#1	1	H#1	24	25
H 1	-	H 1	-	H 1	♭ 7	H 1	♭ 3	H 1	-	♭ 10
Hb1	59	Hb1	10	Hb1	26	Hb1	6	Hb1	2	133
A1	47 #6	A1	16	A1	41	A1	1	A1	8	161
G1	45	G1	30	G1	51	G1	4	G1	2	222
F#1	26	F#1	9	F#1	22	F#1	-	F#1	3	87
F1	-	F1	-	F1	-	F1	-	F1	-	-
E1	17	E1	7	E1	112	E1	-	E1	1	58
D1	10	D1	4	D1	11	D1	-	D1	4	41
C1	-	C1	-	C1	-	C1	-	C1	-	-
				H2	2	H2	21			23
						C3	25			25
						D3	5			5
						E3	2			2

Example 34 Saz semaisi Rehavi **(al Farabi)**

RANGE D1-F#2 number of bars 56 measure 10/8 (6/8) 𝅘𝅥𝅯

1 HANE 4		TESLIM 4 (x4)		2 HANE 4		3 HANE 8		4 HANE 24		TOTAL 56
A2	-	A2	-	A2	-	A2	-	A2	-	-
G2	-	G2	-	G2	-	G2	-	G2	-	-
F#2	2	F#2	-	F#2	-	F#2	2	F#2	-	4
F2	-	F2	2	F2	-	F2	-	F2	-	8
E2	♭ 2	E2	2	E2	-	E2	4 𝅗𝅥 2	E2	4 𝅗𝅥 4	16 𝅗𝅥 6
D2	9	D2	2	D2	5	D2	15	D2	22	59
C2	12	C2	4	C2	6	C2	22	C2	38	94
H#1	-	H#1	-	H#1	-	H#1	-	H#1	-	-
H 1	-	H 1	-	H 1	-	H 1	-	H 1	-	-
Hb1	𝅗𝅥 20	Hb1	𝅗𝅥 14	Hb1	𝅗𝅥 23	Hb1	𝅗𝅥 48	Hb1	𝅗𝅥 78	𝅗𝅥 225
A1	10	A1	18	A1	21 #3	A1	21 #5	A1	40 #12	164 #20
G1	20	G1	27	G1	17	G1	26	G1	56	227
F#1		F#1	3	F#1	2	F#1	3	F#1	8	25
F1		F1	-	F1	-	F1	-	F1	-	-
E1		E1	2	E1	-	E1	2	E1	8	18
D1		D1	2	D1	2	D1	4	D1	4	18
C1		C1	-	C1	-	C1	-	C1	-	-

Example 35 Saz semaisi (Ismail Hakki Bey)

RANGE D1-C3 number of bars 80 measure 12/8 𝅘𝅥𝅯

1 HANE 4		TESLIM 4 (x4)		2 HANE 4		3 HANE 4		4 HANE 16		TOTAL 80
A2	-	A2	-	A2	-	A2	9	A2	-	9
G2	-	G2	-	G2	-	G2	21	G2	-	21
F#2	-	F#2	-	F#2	-	F#2	7	F#2	-	7
F2	1	F2	-	F2	3	F2	3	F2	-	7
E2	3	E2	-	E2	7	E2	10	E2	8	28
D2	13	D2	4	D2	15	D2	13	D2	38	95
C2	8	C2	4	C2	13	C2	4	C2	24 #4	65 #4
H#1	-	H#1	-	H#1	-	H#1	-	H#1	-	-
H 1	-	H 1	-	H 1	-	H 1	-	H 1	-	-
Hb1	13	Hb1	11	Hb1	22	Hb1	4	Hb1	28	111
A1	12	A1	12	A1	11	A1	-	A1	28 #4	99 #4
G1	15	G1	18	G1	5	G1	-	G1	56	148
F#1	5	F#1	6	F#1	-	F#1	-	F#1	28	57
F1	-	F1	-	F1	-	F1	-	F1	-	-
E1	5	E1	10	E1	-	E1	-	E1	52	97
D1	1	D1	11	D1	-	D1	-	D1	64	109
C1	-	C1	-	C1	-	C1	-	C1	-	-
						H2	3	H2		3
						C3	2			2

Example 36 Peşrev Saba (Kemani Hamza)

RANGE G1-H2 number of bars 94 measure 2/4 𝅘𝅥𝅯

1 HANE 12		TESLIM 20(x2)		2 HANE 13		3 HANE 28		4 HANE 3		TOTAL 94
A2	-	A2	3	A2	-	A2	8	A2	-	11
G2	-	G2	11	G2	1	G2	36	G2	-	59
F#2	-	F#2	-	F#2	-	F#2	-	F#2	-	-
F2	-	F2	15	F2	2	F2	25	F2	-	57
E2	4	E2	13	E2	5	E2	23	E2	-	58
D2	13	D2	18	D2	11	D2	23	D2	-	83
C2	32	C2	51	C2	42	C2	49	C2	5	230
H#1	-	H#1	-	H#1	-	H#1	-	H#1	-	-
H 1	-	H 1	-	H 1	-	H 1	-	H 1	-	-
Hb1	23	Hb1	21	Hb1	28	Hb1	32	Hb1	5	130
A1	14	A1	11	A1	9	A1	18	A1	8	71
G1	5	G1	6	G1	6	G1	2	G1	2	27
F#1	-	F#1	-	F#1	-	F#1	-	F#1	-	-
F1	-	F1	-	F1	-	F1	-	F1	-	-
E1	-	E1	-	E1	-	E1	-	E1	-	-
D1	-	D1	-	D1	-	D1	-	D1	-	-
C1	-	C1	-	C1	-	C1	-	C1	-	-
						H2	2			2

Example 37 Peşrev Saba (Tanburi Buyuk Osman)

RANGE G1-D3 number of bars 96 measure 28/4 ♪

1 HANE 18		TESLIM 6 (x4)		2 HANE 18		3 HANE 18		4 HANE 18		TOTAL 96
A2	6	A2	2 2	A2	♭ 4 ♮26	A2	♭ 1 ♮ 31	A2	6	31 ♮ 57
G2	26	G2	5 1	G2	19	G2	26	G2	7	99
F#2	-	F#2	-	F#2	-	F#2	-	F#2	-	-
F2	25	F2	7	F2	20	F2	13	F2	11	97
E2	17	E2	6 2	E2	11	E2	6	E2	22	80
D2	26	D2	7 3	D2	14 ♮ 4	D2	10	D2	7 ♮ 28	85 ♮ 35
C2	38	C2	10 #1	C2	21	C2	12 #1	C2	19 #14	130 #16
H#1	-	H#1	-	H#1	-	H#1	-	H#1	♭ 8	♭ 8
H 1	-	H 1	-	H 1	-	H 1	-	H 1	♮ 4	♮ 4
Hb1	10	Hb1	3	Hb1	10	Hb1	1	Hb1	8	41
A1	6	A1	4 15	A1	9	A1	6	A1	11	54
G1	-	G1	1	G1	4	G1	1	G1	5	14
F#1	-	F#1	-	F#1	1	F#1	-	F#1	1	2
F1	-	F1	-	F1	-	F1	-	F1	-	-
E1	-	E1	-	E1	-	E1	-	E1	-	-
D1	-	D1	-	D1	-	D1	-	D1	-	-
C1	-	C1	-	C1	-	C1	-	C1	-	-
H2	2	H2	1	H2	7	H2	18	H2	-	31
C3	-	C3	-	C3	3	C3	12	C3	-	15
D3	-	D3	-	D3	1	D3	7	D3	-	8

Example 38 Peşrev Saba (Salih Dede)

RANGE D1-D3 number of bars 182 measure 28/4 ♪

1 HANE 48		2 HANE 46		3 HANE 46		4 HANE 42		TOTAL 182
A2	-	A2	35	A2	61	A2	-	96
G2	5	G2	54	G2	47	G2	4	206
F#2	-	F#2	28	F#2	24	F#2	2	54
F2	15	F2	24	F2	14	F2	6	59
E2	38	E2	66	E2	48	E2	38	190
D2	84	D2	76	D2	29	D2	67	256
C2	95	C2	58	C2	38	C2	85 #4	276 #4
H#1	-	H#1	-	H#1	-	H#1	4	4
H 1	-	H 1	-	H 1	-	H 1	-	-
Hb1	62	Hb1	32	Hb1	27	Hb1	67	188
A1	61	A1	30	A1	26	A1	57	174
G1	32	G1	-	G1	6	G1	29	67
F#1	3	F#1	-	F#1	-	F#1	26	29
F1	-	F1	-	F1	-	F1	-	-
E1	2	E1	-	E1	-	E1	-	2
D1	2	D1	-	D1	-	D1	-	2
C1	-	C1	-	C1	-	C1	-	-

H2	-	H2	7	H2	34	H2	-	41
C3	-	C3	2	C3	34	C3	-	36
D3	-	D3	-	D3	14	D3	-	14

Example 39 Saz Semaisi Saba (Osman Dede)

RANGE G1-A2 number of bars 84 measure 10/8 (3/4) ♪

1 HANE 4		TESLIM 8 (x4)		2 HANE 8		3 HANE 8		4 HANE 32		TOTAL 84
A2	-	A2	-	A2	10	A2	4	A2	16	30
G2	-	G2	6	G2	8	G2	18	G2	20 #8	70 #8
F#2	-	F#2	-	F#2	-	F#2	14	F#2	64	78
F2	3	F2	4	F2	22	F2	18	F2	4	63
E2	11	E2	4	E2	30	E2	46	E2	44 #20	147 #20
D2	17	D2	32	D2	8 ♮ 32	D2	- ♮ 16	D2	- ♮ 64	153 ♮ 112
C2	24	C2	42	C2	24	C2	16	C2	- #40	232 #40
H#1	-	H#1	-	H#1		H#1	-	H#1	4	4
H 1	-	H 1	-	H 1	-	H 1	-	H 1	-	-
Hb1	10	Hb1	30	Hb1	8	Hb1	6	Hb1	2	146
A1	11	A1	22	A1	4	A1	10	A1	20	133
G1	2	G1	12	G1	2	G1	-	G1	8	60
F#1	-	F#1	-	F#1	-	F#1	-	F#1	-	-
F1	-	F1	-	F1	-	F1	-	F1	-	-
E1	-	E1	-	E1	-	E1	-	E1	-	-
D1	-	D1	-	D1	-	D1	-	D1	-	-
C1	-	C1	-	C1	-	C1	-	C1	-	-

Example 40 Saz semaisi Saba (zaharya)

RANGE G1-D3 number of bars 37 measure 10/8 (6/8) ♪

1 HANE 7		TESLIM 3(x4)		2 HANE 4		3 HANE 5		4 HANE 9		TOTAL 37
A2	♭ 2	A2	♭ 1	A2	15	A2	11	A2	♭ 1	26 ♭ 7
G2	-	G2	4	G2	5	G2	5	G2	1	27
F#2	-	F#2	-	F#2	4	F#2	4	F#2	-	8
F2	-	F2	7	F2	-	F2	4	F2	10	42
E2	6	E2	8	E2	2	E2	7	E2	11	58
D2	13	D2	4	D2	4	D2	8	D2	17	54 4
C2	44	C2	16	C2	3	C2	16	C2	20	147
H#1	-	H#1	-	H#1	-	H#1	-	H#1	-	-
H 1	-	H 1	-	H 1	-	H 1	-	H 1	-	-
Hb1	27	Hb1	7	Hb1	5	Hb1	14	Hb1	18	92
A1	42	A1	10	A1	5	A1	16	A1	22	125
G1	2	G1	1	G1	7	G1	1	G1	6	20
F#1	-	F#1	-	F#1	-	F#1	-	F#1	-	-
F1	-	F1	-	F1	-	F1	-	F1	-	-
E1	-	E1	-	E1	-	E1	-	E1	-	-
D1	-	D1	-	D1	-	D1	-	D1	-	-
C1	-	C1	-	C1	-	C1	-	C1	-	-
				H2	8	H2	8		-	16
				C3	15	C3	3		-	18
				D3	3	D3	1		-	4

Example 41 Peşrev Uşşak (Mehmet Çelebi)

RANGE D1-B2 (D3) number of bars 52 measure 16/4 ♪

1 HANE 8		TESLIM 8 (x3)		2 HANE 12		3 HANE 8		TOTAL 52
A2	2	A2	8	A2	5	A2	49	80
G2	4	G2	20	G2	25	G2	52	141
F#2	-	F#2	-	F#2	4	F#2	41	45
F2	9	F2	27	F2	72	F2	9	171
E2	23	E2	37	E2	94	E2	34	262
D2	26	D2	42	D2	73	D2	20	245
C2	38	C2	28 #2	C2	35 #2	C2	8	165 #8
H#1	5	H#1	-	H#1	4	H#1	-	9
H 1	-	H 1	2	H 1	2	H 1	-	8
Hb1	36	Hb1	29	Hb1	18	Hb1	1	142
A1	52	A1	29	A1	21	A1	2	162
G1	35	G1	15	G1	11	G1	-	91
F#1	4	F#1	1	F#1	1	F#1	-	8
F1	10	F1	-	F1	-	F1	-	10
E1	4	E1	-	E1	-	E1	-	4
D1	5	D1	-	D1	-	D1	-	5
C1	-	C1	-	C1	-	C1	-	-
		H2	2	H2	2	H2	16	24
						C3	13	13
						D3	2	2

Example 42 Peşrev Uşşak (Nayi Osman Dede)

RANGE G1-G2 (B2) number of bars 94 measure 28/4 ♪

1 HANE 42		TESLIM 14		2 HANE 38		TOTAL 94
A2	-	A2	-	A2	4	4
G2	7	G2	-	G2	9	16
F#2	-	F#2	-	F#2	-	-
F2	11	F2	2	F2	32	45
E2	35	E2	13	E2	75	123
D2	102	D2	29	D2	82	213
C2	68 #1	C2	25	C2	52	145 #1
H#1	22	H#1	11	H#1	-	33
H 1	-	H 1	-	H 1	-	-
Hb1	27	Hb1	12	Hb1	28	67
A1	30	A1	13	A1	13	56
G1	12	G1	3	G1	1	16
F#1	-	F#1	-	F#1	-	-
F1	-	F1	-	F1	-	-
E1	-	E1	-	E1	-	-
D1	-	D1	-	D1	-	-
C1	-	C1	-	C1	-	-
				H2	2	2

Example 43 Peşrev Uşşak (Mehmed Çelebi)

RANGE G1-A2 (F#1-D3) number of bars 192 measure 14/8 ♪

1 HANE 24		MÜLAZIME 72		2 HANE 48		3 HANE 48		TOTAL 192
A2	-	A2	-	A2	32	A2	-	32
G2	-	G2	-	G2	14	G2	-	14
F#2	-	F#2	-	F#2	-	F#2	-	-
F2	-	F2	12	F2	14	F2	10	36
E2	2	E2	42	E2	18	E2	18	80
D2	16	D2	82	D2	32	D2	34	164
C2	16	C2	76	C2	22	C2	42	156
H#1	-	H#1	-	H#1	-	H#1	-	-
H 1	-	H 1	-	H 1	-	H 1	-	-
Hb1	28	Hb1	54	Hb1	28	Hb1	48	158
A1	36	A1	58	A1	30	A1	46	170
G1	12	G1	12	G1	8	G1	22	52
F#1	-	F#1	-	F#1	-	F#1	4	4
F1	-	F1	-	F1	-	F1	-	-
E1	-	E1	-	E1	-	E1	-	-
D1	-	D1	-	D1	-	D1	-	-
C1	-	C1	-	C1	-	C1	-	-
	-		-	H2	8		-	8
	-		-	C3	10		-	10
	-		-	D3	8		-	8

Example 44 Saz semaisi (Salih Dede)

RANGE G1-A2 (D3) number of bars 48 measure 6/4 ♪

1 HANE 6		TESLIM 4 (x4)		2 HANE 6		3 HANE 6		4 HANE 16		TOTAL 48
A2	1	A2	-	A2	1	A2	12	A2	7	21
G2	1	G2	3	G2	3	G2	15	G2	17	48
F#2	-	F#2	-	F#2	-	F#2	16	F#2	-	16
F2	3	F2	6	F2	17	F2	2	F2	30	76
E2	8	E2	8	E2	20	E2	20	E2	50	130
D2	19	D2	13	D2	20	D2	16	D2	74	181
C2	21	C2	14	C2	19	C2	6	C2	56	158
H#1	-	H#1	-	H#1	-	H#1	-	H#1	-	-
H 1	-	H 1	-	H 1	-	H 1	-	H 1	-	-
Hb1	23	Hb1	15	Hb1	15	Hb1	5	Hb1	38	141
A1	28	A1	8	A1	19	A1	12	A1	60	151
G1	10	G1	5	G1	4	G1	2	G1	20	56
F#1	-	F#1	-	F#1	-	F#1	-	F#1	-	-
F1	-	F1	-	F1	-	F1	-	F1	-	-
E1	-	E1	-	E1	-	E1	-	E1	-	-
D1	-	D1	-	D1	-	D1	-	D1	-	-
C1	-	C1	-	C1	-	C1	-	C1	-	-
						H2	3			3
						C3	2			2
						D3	1			1

Example 45 Peşrev Uşşak (Sultan Selim 3)

RANGE D1-G2 number of bars 56 measure 28/4 ♪

1 HANE 21		TESLIM 7 (x2)		2 HANE 21		TOTAL 56
A2	-	A2	-	A2	-	-
G2	-	G2	-	G2	1	1
F#2	-	F#2	-	F#2	-	-
F2	2	F2	1	F2	3	7
E2	10	E2	1	E2	7	19
D2	13	D2	4	D2	22	53
C2	36	C2	7	C2	29 #6	79 #6
H#1	-	H#1	-	H#1	3	3
H 1	-	H 1	-	H 1	-	-
Hb1	32	Hb1	9	Hb1	24	74
A1	29	A1	12	A1	32	85
G1	14	G1	10	G1	18	52
F#1	2	F#1	3	F#1	2	10
F1	-	F1	-	F1	-	-
E1	1	E1	2	E1	1	6
D1	3	D1	-	D1	3	6
C1	-	C1	-	C1	-	-