

**ÇANKAYA UNIVERSITY
GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES
COMPUTER ENGINEERING**

MASTER THESIS

**ANALYSIS OF TURKISH ART MUSIC:
IDENTIFICATION OF MAKAM SIGNATURES**

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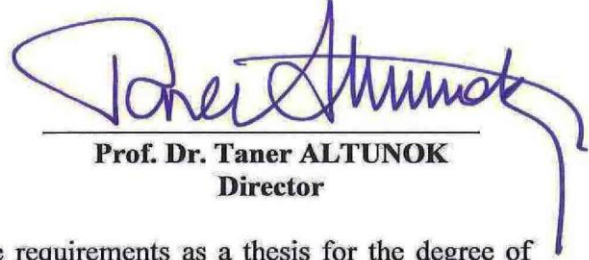
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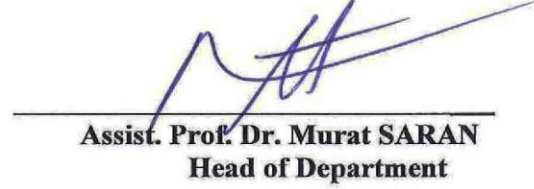
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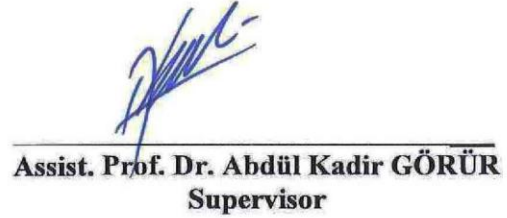
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ABSTRACT

ANALYSIS OF TURKISH ART MUSIC; IDENTIFICATION OF MAKAM SIGNATURES

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This study aims to gather more scientific-based concrete data by using computer technology and to figure out what extent the makam structure of Traditional Turkish Art Music interpreted in the compositions. For this reason, 120 compositions from Muhayyer kürdi, Acem kürdi and Kürdi makams from Traditional Turkish Art Music were analyzed by computer program in terms of makam and gained data were compared with the makam structure of Traditional Turkish Art Music. Also, makam of the composition is being tried to determine with the help of computer software. Musical note's frequency of usage, usage duration and effectiveness level were calculated and progression analysis of the scales in the compositions were done. It was seen that data gained by research show parallelism to a large extent with the makam structure of the Traditional Turkish Art music. In addition, thanks to computer software the makam of the composition can be determined but it is seen that the definition of the progression cannot be expressed by mathematical data with the gained data.

Key words: Traditional Turkish Art Music, Makam, Identification of Makam Signatures

ÖZ

TÜRK SANAT MÜZİĞİNDEKİ MAKAM YAPILARININ ANALİZİ

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Bu araştırma, Geleneksel Türk Sanat Müziği makam yapısının eserlerde ne denli ifade edildiği ve şüana kadar kişisel kanayetlerle, kişisel gözlemlerle yorumlanan makam kavramı bilgisayar teknolojisi kullanılarak, bilimsel verilere dayalı daha somut veriler elde etmek üzere yapılmıştır. Bu amaç doğrultusunda Türk Sanat Müziği repertuarından seçilen Muhayyer kürdi, Acem kürdi ve Kürdi makamlarına ait 120 eser bilgisayar ortamında istatistiksel olarak makamsal yönden analiz edildi ve elde edilen veriler Geleneksel Türk Sanat Müziği makam yapısıyla karşılaştırıldı. Ayrıca, bilgisayar yazılımı ile bir eserin hangi makama ait olduğu belirlenmeye çalışıldı. Notaların kullanım sıklığı, kullanım süresi, etkinlik dereceleri hesaplandı ve eserlerdeki dizilerin seyir analizi yapıldı. Araştırma sonucunda elde edilen verilerin Geleneksel Türk Sanat Müziği makam yapısıyla büyük ölçüde paralellik gösterdiği tespit edilmiştir. Ayrıca, bilgisayar yazılımı ile eserin hangi makama ait olduğu büyük ölçüde belirlenebilmiştir. Fakat, elde edilen veriler doğrultusunda seyir kavramının matematiksel verilerle ifade edilemeyeceği gözlenmiştir.

Anahtar Kelimer: Türk Sanat Müziği, Makam, Bilgisayar Destekli Makam Analizi

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LIST OF ABBREVIATIONS

T.R.T	:	Turkish Radio and Television Corporation
TTFM	:	Traditional Turkish Folk Music
TTCM	:	Traditional Turkish Classical Music
TCM	:	Turkish Classical Music
F.U	:	Frequency of Usage
A.D	:	Audible Duration
E.D	:	Effectiveness Level

CHAPTER I

INTRODUCTION

Music is an art for people to express their emotions, thoughts and ideas according to specific rule by sound. With the help of this art; people can find the chance of expressing their happiness, sadness, pain and many other emotions. Although music is a branch of art, it can be thought as a science, also. Technology progresses in an incredible speed due to scientific developments, thus each consecutive day newer solution to scientific problems is being found. Opportunities of computer technology seriously direct the scientific research. Extraordinary developments in electronic and computer technology rapidly reach many science branches. One of these science branches is music.

"Conversion of musical data into statistical data via computer-aid gives a chance to assess many fields during analysis of the composition and leads to new scopes." (Şengün, 2005, p.1)

In the recent times, it is observed that the scientific studies on the Traditional Turkish Music increased thanks to technological advances. Traditional Turkish Music, which was attempted to be expressed by personal thoughts and comments, is now being interpreted in accordance with the scientific data. Traditional Turkish Music is a type of music with its unique structure and characteristic features. One of these features is having a makam structure. Turkish Art Music is type of makam music. Makam, used in Turkish music, is a name given to the process of a scale. From past to present, the definition of the makam structure, its usage in the compositions and conformity of composers with makam structure during composing has always been a matter of debate.

In this study; an answer is being sought whether there is a relationship between data, gained by computer technology via analysis of a compositions chosen from Turkish Classical Music repertoire in terms of makam, and characteristic features of Turkish Music exists or not.

The following sub-problems are presented by following the question sentence;

1. Is there any effect of usage frequency of pitches used in composed compositions exist on makam?
2. Is there any effect of usage duration value of pitches used in composed compositions exist on makam?
3. Does parallelism exist between data gained from Kürdi, Muhayyer kürdi, Acem kürdi makams and qualitative data?
4. What are the effects of series and melodic progressions on makam?
5. Can Finalis tunes, dominant tunes and leading tone tunes be taken as a base during determination of the makam?
6. Can makam analysis be done with mathematical and statistical data?
7. Can a makam of a modal melody be understood without listening?
8. Can a makam of a modal melody be understood with using computer software?

1.1. PURPOSE

From past to present, Turkish Art Music is tried to be analyzed by hearsay information, personal thoughts and comments. In this study, the concept makam in Turkish Art Music is tried to be analyzed by using computer technology in order to obtain more concrete data based on scientific facts.

Makam to which a modal melody belongs can be understood by persons who take musical education through hearing. In addition to the main purpose, the makam to which a modal melody belongs is tried to be determined by using computer software. Within this research, it is aimed to have an interdisciplinary study covering branches of music and engineering.

1.2. LIMITATION

This study is limited to Kürdi, Muhayyer kürdi and Acem kürdi makams which are similar in terms of both verbal work of Turkish Art Music and scales chosen from TRT (Turkish Radio and Television Corporation) repertoire.

1.3. SIGNIFICANCE

This study is significant since it is an interdisciplinary study covering branches of music and engineering as well as choosing above mentioned makams which have so far not being used for such a study.

1.4. DEFINITIONS

Makam: Makam means generating tunes by means of emphasizing a tonic and a dominant in a scale in accordance with sticking to other rules. (Özkan, 1988, p.77)

Scale: It is a group of sounds which can be generally comprised of sequential and compatible 8-juxtaposed (octave) and can have its internal orders of intervals diversely. (Tanrıkorur, 2005, p.141).

Melodic progression: It is set of rules regulating the tune motion, and a must for developing a makam identity for scales in Turkish Music which has particular interval order. same scale in Turkish Music (i.e. Uşşâk, Bayati, Isfahan, Acem), scale signifies nothing without having a known melodic progression (Tanrıkorur, p.210).

Tonic pitch: It is the most chest note where the melodic progression of makam ends. It is also known as Finalis pitch. Modal melodies may not start from tonic pitch but they must end in this pitch. Also, modal tunes never end in Upper Tonic pitch (Tanrıkorur, 2005, p.141).

Dominant tone pitch: It is the general name of ‘melodic semicolon’ or ‘breathing pitches which tune sentences are to be rested awhile during melodic progression (hence termed as Suspended Cadence)(Tanrıkorur, 2005,p.141).

Leading Tone Pitch: The sound under a step from scale’s ‘Tonic’ or ‘Finalis’ pitch is called as ‘Leading tone’. Leading tone is the pitch which reinforces the tonic as well as giving strength to (Yavaşca, 2002, p. 3).

Upper Tonic Pitch : It is seen that Upper Tonic pitch, determined clearly and certainly in basic makams, does not show the same feature and clarity in compound (combined) makams, on the contrary it get rids of this feature. Shrill high-pitched tonics; however not to be considered as crucial as Finalis and dominant pitches, have important and noteworthy roles for improvement of melodic progression and harmony since because of their duty of task. In basic makams, shrilled high-pitched tonics quite clearly constitute the most shrilled sound of the eight juxtaposed (Kutluğ, 2000, p. 85).

Development: Development is increasing the scope of scales (of eight juxtaposed sound) in pitches together with having tunes from chest note and shrill high-pitched sound (Kutluğ, 2000, p.88).

1.5. MAKAM INTRADITIONAL TURKISH MUSIC

Throughout the history, Turks had changed their place constantly and established new relationships with their neighbours. Turkish tribes in Central Asia interacted with communities they closely related to and had cultural exchange as a natural result of a nomadic life.

When the historical chain is being followed, it is seen that Turkish music culture reached up to today by feeding from five different cultural nourishments; Middle Asia, Ancient Anatolia- Mediterranean and Aegean, Islam, Ottoman and finally the Western culture (Can, 2001,p.1).

"Traditional Turkish Music is a contemporary, noble and majestic traditional music which is loyal to laws and rules formed by a nation and reached to scientific and artistic perfection" (Özkan, 2004, p. 25).

Traditional Turkish Music is divided into two different type; Classical Turkish Music (Turkish Art Music) and Turkish Folk Music. Turkish Art Music has remarkable aesthetics aspects and addresses to general. It has divan literature in its roots and it has a heavy language. On the other hand, folk poets are the source of the Turkish Folk Music and reflect the culture of the region which they belong to. Turkish Art Music is being progressed in accordance with rules in the modal-dominant compositions; introduction-body-conclusion.

1.6. TYPES OF MAKAMIN TRADITIONAL TURKISH MUSIC

Makams are divided into three in Traditional Turkish Music:

- 1- Basic Makams
- 2- Şed Makams (Transposed Makams)
- 3- Murekkeb Makams (Compound Makams)

1.6.1. Basic Makams

Some conditions are needed in order to accept a makam as a basic makam. These are;

- It must have a scale which consists of a quartette and a quintette or a quartette.
- Quartettes and Quintettes must be a tetrachord and apentachord (Çargah, Bûselik, Kürdi, Râst, Uşşak, and Hicaz).
- It should have an eight-juxtaposed-sound scale and this scale should have all characteristics of the makams.

Makams which have above mentioned features are basic makams (Özkan, 1998, p.94).

1.6.2. Şed (Composed) Makams

It is collapsing any quartette or quintette or a makam scale by taking them from their place- in other words from their cadential note to over another pitch through accepting another pitch as a cadential note by making necessary note changes without changing their intervals. All scales and medleys cannot be collapsed over all sounds in traditional Turkish Music (Özkan, 1998, p.189).

1.6.3. Mürekkebe (Compound) Makams

Mürekkebe (Compound) Makams consist of interaction of various medleys and scales and also clustering of these transitions in a special format. The essential of the Mürekkebe (Compound) makams are transition. Composing and scale of these makams generally does not obey the rules of the basic makams (Özkan, 1988, p.271).

1.7. TUNE SYSTEM IN TRADITIONAL TURKISH MUSIC

The tune system still used in Traditional Turkish Art Music is a twenty-fourth pitch system, also termed as Arel-Ezgi-Uzdilek since it is suggested and advocated by H.Sadettin Arel, Suphi Ezgi and S. Murat Uzdilek. Accidentals used in Arel-Ezgi-Uzdilek system were shown in detail in Table 1.7.1.

Interval between two sounds divided into two equal parts in Western Music whereas interval between two musical notes is divided into nine parts in Turkish Music; both of these are used efficiently. This case shows how rich the Turkish Music is. Each binary which exist between pitches in Turkish music sound system has special symbols and names signified with individual letters. These letters and symbols are shown in Table 1.7.2. in detail.

In traditional Turkish music, there is one diesis in 1st, 4th, 5th, 8th and 9th commas from any note to a high note and one flat in 1st, 4th, 5th, 8th and 9th commas from a high note to a low note. For instance; first (comma), second (small half tone), third (large half tone), fourth (small whole tone) commas are used in the E-F full interlude. The smallest binary interlude is the 4-comma small half tone interlude. There exist 7 musical notes and 6 interludes in an octave. As a result of this, 24 unequal interludes are gained in an octave.

Table 1.7.1. Accidentals used in Arel Ezgi Uzdilek System

1	Raises the following note by a comma value.	♯
2	Raises the following note by a small half tone value.	#
3	Raises the following note by a large half tone value.	♯
4	Raises the following note by a small whole tone.	♯
5	Raises the following note by a large whole tone.	♯
6	Lowers the following note by a comma value.	♭
7	Lowers the following note by a small half tone.	♭
8	Lowers the following note by a large half tone.	♭
9	Lowers the following note by a small whole tone.	♭
10	Raises the following note by a large whole tone value.	♭

Table 1.7.2. Letter and Symbols in Turkish Music

Name of the Interlude	Value of the Comma	Sharp(Accidental)	Flat	Symbol
Comma	1	♯	♭	F
Small half tone	4	#	♭	B
Large half tone	5	♯	♭	S
Small whole tone	8	♯	♭	K
Large whole tone	9	♯	♭	T
Augmented second	12-13	-	-	A-A 12-13

1.8. RELATED PUBLICATIONS AND RESEARCH

In this section, a relevant literature study was carried and the scientific studies related to topic was examined and listed by title.

In the doctorate study completed by Hasan Tahsin Sümbüllü in 2009 under Gazi University Faculty of Educational Science; its searched whether "Model on Makamic Analysis and Naming of Modal Center Traditional Turkish Folk Music Scales" in Traditional Turkish Folk Music is a type of modal or not. An answer is being sought for questions like;

- Does a meaningful correlation exist between TTFM series and TTCM series or not?
- How is the melodic progression analysis of TTCM series in accordance with the quantitative data?

As a result of this research; it is determined that quantitative data gained from TTCM series show parallelism with qualitative data, TTFM is a modal music and there is no objection to express TTFM series only with makam name or makam series.

Nihan Şengül analysed the topic The Computer Supported Statical Evaluation and Makam Analysis of Selâhattin Pınar's Works in her post graduate work, which she prepared at the Erciyes University Faculty of Social Sciences in 2005. 48 compositions composed in Hicaz makam was examined by "Computer-Aid Analysis Method" in order to analyse conformity of usage frequency of pitches, usage duration of pitches and melodic progression of scales to traditional makam structure.

Yener, (2004), in his article named Research of Stereotyped Tunes in Turkish Art Music Hicaz Songs via Markov Method and Computer Supported Analysis; 50 composition from Turkish Art Music Hicaz modal were chosen and scales were analysed with Markov Method, then the question of if the compositions composed in Turkish Art Music Hicaz modal were formed according to stereotyped melodies or personal opinions was tried to be answered, and in the end of the analysis some

stereotyped melodies' existences are discovered which form the Hicaz modal's structure.

Turan Saęer, in his postgraduate study "An Examination of Traditional Type of Art Music Makam Around Music School" completed at the Gazi University Faculty of Sciences in 1988, examined melodic motion of 1000 compositions which composed of the most 20 popular makam by handling modal structure of Turkish Art Music. Duration and frequency of pitches used in these compositions were analysed and the melodic transitions from one pitch to another pitch were examined. For each analysed makam, 5 pieces of tune instances were constituted.

Begüm Yalçinkaya, in her postgraduate study "Computer-Aided Statistical Analysis of Traditional Turkish Art Music Compositions and an Instance of Algorithmic Composition" prepared at the Gazi University Faculty of Educational Sciences in 2004, examined 46 compositions among Traditional Turkish Compositions which are in the form of Hüseynî makam song and Hubbub Rhythmic Mode with 10/8 time signature. Research shows that sound fields of composition, frequency of usage of pitches, melodic emotion of pitches, usage of intervals and composition's structures in terms of rhythm complies with the corporate structure of Traditional Turkish Art Music, and all of the compositions definitely reflect of compositions in the form of the Hubbub in the Hüseynî makam.

Zafer Telli, in his postgraduate study "Modal Analysis of Composition used in Şanlıurfa Folk Music" prepared at the Kırıkkale University Faculty of Social Sciences in 2011, determined the conformity of compositions used in Şanlıurfa folk music composed according to Traditional Turkish Art Music Literature and indigenous makams to Turkish Art Music makam criteria, duration of pitches and frequency of pitch usage via modal analysis. In research, 362 compositions were examined in total via scanning method. 87% of these works are comprised of **kırık music** and 13% of them are unmetred folk music. As a result of the research, it is accepted that gained data show similar features with Traditional Turkish Art Music.

CHAPTER II

METHOD

The methods used, data gathering tools, steps during gathering and process of data, software used during process stages, population and sampling are included in this section.

2.1. MODEL OF THE RESEARCH

In this study, "Statistical Analysis Method with Computer Software" was used. With the help of this method, Traditional Turkish Art Music compositions that composed in Muhayyer kürdi, Acem kürdi and Kürdi makam were analysed in terms of makam and it is examined that to what extent the gained data reflect the makam structure of Traditional Turkish Music.

2.2. POPULATION AND SAMPLE

Population of the research is consisted of verbal work of Turkish Art Music chosen from TRT repertoire. On the other hand, a sample is consisted of A-stable compositions- Kürdi, Muhayyer kürdi, Acem kürdi makams which very similar to each other- and the compositions in the form of song that belongs to these makams.

Compositions were randomly selected for the research. There exist 172 makam in the TRT Turkish Art Music repertoire. Total number of compositions belong to 3 makams (Muhayyer kürdi, Acem kürdi and Kürdi) which were chosen among 172 makam are shown in Table 2.2.1.

Table 2.2.1. Muhayyer kürdi, Acem kürdi, Kürdi Makams in the TRT TSM Repertoire a number of the Compositions

ITEM NO.	MAKAM	NUMBER OF COMPOSITIONS
1	Muhayyer kürdi	609
2	Acem kürdi	330
3	Kürdi	109
TOTAL	3	1048

Makams used in research, number of compositions regarding these makams and their percentage ratio were given in detail in Table 2.2. 2.

Table 2.2.2. Makams used in the research, number of composition and the percentage

ITEM NO.	MAKAM	NUMBER OF THE COMPOSITIONS	%
1	Muhayyer kürdi	40	33.33
2	Acem kürdi	40	33.33
3	Kürdi	40	33.33
TOTAL	3	120	100

During the selection of the makams which will be used in the research, expert's views were taken and literature was reviewed as a first, then makams which computer-aided analysis are not applied until now were chosen.

The list of the compositions that generate the sample is given in Table 2.2.3. The compositions are listed according to makam.

Table 2.2.3. Compositions used in the Analysis

ITEM NO.	SONG	COMPOSER	MAKAM	RHYTHMIC MODE
1	Ağlasam faydası yok	Arifm Sâmî Toker	Acem kürdi	Düyek
2	Ah bu gönülde sen olmasaydın	Mustafa Aksu	Acem kürdi	Düyek
3	Akşamı getiren sesleri dinle	Sâdun Aksüt	Acem kürdi	Düyek
4	Al git al git beni sevda rüzgarı mevsim bahar olan ellere düşür	Raif Somer	Acem kürdi	Düyek
5	Alev alev yanyorum	Şaziye Fikret	Acem kürdi	Düyek
6	Artık gelecek sanma sakın geçti o günler	Arif Sami Toker	Acem kürdi	Düyek-Aksak
7	Artık yanımda kal gitme bir yere	Halil İbrahim Taşkent	Acem kürdi	Semai
8	Aşka gel tenhâda olsun bir nefescik çal bugün	Rüştü Eriç	Acem kürdi	Ağır Aksak
9	Aşkımı bir anlasan gözlerime baksanda	Mustafa Sağyaşar	Acem kürdi	Düyek
10	Aşkın gözü görmez ki kafanı vursan taşa	İsmâil Akçapınar	Acem kürdi	Sofyan
11	Aşkın ile gece gündüz giryayım efendim	Sadi Hoşses	Acem kürdi	Yürük Semai
12	Aşkın kanunu yazsan yeniden	Sadettin Oktenay	Acem kürdi	Nim Sofyan
13	Ay geçer yıl geçer uzarsa ara	Kutlu Payaşı	Acem kürdi	Semai
14	Ayırma gözlerini gözlerimden bu akşam	Amir Ateş	Acem kürdi	Düyek
15	Ayrılısak ta kalbim sana küsmedi ki unutayım	Ali Şenozan	Acem kürdi	Sofyan
16	Bahar olur benim kışım mutluluktan döner başım	Rıdvan Tandoğan	Acem kürdi	Aksak

17	Bahar senden almış bütün rengini	Faruk Şahin	Acem kürdi	Düyek
18	Baharla hazan birleşmez ortada yaz var	Avni Anıl	Acem kürdi	Düyek
19	Bak bahtada ikbale	Cevdet Çağla	Acem kürdi	Aksak
20	Bak yine geçti bahar	İzzet Altınbaş	Acem kürdi	Semai
21	Bana aşkın sabrını sundu yarım bu gece	Hüseyin Çoşkuner	Acem kürdi	Curcuna
22	Bari felek ben yüzüne söyleyim	Nikogos Aga	Acem kürdi	Yürük Semai
23	Bende mazide kalan	Teoman Alpay	Acem kürdi	Düyek
24	Beni reddetse de tavrın bilirim özler için	Erol Sayan	Acem kürdi	Aksak
25	Bilir misin a sevdiğim nedir benim tek dileğim	Yusuf Nalkesen	Acem kürdi	Yürük Semai
26	Bir bahar akşamında yine bana dönsen	Şekip Ayhan Özışık	Acem kürdi	Düyek
27	Bir başka eda başka bir arzu ile geldin	Avni Anıl	Acem kürdi	Düyek-Semai
28	Bir gün bana geleceksin	Şekip Ayhan Özışık	Acem kürdi	Düyek
29	Bir sevda geldi başıma	Arif Sami Toker	Acem kürdi	Düyek
30	Canan bilirim sen beni nalan edeceksin	Ekrem Güyer	Acem kürdi	Curcuna
31	Ebedi bir yolculuk olsa sevgimiz	Nevzet Güyer	Acem kürdi	Düyek
32	Fikrimin ince gülü	İsmail Hakkı Bey	Acem kürdi	Semai
33	Geceler hiç bitmiyor	Arif Sami Toker	Acem kürdi	Düyek
34	Kır atıma bineyim yâr yoluna gideyim	Mehmet Yürü	Acem kürdi	Aksak
35	Ruhum şu gelen yılda bile maziyi andı	Alaeddin Yavaşça	Acem kürdi	Aksak
36	Sana eller ne güzel demesin kıskanırım	Faruk Kayacıklı	Acem kürdi	Curcuna

37	Samanyolu	Teoman Alpay	Acem kürdi	Semai
38	Seviyorum özlüyorum	Necdet Tokathoğlu	Acem kürdi	Semai
39	Yollarda kalan gözlere yaşlar doluyor gel	Muzaffer İlkar	Acem kürdi	Yürük Semai
40	Zehretme hayatı bana cânânım	Zeki Müren	Acem kürdi	Curcuna
41	Adım adım ümit verdiğim yollar	Kutlu Payaslı	Muhayyer kürdi	Nim Sofyan
42	Al gülün dalında diken var diye	Mahmut Oğul	Muhayyer kürdi	Nim Sofyan
43	Aşkımınla oynama kumar değildir	İsmet Nedim	Muhayyer kürdi	Sofyan
44	Aşkınla yana yana kül olsa da ocağım	İsmet Nedim	Muhayyer kürdi	Aksak
45	Bakarım yollarına nerdesin sevgilim	Şekip Ayhan Özişik	Muhayyer kürdi	Düyek
46	Bakışı çağırır beni uzaktan	Selahattin Pınar	Muhayyer kürdi	Curcuna
47	Bir kızıl goncaya benzer dudağın	Amir Ateş	Muhayyer Kürdi	Düyek
48	Bunca güzel içinde birisi var ki	Zekai Tunca	Muhayyer kürdi	Düyek
49	Duydum ki unutmuşsun	Selahattin Altınbaş	Muhayyer kürdi	Semai
50	Elbet bir gün buluşacağız	Mustafa Seyran	Muhayyer kürdi	Semai
51	Gençliğe Veda	Yıldırım Gürses	Muhayyer kürdi	Sofyan
52	Gözlerinin rengi deniz mavisini	Faruk Şahin	Muhayyer kürdi	Sofyan
53	Arım, balım, petegim	İsmet Nedim	Muhayyer kürdi	Nim Sofyan
54	Hala sözümdeyim unuttum sanma	Dolgun Dalgıçoğlu	Muhayyer kürdi	Düyek

55	İçin için yanıyor	Şekip Ayhan Özışık	Muhayyer kürdi	Düyek
56	İşte hepsi o kadar	-	Muhayyer kürdi	Sofyan
57	Kapın her çalındıkça o mudur diyeceksin	Yusuf Nalkesen	Muhayyer kürdi	Düyek
58	Karlı dağlar yıldızı	Sadettin Kaynak	Muhayyer kürdi	Düyek
59	Kime derdim söyleyeyim halden bilmezse	İsmet Nedim	Muhayyer kürdi	Sofyan
60	Mevsimler yas tutup çöller ağlasın	Yıldırım Gürses	Muhayyer kürdi	Sofyan
61	Nakış nakış işledim sevdâyı şu gönlüme	Amir Ateş	Muhayyer kürdi	Düyek
62	Ne çıkar bahtımıza ayrılık varsa yarın	Gündoğdu Duran	Muhayyer kürdi	Semai
63	Ne olursun güzelim sevsen beni	Rüştü Demirci	Muhayyer kürdi	Nim Sofyan
64	O beni bir bahar akşamı terkedip gitti	Şekip Ayhan Özışık	Muhayyer kürdi	Düyek
65	Rüzgar söylüyor şimdi o yerlerde	Şekip Ayhan Özışık	Muhayyer kürdi	Düyek
66	Sarmaşık gülleri	Teoman Alpay	Muhayyer kürdi	Semai
67	Sarsam seni gül dudaklım	Yıldırım Gürses	Muhayyer kürdi	Sofyan
68	Sen benimsin ben senin	Turhan Taşan	Muhayyer kürdi	Nim Sofyan
69	Sen gül dalında gonca	Emin Ongan	Muhayyer kürdi	Curcuna
70	Sen ne kadar saklasan gönlündekini	Avni Anıl	Muhayyer kürdi	Düyek
71	Sen nisansın daha ben sarı eylül	Kutlu Payaslı	Muhayyer kürdi	Semai Curcuna

72	Sen uzakta bir yıldız	-	Muhayyer kürdi	Düyek
73	Seni ilk gördüğüm anda	Oktay Tem	Muhayyer kürdi	Aksak
74	Son köprüyü sen attın	-	Muhayyer kürdi	Sofyan
75	Sevgilim benim yanımda olsan	İsmet Nedim Saatçi	Muhayyer kürdi	Düyek
76	Şimdi hasret bu gönül bir gülün busesine	Oktay Tem	Muhayyer kürdi	Düyek
77	Sürmeyi Kaştan Alır Ufacık Yaştan Alır	İsmet Nedim Saatçi	Muhayyer kürdi	Sofyan
78	Tekrar bana dönsen yine beni sevsen	Zeki Müren	Muhayyer kürdi	Düyek
79	Viran olan kalbimde sevgilimi özlerim	Ali Erköse	Muhayyer kürdi	Düyek
80	Yine bahar oldu çoştı yüreğim	Saadettin Kaynak	Muhayyer kürdi	Düyek
81	Aşk rüyadır çok zaman	-	Kürdi	Semai
82	Aşkın tadına vardık	Erol Sayan	Kürdi	Sofyan
83	Aynı bedende can gibiyiz	Ayşe Birgül Yılmaz Mahmut Oğul	Kürdi	Düyek
84	Bakma sen gözlerimden akan yaşlara	Huseyin Erbay	Kürdi	Nim Sofyan
85	Bana kollarını uzatsan biraz	-	Kürdi	Semai
86	Bana sevgiyi anlat gülen çocukları solmayan çiçekleri	Bilge Özgen	Kürdi	Sofyan
87	Bilsen neler vermek isterdim	Erol Sayan	Kürdi	Düyek
88	Bir hayal, bir ümüt, bir rüya da olsa tutku	Yılmaz Pakalınlar	Kürdi	Düyek

89	Bir sevda geldi başıma	Arif Sami Toker	Kürdi	Düyek
90	Çiçekler bile gonca iken sevilir	Erol Sayan	Kürdi	Sofyan
91	Denizlerin birincisi Çesme Egenin incisi	Pınar Köksal	Kürdi	Düyek
92	Dudağında şarkı olsam yüreginde duygu olsam	Rüştü Eriç	Kürdi	Sofyan
93	Dudaklarında arzu kollarında yalnız ben	Sadettin Öktenay	Kürdi	Nim Sofyan
94	Dün akşam yine benim yollarıma bakmışsın	Selami Şahin	Kürdi	Sofyan
95	Gel bahardan zevk alalım	Ömür Gençel	Kürdi	Sofyan
96	Gelemezsin kara gözlüm bilirim	Fusun Ocakçıoğlu	Kürdi	Düyek
97	Gül goncası nazende kaşgöz endam yerinde	Alâeddin Yavaşca	Kürdi	Sofyan
98	Hani ayrılıkk hani yoktu hiç keder	Mümin Salman	Kürdi	Nim Sofyan
99	Hiç tatmadım böyle duyguyu	Selahattin içli	Kürdi	Sofyan
100	İçindeki duygularla biliyorum coşuyorsun	Mustafa Malay	Kürdi	Düyek
101	İlkbahara bekle beni demiştim	Talat Er	Kürdi	Düyek
102	Karlı dağlar, karlı yollar aşda gel	Necip Gülses	Kürdi	Nim Sofyan
103	Nasıl geçer sensiz bu yaz	Mahmut Oğul	Kürdi	Aksak
104	Nasıl unuturuz geçen günleri	Salih Berkmen	Kürdi	Nim Sofyan
105	Ne aşk kaldı ne de bir iz	Turhan Taşan	Kürdi	Sofyan
106	Neşeler bulurum şen gözlerinde	İlgün Soysev	Kürdi	Nim Sofyan
107	O ceylana bakmaya gör	Rehyan Karataş	Kürdi	Düyek
108	Onun olmaya hakkım yok	Zekai Tunca	Kürdi	Düyek

109	Öyle bir göz süzdün öyle bir baktım	Osman Babuşcu	Kürdi	Sofyan
110	Sakın dönme istemem bütün ümitler söndü	Necdet Tokatlıoğlu	Kürdi	Düyek
111	Senelerce beklettin buram buram özlettin	Seyfi Güldağı	Kürdi	Aksak
112	Seni andım bu gece	Şekip Ayhan Özışık	Kürdi	Düyek
113	Senin sevdan rüya bana	Seyfi Güldağı	Kürdi	Nim Sofyan
114	Seninle tattım her mutluluğu	Zekai Tunca	Kürdi	Düyek
115	Sevdiysen hiç bekleme gel yerleş şu kalbime	Erdoğan Çelikkol	Kürdi	Düyek
116	Sevgi yağmuruna tutuldu gönlüm	Erdal Şâhin	Kürdi	Sofyan
117	Susadım gülüşüne	Erol Sayan	Kürdi	Nim Sofyan
118	Uçurumlar	Talat Er	Kürdi	Düyek
119	Yaşamaya bak	K.Kudret Güner	Kürdi	Nim Sofyan
120	Yine menekşelerde gozlerini aradım	Amir Ateş	Kürdi	Düyek

2.3. DATA GATHERING METHOD AND RESOLUTION OF THE DATA

In order to make makam analysis; the basis of the research, publications and scientific research relevant to the subject were examined at first and then Turkish Art Repertoire of the TRT was scanned and the data were chosen by chance method (random).

Whenever the term ‘Turkish Music’ is being heard, the key concern that comes into many people’s mind is how to identify the makams and distinguish these makams from each other. For makam analysis which is the main purpose of the study, a melodic progression map was determined in detail examining the key elements constituting the makams (scale, melodic progression, Finalis tune, dominant tone pitch, leading-tone pitch).

The melodies in our music is not used freely as it's in the Western music but used in a certain order like introduction-body-conclusion. These rules which organize the melody movements are called as 'melodic progression'. It will be not enough if the makam is defined as a general situation of the sound which gathered around one tonic-one dominant tone. The main elements constituting the makam are scale and melodic progression. Definition and the melodic progressions of the makam are the greatest factor for the formation of the pitch hierarchy of the Turkish Music.

Due to such factors; in order to have makam analysis and classification, melodic progression analysis of the scales of the obtained data should be done at first. Melodic progression can be thought as a trip between the pitches. Transition from one pitch to another pitch, the subsequent pitch and waiting period on a pitch during this trip is an indicator of a repetition of the scales according to a certain melodic progression.

For the melodic progression analysis of the scales in this research; Zeren's studies, 'makam and melodic progression' are determined as the method.

If some pitches in a mode scale are used more and some are used less, and if some pitches are insistently emphasized and some is quickly passed, each pitch will have a different efficiency on the whole work. Besides, melodic progression descriptions are made in the manner that this efficiency differences are qualitatively stated. However, if a quantitative Rhythmic Mode is demanded, it is necessary to attribute efficiency degrees to measurable quantities and therefore to search some mainstays (Zeren, 2003, p.96).

2.4. TRANSFERRING THE DATA TO THE COMPUTER ENVIRONMENT

In order to perform computer-aided makam analysis on the obtained data, they were transferred to the computer environment at first.

In order to transfer the data to the computer environment, professional musical notation programs (Finale, Sibelius, CakeWalk) were examined and the most

suitable musical notation program named 'Finale 2011' was used for this study. Finale is the most advanced and preferred musical notation program in the world. With its features like easy composing, arranging, notation and high quality printing; the program can instantly convert musical notes and partitions into sound and record as MP3 audio file.

A display of the composition chosen from the sample in Finale musical notation program is demonstrated in the figure 2.4.1.

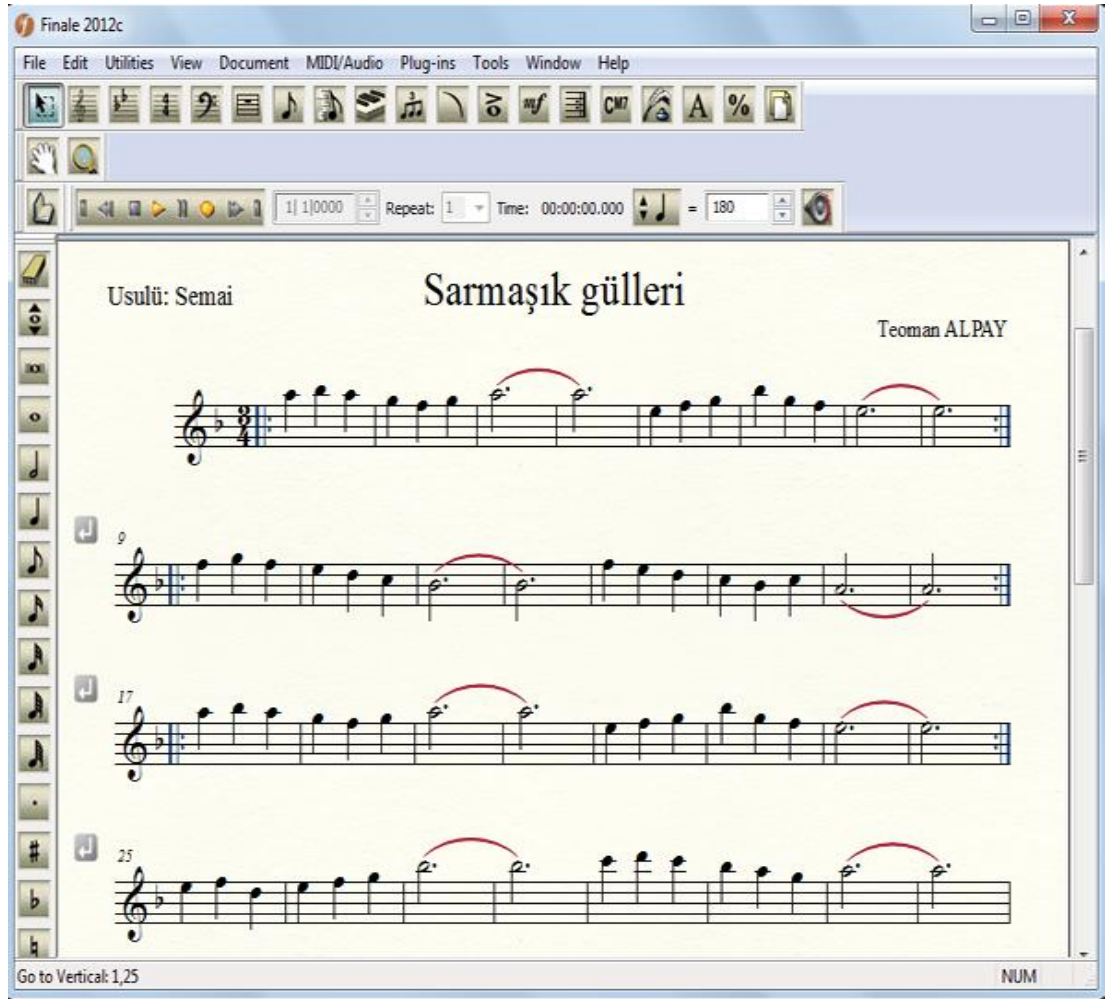
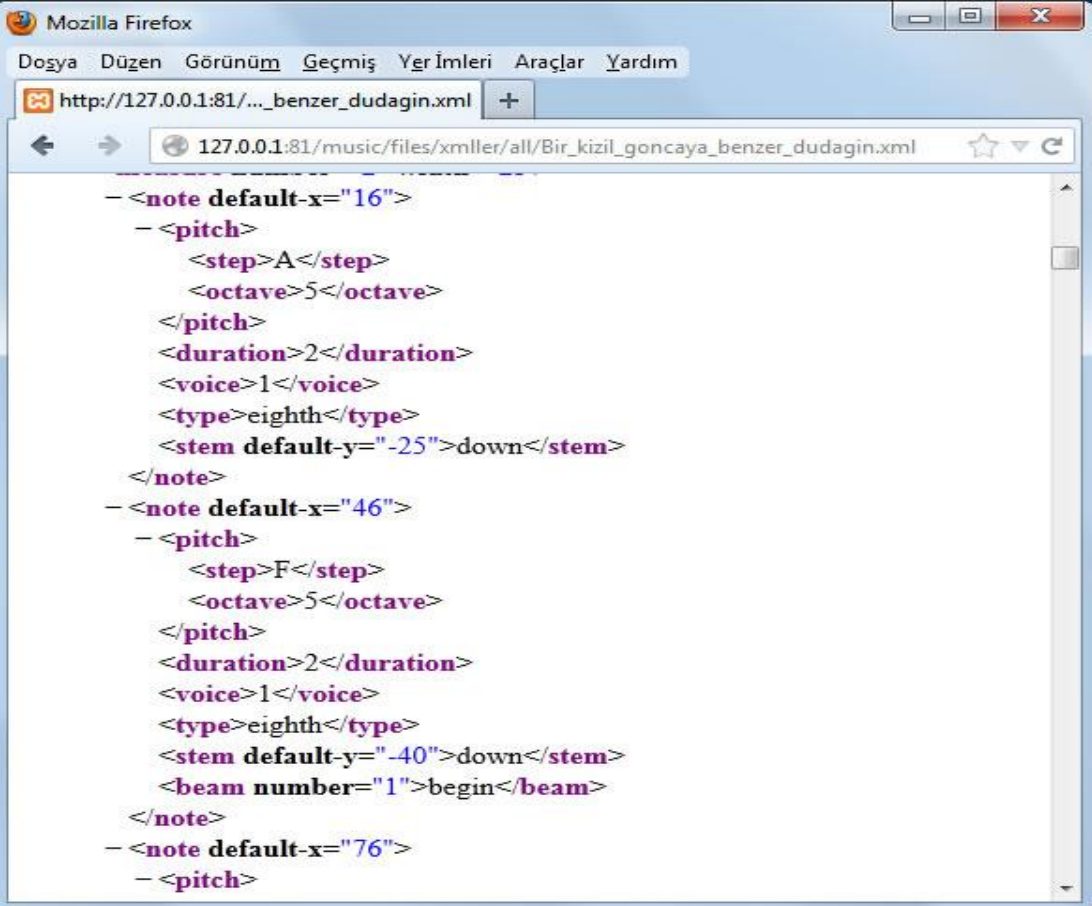


Figure 2.4.1. Drafting the Data via Finale 2011

After transferring the verbal works chosen from TRT's Turkish Art Music repertoire to Finale, all of the compositions were converted into XML (Extensible Markup Language) format through Finale 2011 software in order to be able to make data analysis.

XML is a “meta” markup language used to describe the structure of data. XML has taken the computer industry by storm since its inception and is now the markup language of choice for configuration files, data interchange, B2B transactions. XML is even being used to represent calls to distributed objects through the Simple Object Access Protocol (SOAP), an XML application. XML has numerous advantages including being easy to read, easy to parse, extensible, and widely adopted. In addition, you can define a grammar through a Document Type Definition (DTD) to enforce application-specific syntax. However, the greatest single advantage of XML is that the data can be easily processed by other applications; XML data is not in a proprietary format (Hall, Brown, 2001, p.1133).

A XML software display belonging to a composition used in the analysis is shown in the Figure 2.4.2.



```
- <note default-x="16">
  - <pitch>
    <step>A</step>
    <octave>5</octave>
  </pitch>
  <duration>2</duration>
  <voice>1</voice>
  <type>eighth</type>
  <stem default-y="-25">down</stem>
</note>
- <note default-x="46">
  - <pitch>
    <step>F</step>
    <octave>5</octave>
  </pitch>
  <duration>2</duration>
  <voice>1</voice>
  <type>eighth</type>
  <stem default-y="-40">down</stem>
  <beam number="1">begin</beam>
</note>
- <note default-x="76">
  - <pitch>
```

Figure 2.4.2. XML-formatted computer display

2.5. ANALYSIS OF DATA

Compositions, which's makam and progression analysis will be done, were written in the Finale musical notation program and converted into XML. Then, a PHP-based special software called "Makam Analysis" was prepared in order to calculate frequency of usage, usage duration and effectiveness level in computer area.

While making the definition of the makam in the Traditional Turkish Music, specific features of each makam like Finalis Pitch, Dominant Tone Pitch, Leading-Tone Pitch, Descending Scale and Ascending Scale are stated. A listener can define makam only by analysing these features. Due to these factors; in order to enable analysis of characteristics of makam definition by computer environment, a program named "Makam Analysis" was prepared. Firstly, frequency of usage were calculated and its percentages were taken (Number of the pitches used in the composition were calculated).

After applying this transaction to each composition, the usage duration of each pitch in the composition was calculated and their percentages were taken.

It is necessary to search in order to figure effectiveness of a pitch in the composition after calculating the usage frequency and usage duration of each pitch for each composition. At this point, Ayhan Zeren's Effectiveness Level Formula of pitches in the compositions was taken into consideration.

Ayhan Zeren emphasized that some pitches are used more during the progression of the composition and some pitches are used less and added that effectiveness of each pitch in the composition would be different if it is stopped for a very short while and passed quickly from some pitches. (Zeren, 2003, p.96).

There exist such pitches in the makams which composers have to stop persistently or rest on these pitches. These pitches are called as Dominant Tone, Cadential Note or Upper Tonic pitch. However; apart from these pitches, there exist other pitches having the feature of Suspended Cadence. These pitches show differences according to feature of each makam. While making definition of characteristic structure of the makam; features like Finalis pitch, dominant tone pitch

regarding to that makam are mentioned also. This definition shows that effectiveness level of each pitch is distinct during the progression.

Zeren emphasized that effectiveness of an i pitch in the makam should be proportionate to total frequency of usage, $FU = \sum Ni$ and total audible duration, $AD = \sum ti$ in the composition.

As a result of mathematical equations, effectiveness of an i pitch in the scale can be found according to the Formula below (Zeren, 2003, p.97).

$$ei = \frac{(\sum ti)^2}{\sum Ni} \text{ (Zeren, 2003, p.98)}$$

By using Zeren's mentioned formula in the software called "Makam Analysis", effectiveness levels of whole pitches were calculated.

With the help of "Makam Analysis" software, effectiveness level of all of the pitches was calculated and then it is tried to be analysed whether compositions follow descending or ascending melodic progression.

Each makam has a unique progression. If sounds generally go from sharp tones to chest notes during performing of a composition, scale of the composition is descending; or if it goes from chest notes to sharp tones, the scale is ascending. In accordance with this information as well as taking opinions of experts, it is tried to be calculated whether compositions follow descending or ascending scale by using "MakamAnalysis" software.

For this calculation, xml files of compositions were analysed and then musical octaves of the compositions and musical bars were taken into consideration. The points where the scale ends are generally the last points of the musical bars. In order to calculation, the uppermost musical note of the musical bar was taken as a basis and the other notes were added to and deducted from each other until the musical bar is closed. This transaction was applied to each musical bar individually. All notes between the points where bar line is closed starting after the note where a bar line is opened have been added to and deducted from each other.

If the value between musical bars appears to be positive, ascending scale value is increased by 1. If the value between musical bars appears to be negative, descending scale value is increased by 1.

After applying this transaction to all musical bars, the percentages of descending and ascending melodic progressions of compositions are calculated. After applying this transaction individually to each composition, descending and ascending melodic progression values are calculated in percentage.

Finally, the percentages of descending and ascending melodic progression of compositions related to the makam which is tried to be analysed were individually calculated.

2.6. MAKAM DETERMINATION OF A COMPOSITION BY USING A COMPUTER SOFTWARE

After applying the steps which are described under section 2.5, the makam of the composition is tried to be estimated via computer software.

In order to determine the makam of the compositions, a second module is written to the software named "Makam Analysis". In this module, effectiveness level of all pitches in the composition was calculated. Then, algorithms were written according to characteristics of Muhayyer kürdi, Acem kürdi and Kürdi makams.

While writing algorithms, basic factors which consist makams were taken as a basis. These factors are;

- Finalis Tone
- Dominant Tone
- Progression
- Equipment

According to these four features, percentage calculation is tried to be done in order to find which makam's characteristics the composition show parallelism. Steps during formation of the algorithm are given in detail below;

2.6.1. Estimation of Finalis Tone (Cadential Note Pitch)

While defining the makams of Traditional Turkish Art Music, Finalis Tone of each makam is mentioned. It is the strongest chest note and the ending point of the makam's progression. There is one Finalis Tone (Cadential Tone Pitch) in the makams. There are such pitches that show characteristics of any makams which composers must rest on these pitches while composing. Tonic pitch and dominant tone pitch are the most crucial sounds which determine the makam. Effective levels of these pitches in the composition are much more as compare to other pitches.

Due to these reasons, Finalis Tone (Tonic Pitch) is thought to be effective while determining the makam and effectiveness level of Finalis Tone in the compositions were calculated and compared with other pitches. For instance, Tonic Pitch in the Muhayyer kürdi makam is the A-Dügah pitch. It is expected to have higher effectiveness level of Dügah pitch in compositions related to Muhayyer kürdi in comparison with other pitches. In this study, Finalis Tone (Cadential Note Pitch) which is tried to be analysed in 3 makam is Dügah-A note. If the Finalis Tone is the Dügah pitch in the composition which is tried to be analysed and also in the compositions where effectiveness of Dügah pitch is high; estimation of Finalis Tone is tried to be done after determining that the Dügah pitch is the Finalis Tone of that composition.

2.6.2. Estimation of Dominant Pitch

Dominant Tone Pitch is the most crucial pitch to determine makam after Tonic Pitch. Tonic Pitch is same in the most makams, however Dominant Tone Pitch show differences. Therefore, Dominant Tone Pitch has crucial role while determining the makam of modal melody. Dominant sound is one of the most emphasized musical notes during composing. Due to this reasons, it is thought that Dominant Tone Pitch is effective while determining the makam. Accordingly, effectiveness level of the Dominant Tone Pitch was calculated and compared with other pitches. In this study, first degree Dominant which is tried to be analysed are Dügah-A pitch for Muhayyer kürdi, Acem-F-pitch for Acem kürdi and Neva-D pitch

for Kürdi. Dominant sound estimation was tried to be done by comparing effectiveness level of these pitches with other pitches.

2.6.3. Estimation of Melodic Progression

One of crucial facts that identify the makam is melodic progression. It has a key role during makam analysis of the melodic progression since Finalis pitches, dominant tone pitches and equipment tones of some makams are same.

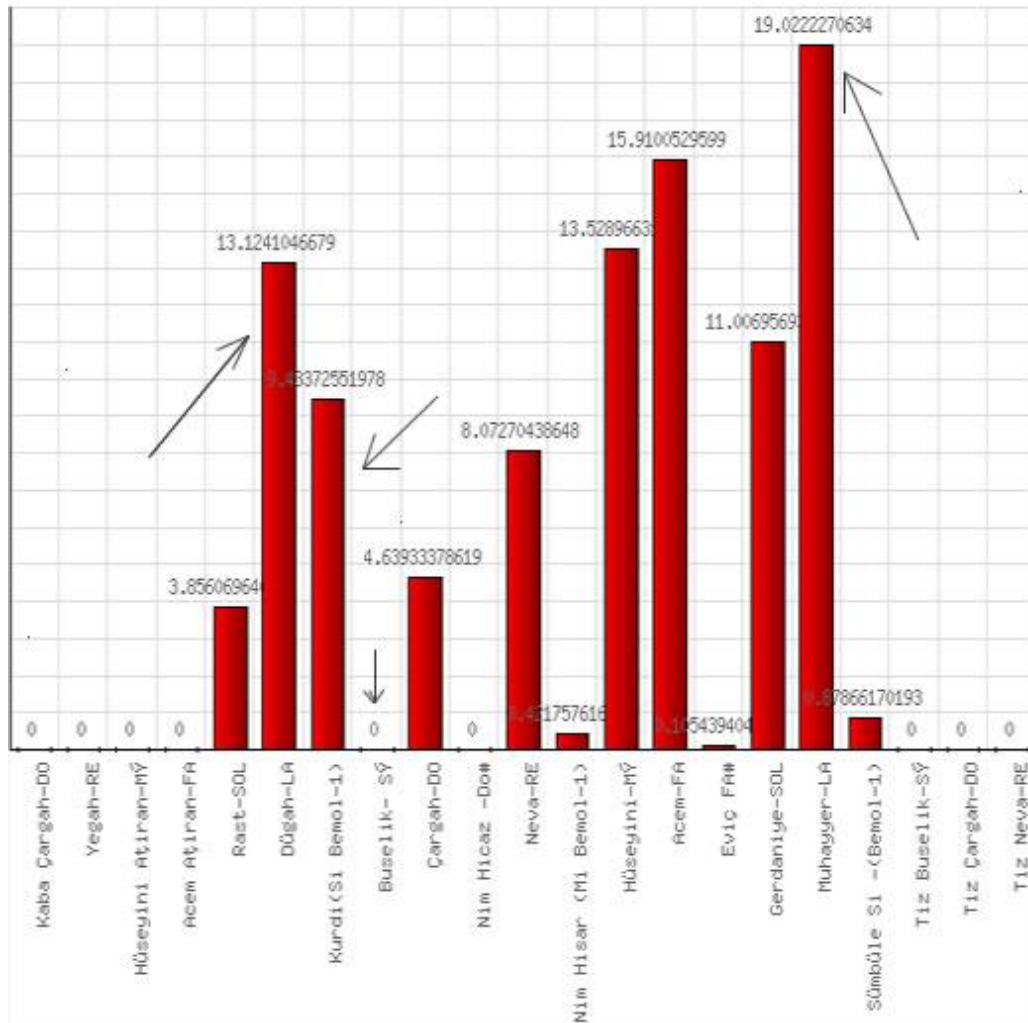
Melodic progression is the only distinctive point separates the makams which have such similar features. In this study; Finalis pitch and equipment tones are same for Muhayyer kürdi, Acem kürdi and Kürdi Makams which are tried to be analysed. Therefore, progression has a key role while determining the makam. Progression can be descending, ascending and sometimes ascending-descending in compositions. If scales in the composition are going from sharp tones to chest notes, progression can be considered as descending; on the contrary if they are going from chest notes to sharp note, progression can be considered as ascending. By taking this information into consideration, the percentages of descending and ascending progressions of the scales are calculated and then progression determination is done for the composition.

2.6.4. Estimation of Equipment

Each makam has unique equipment tones. These pitches are also called as 'Equipment'. There exist such makams which have same Finalis pitches and Dominant Tone Pitches. The only difference to distinguish these makams is equipment tones. With the help of equipment tones; it is possible to gain various makams by moving on the same pitches. Among 3 makam which is tried to be analysed, equipment tones is the Kürdi-B pitch. Estimation of equipment tones is done by comparing effectiveness level of this pitch with other pitches.

By analysing Tonic pitch, Dominant Tone pitch, melodic progression and equipment in scales, it has been aimed to estimate as percentile with which mode's characteristics the mode of works show parallelism as percentile.

Results of a sample composition are shown in the Figure 2.6.4.



Melodic Progression	
Descending melodic progression:	% 73.6842105263
ascending melodic progression:	% 26.3157894737

Makam	Melodic Progression	Dominant tone pitch	Tonic Pitch	Equipment	Result
Muhayyer Kürdi	✓	✓	✓	✓	%100
Acem Kürdi	✓	✗	✓	✓	%75
Kürdi	✗	✗	✓	✓	%50

Figure 2.6.4.The Result of a sample data

2.7. CRITERIA DURING EVALUATION OF THE DATA

Situation below were taken into consideration in this study during composition analysis.

- Data were chosen only from verbal art of TRT's Turkish Art Music repertoire.
- Rest symbols in the compositions were not taken into consideration since they do not have characteristics of a musical note and do not have any effect on the melodic progression of the makam.
- The compositions were written only as a single stanza. Other stanzas are not written again and are left out of assessment and since they are repetition of the first stanza.
- Since comma tones (Small half tone flat, comma flat) do not exist in the Finale 2011 musical notation program, these sounds were written according to western music style and necessary adjustments were done from XML files. Since comma sounds do not exist in Finale 2011 musical notation program in the Traditional Turkish Music, these sounds are composed according to western music style and necessary adjustments for XML files were done.
- During composing, it is monitored that whole pitches in the "25-pitched Traditional Turkish Music Sound System" were not used since this study is limited to Kürdi, Muhayyer kürdi and Acem kürdi Makams. "Some pitches in the "25-pitched Traditional Turkish Music Sound System" were left out of the assessment by taking expert's opinion.

In this study, the musical notes which were taken into consideration are; Kaba Çargah, Yegah, Hüseyini aşiran, Acem aşiran, Rast, Dügah, Kürdi, Bûselik, Çargah, Nim Hicaz, Neva, Nim Hisar, Hüseyini, Acem, Eviç, Gerdaniye, Muhayyer, Sümbüle, Tiz buselik, Tiz Çargah, Tiz Neva. Because in the makams to be analysed, all pitches in 25-pitched Traditional Turkish Music System were not being. Even if it is used, it will not have any effect on modal analysis since it has very low level of percentage values.

CHAPTER III

FINDINGS AND INTERPRETATIONS

In this section, findings and interpretations are involved which are gained after by analysis of compositions taken from TRT's Turkish Art Music repertoire. Analysis was done on Verbal work of Turkish Art Music chosen from TRT repertoire and compositions belong to Kürdi, Muhayyer kürdi, Acem kürdi makams which are very similar to each other in terms of scale. Analysis was done through total of 120 compositions where compositions were chosen by random (chance) method from three makam. In accordance with these gained data, solution to the problems is being sought.

3.1. FINDINGS AND INTERPRETATIONS RELATED TO MUHAYYER KÜRDİ MAKAM

Findings and interpretations are listed below which are gained by chance (random) method from 40 verbal work among 609 compositions that belong to Muhayyer kürdi makam from TRT Turkish Art Music repertoire.

Table 3.1.1. Data related to Muhayyer kürdi makam sample

Musical Notes	FU	FU%	AD	AD%	EL	EL%
Kaba Çargah	0	0	0	0	0	0
Yegah	1	0,011	4	0,012	16	0,013
Hüseyini aşiran	2	0,023	4	0,012	8	0,006
Acem aşiran	11	0,0127	103	0,330	964,454	0,836
Rast	100	1,159	340	1,091	1156	1,002
Düğah	688	7,976	3365	10,807	16458,175	14,279
Kürdi	674	7,814	2223	7,171	7398,054	6,418
Buselik	44	0,510	127	0,407	366,568	0,318
Çargah	808	9,368	2865	9,201	10158,694	8,813
Nim Hicaz	24	0,278	60	0,192	150	0,130
Neva	926	10,736	3070	9,859	10178,077	8,830
Nim Hisar	39	0,452	229	0,735	1344,641	1,166
Hüseyini	1015	11,768	3296	10,585	10703,069	9,286
Acem	810	9,391	2481	7,968	7599,211	6,593
Eviç	98	1,136	340	1,091	1179,591	1,023
Gerdaniye	876	10,156	3028	9,724	10466,648	9,080
Muhayyer	1324	15,350	5569	17,885	23424,290	20,323
Sümbüle	686	7,953	2411	7,743	8473,645	7,351
Tiz Buselik	30	0,347	86	0,276	246,533	0,213
Tiz Çargah	305	3,536	1009	3,240	3337,970	2,896
Tiz Neva	164	1,901	517	1,660	1629,810	1,414

Pitches' frequencies of usage and duration values according to the data gained by composition from Muhayyer kürdi makam are shown in Figure 3.1.1 and Figure 3.1.2.

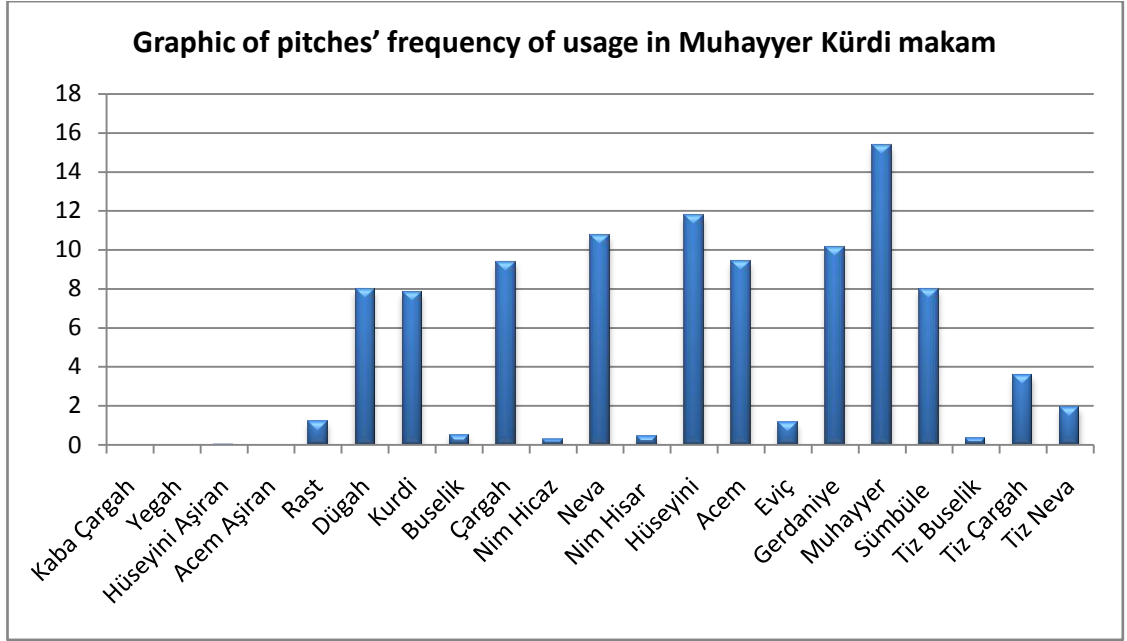


Figure 3.1.1. Graphic of pitches' frequency of usage in Muhayyer kürdi makam

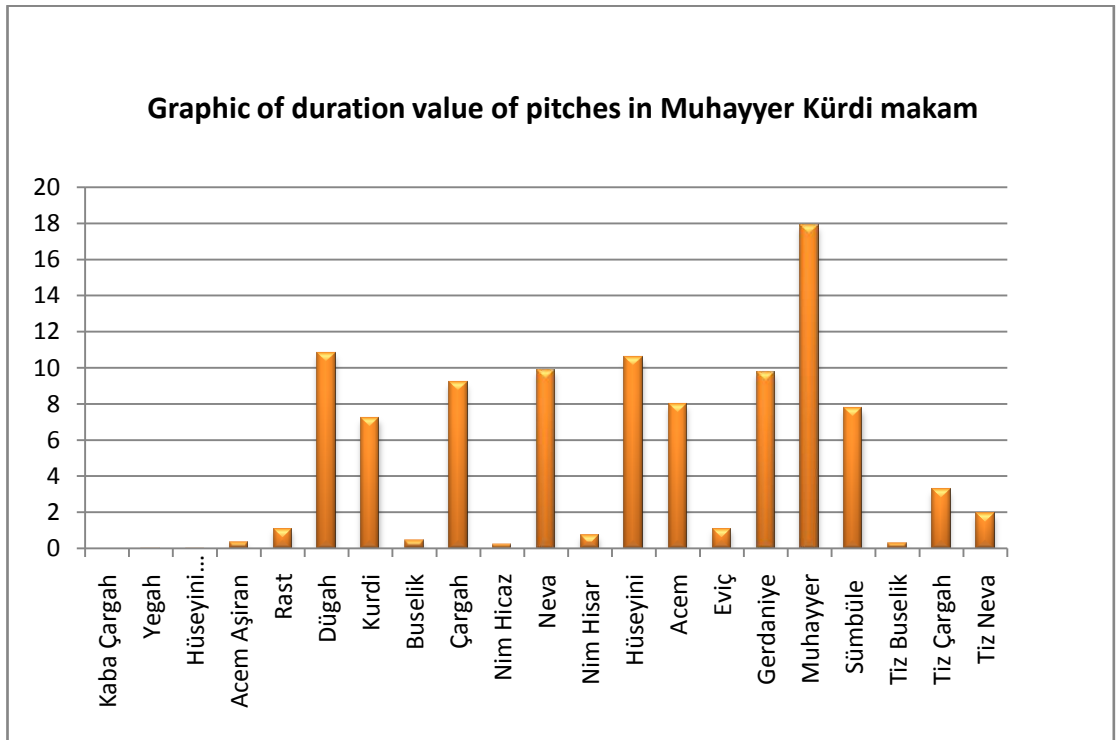


Figure 3.1. 2. Graphic of duration value of pitches in Muhayyer kürdi makam

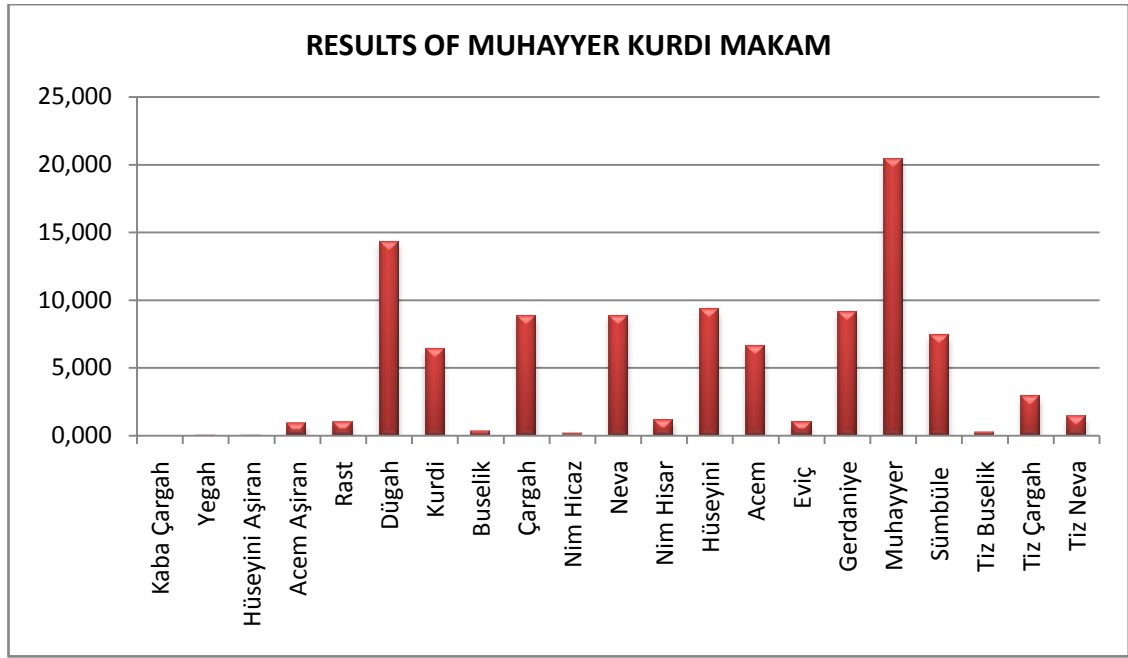


Figure 3.1.3. Results of Muhayyer kürdi makam

3.2. CHARACTERISTIC FEATURES OF MUHAYYER KÜRDİ MAKAM

Muhayyer kürdi Makam Scale is occurred by simultaneous using of Muhayyer Makam scale and Kürdi Makam scale. When traditional musical notation is taken into consideration; primary dominant tone is the makam of Muhayyer pitch in 12th level, secondary dominant tone is the makam of Hüseyini pitch in the 9th level and the rest is the makam of Dügah pitch in the 5th level.

Rest:Dügah-A pitch

Melodic progression: Descending

Dominant tone: Muhayyer-A pitch

Equipment: Kürdi-B

Leading Tone: Rast-G pitch

Scale of the Melodic progression:Melodic progression of Muhayyer kürdi makam is generally come into use around from Muhayyer pitch which is an Upper Tonic pitch. It has been ranged within sounds of Çargah quintette on Acem pitch which are mostly extension sounds and passed to sounds of Muhayyer Mode scale.Suspended Cadence is done at the Neva Pitch. Kürdi Quartette is being used

when progressing through Neva Pitch to the Finalis. Finalis is done at the Dügah pitch(Özkan, 1994, p.162).

3.3. COMPARISON BETWEEN CHARACTERISTICS OF MUHAYYER KÜRDİ MAKAM AND GAINED DATA

Features of Muhayyer kürdi makam according to the gained data and Figure 3.1.1, 3.1.2, 3.1.3 can be listed as below.

As a result of Muhayyer kürdi makams analysis, compositions show 74,27% descending melodic progression, 25,72% ascending melodic progression characteristics.

Dominant tone is the Muhayyer-A pitch with 20,32%. Cadential Note Pitch is the second level Dominant Tone Pitch after the Dügah-A and Hüseyini-E pitch with 9,28%. It is being developed at the shrilled-regions. Gained data show parallelism with the characteristics of the Muhayyer kürdi Makam. Effectiveness level of pitches of Muhayyer kürdi makam scale showed figure 3.3.1.

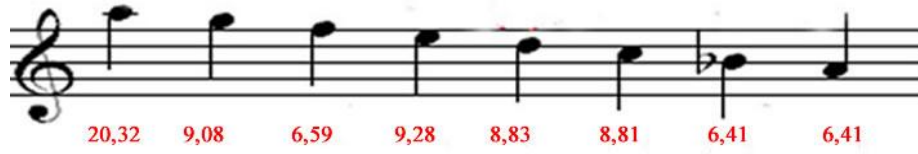


Figure. 3.3.1. Effectiveness Level of Pitches in the Muhayyer kürdi Makam

3.4. FINDINGS AND INTERPRETATIONS RELATED TO ACEM KÜRDİ MAKAM

Findings and interpretations are listed below which are gained by chance (random) method from 40 verbal work among 330 compositions that belong to Acem kürdi makam from TRT Turkish Art Music repertoire.

Table 3. 4. 1. Data related to sample of Acem kürdi makam

Musical Note	FU	FU%	AD	AD%	EL	EL%
Kaba Çargah	0	0	0	0,000	0,000	0
Yegah	1	0,011	1	0,002	1,000	0,00036
Hüseyini aşiran	2	0,023	5	0,011	12,500	0,00453
Acem aşiran	15	0,179	289	0,615	5568,067	2,01796
Rast	112	1,341	566	1,205	2860,321	1,03663
Dügah	771	9,232	5483	11,670	38992,593	14,1316
Kürdi	693	8,298	3568	7,594	18370,309	6,65771
Buselik	38	0,455	126	0,268	417,789	0,15141
Çargah	984	11,783	5180	11,025	27268,699	9,88264
Nim Hicaz	9	0,107	39	0,083	169,000	0,06125
Neva	1138	13,627	5790	12,324	29458,787	10,6764
Nim Hisar	92	1,101	435	0,926	2056,793	0,74542
Hüseyini	1178	14,106	5335	11,355	24161,481	8,75653
Acem	1245	14,908	7219	15,365	41858,603	15,1703
Eviç	22	0,263	98	0,209	436,545	0,15821
Gerdaniye	837	10,022	3893	8,286	18106,869	6,56224
Muhayyer	829	9,926	6193	13,181	46264,474	16,767
Sümbüle	276	3,304	1977	4,208	14161,337	5,13231
Tiz Buselik	6	0,071	21	0,045	73,500	0,02664
Tiz Çargah	86	1,029	647	1,377	4867,547	1,76408
Tiz Neva	17	0,203	118	0,251	819,059	0,29684

Pitches' frequencies of usage and duration values through data gained by composition from Muhayyer kürdi makam are shown in Figure 3.4.1.and Figure 3.4.2.

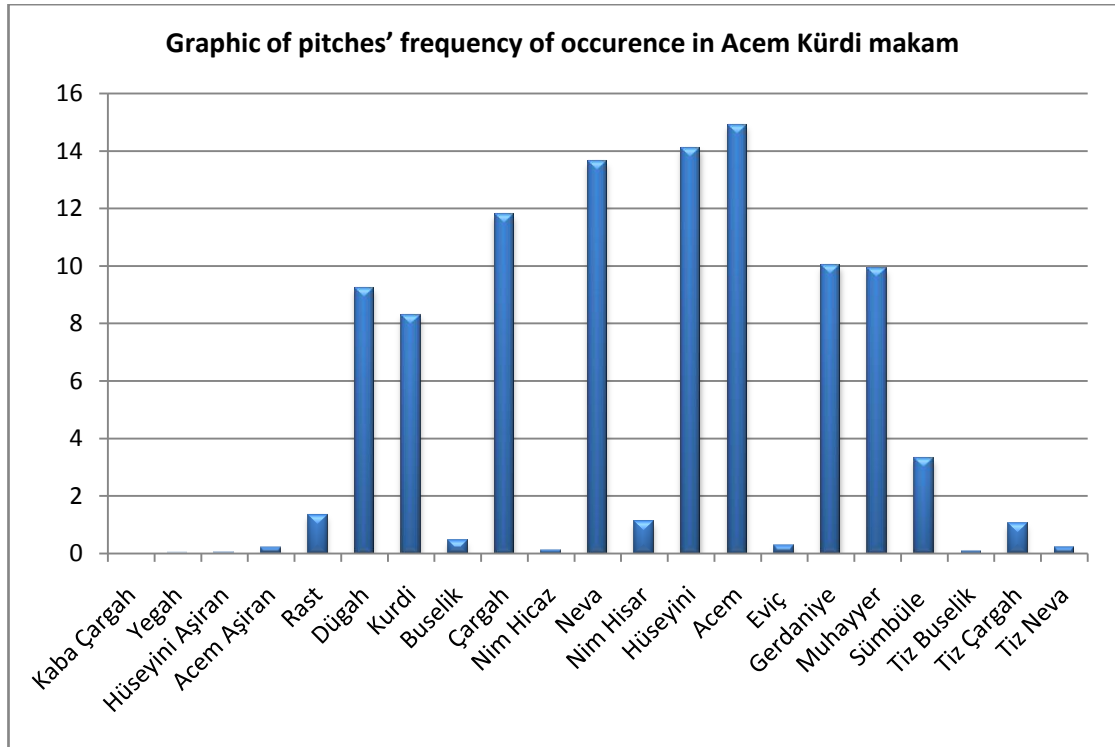


Figure 3.4.1. Graphic of pitches' frequency of usage in Acem kürdi makam

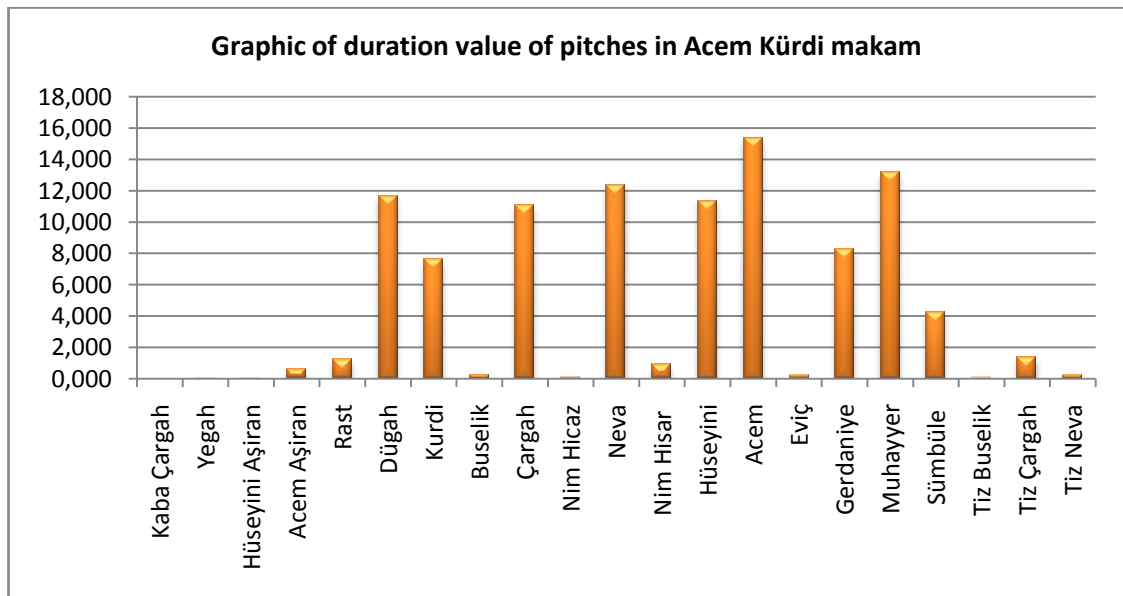


Figure 3.4.2. Graphic of duration value of pitches in Acem kürdi makam

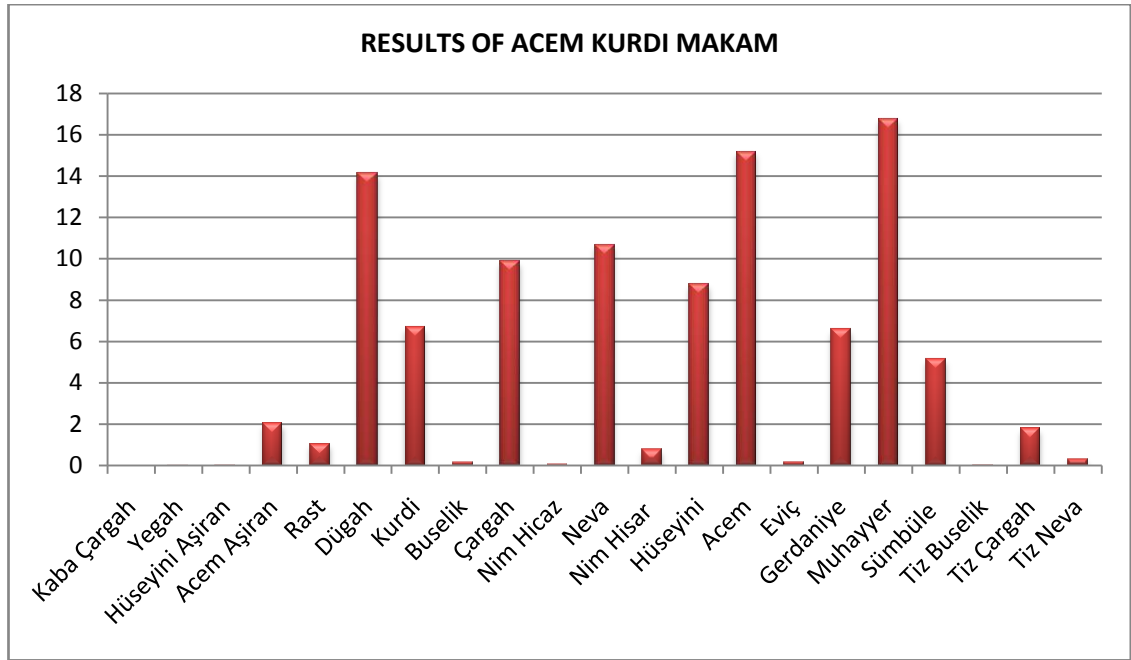


Figure 3.4.3. Results of Acem kürdi makam

3.5. CHARACTERISTIC FEATURES OF ACEM KÜRDİ MAKAM

Rest:Dügah-A pitch.

Melodic progression: Descending.

Equipment: Kürdi-B.

Leading Tone: Rast-G pitch.

Scale: It is gained by adding a suitable Kürdi quartette or quintette to the scale and medleys which constitute Acem makam. Acem kürdi Makam Scale is consist of adding a Beyati scale, a Kürdi quartette or a quintette to a Çargah quintette in the Acem pitch. Makam ends with Kürdi Medley.(Özkan, 1994, p.319).

Dominant Tone: First degree dominant tone is the Acem pitch. Second degree dominant tone is Neva pitch. Muhayyer is used as Dominant tone in some compositions. If Acem makam is shown primarily, primary dominant tone has to be Neva, secondary dominant tone has to be Acem. (Özkan, 1994, p.320).

3.6. COMPARISON OF CHARACTERISTIC FEATURES OF ACEM KÜRDİ MAKAM AND GAINED DATA

Features of Acem kürdi makam according to the gained data and Figure 3.4.1, 3.4.2, 3.4.3 can be listed as below.

As a result of Acem kürdi makams analysis, compositions show 72,32% descending melodic progression, 27,67 % ascending melodic progression characteristics.

Dominant tone is the 16,76% Muhayyer-A pitch and 15,17% Acem -F pitch. Cadential Note Pitch is the second level dominant tone pitch after Dügah-A and the Neva-D pitch with ratio of 10,67%.

Gained data show parallelism with characteristic features of Acem kürdi makam, however differences are observed in dominant tones. It is the dominant Acem-F pitch according to Acem kürdi makam. According to the gained data, Muhayyer-A pitch is higher than Acem pitch with a difference of 1% since Muhayyer Pitch is being used as dominant tone in some Acem kürdi compositions. Effectiveness level of pitches of Acem kürdi makam scale showed figure 3.6.1.



Figure. 3.6.1. Effectiveness Level of Pitches in the Acem kürdi Makam

3.7. FINDINGS AND INTERPRETATIONS RELATED TO KÜRDİ MAKAM

Findings and interpretations are listed below which are gained by chance (random) method from 40 verbal work among 109 compositions that belong to Kürdi makam from TRT Turkish Art Music repertoire.

Table 3.7.1. Data related to sample of Kürdi Makam

Musical Note	FU	FU%	AD	AD%	EL	EL%
Kaba Çargah	3	0,032	0	0,000	0	0,000
Yegah	13	0,141	14	0,032	15,0769	0,007
Hüseyini aşiran	10	0,108	36	0,082	129,6	0,061
Acem aşiran	26	0,281	142	0,324	775,538	0,368
Rast	157	1,700	724	1,651	3338,7	1,582
Dügah	1097	11,876	6278	14,320	35928,2	17,026
Kürdi	1007	10,902	4910	11,199	23940,5	11,345
Buselik	32	0,346	102	0,233	325,125	0,154
Çargah	1253	13,565	5762	13,143	26496,9	12,556
Nim Hicaz	45	0,487	215	0,490	1027,22	0,487
Neva	1461	15,817	6483	14,787	28767,5	13,632
Nim Hisar	17	0,184	77	0,176	348,765	0,165
Hüseyini	1343	14,539	5990	13,663	26716,4	12,660
Acem	890	9,635	3826	8,727	16447,5	7,794
Eviç	25	0,271	122	0,278	595,36	0,282
Gerdaniye	645	6,983	2716	6,195	11436,7	5,420
Muhayyer	676	7,318	3624	8,266	19428,1	9,207
Sümbüle	292	3,161	1396	3,184	6674,03	3,163
Tiz Buselik	11	0,119	44	0,100	176	0,083
Tiz Çargah	146	1,581	732	1,670	3670,03	1,739
Tiz Neva	88	0,953	649	1,480	4786,38	2,268

Pitches' frequencies of usage and duration values according to the data gained by composition from Kürdi makam are shown in Figure 3.7.1. and Figure 3.7.2.

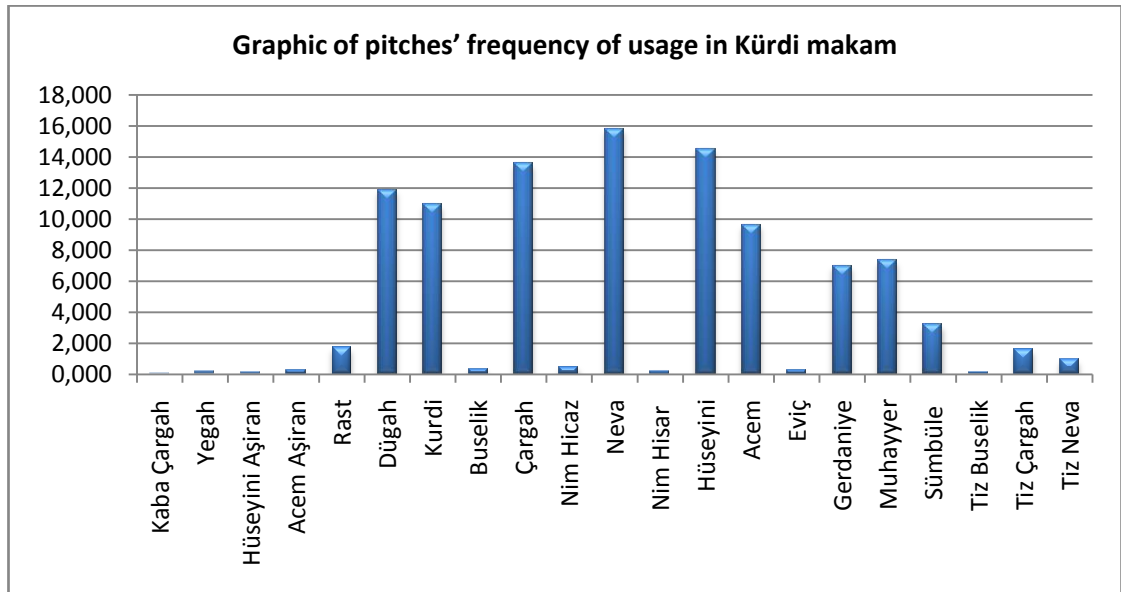


Figure 3.7.1. Graphic of pitches' frequency of usage in Kürdi makam

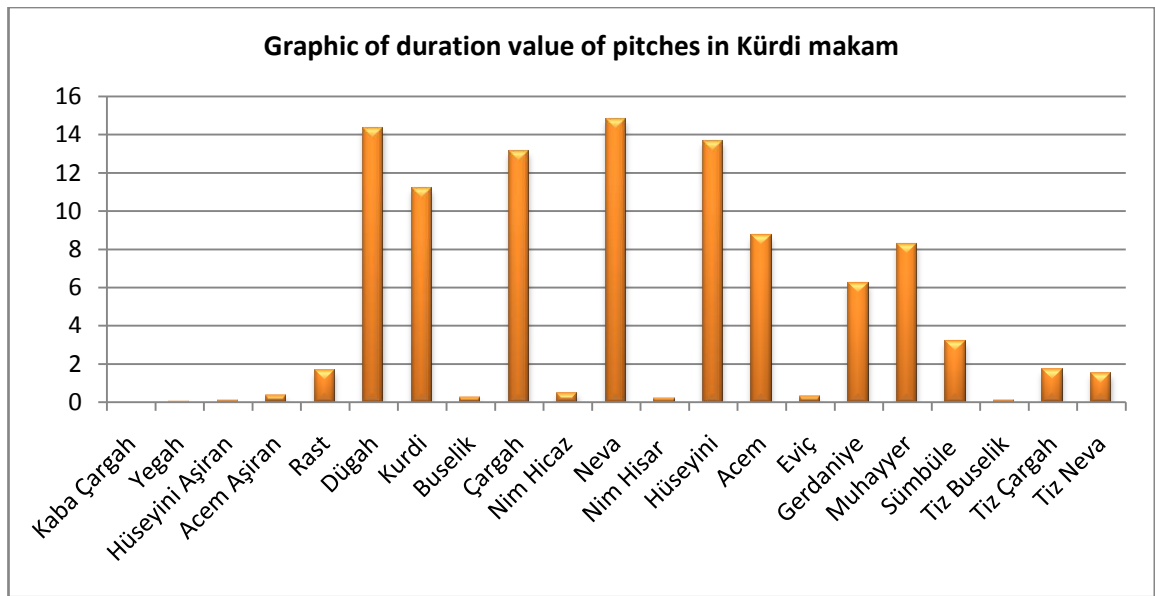


Figure 3.7.2. Graphic of duration value of pitches in Kürdi makam

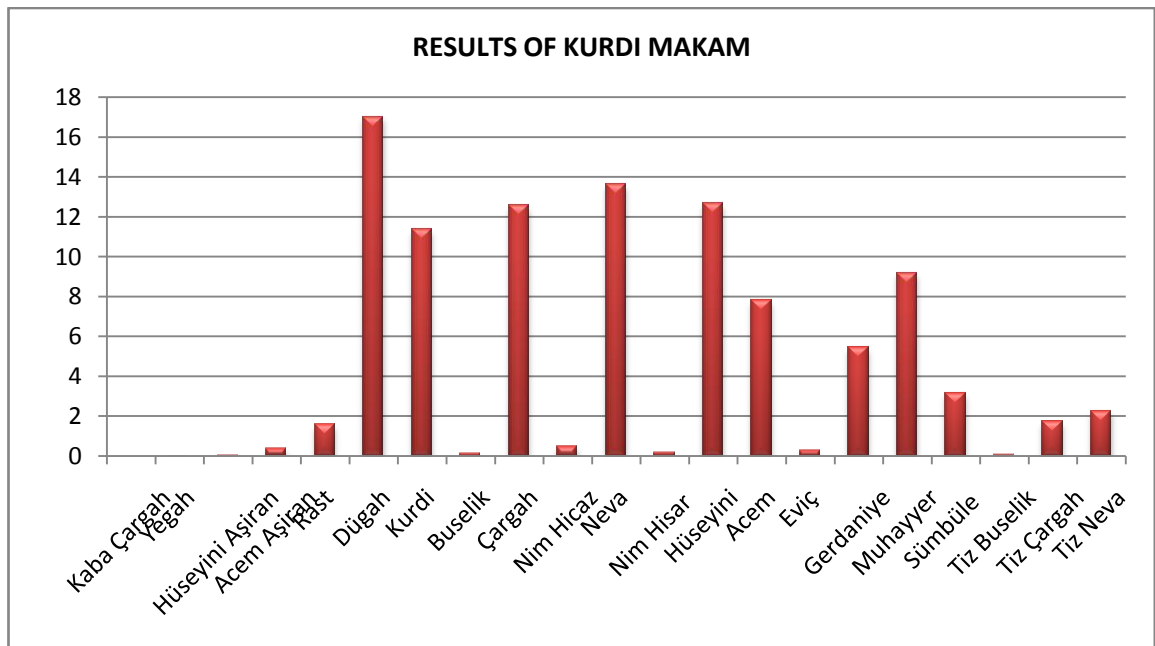


Figure 3.7.3. Results of Kürdi makam

3.8. CHARACTERISTIC FEATURES OF KÜRDİ MAKAM

Rest: It is Dügah- A pitch.

Progression: It is ascending; sometimes ascending-descending. Melodic progression is started from around rest or dominant tone.

Equipment: Kürdi-B.

Leading Tone: It is the Rast - G pitch. Sometimes, nim Zirgule is being used.

Scale: It is occurred adding Bûselik pentachord at the Neva-D pitch to the Kürdi tetrachord.

Dominant Tone: It is the Neva pitch at the joining point of tetrachord and pentachord and has Bûselik Makam above. (Özkan, 1994, p.111).

3.9. COMPARISON BETWEEN CHARACTERISTIC FEATURES OF KÜRDİ MAKAM AND GAINED DATA

Features of Kürdi makam according to the gained data and Figure 3.7.1, 3.7.2, 3.7.3 can be listed as below.

As a result of Kürdi makams analysis, compositions show 58,73% descending melodic progression, 41,26 % ascending melodic progression characteristic feature.

Dominant tone is the 13,63% Neva-D pitch. It is observed that Tonic Pitch is Dügah-A. Kürdi quartette is developed by Kürdi quintette on Muhayyer Pitch. There exist differences between gained data and characteristic features of Kürdi makam. Kürdi makam is ascending, sometimes ascending-descending. Analysis show % 58,73 descending melodic progression. The cause for having higher descending melodic progression value is thought to be originated because of compositions chosen for the study.

However, having close Descending and Rising melodic progression values (Descending: 58,73% - Ascending: 41,26%) show parallelism with characteristic feature of Kürdi makam. Because melodic progression can be ascending-descending in Kürdi makam. Effectiveness level of pitches of Kürdi makam scale showed figure 3.9.1.

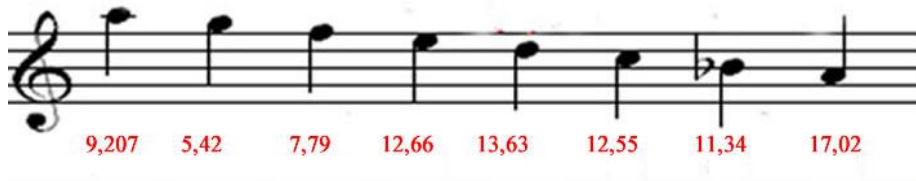


Figure. 3.9.1. Effectiveness Level of Pitches in the Kürdi Makam

3.10. MAKAM DETERMINATION OF A COMPOSITION BY USING COMPUTER SOFTWARE

3.10.1. Makam Estimation of two composition sample from Muhayyer kürdi Makam

MUHAYYER KÜRDİ ŞARKI

USÖL : DÜVEK Müzik: Amir Ateş
♩ = 144 Söz : Melek Hiç

BİR KIZIL GONCAYA BENZER DUDAĞIN

Söz...

BİR KIZIL GONCAYA BENZER DUDAĞIN
HER GÖREN GÖĞÜSÜME TAKSAM SENİ DER

AÇILAN TEK GÜLÜSÜN SEN BU BAĞIN
KİMİ ATEŞ GİBİ YAKTIN BENİ DER

KURULUR KALPLERE SEVDA OTAĞIN
KİMİ BİLİR HANGİ GÖNÜLDÜR DURAĞIN

D. TAĞIN SÖZ EDER
DURAĞIN (SON) D.C. (başta)

-1- -2-

Bir kızıl goncaya benzer dudağın
Açılan tek gülüsün sen bu bağın
Kurulur kalplere sevda otağın
Kimi bilir hangi gönüldür durağın

Her gören göğsüme taksam seni der
Kimi billur bakışından sözeder
Kimi ateş gibi yaktın beni der
Kimi bilir hangi gönüldür durağın

Figure 3.10.1.1. The composition named "Bir Kızıl Goncaya Benzer Dudağın" in Muhayyer kürdi makam chosen from TRT repertoire.

Results related to the composition named "Bir Kızıl Goncaya Benzer Dudağın" are listed as below.

Table 3.10.1.1. Results related to the composition named "Bir Kızıl Goncaya Benzer Dudağın"

Item No.	Musical Notes	Effectiveness Levels %			
1	Kaba Çargah	0			
2	Yegah-D	0			
3	Hüseyini aşiran-E	0			
4	Acem aşiran-F	0			
5	Rast-G	3,85			
6	Dügah-A	13,12			
7	Kürdi(B-Flat-1)	9,43			
8	Büselik- B	0			
9	Çargah-C	4,63			
10	Nim Hicaz -C#	0			
11	Neva-D	8,07			
12	Nim Hisar (E-Flat-1)	0,421			
13	Hüseyini-E	13,52			
14	Acem-F	15,91			
15	Eviç F#	0,105			
16	Gerdaniye-G	11,006			
17	Muhayyer-A	19,022			
18	Sümbüle- B	0,876			
19	Tiz Buselik-B	0			
20	Tiz Çargah-C	0			
21	Tiz Neva-D	0			
Makam	Melodic progression	Dominant Tone	Finalis	Equipment	Result
Muhayyer kürdi	✓	✓	✓	✓	100%
Acem kürdi	✓	✗	✓	✓	75%
Kürdi	✗	✗	✓	✓	50%

Makam Analysis software concluded that the composition named "Bir Kızıl Goncaya Benzer Dudağın" shows 100% parallelism with characteristic features of Muhayyer kürdi makam.

SARMAŞIK GÜLLERİ

Muhayyerküirdi Şarkı
Usulü: Semai TEOMAN ALPAY

S A Z

Yalnız ka lan ru ĩu mun a cı sı çok de rin dir
Her yer de ĩa tı ran var her yer se nin le do lu

Yıl lar geç se de i nan kal bım yi ne se nin dir
Her şey de se nin i zin bu yol aş kı mın yo lu

A la maz bil sev gi lim kal bım de ĩi ye ri ni

San ĩi i çim de a çan bu sar ma şık gül le ri D.C.

-1- -2-

Yalnız kalan ruhumun acısı çok derindir
Yıllar geçse de inan kalbimin esiridir
Alamaz bin sevgili kalbimdeki bu yeri
Sanki içimde açan bu sarmaşık gülleri

Her yerde hatıran var ,her şey seninle doğru
Her şeyde senin ismin, bu yol aşkımın yolu
Alamaz bin sevgili kalbimdeki bu yeri
Sanki içimde açan bu sarmaşık gülleri

Figure 3.10.1.2. The composition named "SarmaşıkGülleri" in Muhayyer kürdi makam chosen from TRT repertoire.

Results related to the composition named " Sarmaşık Gülleri " are listed as below.

Table 3.10.1.2. Results related to the composition named " Sarmaşık Gülleri "

Item No.	Musical Notes	Effectiveness Levels %			
1	Kaba Çargah	0			
2	Yegah-D	0			
3	Hüseyini aşiran-E	0			
4	Acem aşiran-F	0			
5	Rast-G	0			
6	Dügah-A	14.86			
7	Kürdi(B-FLat-1)	13.49			
8	Buselik- B	0			
9	Çargah-C	2.47			
10	Nim Hicaz -C #	0			
11	Neva-D	7.13			
12	Nim Hisar (E Bemol-1)	0			
13	Hüseyini-E	20.07			
14	Acem-F	6.60			
15	Eviç- F#	0			
16	Gerdaniye-G	6.60			
17	Muhayyer-A	20.07			
18	Sümbüle- B	7.43			
19	Tiz Buselik-B	0			
20	Tiz Çargah-C	0.82			
21	Tiz Neva-D	0.4			
Makam	Melodic progression	Dominant Tone	Finalis	Equipment	Result
Muhayyer kürdi	✓	✓	✓	✓	100%
Acem kürdi	✓	✗	✓	✓	75%
Kürdi	✗	✗	✓	✓	50%

It is obvious to have high effectiveness level of Hüseyini pitch in this makam since it is the Dominant Tone Pitch of the Muhayyer Makam which is used as descending type of Hüseyini Makam.

Makam Analysis software concluded that composition named "Sarmaşık Gülleri" shows 100% parallelism with characteristic features of Muhayyer kürdi makam.

3.10.2. Makam Estimation of two composition sample from Acem kürdi makam

Acem Kurdi
Sekizlik=240

Bir sevda geldi başıma

Arif Sami TOKER

Bir sevda geldi başıma Gülüşün ince kıvrak şensin Bir gün ümit veriyorsun
Felek su kattı aşıma Bir selam vermeden geçersin Sonra gülüp kaçıyorsun
Uyku girmiyor gözüme ah Bilsen beni ne çok üzersin Sen beni öldürüyorsun ah
Unuttun beni zalim unuttun beni zalim Seviyorum seviyorum seviyorum seni zalim Unuttun beni zalim unuttun beni zalim

Figure 3.10.2.1. The composition named "Bir Sevda Geldi Başıma" in Acem kürdi makam chosen from TRT repertoire.

Results related to the composition named " Bir Sevda Geldi Başıma" are listed as below.

Table 3.10.2.1. Results related to the composition named " Bir Sevda Geldi Başıma"

Item No.	Musical Notes	Effectiveness Levels %			
1	Kaba Çargah	0			
2	Yegah-D	0			
3	Hüseyini aşiran-E	0			
4	Acem aşiran-F	0			
5	Rast-G	0			
6	Dügah-A	5.11			
7	Kürdi(B-FLat-1)	3.59			
8	Buselik- B	0			
9	Çargah-C	4.90			
10	Nim Hicaz -C #	0			
11	Neva-D	11.42			
12	Nim Hisar (E Bemol-1)	0			
13	Hüseyini-E	15.86			
14	Acem-F	7.50			
15	Eviç F#	0.77			
16	Gerdaniye-G	7.30			
17	Muhayyer-A	34.72			
18	Sümbüle B	6.39			
19	Tiz Buselik-B	0			
20	Tiz Çargah-C	2.38			
21	Tiz Neva-D	0			
Makam	Melodic progression	Dominant Tone	Finalis	Equipment	Result
Muhayyer kürdi	✓	✓	✓	✓	100%
Acem kürdi	✓	✗	✓	✓	75%
Kürdi	✓	✗	✓	✓	75%

Makam Analysis software concluded that composition named "Bir Sevda Geldi Başıma" shows 100% parallelism with characteristic features of Muhayyer kürdi

makam and 75% parallelism with characteristic features of Acem kürdi makam. The expectation for this composition is to have Acem kürdi result as 100%.

However; since "Muhayyer-A" pitch is used as dominant tone in some Acem kürdi compositions, it usual to have higher effectiveness level in "Muhayyer-A".

DÜYEK
SÜRE:4

ACEM- KÜRDİ ŞARKI

Müzik: MUSTAFA SAĞYAŞAR
Söz: NİMEGÜL KARADAĞ

Askımı Bir Anlasan Gözlerime Baksan da

AŞ-KI-Mİ BİR AN-LA-SAN GÖZ-LE-Rİ-ME
BAK-SAN-DA GÖZ-LE-Rİ-ME BAK-SAN-DA
A-TEŞ OL-SAN
RÂ-ZI-YIN GÖN-LÜ-MÜ SEN YAK-SAN-DA
GÖN-LÜ-MÜ SEN YAK-SAN-DA
HEP Â-FET-SİN GÖN-LÜ-MÜ DE BİR SU Gİ-Bİ
AK-SAN-DA BİR SU Gİ-Bİ AK-SAN-DA

Aşkımı bir anlasan gözlerime baksan da
Ateş olsan razıyım gönlüme sen yaksan da
Hep afetsin gönümde bir su gibi aksan da
Ateş olsan razıyım gönüm...

Figure 3.10.2.2. The composition named "Aşkımı Bir Anlasan Gözlerime Baksan da " in Acem kürdi makam chosen from TRT repertoire.

Results related to the composition named "Aşkımı Bir Anlasan Gözlerime Baksan da" are listed as below.

Table 3.10.2.2. Results related to the composition named "Aşkımı Bir Anlasan Gözlerime Baksan da"

Item No.	Musical Notes	Effectiveness Levels %			
1	Kaba Çargah	0			
2	Yegah-D	0			
3	Hüseyini aşiran-E	0			
4	Acem aşiran-F	0			
5	Rast-G	2.10			
6	Dügah-A	9.62			
7	Kürdi(B-FLat-1)	9.34			
8	Buselik- B	0			
9	Çargah-C	9.43			
10	Nim Hicaz -C #	0			
11	Neva-D	14.40			
12	Nim Hisar (E Bemol-1)	0			
13	Hüseyini-E	11.38			
14	Acem-F	24.62			
15	Eviç F#	0			
16	Gerdaniye-G	4.97			
17	Muhayyer-A	11.71			
18	Sümbüle B	1.37			
19	Tiz Buselik-B	0			
20	Tiz Çargah-C	1.02			
21	Tiz Neva-D	0			
Makam	Melodic progression	Dominant Sound	Finalis	Equipment	Result
Muhayyer kürdi	✓	✗	✓	✓	% 75
Acem kürdi	✓	✗	✓	✓	% 100
Kürdi	✗	✗	✓	✓	% 50

Makam Analysis software concluded that composition named "Aşkımı Bir Anlasan Gözlerime Baksan da" shows 100% parallelism with characteristic features of Acem kürdi makam.

3.10.3. Makam Estimation Of Two Composition Sample From Kürdi Makam

Karlı Dağlar Karlı Yollar Aş ta Gel Kürdi Şarkı

KARLI DAĞLAR KARLI YOLLAR AŞ DA GEL (SA2) KOLLARIMA KUCAĞIMA
KOŞDA GEL (SA2) BENİ BEKLİ YOR DİYEREKDİYEREK KOŞDA GEL KOŞDA GEL
AŞ DA GEL HASRET DOĞAR KEN YAZILMIŞALNI MA (SA2)
MA (SA2) SEVDİ Ğİ Mİ ÖMÜR BOYU BEKLERİM BEKLE RİM
BEKLERİM BEKLE RİM (SA2.....)

Figure 3.10.3.1. The composition named "Karlı Dağlar Karlı Yollar Aş ta Gel" in Kürdi makam chosen from TRT repertoire.

Results related to the composition named "Karlı Dağlar Karlı Yollar Aş ta Gel" are listed as below.

Table 3.10.3.1. Results related to the composition named "Karlı Dağlar Karlı Yollar Aş ta Gel"

Item No.	Musical Notes	Effectiveness Levels %			
1	Kaba Çargah	0			
2	Yegah-D	0			
3	Hüseyini aşiran-E	0			
4	Acem aşiran-F	0			
5	Rast-G	1.45			
6	Dügah-A	9.03			
7	Kürdi(B-FLat-1)	11.23			
8	Buselik- B	0			
9	Çargah-C	13.05			
10	Nim Hicaz -C #	0			
11	Neva-D	14.74			
12	Nim Hisar (E Bemol-1)	0			
13	Hüseyini-E	23.46			
14	Acem-F	6.06			
15	Eviç F#	0			
16	Gerdaniye-G	4.08			
17	Muhayyer-A	9.53			
18	Sümbüle B	6.15			
19	Tiz Buselik-B	0			
20	Tiz Çargah-C	1.1			
21	Tiz Neva-D	0			
Makam	Melodic progression	Dominant Tone	Finalis	Equipment	Result
Muhayyer kürdi	✓	✗	✓	✓	75%
Acem kürdi	✓	✗	✓	✓	75%
Kürdi	✓	✓	✓	✓	100%

Online Makam Analysis software concluded that composition named "Karlı Dağlar Karlı Yollar Aş ta Gel" shows 100% parallelism with characteristic features of Kürdi makam.

TRT Rep.No:20319

U:Sofyan
S:3',30"
♩=92

KÜRDÎ ŞARKI
Nasıl Geçer Sensiz Bu Yaz
(SENSİZ BU YAZ)

Söz ve müzik:
Mahmut OĞUL
(Gemlik / Kumla-1993)

1) NASIL GEÇER SENSİZ BUYAZ HERYA NIMDA HÂTI RANVAR

DALGA LARDA GÜZEL YÜZÜN KUMSAL DAİZ LERİN VAR

(-----SAZ-----)

ÖYLE BÜYÜK BİRAŞK TIO HIÇHE SAPSIZ GELİ VEREN

SANKİ BİRYAZ YAĞMU RUYDU GÖNLÜ MÜZE SÜZÜ LEN

Nasıl geçer sensiz bu yaz
Her yanımda hatıran var
Dalgalarda güzel yüzün,
Kumsalda izlerin var

Öyle büyük bir aşk ki o
Hiç hesapsız geliveren
Sanki bir yaz yağmuruydu
Gönlümüzde süzülen

./.

Figure 3.10.3.2. The composition named "Nasıl Geçer Sensiz Bu Yaz" in Kürdî makam chosen from TRT repertoire.

Results related to the composition named "Nasıl Geçer Sensiz Bu Yaz" are listed as below.

Table 3.10.3.2. Results related to the composition named "Nasıl Geçer Sensiz Bu Yaz"

Item No.	Musical Notes	Effectiveness Levels %			
1	Kaba Çargah	0			
2	Yegah-D	0			
3	Hüseyini aşiran-E	0			
4	Acem aşiran-F	0			
5	Rast-G	1.75			
6	Dügah-A	11.19			
7	Kürdi(B-FLat-1)	4.10			
8	Buselik- B	0			
9	Çargah-C	7.40			
10	Nim Hicaz -C #	0			
11	Neva-D	19.92			
12	Nim Hisar (E Bemol-1)	0			
13	Hüseyini-E	24.70			
14	Acem-F	11.19			
15	Eviç F#	0			
16	Gerdaniye-G	4.40			
17	Muhayyer-A	10.52			
18	Sümbüle B	3.58			
19	Tiz Buselik-B	0			
20	Tiz Çargah-C	1.17			
21	Tiz Neva-D	0			
Makam	Melodic progression	Dominant Tone	Finalis	Equipment	Result
Muhayyer kürdi	✘	✘	✔	✔	% 50
Acem kürdi	✘	✘	✔	✔	% 50
Kürdi	✔	✔	✔	✔	% 100

Makam Analysis software concluded that composition named "Nasıl Geçer Sensiz Bu Yaz " shows 100% parallelism with characteristics of Kürdi makam.

CHAPTER IV

RESULTS AND SUGGESTIONS

In this section, results related to research findings and corresponding suggestions about research subject are included.

1.1. RESULTS

Compositions in song form belonging to Dügah-A determined Muhayyer kürdi, Acem kürdi and Kürdi makams in Traditional Turkish Art Music were analysed in terms of makam, and results were gained respecting to the questions like "To what extent one is abided by structure of Traditional Turkish Music Makam in the compositions", "How to make makam analysis by computer software " and to the sub-problems of the research.

Percentage value of pitches' usage frequency in the forty composition which refer to Muhayyer kürdi makam and which's makam analysis were done figured out that Muhayyer-A pitch with 15,35% and Hüseyini-E pitch with 11,78% are dominant in shrilled regions and Dügah-A pitch with 7,97% and Kürdi-B pitch with 7,81% are dominant in chest regions. Similarly, percentage duration values of the pitches give the result that Muhayyer-A pitch with 17,88% and Hüseyini-E pitch with 10,58% are dominant in shrilled regions and Dügah-A pitch with 10,80% and Kürdi-B pitch with 7,17% are dominant in chest regions.

Afterwards; "By using the formula which calculates the effectiveness level of a pitch in the composition", effectiveness level values of pitches in percentages show that Muhayyer-A pitch with 20,32% and Hüseyini-E pitch with 9,28% are dominant in shrilled regions and Dügah-A pitch with 14,27% and Kürdi-B pitch with 6,41% are dominant in chest regions. Finally, the result is yielded which suggest that the

forty compositions which were analysed follow descending route at the rate of 74,272% and ascending route at 25,727%.The data gained by analysis and the structure of Muhayyer kürdi makam from the Traditional Turkish Art Music were compared and it is concluded that they show parallelism to a large extent.

Percentage value of pitches' frequency of usage in the forty composition which refer to Acem kürdi makam and which's makam analysis were done figured out that Acem-F pitch with 14,90%, Hüseyini-E pitch with 14,10%, Gerdaniye-G pitch with 10,02% ,Muhayyer-A pitch with 9,92% are dominant in shrilled regions and Dügah-A pitch with 9,23% and Kürdi-B pitch with 8,29% are dominant in chest regions.

Likewise, percentage duration value of pitches give the result that Acem-F pitch with 15,36% and Muhayyer-A pitch with 13,18% are dominant in shrilled regions and Dügah-A pitch with 11,67% and Kürdi-B pitch with 7,59% are dominant in chest regions. Then, "By using the formula which calculates the effectiveness level of a pitch in the composition", effectiveness level values of pitches in percentages show that Muhayyer-A pitch with 16,76% and Acem-F pitch with 15,17% are dominant in shrilled regions and Dügah-A pitch with 14,13% and Kürdi-B pitch with 6,65% are dominant in chest regions. Finally, the result is yielded which suggest that the forty compositions which were analysed follow descending route at the rate of 72,329% and ascending route at 27,670%. According to the characteristics of Acem kürdi makam, the dominant tone is the Acem-F pitch. According to the gained data, Muhayyer-A pitch is resulted more than Acem-F pitch with 1% difference since Muhayyer Pitch can sometimes be used as dominant tone in Acem kürdi makam.

The data gained by analysis and the structure of Acem kürdi makam from the Traditional Turkish Art Music were compared and it is concluded that they show parallelism to a large extent.

Percentage value of pitches' frequency of usage in the forty composition which refer to Kürdi makam and which's makam analysis were done figured out that Neva-D pitch with 15,81% and Hüseyini-E pitch are dominant in the areas near shrilled regions and Dügah-A pitch with 11,87% and Kürdi-B pitch are dominant in chest regions. Similarly, percentage duration values of the pitches give the result that

Neva-D pitch with 14,78% and Hüseyini-E pitch with 13,66% are dominant in areas near to shrilled regions and Dügah-A pitch with 14,32% and Kürdi-B pitch are dominant in chest regions.

Afterwards; "By using the formula which calculates the effectiveness level of a pitch in the composition", effectiveness level values of pitches in percentages show that Neva-D pitch with 13,63% and Hüseyini-E pitch with 12,66% are dominant in areas near to shrilled regions and Dügah-A pitch with 17,20% and Kürdi-B pitch with 11,34% are dominant in chest regions. Finally, the result is yielded which suggest that the forty compositions which were analysed follow descending route at the rate of 58,737% and ascending route at 41,262%. The data gained by analysis and the structure of kürdi makam from the Traditional Turkish Art Music were compared and some differences were observed. Kürdi makam show ascending, sometimes ascending-descending characteristics. According to data related to Kürdi makam, descending route value exists higher than ascending route value. The expectation was to have higher ascending route value than descending route value, but Kürdi makam can sometimes be used as ascending-descending.

1.1.1. Results Devoted to the Problem ‘how can makam analysis be done with the computer software?’

Algorithms that are suitable characteristics of the makams were written. 100% Muhayyer Kurdi Makam is found for 30 compositions among 40 Muhayyer Kurdi compositions which were analysed. 100% Acem Kürdi Makam is found for 26 compositions among 40 Acem Kürdi compositions which were analysed. 100% Kürdi Makam is found for 16 compositions among 40 Kurdi compositions which were analysed. These results were not as expected. The reason for this is thought to be derived from composer's behaviour. They did not abide by makam structure of the Traditional Turkish Art Music. Also another reason is being unable to define in which part of the composition that the concept of progression distinguishes itself. This situation show that the concept of the progression cannot be interpreted by mathematical data.

1.1.2. Suggestions

According to the research results, it is a noticeably reality that studies related to the Traditional Turkish Music Makams are insufficient. The method used in this research can be a resource by applying to various makams of Traditional Turkish Art Music in order to get results based on scientific-data rather than personal thoughts.

Thanks to these studies, one can be informed that to what extent composers abide by makam structure of Traditional Turkish Art music during composing. Also; scientific studies should be done for the composition which's makam cannot be clearly defined and their makams should be stated clearly.

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APPENDIX A

COMPLETE PITCH NAMES

Kaba ÇARGÂH
 Kaba nim HICAZ
 Kaba Hicaz
 Kaba dik Hicaz
 YEGÂH
 Kaba nim Hisar
 Kaba HİSAR
 Kaba dik Hisar
 HÜSEYİNİ-ASIRAN
 ACEMASIRAN
 Dik Acemasiran
 IRAK
 GEVEST
 Dik Gevest
 RAST
 NİM ZİRGÜLE
 ZİRGÜLE
 Dik Zirgüle
 DUGÂH
 KÜRDİ
 Dik Kürdi
 SEGÂH
 BUSELİK
 Dik BUSELİK
 ÇARGÂH
 NİM HICAZ
 HICAZ
 Dik Hicaz
 NEVA
 NİM HİSAR
 HİSAR
 Dik Hisar
 HÜSEYİNİ
 ACEM
 Dik Acem
 EVİÇ
 MAHUR
 Dik Mahur
 GERDANIYE
 NİM ŞEHNÂZ
 ŞEHNÂZ
 Dik Şehnâz
 MUHAYYER
 SÜMBÜLE
 Dik Sümbüle
 Tiz Segâh
 Tiz Buselik
 Tiz dik Buselik
 Tiz Çargâh
 Tiz nim Hicaz
 Tiz Hicaz
 Tiz dik Hicaz
 Tiz Neva

APPENDIX B

CIRRICULUM VITAE

PERSONAL INFORMATION

Surname, Name:ER, Mehmet Bilal

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EDUCATION

Degree	Institution	Year of Graduation
MS	Çankaya Univ. Computer Engineering	2013
BS	Eastern Mediterranean Univ. Computer Engineering	2010

WORK EXPERIENCE

Year	Place	Enrollment
2010-2011	Sır Ajans	Software Engineer
2011-2012	Eliz Yazılım	Software Engineer
2013-Present	Harran Univ.	Project Assistant