ISTANBUL TECHNICAL UNIVERSITY ★ INSTITUTE OF SOCIAL SCIENCES

THE ROLE OF SOUND DESIGN IN FILMIC NARRATION: CASE STUDIES FROM CINEMA OF TURKEY AFTER 2000

Ph.D. THESIS

Taylan ÖZDEMİR

Department of Music

Music Doctoral Programme

SEPTEMBER 2015

ISTANBUL TECHNICAL UNIVERSITY ★ INSTITUTE OF SOCIAL SCIENCES

THE ROLE OF SOUND DESIGN IN FILMIC NARRATION: CASE STUDIES FROM CINEMA OF TURKEY AFTER 2000

Ph.D. THESIS

Taylan ÖZDEMİR
(409092006)

Department of Music

Music Doctoral Programme

Thesis Advisor: Doç. Dr. Can KARADOĞAN

SEPTEMBER 2015

İSTANBUL TEKNİK ÜNİVERSİTESİ ★ SOSYAL BİLİMLER ENSTİTÜSÜ

SİNEMASAL ANLATIMDA SES TASARIMININ ROLÜ: 2000 SONRASI TÜRK SİNEMASINDAN ÖRNEKLER

DOKTORA TEZİ

Taylan ÖZDEMİR
(409092006)

Müzik Ana Bilim Dalı

Müzik Doktora Programı

Tez Danışmanı: Doç. Dr. Can KARADOĞAN

EYLÜL 2015

Taylan Özdemir, a Ph.D. student of ITU Institute of Social Sciences student ID 409092006, successfully defended the dissertation entitled "THE ROLE OF SOUND DESIGN IN FILMIC NARRATION: CASE STUDIES FROM CINEMA OF TURKEY AFTER 2000", which he prepared after fulfilling the requirements specified in the associated legislations, before the jury whose signatures are below.

Thesis Advisor :	**Doç. Dr. Can KARADOĞAN** İstanbul Technical University	.....
Jury Members :	**Yrd. Doç. Dr. Eray ALTINBÜKEN** İstanbul Technical University	.....
	Doç. Dr. Melis BEHLİL Kadir Has University	.....
	Yrd. Doç. Dr. Defne TÜZÜN Kadir Has University	.....
	Yrd. Doç. Dr. Yahya Burak TAMER Bahçeşehir University	.....

Date of Submission: 26 June 2015
Date of Defense : 08 September 2015

Özlemle andığım
annem Gülten ve babam Kemal'e,

her zaman yanımda olan
kardeşim Doğan ve sevgili eşim Ayşe'ye,

Ve dünyalar tatlısı
biricik oğlum Kemal'e.

FOREWORD

First of all, I would like to thank to all students and academic staff of MIAM that I have had the privilege of studying with. It was especially an honor for me to work with Pieter Snapper and Reuben de Lautour, who are my instructors of SED classes, and I would like to express my gratitude to them for their support.

During last ten years, my life changed a lot and I had to pass through both good and bad moments. I would like to thank Ergin Özler and Güney Özelkan for being there with me at all times, perhaps one of the most valuable things I earned from MIAM is your friendship.

I would like to thank to the respectable members of thesis monitoring committee, starting from my supervisor Can Karadoğan, Melis Behlil and Eray Altınbüken for their valuable guidance that made this work possible.

Finally, I would like to thank to my wife, Ayşe Özdemir for her patience, without your support, I couldn't have come this far.

June 2015 Taylan ÖZDEMİR

TABLE OF CONTENTS

Page

ABBREVIATIONS

AES	**:** Audio Engineering Society
ASL	**:** Average Shot Length
EBU	**:** European Broadcasting Union
DAW	**:** Digital Audio Wokstation
DTS	**:** Digital Theater Systems
dB	**:** Decibel
Hz	**:** Hertz
ITU	**:** International Telecommunication Union
LFE	**:** Low Frequency Effects (channel)
LRA	**:** Loudness Range
LU	**:** Loudness Unit
LUFS	**:** Loudness Units Full Scale
SDDS	**:** Sony Digital Dynamic Sound
SMPTE	**:** Society of Motion Picture & Television Engineers
SPL	**:** Sound Pressure Level

LIST OF TABLES

Page

LIST OF FIGURES

Page

THE ROLE OF SOUND DESIGN IN FILMIC NARRATION: CASE STUDIES FROM CINEMA OF TURKEY AFTER 2000

SUMMARY

Contemporary cinema is an audio-visual art form with visual priorities. On the other hand, historical evolution of the narrative form landed significant importance to sound in cinema. Within the scope of this study, the relation between sound design and filmic narration will be investigated with the addition of case studies selected from new cinema of Turkey.

To have a better perspective on the narrative form of contemporary cinema, the development of sound and film technologies required to be investigated in a historical context. The milestones in the film sound history such as the transition from silent films to "*talkies*" and the introdution of multichannel audio had all significant effects on both film production practices and filmic narration.

After considering the historical development of the film sound, the analysis of soundtrack in terms of filmic narration will be introduced. In order to build a proper framework for the analysis method in this study, it is aimed to rely on measurable data together with objective observations rather than subjective comments; with only one exception, that being the subject of perceptual qualities of film sound.

The framework of the analysis consists of four components, which are the physical, spatial, temporal and functional properties of film sound.

Physical properties of film sound investigates the measurable qualities of sound, loudness being the most important of them. The other physical properties are the dyamic range (on a micro and macro scale), spectral range and timbral manipulations in film sound.

Spatial properties includes two categories, which are about sounds and their sources in the story space and in the physical space. First category discusses on-screen/off-screen and diegetic/non-diegetic sound while the second catedory focuses on the relationship of physical spaces with sound sources and how sound is reproduced in the listening environment to create the filmic auditory space.

Temporal properties include the topics of perceptual qualities that effect time perception in the image, the temporal relationship between editing and sound and finally simultaneous/non-simultaneous sound and their relationship with the story time in a movie.

The last category is the functional properties of film sound. This section is mostly derived from the works of Michel Chion (1994), in which he discusses sound in the

audiovisual chain. He introduced four subjects, which are punctuation, anticipation, unification and seperation, while I decided to add a fifth subject to this category in order to complete the framework of the analysis in this study.

In conclusion, this study investigates the role of sound design in filmic narration by building a comprehensive analysis methodology that can be used to focus on how different properties of sound serve particular functions in a soundtrack. In the meantime, case studies selected from the new cinema of Turkey provides an insight about how directors approach sound design in their films.

SİNEMASAL ANLATIMDA SES TASARIMININ ROLÜ: 2000 SONRASI TÜRK SİNEMASINDAN ÖRNEKLER

ÖZET

Sinema, günümüzde görsel-işitsel bir sanat dalı olarak karşımıza çıkmaktadır. İlişkileri itibariyle her ne kadar görselin ses üzerinde hiyerarşik üstünlüğü bulunsa da tarihsel süreç içerisinde ses, sinemasal anlatının oldukça önemli bir bileşeni haline dönüşmüştür. Bu çalışma kapsamında, günümüzde film sesi tasarımının sinemasal anlatım ile ilişkisi incelenecek ve sesin hangi özelliklerinin ele alınan etkiyi yarattığı araştırılacaktır. Bu doğrultuda gerekli incelemelerin yapılabilmesi için, anlatılan hikayenin ön plana çıktığı, kendi özgün sinemasal dilini oluşturma konusunda başarılı adımlar atmış yönetmenlerin eserleri arasından seçilmiş, Türkiye'nin yeni sinemasından yirmi beş film mercek altında alınmıştır.

Sinemanın günümüzde ulaştığı anlatım formunun daha iyi anlaşılabilmesi için, sessiz sinema döneminden itibaren ses ile olan ilişkisinin incelenmesi, ses teknolojilerinde yaşanan gelişmelerin sinema sektöründe ne gibi olumlu-olumsuz etkileri olduğunun gözlemlenmesi faydalı olacaktır. Sessiz sinema döneminde ulaşılan anlatı yöntem ve geleneğinin sesli sinemaya geçişte gösterdiği değişiklikler incelendiğinde, ilk etapta senkronize sesin getirdiklerinin yanında götürdüklerinin de olduğu görünmektedir. Örneğin geçmişte ses kayıt ekipmanlarının yapısının kamera pozisyon ve hareketlerinde belirleyici ve kısıtlayıcı rol oynadığı bilinmektedir. Elbette gelişen teknoloji ile birlikte bir çok sorun oradan kalkmıştır; ayrıca ses sayesinde ekranda görünmeyen olayların seyirciye aktarılması mümkün hale gelmiş, hatta çok kanallı sesin gelmesi ile birlikte ekran dışında kalan hikaye dünyası seyirciyi çevreleyecek şekilde genişletilebilmiştir.

Tarihsel süreç içerisinde ses ve görüntü ilişkisinin gelişimi incelendikten sonra günümüzdeki anlatı sineması formu içinde, tasarlanan sesin anlatım içindeki konumu analiz edilecektir. Bu analizin sağlıklı olabilmesi için öncelikle ölçülebilir veri ve objektif gözlemlere dayalı olması amaçlanmıştır. Bu nedenle oluşturulacak analiz çerçevesi dahilinde yapılacak yorumların, algısal özelliklerin ele alındığı bölümler dışında nesnel sınırlar içinde kalması hedeflenmiştir. Örnek vermek gerekirse ses aracılığıyla anlatım içerisinde vurgulanan bir olay tespit edildiğinde, sesin hangi özelliğinin bu vurguyu nasıl gerçekleştirdiği bu çalışmanın konusudur; ancak vurgulanan olayın ses aracılığı ile ulaştığı duygu durumunun tespit edilmesi, mesela yaratılan heyecan veya hüzün önemli olmakla birlikte başka bir çalışmanın konusudur.

Bu çalışma kapsamında oluşturulan analiz çerçevesi, film sesinin dört temel özelliğini incelemektedir; bunlar sesin fiziksel, mekansal, zamansal ve fonksiyonel özellikleridir.

Sesin fiziksel özellikleri kendi içinde dört alt başlığa ayrılmaktadır. Ses şiddeti bu çalışma içinde önemli bir yer tutmakta ve mevcut film sesi çalışmaları literatürüne yeni bir nesnel gözlem aracı kazandırmaktadır. Bu kapsamda filmlerin ses şiddeti çizelgeleri oluşturulmuş, yüksek ya da düşük ses seviyesi noktalarında hangi olayların gerçekleştiği ve bu olaylar sırasında sesin hangi işlevleri yerine getirdiği gözlemlenmiştir. İkinci olarak film sesinin dinamik aralığı makro ve mikro ölçekte incelenmiş, yönetmenlerin kendi aralarında ve yıllar içerisinde dinamik aralık kullanımı gözlemlenmiştir. Ses frekans aralığı ölçümleri de yapılmış, belirli frekans aralıklarının hangi amaçla kullanıldığı açıklandıktan sonra elde edilen spektrum analiz grafikleri benzer çalışmaları ilerletmek isteyenler için ekte sunulmuştur. Sesin fiziksel özellikleri kapsamında son olarak tını manipülasyonları ve bu manipülasyonların film dahilinde hangi amaçla gerçekleştirildikleri incelenmiştir.

Film sesinin mekansal özellikleri ise iki grupta ele alınmıştır. Öncelikle hikaye dünyası ve anlatım araçları göz önüne alınmış, *on-screen*/*off-screen* ve *diegetic*/*non-diegetic* ses tanımları örneklerle açıklanmıştır. Ardından fiziksel mekanlar kapsamı altında ses kaynağı ile mekanın ilişkisi incelendikten sonra, dinleyici tarafında yeniden üretilen sesin, özellikle çok kanallı ses sistemleri arcılığıyla nasıl bir işitsel uzay yarattığı tartışılmıştır.

Sesin zamansal özellikleri altında ise senkronizasyonun başlı başına zamansal bir olgu olduğundan yola çıkarak sesin zaman algısı üzerindeki etkileri ele alınmış, ardından kurgu ve ses arasındaki ilişkinin zamansal boyutu tartışılmıştır. Bu bölümde son olarak ses ve görüntü eş-zamanlılığı üzerinden ses ve anlatı zamanı ilişkisi mercek altında alınmıştır.

Bu çalışma kapsamında ele alınan son başlık ise sesin fonksiyonel özelliklerdir. Özellikle Michel Chion (1994) tarafından ortaya konan, sesin görsel-işitsel yapı içerisinde üstlendiği görevlerden yola çıkılarak hazırlanan bu bölüm, Chion'un bahsettiği dört alt başlığa, bu çalışmada kullanılan analiz çerçevesinin tamamlanması için gereken son konunun da eklenmesi ile beş bölümde incelenmiştir. Bu bölümler, noktalama (*punctuation*), beklenti yaratma (*anticipation*), birleştirme (*unifiction*) ve ayrıştırma (*separation*) fonksiyonlarına tanımlama (*description*) fonksiyonunun eklenmesi ile son halini almıştır. Michel Chion'un (1994) belirttiği üzere, sesin noktalama özelliği, bir metnin seyirciye aktarıldığı tiyatro gibi sahne sanatlarının geliştirdiği vurgulama, tonlama, jest ve mimik gibi unsurların bu sanat dallarındaki işlevleri ile sinemada sesin işlevleri arasındaki benzerliklerden yola çıkarak tanımlanmaktadır.

Ses aracılığı ile beklenti oluşturmak ise, sesin fiziksel, mekansal veya zamansal özellikleri aracılığı ile seyirciye henüz görüntüde yer almayan bir ses kaynağı, yahut henüz gerçekleşmemiş bir olay hakkında bilgi sunmak anlamında gelmektedir. Özellikle korku ve gerilim türlerinde sıklıkla karşılaşılan bir yöntemdir.

Sesin birleştirici ve ayrıştırıcı işlevleri de yine fiziksel, mekansal ve zamansal özelliklerle birlikte düşünülmelidir. Film sesi kurgu esnasında birden fazla planın yer aldığı sahnelerde mekansal bütünlüğü sağlayabilir, art arda veya eş zamanlı gerçekleşen olayların zamansal bütünlüğünü tanımlayabilir veya yönetmenin bir olayın bitip yeni bir olaya geçildiğinin altını çizmek ve olay ve mekanları bir birinden ayırmak için kullanılabilir.

Sonuç olarak, bu çalışma bir filmin ses kuşağının tasarımında sesin hangi özelliğinin hangi işlevleri yerine getirdiğinin tespiti için kapsamlı bir yöntem ortaya koymaktadır. Bu esnada 2000 yılı sonrasında çekilen, Türkiye'nin yeni sinemasından seçilmiş örneklere yer vererek, aynı zamanda ilgili filmlerin yönetmenlerinin ses kuşağına bakışlarının gözlemlenmesi ve filmlerinde ses tasarımının yerinin incelenmesi de hedeflenmiştir.

1. INTRODUCTION

Cinema was born as a visual art. Through the stages of its development, from silent film to the introduction of surround, sound or even absence of sound played either a supportive or a substantial role, depending upon the context. Silent films developed a language to tell their story without sound, thus lack of sound in film effected filmic narration. Arrival of synchronised sound, on the other hand, influenced significantly how films are narrated, gradually evolving from early examples of "*talkies*" to the movies with multichannel high fidelity audio as we experience today.

Developments in audio and film technologies had reciprocal results. Many advancements in sound recording and reproduction technologies influenced the film industry, either by increasing practicality in film production process or by providing a creative tool for filmic narration. It is also observed that the artistic or creative demands of the film industry does not only effected the movies but also resulted in several interactions with audio related industries. For example, surround sound systems in game consoles or home entertainment sets initially developed for movie sound reproduction.

Designing sound for film may require several stages of work starting from the first location recording until the final mixdown. Producing a successful motion picture sound may require a solid understanding of the requirements of the movie and a healthy communication with the director, and it depends on the artistic approach and technical skills of sound engineers, designers, editors or mixers involved in the process.

Analysis of the final outcome this process requires a careful and systematic approach. A movie soundtrack can be considered both as a whole and as a sum of its components, and generally in film sound analysis, components of a movie soundtrack are classified under the categories, which are Dialogue, Music and Sound Effects/Noise. The category of sound effects can also be divided into several sub-

categories depending upon the source and means of production, such as stock effects, foley effects, sound design effects and etc.

The structure of this study is based on the investigation of the properties of film sound by considering the soundtrack as a whole at first. After that, contribution of individual components related to the ivestigated property will be studied. For example "loudness" is a physical property. First, the soundrack will be analysed as a whole to determine the loudest points, then these points will be investigated to figure out which component of the soundtrack contributed to that loudness. Required examples that will be included in this study will be selected from new cinema of Turkey.

1.1 Aim and Scope of the Study

In the field of film studies, film sound analysis is not a very old subject. There are great works of various scholars in this topic, but in most of them, the link between film studies and sound engineering practices seems less covered. So, the first aim of this study is to create an analysis methodology that both film scholars and sound engineers benefit from. With this study, film scholars will become familiar to the sound engineering perspective and they will gain new tools that they can utilize in further studies. Sound engineers on the other hand, will get familiar to the concepts of filmic narration.

The second aim of this study is to figure out the role of sound design in filmic narration by using the analysis methodology developed. To achieve this second goal, examples of movies are required to focus on. Selection of the movies that will be included in this study is determined by several factors. Movies from major film industries of the world, especially Hollywood, dominate the film sound studies; so first of all, I decided to focus on Turkey.

In a historical context, popular film industry in Turkey was called "Yeşilçam," and it especially became active after 1950s (Arslan, 2009). The heydays of Yeşilçam were through 1960s and 1970s, and then it started to decline starting from the 1980s. Savaş Arslan (2009) considers the years between late 1980s and early 1990s as 'the dark years' of cinema in Turkey and he mentions that following these years, film culture witnessed a transition to a post-Yeşilçam era, which he calls "new cinema of

Turkey." Arslan (2009) describes his intention in choosing this term as opposed to "new Turkish cinema" as below:

> This term underlines the post-national and transnational aspects of contemporary cinema in Turkey, which is characterized by various clashes, divisions and debates. Following the rapid transformation of society since the 1990s, the new cinema of Turkey is heterogeneous, reflecting a multitude of voices and viewpoints. Unlike Yeşilçam, the new cinema of Turkey is no longer limited by a narrowly defined notion of 'Turkishness'" (p.95).

In addition to this perspective, I decided to concentrate on new cinema of Turkey because I think both the story and its narration appear to be an important concern in the new cinema of Turkey, which inspired me to focus on the interaction between soundtrack and creative choices of directors. Moreover, an observation about the technical properties of the source medium, which is DVD in this study, yielded that the use of surround sound in new cinema of Turkey became the norm after 2000. As a result, these points helped me select 25 movies to analyze from new cinema of Turkey that were produced after 2000.

Table 1.1 : List of selected movies for this study.

DIRECTOR	**TITLE**	**YEAR**
Atalay Taşdiken	Mommo, Kız Kardeşim	2009
Cemil Ağacıkoğlu	Eylül	2011
Derviş Zaim	Filler ve Çimen	2001
Derviş Zaim	Cenneti Beklerken	2006
Derviş Zaim	Nokta	2008
Derviş Zaim	Gölgeler ve Suretler	2010
Emin Alper	Tepenin Ardı	2012
Mahmut Fazıl Coşkun	Yozgat Blues	2013
Nuri Bilge Ceylan	İklimler	2006
Nuri Bilge Ceylan	Üç Maymun	2008
Nuri Bilge Ceylan	Bir Zamanlar Anadolu'da	2011
Nuri Bilge Ceylan	Kış Uykusu	2014
Pelin Esmer	Gözetleme Kulesi	2012
Reha Erdem	Hayat Var	2008
Reha Erdem	Kosmos	2010
Reha Erdem	Jin	2013

Table 1.1 (cont.): List of selected movies for this study.

DIRECTOR	TITLE	YEAR
Semih Kaplanoğlu	Yumurta	2007
Semih Kaplanoğlu	Süt	2008
Semih Kaplanoğlu	Bal	2010
Yeşim Ustaoğlu	Pandora'nın Kutusu	2008
Yeşim Ustaoğlu	Araf	2012
Zeki Demirkubuz	İtiraf	2002
Zeki Demirkubuz	Bekleme Odası	2004
Zeki Demirkubuz	Kader	2006
Zeki Demirkubuz	Yeraltı	2012

1.2 Literature Review

Although not being among the most popular subjects for film scholars, film sound studies is gaining its rightful place gradually. For the scope of this study, four major categories of literature survey was required. First of all, coming from a dicipline of sound engineering, I needed to study basics of film art. Especially Bordwell and Thompson's (2013) *Film Art* provided a comprehensive resource for this subject. Additionally, these resources in the field of film studies also gave an insight about how film scholars handle the subject of film sound in their studies.

The second subject was the history of both film and sound technologies. There is a norm that the audience is accustomed to in terms of production qualities today, but it is a result of a continuous evolution. The important thing about this evolution is that sound effected the filmic narration in several different ways through the history. Thus, understanding what sound brought and what it took from the cinema may help to identfy the properties of today's narrative form.

The third subject is the related to the technical and engineering side of the study. To achieve an up-to-date status in terms of measurements, I investigated recent discussions, especially about loudness norms of audio-visual media. Resources from international organizations such as AES, EBU, and ITU, consisting several articles, recommendations or specifications on the subject, helped me achieve proper calibration in listening environment and implement industry standart measurement methodology.

In addition to the technical specifications related to the audio measurements, literature of acoustics and sound engineering is also consulted.

The last and the most important subject that I studied was the literature in film sound studies. Michel Chion provided the core of the study, along with Rick Altman. I would also like to mention the name of David Sonnenschein (2002), and the books edited by Elisabeth Weis and John Belton (1985) and Jay Beck and Tony Grajeda (2008) for those who look for a first step in film sound studies besides Chion and Altman.

1.3 Methodology

First question was to decide upon the medium. To preserve consistency among the samples, every movie had to be in the same format, thus possible candidates appeared to be the digital videodisc formats; DVD and Blue-ray. DVD releases are easier to obtain and not every selected movie is distributed in Blu-Ray, so DVD became the choice.

After obtaining selected movies, their soundtracks are extracted as *wave* files, without leaving the digital domain. The obtained files are placed into a Digital Audio Workstation (DAW) software.

The analysis framework developed for this study consists of four titles; these are physical, spatial, temporal and functional properties of film sound, and all four titles will be investigated under their own sections through this dissertation. The section of physical properties of film sound relies upon the measured data while others are based on objective observations.

There are points in a movie when sound design interacts with filmic narration very significantly, and the purpose of this study is to look for these moments and find out which aspect of film sound contributes to that effect.

Finally, the compiled data and observations will be investigated to figure out the preferences of directors in terms of sound design.

2. HISTORY OF FILM SOUND

During the early years of motion picture and sound technology researches, developments mostly remained isolated from each other, but after the beginning of their interaction, advancements not only effected their own field, but also yielded reciprocal results for both, regardless of being beneficial or not. Even before the era of synchronized sound in film, there were important attempts on motion picture studies that were conducted by the scientists who were also interested in sound technologies, especially by Edison; whose works will be discussed later in this chapter.

In order to provide a wider perspective on film sound within this chapter, history of recording and reproduction of sound will be investigated starting with the invention of first sound recording devices while pointing out how major advancements in audio technology affected the field of motion picture.

2.1 The Early Days of Sound and Motion Picture Technology

Capturing what is seen and what is heard has always been an interesting topic for the scientists, but it was in the 1800s that the successful attempts on photography and phonography started to emerge. In the early years of the 19th century, important studies were conducted in photography and decades later, research on sound recording started to give results.

When considering the first sound recording device, Edison's *phonograph* usually comes to mind first, but actually there were earlier attempts dating back to 1856. More than twenty years before Edison, a French scientist named Leon Scott invented a sound recording device called "*phonautograph*" (Morton, 2006). This device was based on the principle of transferring acoustic energy into mechanical vibrations. A cone shaped receiver collects and focuses the sound waves into its narrow end, in which a lightweight membrane is attached. The membrane vibrates according to the sound waves received and with the help of an attached stylus, this motion can be

marked upon a coated cylinder which was attached to a crank arm. The cylinder used in that device was made of paper or glass and usually held upon fire in order to coat it with dark soot (Morton, 2006).

When in use, the device is placed so that the receiver end of the cone is directed towards the sound source, and the crank arm was rotated rapidly. As a result, sound waves vibrate the membrane and the stylus attached to membrane scratches the surface of soot coated cylinder, leaving visible marks that can be considered as the first examples of visual representation of sound.

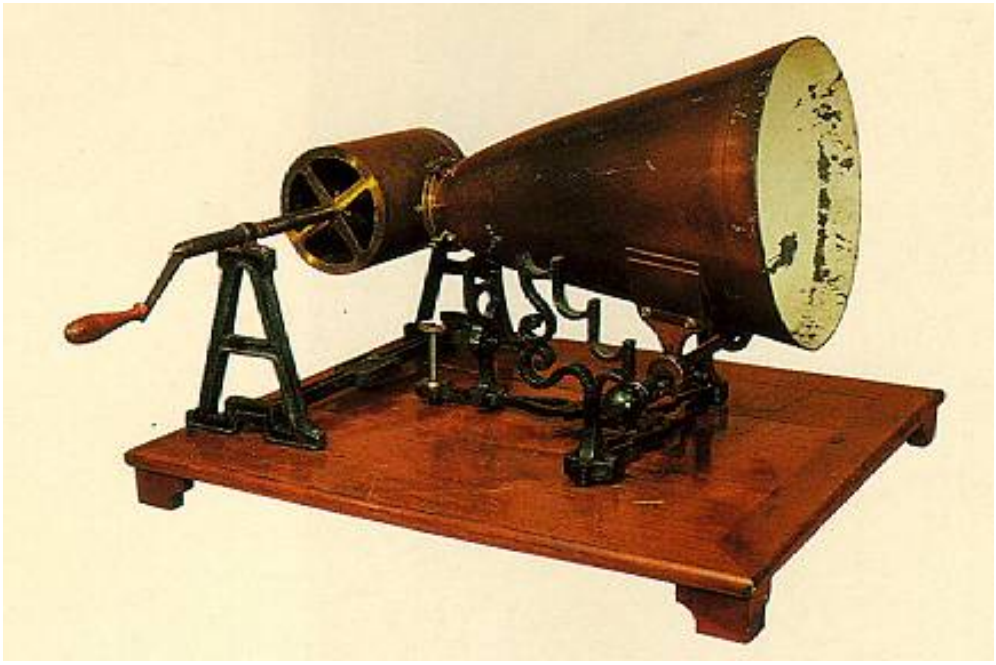

Figure 2.1 : Phonautograph built by Rudolf Koenig in 1859 (Url-1).

The phonautograph was capable of capturing visual representations of sound, but it was not able to reproduce it. Because of that, they were only used for demonstrations at schools and for experimental purposes. Today, with the recent efforts starting from 2000s, institutions such as Electrical and Electronics Engineers (IEEE), managed to reproduce sounds from rare examples of surviving early phonautograph recordings (Morton, 2006).

Following the pioneering effort by Leon Scott, many other scientist initiated studies on sound recording devices, and one of them was Alexander Graham Bell. Being interested in sound, speech and hearing disabilities, he was known to be conducting several experiments and in 1874, within one of his studies on a variation of

phonautograph, he used real human ear obtained from cadavers. The device was later on called "*ear-phonautograph*" and was mentioned in Clarence J. Blake articles "The Use of the Membrana Tympani as a Phonautograph" in Boston Medical and Surgical Journal vol.92 in 1875 and "The Use of the Membrana Tympani as a Phonautograph and Logograph" Archives of Opthalmology and Otology vol.5 in 1876 (Url-2).

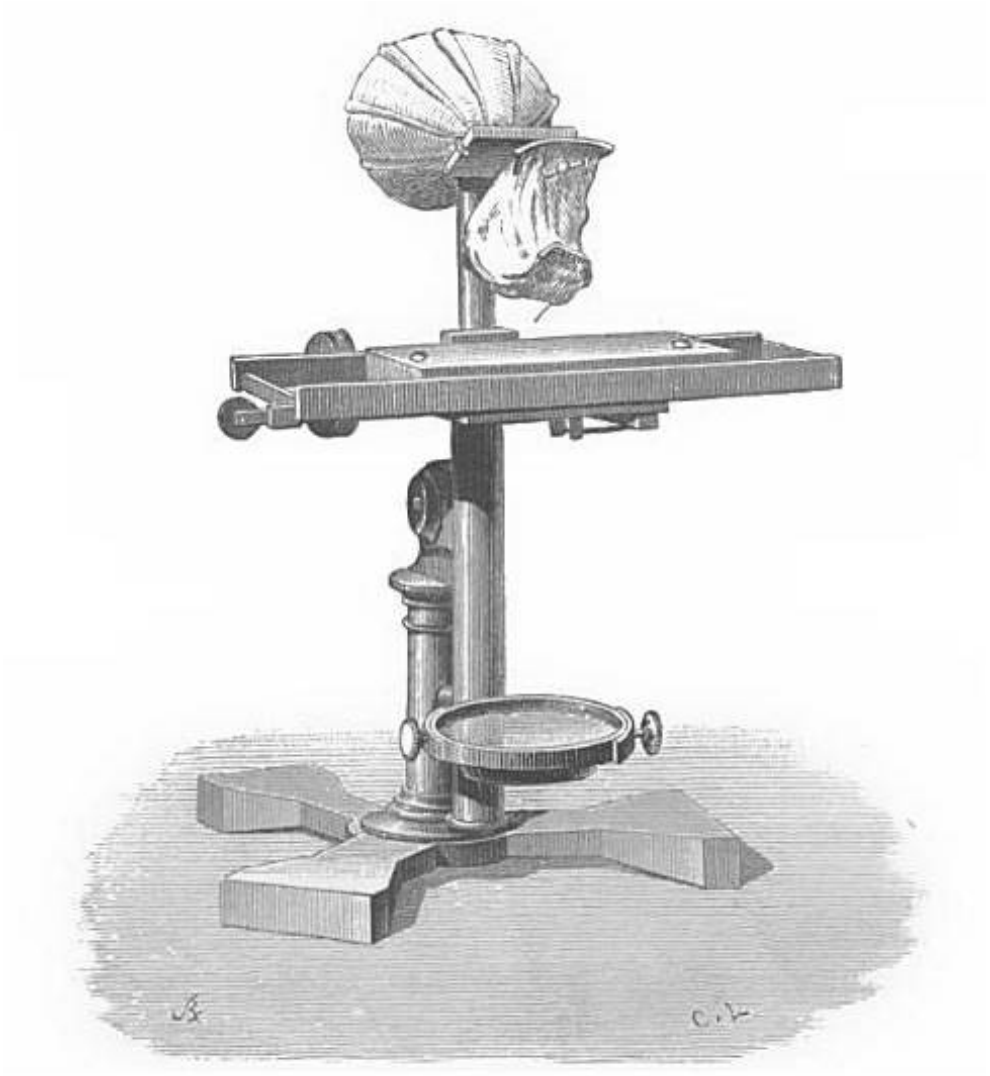

Figure 2.2 : The "Ear-Phonautograph" (Moncel, Count Du. *The Telephone, the Microphone and the Phonograph*. New York: Harper & Brothers, 1879, (Url-3)).

Graham Bell studied different examples of earlier methods for visualizing sound, and by observing that their results vary according the methods they use, he concluded that none of them were as accurate as the human auditory system (Morton, 2006). In order to improve the phonautograph, Bell replaced the cone and membrane system with a part of skull, a human ear and the auditory bones. The resulting system required modifications since the dead tissue was dry and the moving parts had considerable weight. The resulting device was successful at capturing visual representations of sound, but again, was not able to reproduce it.

The contribution of Graham Bell in audio engineering kept growing through the following years, but it was his invention of telephone in 1876 that led another scientist to end up with the most significant inventions of the time regarding audio technology.

After the invention of telephone, Thomas Alva Edison, who was already an important scientist in telecommunication and telegraphy, paid immediate attention to the device. Driven by the motivation of improving telephone, he came up with a sound recording and playback device in 1877, named "*phonograph,*" which was initially intended to work in conjunction with the telephone, for recording incoming calls and sending pre-recorded voice massages (Millard, 2005).

Bell's telephone benefited from transduction, which is based on the principle of converting acoustical energy into another form of energy. Sound waves hitting the thin metal membrane called the diaphragm results in vibrations within an electromagnetic field that induces electric current. The signal is then transmitted to receiver, in which the pulses in the current causes the membrane to move, which in return vibrate air molecules to produce sound. Edison found it very difficult to work with the telephone since the signal at the receiving end of the telephone was too weak to mechanically move any stylus, so he decided to concentrate only on the sound recording device itself (Morton, 2006).

In his design of phonograph, he discarded the cone and placed a sound tube and he replaced the sooted cylinder with a wax-coated paper tape at first, which he replaced with tin foil later on. The mechanism was capable of generating markings on the wax

according to the sound source present at the sound tube and when the process is reversed, it was possible to hear back what was recorded.

Figure 2.3 : Edison with Cylinder Phonograph; Washington, DC; April 18, 1878. (Photo courtesy of U. S. Department of Interior, National Park Service, Edison National Historic Site) (Url-4).

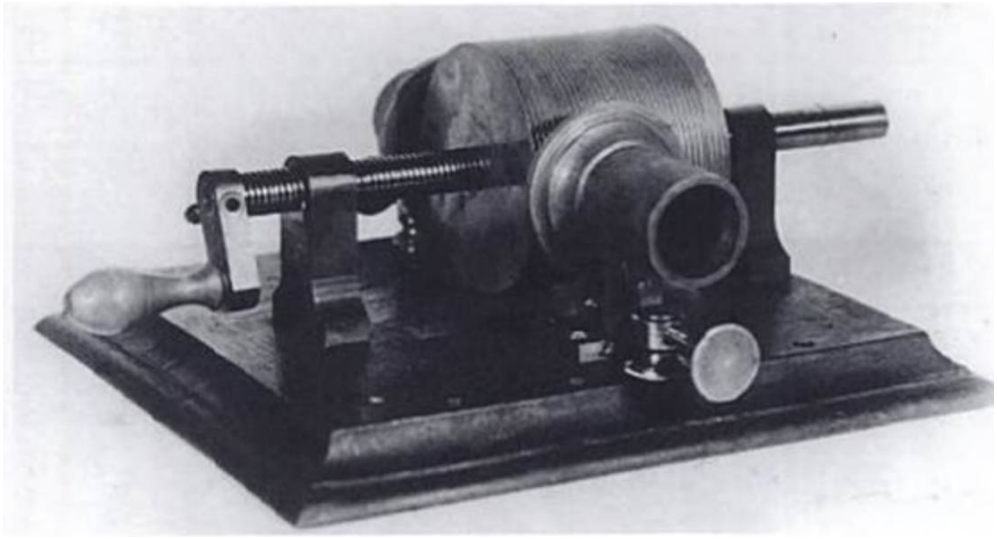

Figure 2.4 : Tin Foil phonograph, built in 1877 (Morton, 2006).

Edison put more effort to promote his new invention by means of press demonstrations and public exhibitions and he succeeded to receive attention in return. Investors were also interested in the device and Edison accepted one of the offers in order to establish his new company called Edison Speaking Phonograph Company. The company owned the manufacturing rights and at first planned to build and sell the devices, but this idea was discarded soon. The device required delicate attention and careful usage, which at the hands of inexperienced people, easily might turn into a failure, so instead of selling them, Edison decided to set up tours and exhibitions for the phonograph with educated staff from the company escorting the demonstrations (Morton, 2006). Company was collecting fees for the shows, and since the public demand was high, this business model was generating proper income; so Edison turned towards other projects.

1870s did also set the scene for an interesting experiment related to photography. The owner of an important railroad business and governor Leland Stanford, who was also very passionate about horses, commissioned a praiseworthy photographer of the time, Eadweard Muybridge on a very specific request. He was wondering if all four of the hooves leave the ground while the horses are galloping, so he asked Muybridge to set the record straight (Leslie, 2001).

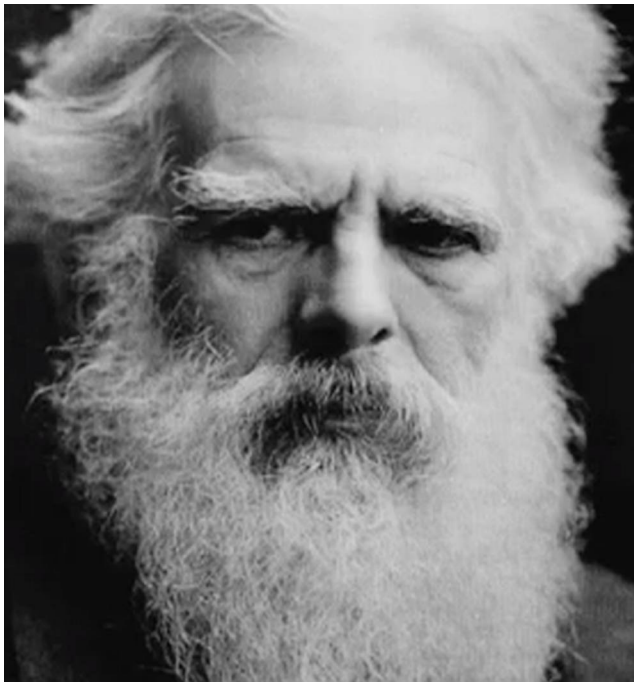

Figure 2.5 : Eadweard Muybridge (Cay, 2009).

Muybridge started his experiments in 1872, but it took several years to obtain results[1]. His plan was to take sequential photographs of the horses at motion manually but it was very difficult to get accurate timing. With the budget and the facilities provided by Stanford, he kept improving his work and by the year 1872, he finally achieved his goal.

On 19th June 1878, at the Palo Alto track, he hosted a public demonstration together with Leland Stanford. At one side of the plain ground of the track, he set up 12 cameras each connected to a triggering mechanism by individual wiring. On the other side he set up a white backdrop to increase contrast and provide indices. When Stanford's race horse was ridden into the track with an attached wheel-cart, the wheel touching the wiring triggered the shutter of the each connected camera separately, resulting in sequential photographs of the horse, which he will later on label his work as "The Horse in Motion" (Leslie, 2001; Cay, 2009).

Muybridge later on patented this mechanism as "Automatic Electro-Photographic Apparatus" and kept on studying human and animal motion, but on that day, he not

[1] Because his work was seriously interrupted by trials due to a crime he was involved (Musser, 1990).

only proved that the all four of the hooves of horses leave the ground, but also inspired other scientists, such as Edison, to work on motion picture.

Figure 2.6 : Preparations for Muybridge's "The Horse in Motion" at Palo Alto track (Cay, 2009).

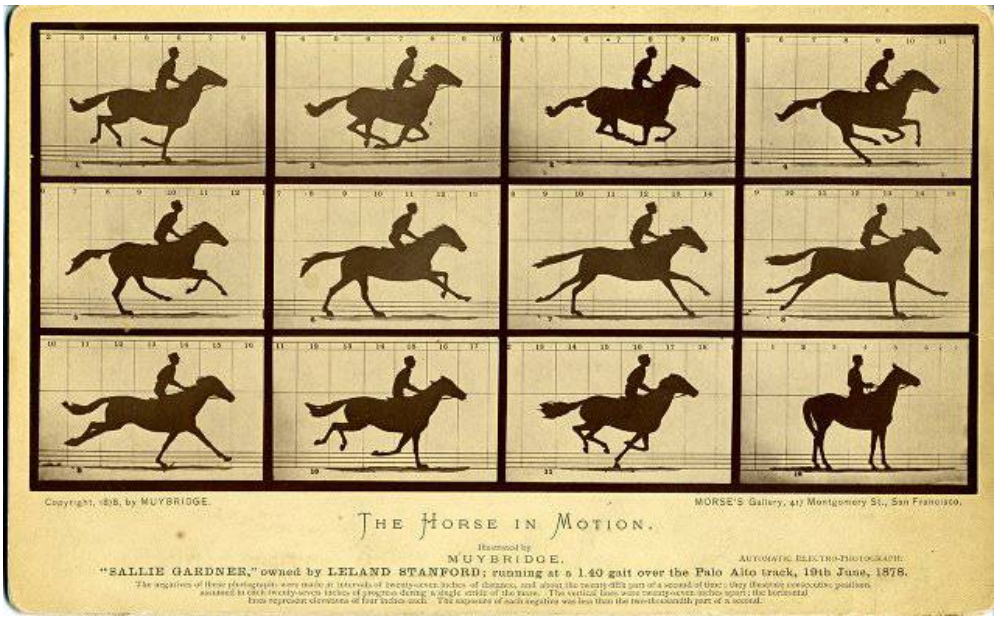

Figure 2.7 : The series of photographs "The Horse in Motion" by Eadweard Muybridge (Url-5).

Very important inventions appeared year after year during the late 1800s and most of them influenced the creative minds of the era, not only in term of science but also in terms of entertainment. One significant example was the implementation of the telephone system as a broadcasting device by French scientist Clement Ader at International Electrical Exhibition in Paris, in 1881. His project aimed to broadcast a performance to a distant audience, by means of placing telephone transmitters at Paris Opera House and the receivers at listening rooms housed at Palais l'Industrie, which required running the cables through the sewers more than two kilometers away. (Curtin, 2014; Pisano, 2012).

During the Paris exhibition, Ader wanted to add more options of performances to select from, but that was not an easy task. According to 31st December 1881 issue of Scientific American, (p422-423), thre was an attempt to set up the system at Théatre Français as well; but the footlights caused significant interference with the transmitters (as cited in Url-6). To overcome the problem, unlike the transmitter placing at the Paris Opera, which was at the sides of prompters' boxes; he preferred to move them to both sides of the stage and behind footlights (Curtin, 2014). As a result, between hours of 20:00~23:00 and three nights a week, the attendees of exhibition were able to listen a few minutes of excerpts of performances selected according to their wish at each session, either from Paris Opera House or Théatre Français (Curtin, 2014).

Celment Ader filed a patent same year for "Improvements of Telephone Equipment in Theaters" and as quoted by Fantel (1981) in New York Times, The patent states that:

> The transmitters (i.e., telephone mouthpieces) are distributed in two groups on the stage - a left and a right one. The subscriber has likewise two receivers, one of them connected to the left ground of transmitters, the other to the right one... This double listening to sound, received and transmitted by two different sets of apparatus, produces the same effect on the ear that the stereoscope produces on the eye.

As it can be derived from the description above, Ader not only pioneered broadcasting, but also prepared the basis of stereophonic sound. His system consisted of spaced pairs of transmitters for each listener. Since the listeners place the pair of

receivers directly towards both ears, they experience the performance with spatial cues for localization.

Clement Ader's system was later on named as "*Théatrophone*" and a few years after, the Théatrophone Company of Paris was formed, aiming to provide the same experience for domestic use. The company provided the equipment necessary to the subscribers, and charged 180 francs annually or 15 francs per use, which is reminiscent of subscription or pay-per-view marketing strategy of 2000s (Curtin, 2014).

According to Curtin (2014), subscribers of the company were "reported to be over 1500 by 1893" (p89). Rivaling companies started to appear and the service became available at cafes, restaurants, hotel lobbies and etc.

Another point about Ader's innovation is that it took around 40 years for radio broadcasting to rise and claim the popularity of Théatrophone, and a lot longer than that for stereophonic sound theory to flourish.

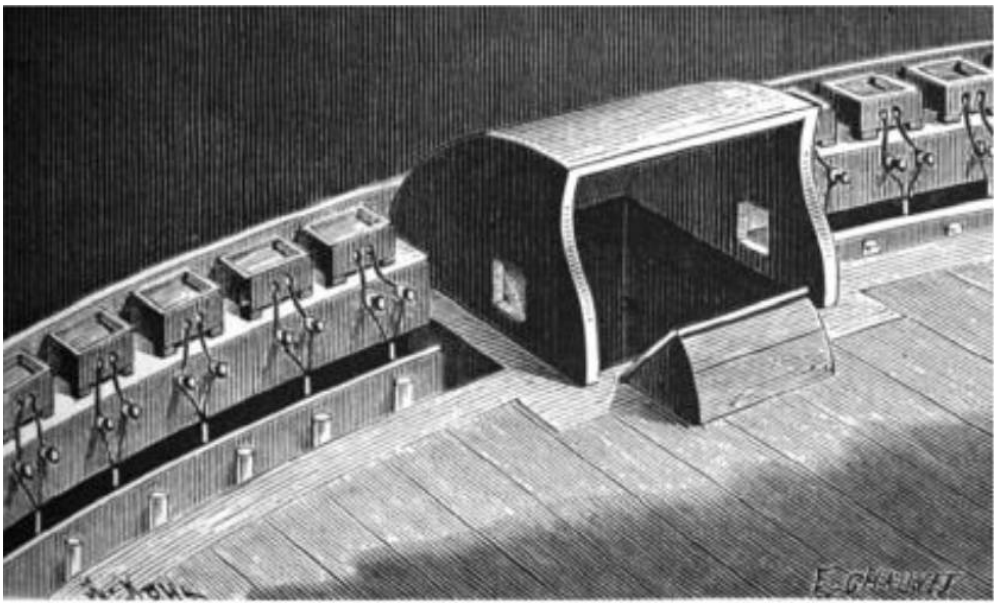

Figure 2.8 : Clement Ader's transmitters placed at both sides of prompter's box at Paris Opera House. (Moncel, 1887).

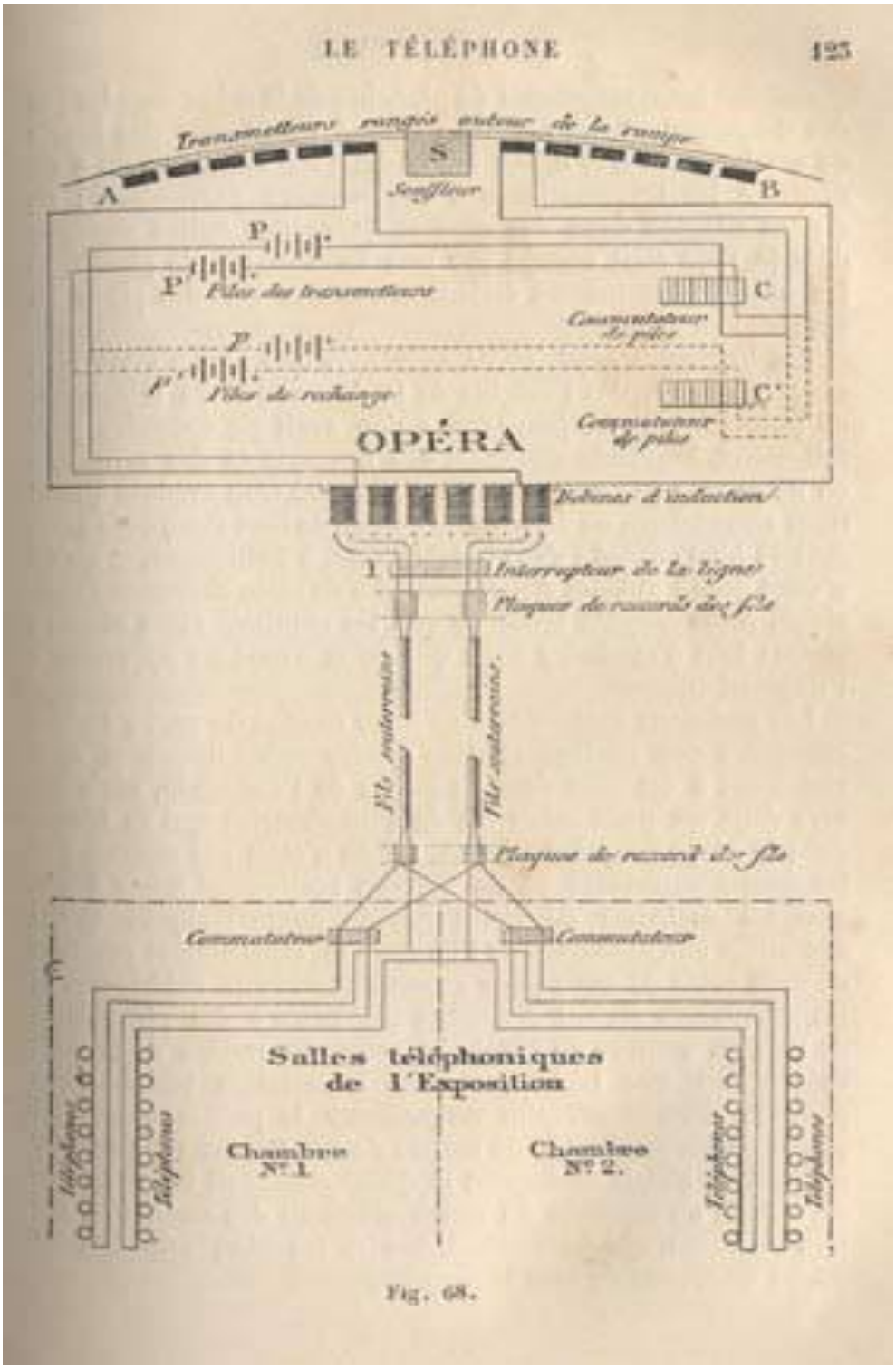

Figure 2.9 : Diagram of telephone system at Paris opera House (Moncel, 1887).

While Clement Ader was introducing transmission of sound for entertainment in Europe, on the other side of the Atlantic, Edison was paying attention to Muybridge's works and Graham Bell was working on Edison's invention of phonograph.

Graham Bell had already received a significant attention due to his invention of the telephone, and he also received several awards, among which the Volta Prize became noteworthy, which he used to establish his new facilities, named Volta Laboratory.

He employed his cousin Chichester Bell as well as Charles Sumner Tainter in his newly formed laboratory, and among many other projects, they tried to improve Edison's phonograph. According to Morton (2006), the scientists at Volta Labs brought some of their first cylinders to Smithsonian Institution at 1881, with the recorded words that were "I am a graphophone and my mother was a phonograph" but it took four more years to finalize the design and it was 1885 when they made a public announcement.

The design was similar to Edison's latest phonograph incarnations in many respects, such as separate recording and playback configurations, cylinder recording medium and etc. but one of the major differences was that it was using a larger wax coated cylinder instead of tin foil in phonograph (Morton, 2006).

The Volta Laboratory tried to contact Edison Speaking Phonograph Company in order to promote graphophone, but Edison did not showed much interest, so they formed the Volta Graphophone Company. The initial business plan of the company was aiming public entertainment, but it was the office tasks such as note taking and dictation that the graphophone found its place for (Morton, 2006).

Edison paid attention to the success of graphophone at the office market so he started to work on improving his phonograph and develop new uses for it (Millard, 2005). On the other hand he was also in touch with Eadweard Muybridge, especially interested in his works of sequential photography and *zoopraxiscope*.

Zoopraxiscope was a device that is developed by Muybridge and it was used for projecting moving animal or human figures, which were drawn onto a glass disc and by spinning the disc in front of a lantern; moving images were projected (Url-8).

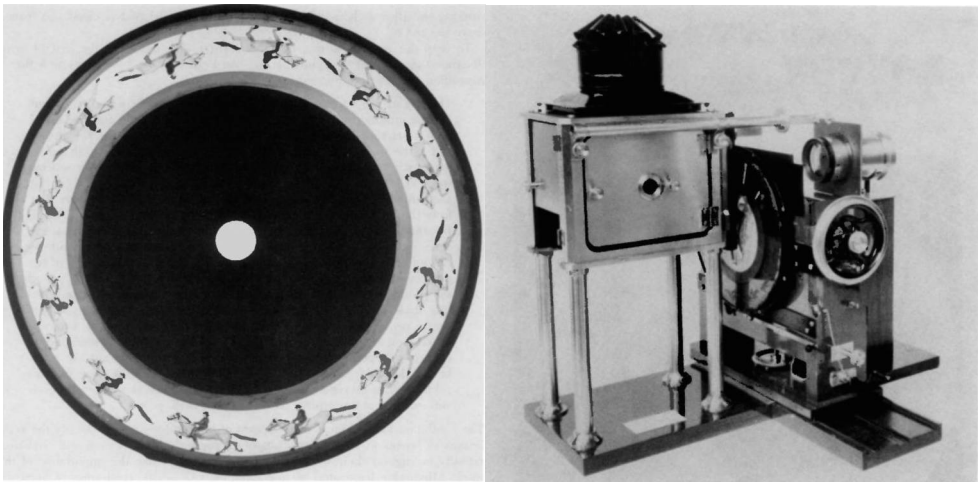

Figure 2.10 : An example of Zoopraxiscope disc and the device (Musser, 1990).

Muybridge had demonstrated his zoopraxiscope system to public in 1880, and although there already had been systems with "magic lantern" for a long time, his device had one important difference. The images he projected were based upon his photographic works on animals and humans in motion, so when the disc was spun, the image projected was a very realistic representation of the subject in motion.

Muybridge's work not only consisted of animals, he also used both male and female human beings as subjects, with minimum clothing in order to observe muscles in motion. This nudity combined with his provoking way of presenting his work during lectures, resulted in both positive and negative reactions from the audience; but he kept on working on the subject and by the year 1887 he published "Animal Locomotion" consisting more than 20,000 images of animals and humans.

Following the first demonstration of zoopraxiscope, he gave several lectures both in Europe and America, and eight years later; on 25 February 1888, he held a lecture at Orange Music Hall, which was located nearby Edison's West Orange laboratory (Musser, 1990). It is possible for Edison to attend Muybridge's lecture himself; and also it is known that they met at Edison's laboratory two days later and Muybridge proposed Edison to combine zoopraxiscope with phonograph (Musser, 1990).

Muybridge's suggestion never turned into cooperation, but with his inspiration, Edison and his crew immediately started to work upon the motion picture project. They discarded Muybridge's design since it required hand drawing of images onto glass disc and started to work on their own which was based upon phonograph and

photography. The famous quote from Edison himself stated that he was "*experimenting upon an instrument which does for the Eye what the phonograph does for the Ear*"[2] but the successful results appeared years later.

Edison appointed his associate William Kennedy Laurie Dickson to the motion picture project in 1889. The initial design used a cylinder like the phonograph and the three surviving sheets of films shot with this cylindrical system are referred as "Monkeyshines," which show movements of a man, possibly an Edison employee in white shirt.

After a visit to Europe for the Paris Exhibition in 1889, Edison witnessed the advancements in photography and especially the usage of filmstrips encouraged him to discard the cylinder design; so when he returned to his lab, he asked Dickson to change the design accordingly (Musser, 1990). Finally in 1891[3], Edison publicly announced the new invention named "kinetoscope," a word derived from Greek words "kineto" and scope; meaning "to move" and "to view" respectively.

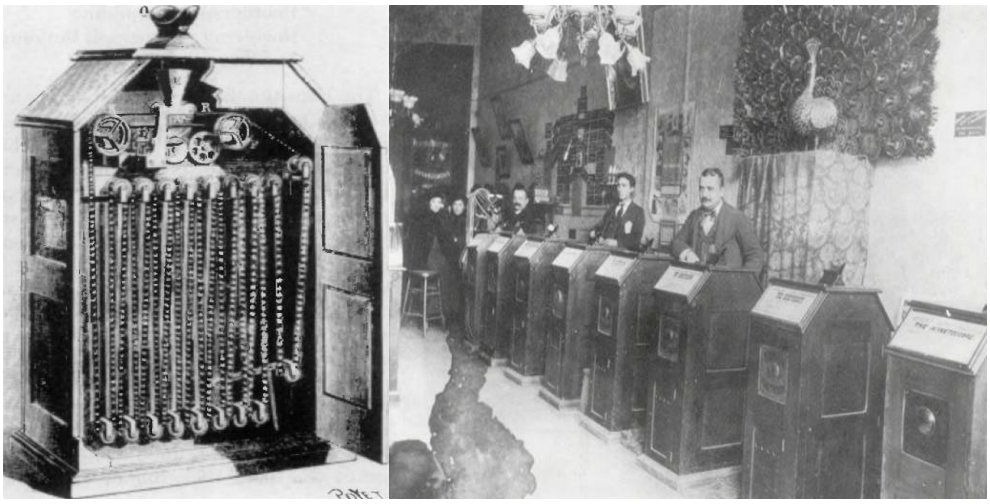

Figure 2.11 : An example of the Kinetoscope and a Kinetoscope parlor (Url-9).

[2] This quote belongs to Edison's caveat presented to US Patent Office in 1888.

[3] It is worth mentioning that the outcome of the project is usually credited to Edison, but there were undeniable efforts of teamwork, and some scholars like Hendricks (1961) even give full credit to Dickson. Another important claim especially supported again by Hendricks (1961) is that the dates regarding the birth of the innovation may not be correct since the personnel involved altered the dates to provide Edison and his company advantage in terms of patent rights.

The design used the filmstrip, but instead of projecting the images to a screen, it provided a single person peep show. Edison's main motivation was to propose the device for personal use, not for a crowd, because he believed that it would be more profitable that way (Morton, 2006).

In order to provide content for his kinetoscope parlors, Edison used "Black Maria," which is a building that was built for his motion picture project within the West Orange facilities. The building had special properties such as the ability of adjusting position according to sun when needed, had a convertible ceiling that can be removed for more sunlight and black inside walls to provide contrast for better image quality (Musser, 1990).

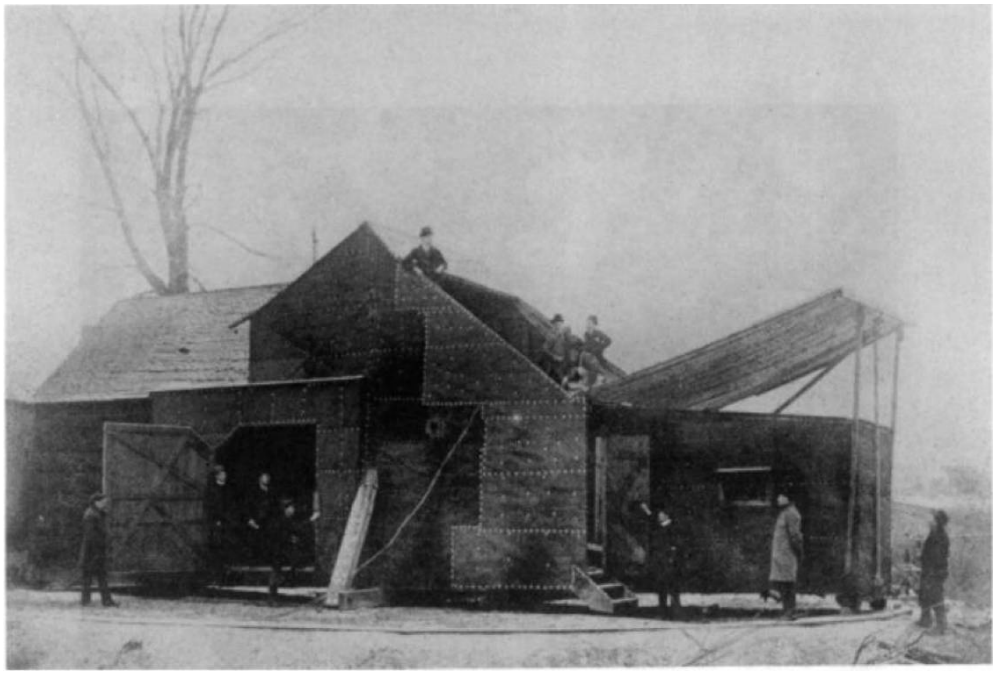

Figure 2.12 : The Black Maria circa 1894 (Musser, 1990).

The early examples of films included movements of a muscular man, or a scene from a barbershop, or a blacksmith or a boxing match, which all, as Musser (1991) states, were made by men for men and consisting men; but women started to appear soon after famous dancers of the era such as Carmencita and Annabelle Moore were invited to Black Maria for various films. These early examples of films were also important since some of them had hand painted versions, which can also be considered as the first surviving examples of colored motion picture.

Edison kept on working on improving his invention, and in 1895 together with Dickson, he unveiled the "*kinetophone,"* which can be described as a combination of phonograph and kinetoscope. The device was still a peepshow but there were multiple options of accompanying "*soundtracks"* which were prepared for playing along with the image. Different styles of music were provided for the audience to choose from but none of them was intended to be truly in sync with the image.

Figure 2.13 : The Kinetophone (Musser, 1991).

Europe on the other hand, was on the verge of similar developments, and since the patents and innovational rights for Edison regarding his recent innovations of motion picture were valid only in continental America, Lumiere brothers found their way to build and promote their own system in 1895.

The Lumiere Brothers' setup named "*cinematograph*" was weighting approximately 5 kilograms[4] and it could easily be fitted in a suitcase (Bordwell, 2013). Also the overall process was so quick that they promoted the system with the statement that it is possible to "*film in the morning, bath in the afternoon and present at night.*"

[4] Bordwell states that the device was around 12 lbs.

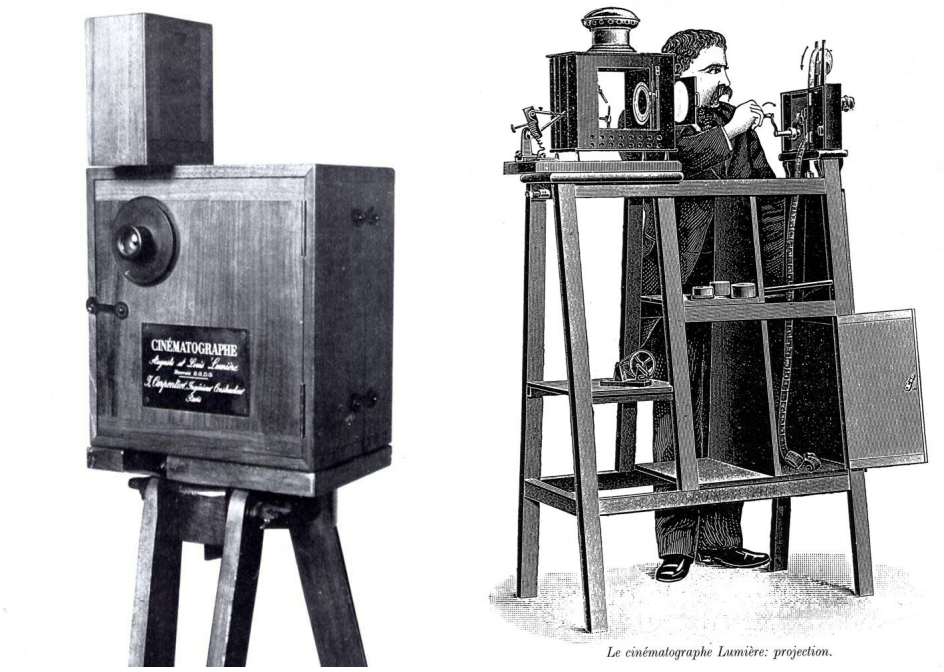

Figure 2.14 : The Cinematograph in camera mode and projector mode (Url-10).

There were several other systems with similar functions at that time but the practicality of the cinematograph set it apart. It was also different from Edison's devices, because it was projecting the image to a screen for a crowd of audience instead of presenting a single person peep show that the Edison system was based on. The approximate length of a cinematograph film was around one minute and with help of portability, it was an easier task to shoot outdoor scenes. A famous example for early cinematograph film is "The Arrival of Train at La Ciotat" which showed a train approaching to the station and the passengers walking by the dock. What makes this 50 seconds long of motion picture important is that it created an urban legend that the audience were shocked in fear as they thought that the train is actually coming towards them (Loiperdinger, 2004). This myth helped the cinema to establish a fame of having strong effect on the audience and helped it to increase its popularity.

The following years various other devices were developed as motion picture systems with or without sound; Chronophone, Cameraphone, Cinephone, Vivaphone and Synchroscope to name a few. Edison also added a projecting motion picture setup among his inventions. Apart from the variety of these systems, one thing remained constant; there was an increasing public attention and companies in the business

were trying to provide more content for the audience. As a result, from the birth of the first examples of films until the arrival of the "*talkies*" in 1927, for more than thirty years, filmmakers gradually developed an art form. As far as film studies are concerned, this period is usually referred as the era of "*Silent Cinema.*"

2.2 From Silent Cinema to Synchronised Sound

When the term "silent cinema" is mentioned in a film sound study, it is often succeeded by an explanation that the term is wrong by definition. The reason behind this is that most of the films from that era were presented to the audience with some sort of sound accompaniment, ranging from a single musician playing an instrument to a full orchestral performance or a narrator or even sound effects produced by machines. Scholars studying film sound propose other terms, for example Michel Chion (2009) suggests the term "*deaf cinema,*" because according to him, within these movies "*there were words and noises, but they could not be heard*" (p. 3). It is important to mention that the French term for silent cinema is "*cinéma muet*" and it can be translated to English as "mute cinema," so it is understandable for a Frenchman to propose "deaf" against "mute" since he suggests that the movies were not mute, they were providing words and noises but the audience could not hear them[5].

For scholars of a technical point of view, the terms such as "cinema with asynchronous sound" or "cinema with non-synchronised sound" are familiar as well. This perspective emphasises the existence of sound accompaniment but also points out that the proper synchronisation of sound to image had not been achieved at the time.

In any case, initial acceptance of the term "silent cinema" and the fact that it is still being used often today can be the topic of another discussion, merely, if it is an indication whether film scholars consider sound as a lesser component of the art or not.

Besides the terminology discussions, there are two major topics that should be covered in order to understand how the filmmakers of the era were able to develop

[5] This is pointed out by the translator of Chion's "Audio-Vision", Claudia Gorbman.

their own way of expression with regards to sound. First, how the sound accompaniment was presented to the audience, and the other one is how the intended sonic events were implied by visual images.

The correspondence between sound and image has roots in visual arts dating before the birth of cinema. There are examples of painters who expanded the expressive horizons of their art by including visual implications of sonic events or naming them after sound related topics (Christie, 2001). In the 1859 painting "L'Angelus" by Jean François Millet, it can be observed that the implied sound of the church bell coming from the distant church that can be seen by the shoulder of the farmer lady has a crucial part, even Millet declared how he was inspired from his grandmother who stops working in the fields whenever she hears the church bell ring and makes everyone pray with her.

The 1833 painting of Ferdinand Knopff named "En écoutant du Schumann" strongly benefits from the title to indicate that the lady in the painting is listening to Schumann and this situation evokes an aural dimension on the audience for those who are familiar with Schumann's music (Christe, 2001).

Figure 2.15 : "L'Angelus" by Millet (left) and "En écoutant du Schumann" (right) by Knopff (Url-11 and Url-12).

The implications of sound in the cinema on the other hand, can be traced through movies themselves and their screenplays. Within a study for identification of sound references in screenplays and films that were shot in France between 1895 and 1915, Isabelle Raynauld (2001) studied a total number of 5348 titles from Pathé and Méliès. Her study revealed that apart from the non-scripted films, 57% of the titles

covered were screenplays with major sound related elements with most of these elements being very important for the story. Raynauld (2001) gives examples of these screenplays from both Pathé and Méliès such as:

> "The cook who hears his Boss's footsteps approaching because he heard the sound of broken dishes hides in the pantry"

and:

> "He goes to listen through his door and hears with fear a series of gunshots"

As it can be observed from these quotations, sounds although not being heard by the audience, provided narrative information and they were intended to play a part for the development of the story. Another interesting point from the same study is that Raynaulds (2001) requested assistance from deaf people to watch these films for lip reading in order to see if the actors stick to the lines written for them. The results showed that in vast majority of the cases actors were performing according to their lines. Although there are stories about early films in which actors talk off-topic, it can be deduced from this study that this misbehaviour was given up with the help of a rapid transition from amateur casting to professional acting.

In another study focusing on the usage of sound elements in pre-1915 European melodramas conducted by Dominique Nasta (2001), the stylistic differences of sound visualisation in American and European melodramas are distinguished. He states that in American examples, the sound elements usually function to set the mood while their European counterparts employ symbolism more often. Then he focuses on the visualisations of sounds that are intended as if they were heard, and introduces "subliminal auditory perception" into silent film sound analysis. He states that when a visual stimulus connected to a sound element occurs in a film, it evokes unintentional perception of sound by the audience since the required connection of the image to sound is already present in the memory of the viewer. His work expands upon examples of categorical analysis of sound events in films, showing how the sonic events are visualised based on the phenomenon of subliminal auditory perception and how these events relate to filmic narration.

Michel Chion (2009) also gives examples that can be considered within the same scope. In the early action melodramas such as "The Great Train Robbery (1903)," smoke from the guns and detonation of the bombs lets the audience know precise

moment of action and meantime the unheard sound of the gunshot is evoked within the mind of the audience with this implication. Since at the time guns were actually creating smoke, the practice was started unintentionally; but even after the invention of smokeless gunpowder, filmmakers kept using this method since it was the easiest way in the absence of sound to tell the audience that the gun is shot.

Chion (2009) also points out how another difficult task, that of creating the sense of a continuous sound, was overcome by the filmmakers of the era. He states that the periodical refrain shots of the sound source evoke a perception on the audience that the sound is continuous. To give an example, Chion points to Eisenstein's "The Strike (1925)," in which the continuous sound of the factory siren is implied by the refrain shots of the source. By this method, the director not only creates a sense of continuous sound, but he also succeeds in building up a narrative rhythm by adjusting the reoccurrence of the refrain shots.

Another obvious example of visual reference to sound is the usage of intertitles or subtitles in movies. These might be used to set the scene or time but also they are used to declare to the audience what actors are actually saying and how they say it. The dialogue related intertitles can contain additional information about the emotional state of the speech and can present cues to the audience; such as the italics may mean a sarcastic intonation or bold letters may mean loud or shouting voices or emphasis (Chion, 2009). In addition to the intertitles, when the scene calls for certain sonic information that needs to be transmitted to the audience, actors acted with overly emphasised facial expressions and exaggerated their lip movements to compensate the lack of sound.

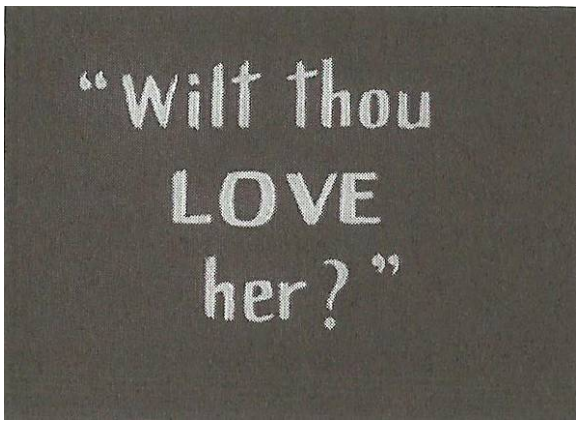

Figure 2.16 : An intertitle from "*Sunrise*" by F. W. Murnau (Chion, 2009, p.13).

Before the appearance of intertitles, the absence of audible verbal expression through the film was initially compensated by the commentaries of live narrators. Those people may describe the scene or they can read or act the actors' lines. The increasing usage of intertitles diminished this practice in most of the Western countries; but in some other countries, depending on the local culture, those narrators gained wide popularity; they even were considered movie stars (Chion, 2009). Japanese "*Benshi*" tradition is an example for this situation, which kept going until early '30s, after the arrival of sound films. Akira Kurosawa (1984) recalls in his memories that his elder brother, Heigo was a successful *benshi*, and after the arrival of sound film turned the *benshi* tradition obsolete, he lost his job and committed suicide.

On the other hand, the most encountered actual sound accompaniment for a movie from the era of silent cinema was music. Most of the places that presented films to the public employed at least a musician, mostly a pianist, or even an orchestra. The musicians provided real time musical accompaniment for the movie that can help to emphasise the emotion of the scene, or mimic the sound of something appearing on the screen, or create impulsive effects to support events. The live music that is played along the movie could be an improvisation relying only upon the talent of the musician, but also it could be pre-selected score, usually from the popular tunes of the time or from the classical repertoire (Chion, 2009). In some rare cases, there were original scores that were written specifically for a movie.

Drummers were also very common among the movie theatre musicians since the drums and percussion instruments are very suitable to create sound effects with various timbral characteristics. In addition to acoustic instruments, machines were built to provide sound effects. Sound effect boxes were known to be built in order to reduce the number of the employed sound staff; but they were not patented, so the first patented device that combined several sound effects into a single cabinet was "*Ciné Multhiphone Rousselot,*" which was built in France in 1907 (Altman, 2004; Bottomore, 2005). Two years later in England, A. H. Moorehouse invented "*Allefex,*" another sound fx device which was claimed to be capable of producing more than 50 different sounds ranging from car sounds to machine guns, bird sounds to thunder sounds (Talbot, 1914).

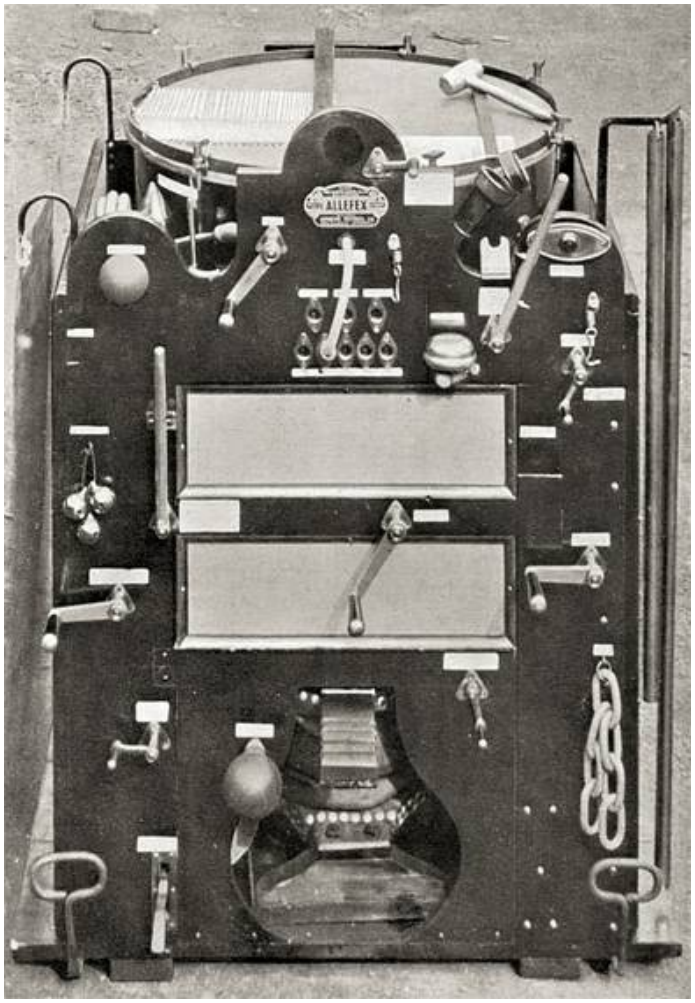

Figure 2.17 : The “Allefex” (Talbot, 1914).

However, the usage of the effects was not always welcomed. Stephen Bottomore (2001) compiled excerpts from articles and magazines dating back to the era of silent cinema, which included several complaints regarding the usage of live sound effects. First of all, the infidelity of the sound effect to the image creates false interpretations on the audience. He quotes an article from *The Moving Picture World* from 1909, which states that “the imitations should be fairly accurate or they shouldn’t be attempted” (p 130). On the other hand, while providing examples for inaccuracy, Bottomore quotes from H. H. Fullilove and an interesting point appears; the exaggerated sound effects or lack of verisimilitude between image and sound can be very effective in comedies. Fullilove says that he sometimes pulls a cork from an empty bottle to imitate a sound of a kiss, which in return receives laughter from the audience (p. 134).

Apart from the case of comedies, another complaint that study points out is that constant timbre of the effect over changing conditions irritates the audience, such as hearing the same sound from the hooves of a horse although the surface changes from stone to soil.

Most of the problems were related to limited equipment and staff and in order to keep the wages low, the sound effects personnel employed in the theatres were usually young and inexperienced (Bottomore, 2001). That being one of the reasons, sound fx person of the era had a tendency to overdo the effects. I also observe this fact among the students of Sound Design for Visual Media classes. It is always an important question for the sound designer/fx person to decide what to create sound for and what not to. Otherwise, creating a sound just because the source is on screen can create a distraction from the focal point. An example of this situation that Bottomore (2001) gives in his article is that of a sound person who creates loud and hysterical bird singings in a scene of two lovers, just because there was a bird in a cage far away in the room and he was able to see it.

Another issue for the sound person of the era was finding a way to employ sounds for continuously visible sources without becoming overwhelming for the audience. The option of keeping on the sound as long as the source is on screen seemed to be very tiring and left less headroom for other effects that might occur during that time. One way to overcome this problem was to use short but periodical sound effects as reminders of what is going on the screen. This was a simple yet effective solution, but still wasn't able to work every time since there always were a possibility to turn a serious car chase into a funny parody by employing a honk-honk sound time to time just to remind that there is a car on the screen. Regarding this topic, Bottomore (2001) quotes an article from 1913:

> to maintain silence throughout the main portion of a long film and then cut in suddenly for about two seconds with the absolutely unimportant sound of a motor-car or a horse galloping, is simply to draw attention to the limited nature of your effects. (p137).

In any case, these examples prove that there had been numerous discussions about sound usage during the silent cinema era, both in theory and practice. As a result, when the synchronous sound arrived, people of the industry already had a background about how to deal with it.

2.3 Arrival of the Synchronised Sound

Besides the innovations in entertainment business, major advancements were taking place in telecommunication technology, which in return, significantly effectied sound and movie industries. One of those inventions was the "vacuum tube," which was already in use by the beginning of 1900s, but it was 1906 when Lee De Forest patented first triode vacuum tube called "*audion*" (Gomery, 1985).

In those days, giant corporations led the telecommunication industry and one of them was American Telephone & Telegraph (AT&T) Company. Its subsidiary called Western Electric gained the rights for audion tube in 1912 in order to experiment upon amplifiers for long distance telephone transmission (Gomery, 1985). After the World War I, their research successfully resulted in the manufacturing of audio amplifiers and loudspeakers, not only for telecommunication but also for public address systems. It is worth mentioning that these are improved variations on existing technologies and not new inventions; but what sets Western Electric apart from other companies is their decision to employ these designs for the film industry.

Major film companies such as Paramount or Loew's were already making significant profits and they were controlling international distributions and theater chains, so it was Warner Bros. that was looking for new ideas to get a better place among the industry. Gomery (1985) briefly summarizes the financial and business development strategies of Warner Bros. through the mid 1920s. As he states, Warners appointed a well-known Wall Street investor as the head of finance committee. With the help of his connections, company was able to get a $3 million bank loan and an additional $4 million fund raised from bonds in 1925. With these resources, Warner Bros. bought Vitagraph Corporation and started a ten-theatre chain. Within the same year, Warner Bros decided to get the sound equipment for their new theaters from Western Electric. This business relation immediately resulted in a co-operation, in which Warner Bros. providied film-related resources such as camera operators, editors etc. while Western Electric was responsible for providing sound equipment and engineering. In 1926, both sides decided to establish a new company for sound motion picture, so the Vitaphone Corporation was born. As Gomery (1985) states, Vitaphone also followed a progressive business plan. First, they contracted Victor Talking Machine for their popular music artists, and then with a similar approach,

they contracted Metropolitan Opera Company. Vitaphone even hired New York Philharmonic Orchestra to record the music for their premiere. The Vitaphone Corporation had several advantages compared to others in the business; most importantly they had the financial strength of AT&T and they received technological assistance from Western Electric and its research department called Bell Laboratories, which resulted in superior sound quality due to recent invention of condenser microphones and better amplification (Gomery, 1985).

On 6 August 1926, Vitaphone premiered "*Vitaphone Preludes*" at Warner Theatre in New York (Gomery, 1985). These preludes with sound mostly consisted of concerts and operatic performances, but there was also a silent feature named "*Don Juan;*" which employed a synchronized soundtrack of musical accompaniment as well as sound effects. The Vitaphone made a bright start and by the end of 1926, they were able to sell approximately 100 sound systems to theaters; but the Western Electric directorate had different plans. They were planning to convince larger film companies to use their equipment, so they terminated their contract with Warner Bros and formed Electrical Research Products Inc. (ERPI) for their non-telecommunication businesses and started to sell licensing for their equipment, making Vitaphone one of their licensees (Gomery, 1985). On the other hand, five of the greatest major film companies which are MGM, Universal, Paramount, First National and Producers Distributing Corporation signed an act known as "Big Five Agreement" in regard of acting together about sound systems in order to avoid possible income losses due to mismatch of sound formats. According to Morton (2006), there were almost 200 different sound systems competing in the world by 1930, so it was a reasonable behavior for these companies to take it slow to observe the trends in sound technology, just like being precautious about ERPI's offerings at the beginning.

Warner Bros. on the other hand, kept releasing short films with Vitaphone sound. They had no competition in this respect, but it was Fox Film Corporation that employed a different use for synchronized sound and motion picture. In 1926, Fox Film Corporation signed a contract for a sound-on-film system, which is developed by Theodore W. Case and Earl I. Sponable (Gomery, 1985). The system was later named "Movietone" and it was superior to Western Electric's sound-on-disc system. Major entertainers were already under contract with Warner Bros., and Fox Film

Corporation owned a relatively small number of theaters, so as a business plan, they decided to use the sound technology for their newsreels and as a result, they premiered the first sound newsreel on 30 April 1927 (Gomery, 1985).

On 6 October 1927, Warner Bros. released their new feature with sound. Although not being completely a sound film, "The Jazz Singer" made a huge impact. The synchronized music had already been in theaters for more then a year; but it was the excerpts of synchronized speech on the movie that increased the effect, and "*talkies*" were born.

The Jazz Singer was a great success and even raised the profits of Warner Bros by 600% in 1928 (Gomery, 1985). The significant amount of public attention towards the sound film forced the industry to make an immediate switch to "*talkies*" from silent movies. In 1927 there were 157 sound-equipped theaters but this number reached to 13,880 in 1931(Kelley, 2001). Another example for the pace of this transition stated by Gomery (1985) is that 22% of all U.S. theaters were also presenting the silent versions of the talkies in 1930; but only two years after, in 1932 approximately 0% of the theaters were presenting the silent versions.

On the other side of the medallion, transition to sound film created side effects for the people involved in the industry. One major group that was severely effected was the musicians. Robin D.G. Kelley (2001) discusses various aspects of this subject while pointing out the decrease in the number of musicians working in the theatres. As he states, there were approximately 26,000 musicians working in the U.S. theatres in 1926, just before the birth of the "talkies." This number was reduced to 14,000 in 1930 and only 4100 musicians were able to keep their jobs in theatres by 1934. The transition to sound film caused approximately 22,000 musicians to lose their jobs while Hollywood was able to provide new positions for only about 500 studio musicians. Because of this situation, American Federation of Musicians (AFM) led a national campaign against recorded sound, which they called "*canned music,*" combined with a strike of musicians (Kelley, 2001). Although the strike and the campaign were a failure, the questions raised about to protect the rights of the musicians are important.

Figure 2.18 : An example of magazine advertorials for the AFM campaign against "*canned music*" (Url-13).

PAGE THREE

CANNED MUSIC THEATER

TRAMPLING ART FOR PROFITS

FOR all its virtues, modern industrialism *can* run amuck under the spur of greed for profits. Witness, the ruin threatening the Art of Music.

•

300 musicians in Hollywood supply all the "music" offered in thousands of theatres. Can such a tiny reservoir of talent nurture artistic progress?

•

The true function of the machine is to *increase* the value of the product fed into it—not to *debase* it. Therefore mechanical music, *as a substitute* for Living Music, is a spurious form of progress—Like a loom converting good wool into shoddy.

•

The grind organ, however operated, is a grind organ still. For music is an *emotional art*, a form of social intercourse, and hence dependent upon human contact.

•

Who profits by the elimination of genuine music from the theatre? *Not* the music-loving public! *Not* the musician!

•

If you agree that theatre patrons are entitled to real music—*in addition* to talking and sound motion pictures, for the price they pay—HELP SAVE THE ART FROM RUIN. Enroll with millions of others in the Music Defense League. *When the public's voice is raised its will must be served!*

American Federation of Musicians
1440 Broadway, New York, N. Y.

Gentlemen: Without further obligation on my part, please enroll my name in the Music Defense League as one who is opposed to the elimination of Living Music from the Theatre.

Name .....

Address .....

City..... *State*.....

THE AMERICAN FEDERATION OF MUSICIANS

(Comprising 140,000 professional musicians in the United States and Canada)

JOSEPH N. WEBER, President, 1440 Broadway, New York, N. Y.

Figure 2.19 : Another example of magazine advertorials for the AFM campaign against "*canned music*" (Url-13).

The resistance to arrival of sound was not only from the people losing their jobs; even some of the directors took an opposing stance. For example Russian directors Eisenstein, Pudovkin and Alexandrov released "A Statement"[6] in August 1928 to declare their point of view against ways of using sound in movies. Although they forecasted that the "illusion of talking people" will convert movies into the "photographed performances of a theatrical sort" and will overshadow the major technical tool, the "*montage;"* it is also equally important that these directors' point of view was not totally against sound (Weis, E. and Belton J., 1985, p.84). In fact, they suggested experimental ways of sound usage such as non-synchronization as creative tool to provide a counterpoint of sound and image.

French director René Clair was also skeptical about sound. In a letter he wrote in May 1929, which will later on be published as "The Art of Sound,"[7] he concludes that the sound film "has conquered the world of voices, but it has lost the world of dreams" (Weis, E. and Belton J., 1985, p.95). On the other hand, earlier in the same letter, he gives the movie "*Broadway Melody"* as an example for a creative use of sound in a film. In that movie, there is a scene in which the off-screen sound has narrative information. In that scene, there is a close shot of the actress gazing sadly through a window while the audience hears the sounds from a departure of other person such as a door closing and a car leaving. This scene is among the very first examples of creative sound editing utilizing screen sound as a narrative tool, and Clair states that sound helped to achieve a "unity of place" while a silent film equivalent would require several cuts.

An American film critic, Harry Alan Potamkin was also discussing the pros and cons of the sound in motion picture in the early days of synchronized sound. As quoted by Wierzbicki (2009), in a magazine article of April 1929, Potamkin gives adcice about music usage:

> Since music is inevitable, we can make the best use of silence by selecting the intervals carefully at which the music will be hushed. At all other times the music is to be subdued – I might even say, made bashful. Long periods of silence separated by music will emphasize not the silence but the sound. And only by emphasizing silence can we stress the silent

[6] The English translation of "A Statement" by Jay Leyda can be found in E. Weis and J. Belton (Eds.) (1985), *Film Sound: Theory and Practice*, p. 83-85

[7] The English translation of "The Art of Sound" by Vera Traill can be found in E. Weis and J. Belton (Eds.) (1985), *Film Sound: Theory and Practice*, p. 93-95

> image. Though in the emphasis of silence in sound, there is still an emphasis of the sound arrangement. To this I answer: subdue the silence in sound, use it sparingly. But see that the music neither distracts nor deceives the sight. Hide the orchestra. (p. 99).

The examples given here about the doubts about sound in film were based on artistic decisions; but there were also side effects to be considered due to the implementation of the sound technology to the movies. For example, Edward Bernds (1999), in his autobiography about his experience of early sound films in Hollywood, complains about the weight of equipment:

> The man who invented the light-valve may be a genius, but the engineers who design the other Western Electric equipment were decidedly not. Everything they provided for us was oversized and overweight. They must have come from designing battleship hardware because, for studio use, they made liberal use of bronze, which resists saltwater corrosion but heavy. Saltwater corrosion is not a serious problem in Hollywood (p. 69).

Bulky and heavy equipment restricted mobility and the necessity of on-location sound recording enforced use of sound isolation for the noisy equipment, especially cameras. Until the arrival of self-isolated cameras, the tendency was to put camera and the operator into a soundproof isolation cabin (Salt, 2009). This solution helped to keep the camera noise away, but on the other hand, it restricted camera movements like panning.

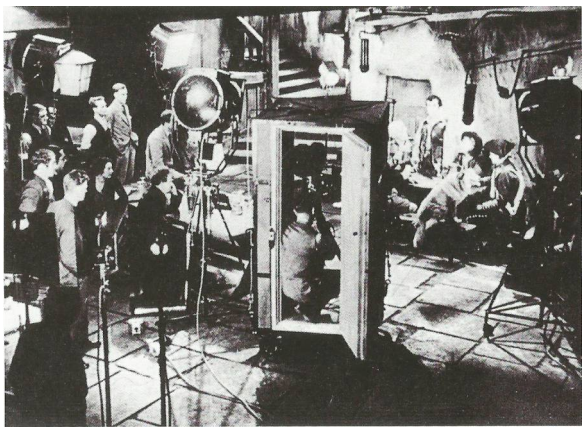

Figure 2.20 : Camera in an isolation booth (Pramaggiore and Wallis, 2011, p.231).

Microphones were also prone to wind and noise and they needed the amplifiers close to them, making outdoor shots more difficult (Altman, 1985). Also, in order to keep the microphones outside the frame, operators needed to keep them at a distance, which added the problem of directionality. To overcome these problems, engineers

worked on more directional microphone designs, like the use of parabolic reflectors or, later on, they invented ultra-directional microphones, such as the shotgun microphones, as we know today.

For the early sound films, it can also be observed that the dialogue and the music rarely existed together if they were not recorded at the same time (Altman, 1985). The sound esthetics and requirements call upon different settings for dialogue and music. In order to retain intelligibility, dialogue needs less reverberation, while music usually benefits from it, and they both require different recording techniques. If they were both needed simultaneously, pre-recorded music was played back while shooting, since synchronized sound could only be achieved by recording during filming in those days. Altman (1985) argues that this playback system "permitted immediate capitalization on the sound film's fundamental lie: implication that the sound is produced by the image when in fact it remains independent from it" (p.46). Altman (1985) also summarizes this approach as "Hollywood's habit of *constructing* reality as opposed to observing it" (p. 47).

Perhaps, the most important technical development related to sound is the implementation of optical recording by the beginning of the '30s. This new system had better sonic fidelity, and since the recording medium was the film itself, it was less prone to distribution or operator errors. The contribution of optical recording to film art was mostly noticeable in editing practices. Optical sound recording made it possible to edit sound and image separately, allowing the directors to use sound as an additional narrative tool. Like the example of *Broadway Melody* (1929) given before, it became possible to use sound for declaring events without visualizing them, or as in an example Michel Chion (2009) gives about *Dishonered* (1930), when Marlene Dietrich was playing Beethoven on the piano, "we get these auditory *leaps of presence* right in the middle of the uninterrupted playing of the piece" when the spectators see her room and outside consequently while "the music cue, without any breaks in its harmonic, rhythmic, and melodic line, is subjected to instantaneous changes in timbre and volume" (p.53).

Avarage shot length (ASL) was also affected by the coming of synchronized sound. The ASL of American silent movie examples from late '20s was about 5 seconds (Salt, 2009). With the coming of the sound, the initial trend was increased ASL, both because of the narrative decisions based on sound usage and the technical difficulties

of editing two different mediums of sound and image. With the help of optical sound systems, editing became easier, and the filmmakers' choices became not restricted by technical reasons. Because of that, the directors missing the editing tempo of silent cinema were able to do it that way, and others may not; yielding various examples of ASL ranging from short to long. Barry Salt (2009) observes that the ASL of a Hollywood movie during 1934-1939 was about 8-9 seconds. He also states that the tendency shifts towards longer average shot lengths starting from the late '30s and through the '40s.

2.4 Towards Stereo, Dolby Stereo and Beyond

First years of the '30s set the scene for important theoretical developments regarding sound technologies. Engineers from major companies were already working on several subjects related to sound technology and equipment; but one of them, Alan Blumlein, who was an engineer at EMI, provided a milestone for stereophonic sound. On 14th of December 1931, he filed a patent about "Improvements in and relating to Sound-transmission, Sound-recording and Sound-reproducing Systems" in which he describes methods for stereophonic recording and reproduction of sound.

Another study conducted by Steinberg and Snow (1934) concentrated on sound reproduction. In that study, they tried to figure out the number of reproduction channels required for a realistic representation of a performance picked up by microphones. In theory, an infinite number of microphones connected to an infinite number of speakers would be able to reproduce the performance perfectly; but since that is not possible, they concluded that a minimum number of three channels, left, right and center was adequate for a realistic representation. This three-channel stereo evolved into two-channel stereo by means of employing a phantom center image, as in the stereo systems that we use today; but the physical center channel remained crucial to avoid shifts in stereo image whenever the reproduction system is aimed at a larger group of audience, like in movie theaters (Rumsey, 2001).

Although the theories of stereophonic sound date back to the '30s, the actual appearance of the technology was in the '50s. Until then, majority of the music and movies produced were monaural. This means that all sound was reproduced through a single channel, resulting a fixed sound source localized at the center. There were, on the other hand, rare examples of experimental works on multi-channel sound

reproduction in movies. One of them was “Fantasia,” a Walt Disney animation released in 1940. The animation had abstract qualities to it, and the visuals were used to emphasize sense of depth by employing backgrounds, horizon lines and approaching or diverging figures (Farmer, 2008). In order to support visual perspective, a new sound production system was employed. Radio Corporation of America (RCA) developed “Fantasound,” unique to Fantasia, which consisted of Left, Center and Right tracks controlled by a fourth “control track.” Spanned over two synchronous projectors, this system was capable of creating a non-static sound field by placing various sources to different channels (Kerins, 2011). Although the initial aim for developing the system was to provide new and surprising experience to audience, the majority of the critics from the era were about how the abrupt position changings of sonic elements distracted the audience.

The Fantasound system did not gain much popularity and the beginning of World War II postponed coming of multi-channel systems for about a decade. On the other hand, engineering advancements related to war technologies found their way into mainstream uses soon after the end of the war. For example, loudspeakers were improved due to use of stronger magnets and allies obtained German technology of magnetic recording on tape (Kerins, 2011). This magnetic recording technology provided better sound quality, better signal to noise ratio and higher dynamic range (Belton, 1992). The recording industry immediately adapted this new system and magnetic recording became the norm. But, although the recordings were made onto magnetic tape, and even 75% of Hollywood movies used magnetic sound recording systems by the end of 1951, final prints were still optical films in order to keep them compatible with existing equipment in theaters (Altman, 1985).

1950s witnessed several experiments about the norms of both image and sound. Aspect ratio was changed and widescreen image became more popular. Increasing the size of the image asked for a wider sound accompaniment; and so multichannel stereo systems started to emerge, such as CinemaScope of Twentieth Century-Fox, which was a widescreen format combined with 4 channel magnetic audio (Kerins, 2011). Several other multichannel systems appeared in those days; but none lasted long and there was a tendency towards turning back to mono; perhaps as Belton (1992) argues that the spectators needed a stabilizing factor in front of a larger screen

and “the widescreen revolution needed to anchor itself in the conventions of the past in order for it to break with the past” (p. 167).

Not many advancements concerning film sound technologies took place until the ‘70s. Even the sound frequency specification guidelines prepared by the Academy of Motion Picture Arts and Sciences didn’t change between the years 1938 and 1970. On the other hand, Multitrack recording practices improved during these years; but increasing the track count also increased the noise floor, requiring a noise surprassing system. A company named Dolby Laboratories worked on the issue and invented “Dolby Type-A” noise reduction system in 1965.

Dolby Laboratories developed a multichannel sound system called “Dolby Stereo.” Although the name implies two-channel stereo, the system also included a single surround channel. Dolby Stereo was developed in early ‘70s, but it was 1977 that it made its huge impact on film sound, with the movie *Star Wars*. There were many advantages of the system compared to earlier multichannel systems and perhaps the most important one is that it employed optical final print, which made it a lot cheaper to implement, and it was mono compatible, making it possible to screen the movie in mono with existing equipment (Kerins, 2011).

Dolby Stereo quickly became the norm for film sound in theaters and in 1982; Dolby Surround was introduced to bring the Dolby Stereo experience to the domestic audiences (Rumsey, 2001).

Digital technologies started to dominate many industries in the late ‘80s and the early ‘90s; including sound recording and production. Adapting to the digital era, Dolby developed “Dolby Digital” sound format, which is a 6-channel surround digital sound system with 5.1 speaker configuration, first premiered with *Batman Returns* in 1992. One year later, two new digital systems appeared; Sony introduced Sony Digital Dynamic Sound (SDDS) with *Last Action Hero* and MCA/Universal Studios supported DTS (Digital Theater Systems) with *Jurassic Park* (Sergi, 2005). As Kerins (2011) states, each of these three systems had their positive and negative sides related to sound quality and marketing strategy. Dolby had a pedigree about film sound but had no direct contribution from a major film studio while SDDS was backed up by Sony/Columbia and DTS was supported both by Universal and by a famous director, Steven Spielberg. DTS was cheapest; but SDDS promised most

number of channels with a 7.1 configuration. Considering these facts it could be said that a format war was on the verge; but a consensus was reached soon. According to this agreement, it was decided to print all sound formats onto the same filmstrip; so that any theater would be able to play whichever format they had the equipment for. Kerins (2011) describes how the filmstrip was arranged accordingly; Dolby took the area in-between the perforated sprocket holes, because their engineers concluded that this part was less prone to any mechanical wear or damage, while SDDS took further to the edge of the strip. Although this part was near the edge, it had more space for the additional data required for 7.1-channel setup. DTS followed a different approach and only asked for a very tiny space for the time code needed to synchronize film with the sound data provided in a separate compact disc. This provided the advantage of more space for DTS; providing the possibility of using higher bit rates and resolution for digital audio.

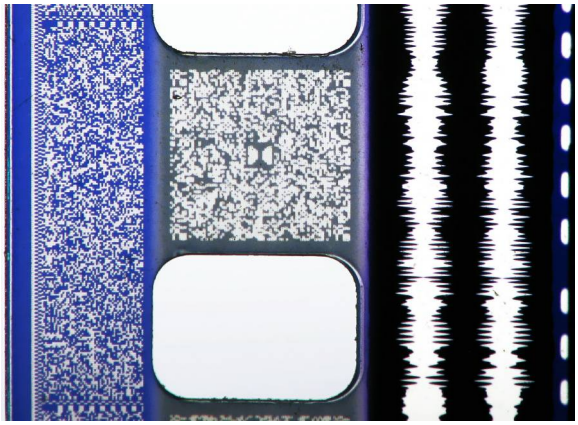

Figure 2.21 : 35 mm film print with four audio formats, from left to right: blue area is SDDS, grey area between sprocket holes is Dolby Digital (with double D logo), black and white waveforms are analog optical soundtrack and the dashed lines are DTS timecode (Url-14).

With the beginning of the 21st century, recent research in film sound have been concentrated on introducing vertical positioning of sound sources. Holman (2001) offered a configuration of 10.2 while Hamasaki et al. (2004) suggested a 22.2 system. Both of these systems provide vertical positioning of sound sources. Dolby Laboratories also developed a new format called "Dolby Atmos" containing height information, and even premiered the system with the movie *Brave* on 22 June 2012, followed by 64 releases in 2013, 54 releases in 2014 and with 25 new movie releases scheduled during 2015 (Url-15).

3. ANALYSIS OF FILM SOUND AND ROLE OF SOUND DESIGN IN FILMIC NARRATION

3.1 Physical Properties of Film Sound

By its simplest definition, sound is "a mechanical disturbance of the medium, which may be air, or a solid, liquid or other gas" (Howard *et. al*., 2001). Although not providing adequate information for a comprehensive explanation, this definition implies that sound is a kind of a "*vibrating system*" that can be studied according to the laws of physics. Under the scope of acoustics, which is a branch of science that focuses on sound, sound waves can be studied based upon their physical properties such as amplitude, frequency, phase and etc. With a similar approach, physical properties of sound can also be investigated to provide a basis for film sound analysis.

In order to provide a proper organization, I studied physical properties of film sound under four categories. First category is about loudness; consisting the overall loudness of the material, loudness distribution, loudness of individual elements of the soundtrack and comparative loudness of different film sound components such as dialogue, music and sound effects/ambient noise; that will be investigated under the section "Loudness: Levels and Relative Levels in Film Sound."

Second category is the dynamic range of the film sound. The dynamic range refers to the difference between the loudest and quietest sonic elements in a soundtrack. In music, dynamics is an expressive tool, for example composers indicate in their scores how loud they prefer the performance of an instrument, labeling the corresponding partition like *piano* or *forte, mezzo piano* or *mezzo forte,* and *pianissimo* or *fortissimo* and etc. In film sound studies on the other hand, this should be observed under two sub-categories. First one is macro-dynamics, which is the difference of loudness between loudest scene and quietest scene throughout the complete movie, while second aspect is to observe micro-dynamics, which is the difference in loudness of consecutive sonic events. This subject will be covered under the title of "Dynamic Range: Macro and Micro Dynamics of Film Sound."

The third category is related to frequency spectrum of the film sound. It could be a means to observe the usage of the audible spectral range or specific regions of it, such as sub bass frequencies. It can also be a very helpful tool when it is combined with other data, such as loudness measurements. This topic will be covered under the section that is named as "Frequency: Spectral Information of Film Sound."

The last subject is about alterations of timbral characteristics in film sound. It will be about observing the usage of special effects such as filters, equalizers, reverb or modulation effects and etc. This section will be named as "Special FX: Effects and Timbral Manipulations in Film Sound."

3.1.1 Loudness: Levels and relative levels of film sound

How to manage the loudness of a program material was always an important issue for audio-visual media, especially in broadcasting. To begin with, the commercials getting louder and louder received complaints from the audience, and some governments decided to take precautions, such as the CALM Act (Commercial Advertisement Loudness Mitigation Act) initiated by U.S. government (Url-16). Later on, several television and radio stations started to ask content providers to fulfill loudness requirements they adopted based upon specifications from international broadcasting and telecommunication unions. The concept of setting norms and regulations for loudness levels was not limited to broadcasting. Video game industry followed the route, as being a developer of a game console platform, Sony formed Audio Standards Working Group (ASWG) to investigate the perceived loudness of audio content from a game that a player is exposed while playing during certain period of time (Url-17).

With the start of the Dolby era, in order to preserve consistency in loudness of different movies and theaters, final soundtracks were prepared under the observation of a Dolby consultant, and sound systems in theaters were calibrated according to guidelines. Although it might be assumed that the loudness issue in theaters is under control, it is not always the case. There happened to be several complaints about excessive sound levels in theaters especially in Hollywood movies. For example, in 2010, there had been a hearing injury due to a loud screening of the Christopher Nolan movie *Inception* in Belgium that was taken to the court, and similar

complaints may lead EU to take legal action in the future regarding this issue (Grimm, 2013).

The complaints about loudness in theaters across Europe led the operators to adjust levels lower than suggested settings. Grimm (2013) states that as a result of this reduced volume in theaters, directors started to complain about their movies being softer in volume, so in order to prevent this, post production facilities started to use more compression, resulting in less dynamic range in the movies.

Media for domestic use such as DVD or Blue-Ray on the other hand, are subject to different issues related to the nature of the listening environment. There is usually more background noise at home than in theaters, so in order to keep quiet passages audible and loud passages not disturbing, dynamic range control (DRC) settings can be embedded in audio streams as a metadata (Url-18). In most cases, these settings are selectable to various degrees or totally bypassable by the user. There is also another metadata called "dialnorm," which is a pre-measured and embedded value for average dialogue level. Decoders adjust the overall volume of the movie according to that setting in order to keep the dialogue levels consistent from movie to movie as long as the volume setting on the player is kept constant (Url-18).

Since loudness is an important technical aspect of audio-visual material as explained above, postproduction facilities have several tools for loudness measurements. It is also possible to use these measurement tools to analyze the soundtrack of a movie that can be extracted from DVD. Within the scope of this analysis, loudness measurements are not only used to figure out the loudness levels of the movie soundtrack but also to identify their relationship with the film itself. In that case, it is possible to observe what is happening in the movie alongside a soundtrack, which elements are preferred to be loud and which are preferred to be quite, and it is possible to look for similarities and differences among the directors in regards of sound level decisions.

To perform loudness measurements, DVDs of selected movies are obtained. AC-3 audio streams are extracted and converted to "*wave"* files and imported to a Digital Audio Workstation (DAW). A multi-channel loudness metering plug-in was used to obtain loudness values per second. The results are imported to spreadsheet software

to build charts and diagrams. Since the tables are very large, a short excerpt from one of the movies is given below to provide an example:

Table 3.1 : A short example of loudness data for Reha Erdem's "*Kosmos.*"

Time	Short LM1	Long LM1	Short Dialog	Long Dialog	Short EBU	Long EBU	TruePeak
00:00:41	-35.4	-35.4	No Anchor	-120	-34.6	-34.3	-17.3
00:00:42	-34.7	-34.7	No Anchor	-120	-33.1	-33.8	-18.3
00:00:43	-33.6	-33.6	No Anchor	-120	-31.7	-33	-18.4
00:00:44	-32.4	-32.4	No Anchor	-120	-30.5	-31.7	-18.5
00:00:45	-31.1	-31.1	No Anchor	-120	-28.6	-30.5	-18.6
00:00:46	-29.1	-29.1	No Anchor	-120	-25.8	-28.5	-15.7
00:00:47	-28.8	-28.8	No Anchor	-120	-25.3	-28.1	-17.3
00:00:48	-28.6	-28.9	No Anchor	-120	-25.6	-28.2	-19.2
00:00:49	-28.4	-29.1	No Anchor	-120	-28.5	-28.5	-21.2
00:00:50	-28.1	-29	No Anchor	-120	-30	-28.6	-16.9
00:00:51	-27.7	-28.8	No Anchor	-120	-28.9	-28.4	-18.2
00:00:52	-27.3	-28.6	No Anchor	-120	-27.4	-28.2	-18.1
00:00:53	-27	-28.4	No Anchor	-120	-26.5	-28	-16.1
00:00:54	-26.7	-28.2	No Anchor	-120	-26.2	-27.9	-12.9
00:00:55	-26.9	-28.3	No Anchor	-120	-26.8	-27.9	-18.5
00:00:56	-27.4	-28.1	No Anchor	-120	-27	-27.8	-14.9
00:00:57	-27	-27.8	No Anchor	-120	-25.9	-27.5	-14.7
00:00:58	-26.5	-27.5	No Anchor	-120	-24.8	-27.2	-15.9
00:00:59	-26	-27.4	No Anchor	-120	-24.4	-27.1	-15.4
00:01:00	-25.6	-27.2	No Anchor	-120	-24.6	-26.9	-14.9
00:01:01	-25.6	-27.2	No Anchor	-120	-25.1	-26.8	-18.2
00:01:02	-25.7	-27.2	No Anchor	-120	-25.8	-26.9	-18.1
00:01:03	-25.8	-27.2	No Anchor	-120	-27.1	-26.9	-16.7
00:01:04	-25.9	-27.2	No Anchor	-120	-27.4	-26.9	-16.8
00:01:05	-25.5	-27.1	No Anchor	-120	-26.4	-26.8	-17.5
00:01:06	-25.3	-26.9	No Anchor	-120	-25.2	-26.6	-15.5
00:01:07	-25.3	-26.8	No Anchor	-120	-24.4	-26.5	-13.1
00:01:08	-25.3	-26.7	No Anchor	-120	-24.2	-26.4	-16.4
00:01:09	-24.9	-26.4	No Anchor	-120	-23.5	-26.1	-12.8
00:01:10	-24.8	-26.3	No Anchor	-120	-23.3	-26	-14.9
00:01:11	-24.3	-26.1	No Anchor	-120	-22.5	-25.8	-14.2
00:01:12	-24.1	-26.1	No Anchor	-120	-23.2	-25.8	-16.7
00:01:13	-23.8	-26	No Anchor	-120	-23.3	-25.7	-15.3
00:01:14	-23.9	-26	No Anchor	-120	-24.9	-25.7	-16.5
00:01:15	-24.1	-26.1	No Anchor	-120	-26	-25.8	-21.1
00:01:16	-24.4	-26.1	No Anchor	-120	-28.6	-25.9	-22
00:01:17	-24.8	-26.2	No Anchor	-120	-29.2	-25.9	-16.6
00:01:18	-25	-26.2	No Anchor	-120	-28.9	-26	-16.5
00:01:19	-25.2	-26.1	No Anchor	-120	-25.9	-25.9	-14.4

As it can be seen in Table 3.1, there are three groups of data columns; LM1, Dialog and EBU, each with short-term and long-term values, alongside with a separate column for true-peak values. Long-term is the overall average of loudness for the entire movie, while short-term is the average of a period of one to several seconds. EBU data columns take foreground audio as anchor as specified in EBU-R128 recommendation, which means in this method averaging of long-term loudness stops if the audio levels fall 8 db below the foreground audio. Dialogue data columns take the dialogue levels as anchor, meaning that it measures and averages long-term loudness when dialogue exists. The LM1 method on the other hand, doesn't take anything as anchor and averages the entire program material. Since quiet passages are also important in this study, considering that the silence is an expressive tool for the director or the sound designer, data from LM1 method is used.

Then the data obtained from the loudness measurements are used for creating loudness versus time charts for each selected movie. An example of a loudness chart is given below, and all charts for selected movie database can be seen at Appendix A.

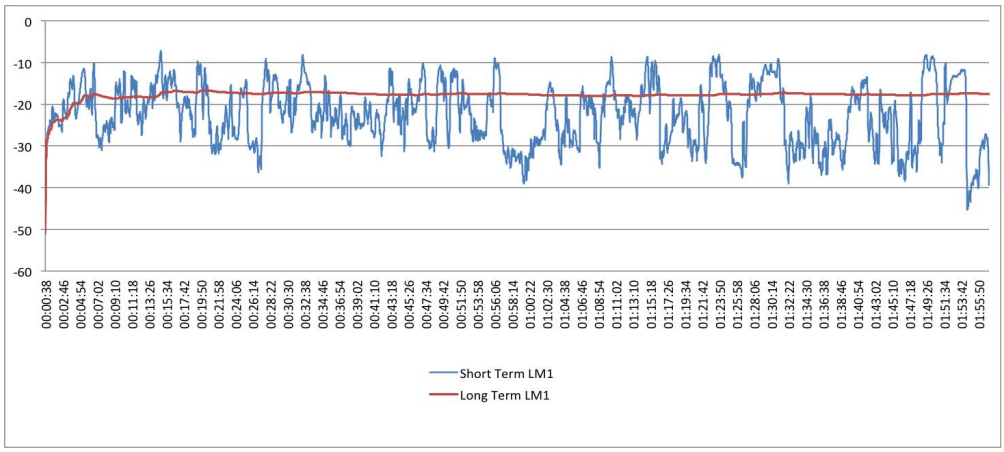

Figure 3.1 : Loudness chart for Reha Erdem's "*Kosmos.*"

3.1.1.1 Investigating loudest sonic events

These loudness charts make it easier to spot louder or quieter sections on the graph, and checking the movie for corresponding scenes and sequences at those sections provides information about creative decisions of the director and / or sound designer.

The initial difference among the choices of directors related to sound can be observed in the usage of non-diegetic music. The movies selected for this study to provide examples for "New Cinema of Turkey" are listed in Table 3.2 along with the indication of the usage of non-diegetic music. The most significant observation about loudness among these examples is that if music exists in a soundtrack, it is most possibly the loudest element in a movie. In addition to that, if there is non-diegetic music, it is usually louder than diegetic music within the same movie. It is known that some directors do not prefer to use non-diegetic music in their movies, such as Nuri Bilge Ceylan or Semih Kaplanoğlu and out of 25 movies investigated within the scope of this study; there were eight movies without non-diegetic music. For the rest of the movies in which music is employed, it is worth to investigate its usage.

Table 3.2 : Table of the movies showing usage of non-diegetic music.

DIRECTOR	TITLE	YEAR	NON-DIEGETIC MUSIC
Atalay Taşdiken	Mommo, Kız Kardeşim	2009	+
Cemil Ağacıkoğlu	Eylül	2011	+
Derviş Zaim	Filler ve Çimen	2001	+
Derviş Zaim	Cenneti Beklerken	2006	+
Derviş Zaim	Nokta	2008	+
Derviş Zaim	Gölgeler ve Suretler	2010	+
Emin Alper	Tepenin Ardı	2012	+
Mahmut Fazıl Coşkun	Yozgat Blues	2013	+
Nuri Bilge Ceylan	İklimler	2006	-
Nuri Bilge Ceylan	Üç Maymun	2008	-
Nuri Bilge Ceylan	Bir Zamanlar Anadolu'da	2011	-
Nuri Bilge Ceylan	Kış Uykusu	2014	+
Pelin Esmer	Gözetleme Kulesi	2012	-
Reha Erdem	Hayat Var	2008	+
Reha Erdem	Kosmos	2010	+
Reha Erdem	Jin	2013	+
Semih Kaplanoğlu	Yumurta	2007	-
Semih Kaplanoğlu	Süt	2008	-
Semih Kaplanoğlu	Bal	2010	-
Yeşim Ustaoğlu	Pandora'nın Kutusu	2008	+
Yeşim Ustaoğlu	Araf	2012	+
Zeki Demirkubuz	İtiraf	2002	+
Zeki Demirkubuz	Bekleme Odası	2004	+
Zeki Demirkubuz	Kader	2006	+
Zeki Demirkubuz	Yeraltı	2012	-

This observation about loud non-diegetic music may not be very surprising since it is usual to expect music to be loud due to its nature, but another interesting point about it is that the non-diegetic music is usually the loudest element of a movie if it is used in the final credits or in the final sequence towards the credits. The opening credits may not be that loud even if there exist a non-diegetic music, because in several cases, directors of new cinema of Turkey prefer medium or low-profile introductions in terms of loudness rather than a continuous *forte* beginning, and they prefer to build up later on; so even if they present a quieter beginning, music towards the final scene or music in final credits is loud.

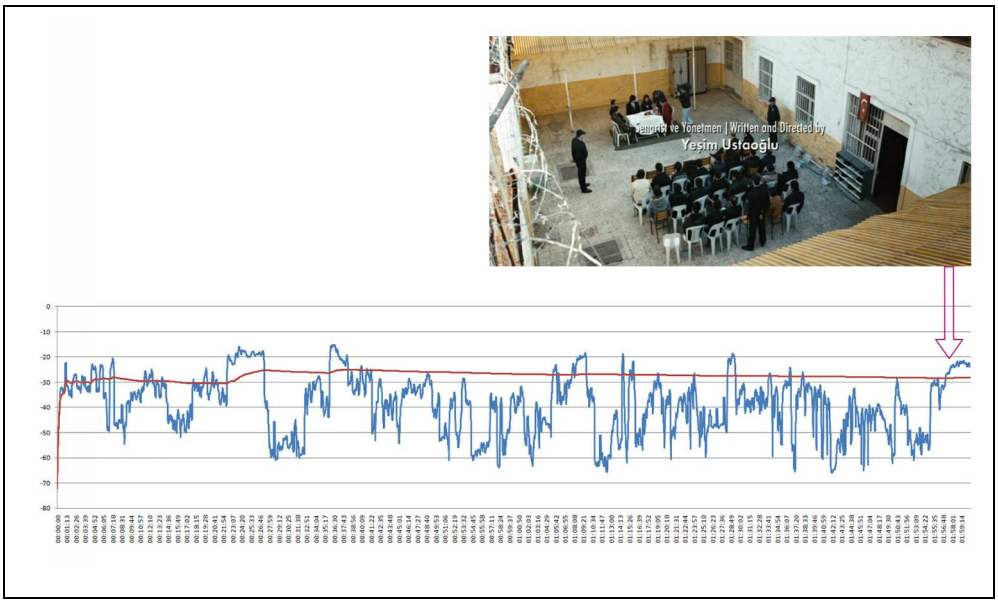

Figure 3.2 : Non-diegetic music in final scene of "Araf."

For example in "*Araf,"* by Yeşim Ustaoğlu, it can be observed that the final wedding scene within the prison is among the loudest sections of the movie due to the addition of non-diegetic music, which can be seen in Figure 3.2. With this type of ending, it is also a usual choice for the directors to roll the credits on top of the final scene while the non-diegetic music keeps playing on.

It can also be observed from the same chart that there exist several other loud sections. As seen in Figure 3.3 below, some of those sections are loud because of the music again, but in those scenes music is diegetic. The music between 00:22:21 and 00:27:09 originates from the wedding, and between 00:35:33 and 00:38:11, the music is originating from the disco that the characters are dancing and chatting along

with. It is also worth noting that the loudness dramatically decreases instantly right after the wedding scene, around 00:27:10, providing an example for the micro dynamics of film sound, which will be discussed later on in this chapter.

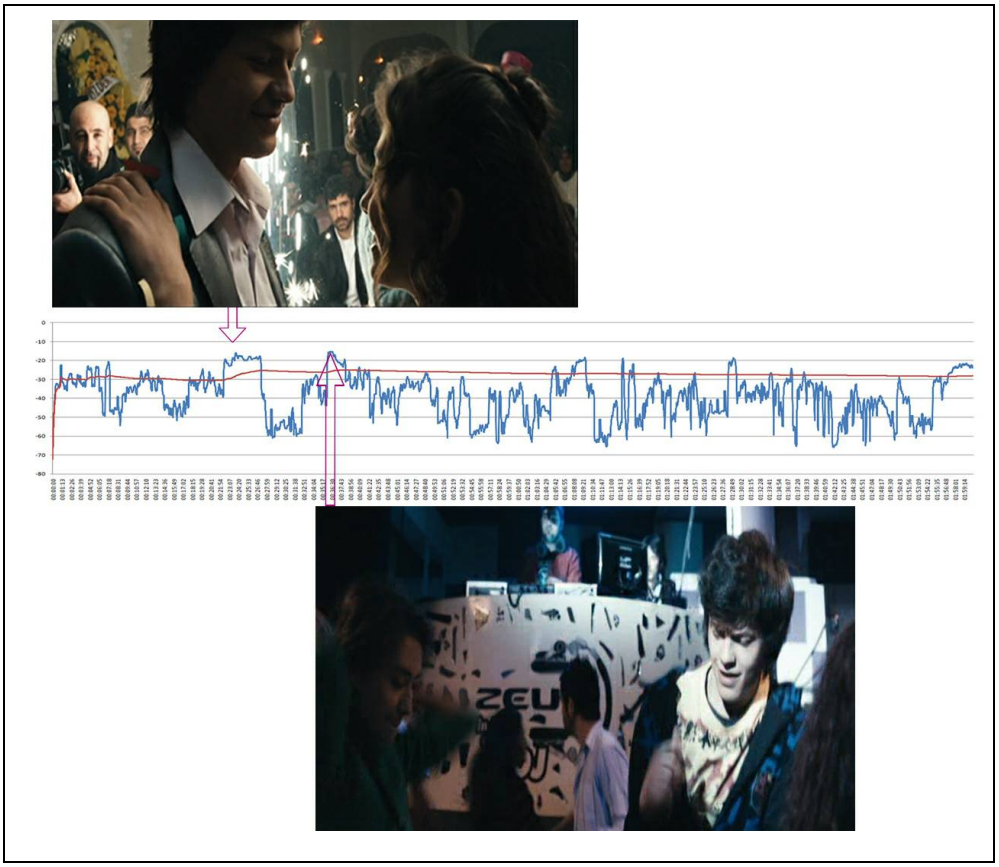

Figure 3.3 : Examples of loud diegetic music in "*Araf*."

Reha Erdem follows a similar pattern in "*Hayat Var*" towards the final, which can be observed in Figure 3.4. In this final scene, there is an audio-visual refrain appearing again, with the ships whistling in various pitches in as if they show response to the actions of the characters towards them, with the variety of pitches creating almost a musical texture, and the director chooses to crossfade this loudest sonic texture into a non-diegetic arabesque music "Dert Bende, Derman Sende" by Mine Koşan, to roll the credits upon.

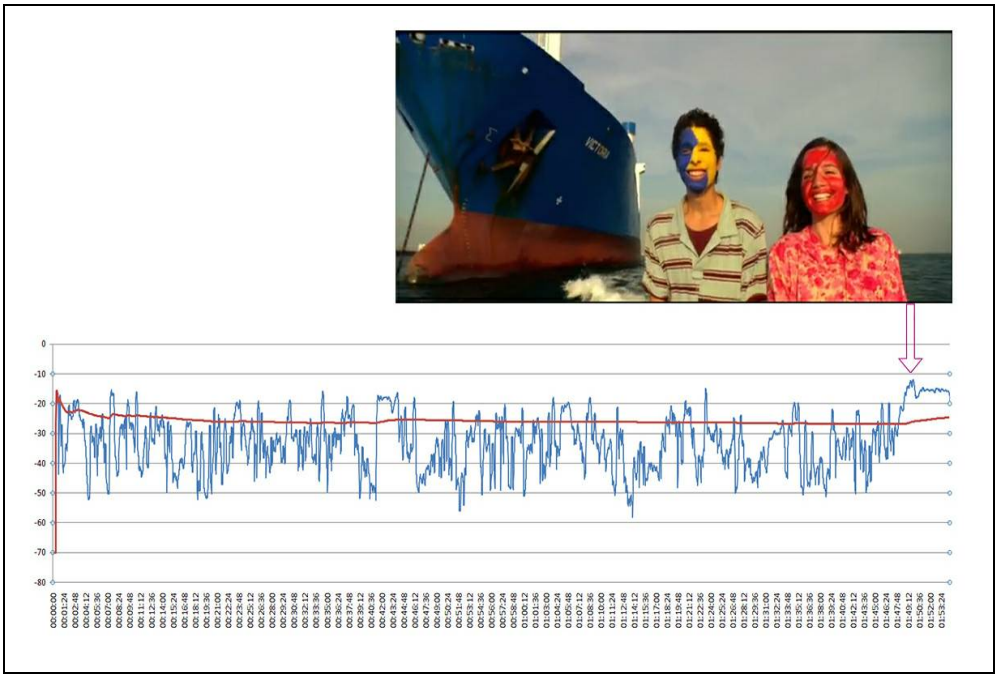

Figure 3.4 : Loud final scene and non-diegetic music in "*Hayat Var.*"

Another examples for the same approach of utilizing loud non-diegetic music on the final scene and rolling credits along with it can be seen in Emin Alper's "*Tepenin Ardı*" and Cemil Ağacıkoğlu's "*Eylül.*" In each of these movies, there is only one non-diegetic music theme. In "*Tepenin Ardı,*" music only comes in at the final scene and in "*Eylül*" music appears both in the beginning and in the end.

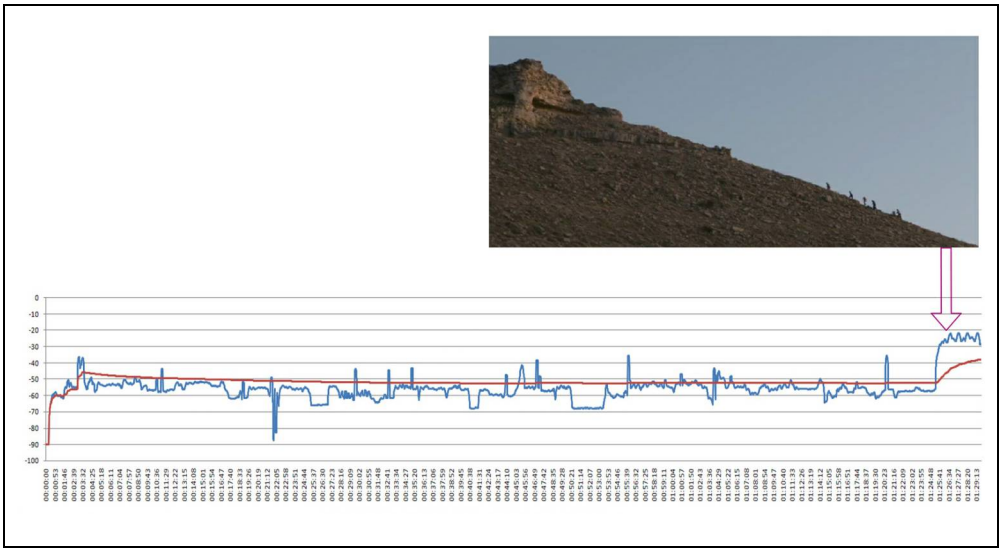

Figure 3.5 : Loud final sequence and non-diegetic music in "*Tepenin Ardı.*"

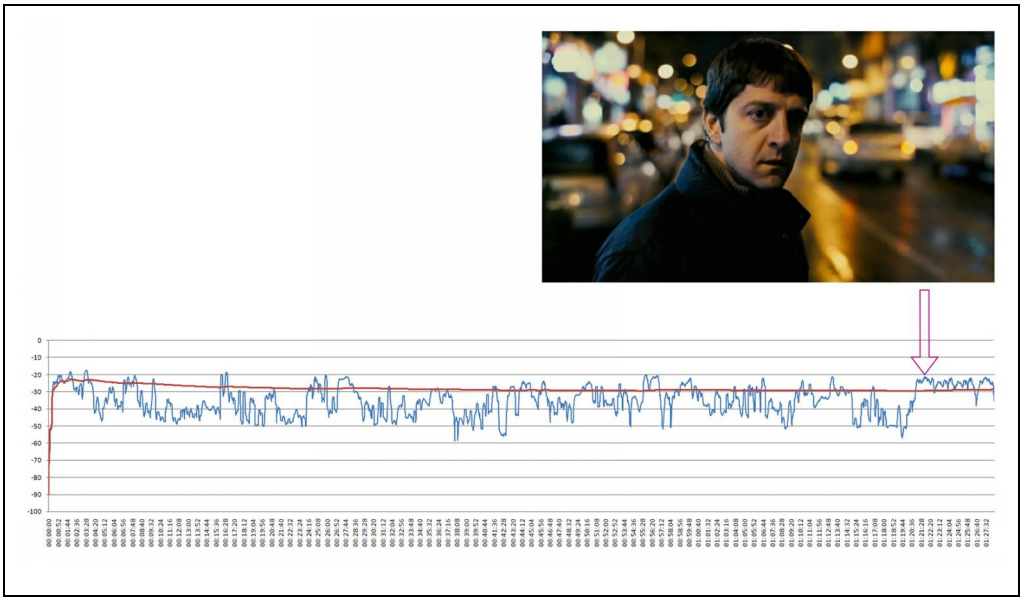

Figure 3.6 : Loud final sequence and non-diegetic music in "*Eylül.*"

As it can be seen in Figure 3.5, the final sequence is significantly loud in "*Tepenin Ardı*" because of the non-diegetic music involved. It is also worth mentioning that the music emphasizes the final not only by its sonic properties but also with its composition. The marching theme ironically highlights the course of events that led to the final, and provides a clue for what will happen afterwards.

"*Eylül*" utilizes a single musical theme both at the beginning and at the end of the movie. The opening scene in the taxi is presented with credits and the musical theme and in the final sequence, this non-diegetic music fades in by the ending of previous bed scene at the hotel, which is quiet, and keeps playing through the final sequence and than with the credits, utilizing a relatively longer continuous usage of non-diegetic music, which can be observed in Figure 3.6, compared to the previous examples.

On the other hand, "*Yozgat Blues,*" by Mahmut Fazıl Coşkun or "*Kader*" by Zeki Demirkubuz, uses the loud final non-diegetic music only upon the end credits. In both movies, for the dramatic emphasis on the ending, the final scenes are followed by a sudden decrease in loudness and a visual cut into darkness fulfilling the screen, followed by the non-diegetic music along with the credits.

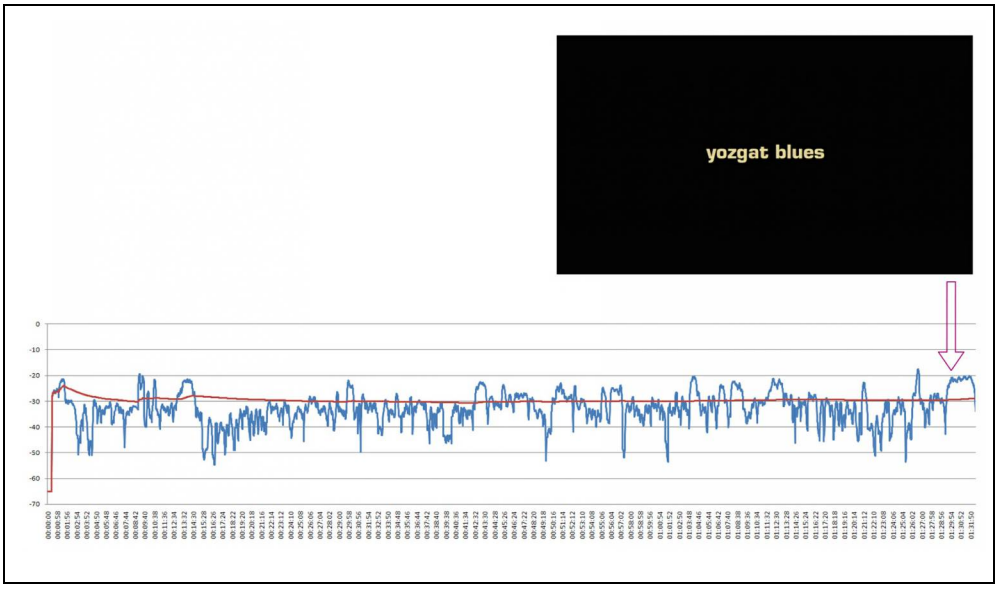

Figure 3.7 : Loud non-diegetic music in the credits of "*Yozgat Blues.*"

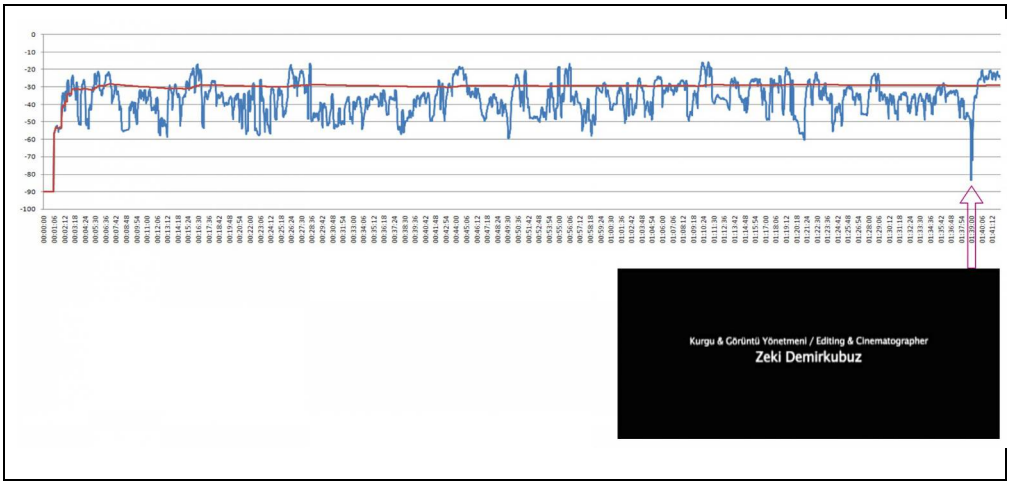

Figure 3.8 : Loud non-diegetic music in the credits of "*Kader.*"

A similar approach can be seen in the ending of Derviş Zaim's "*Nokta.*" In that movie, the final scene; before fading out to the credits on black background, is the quietest within the whole movie, which means that "silence" is the intentionally chosen method for the dramatic emphasis on the final. It is also worth noting that after the prologue, same music theme is used in motorcycle scene to accompany the credits as seen in Figure 3.9.

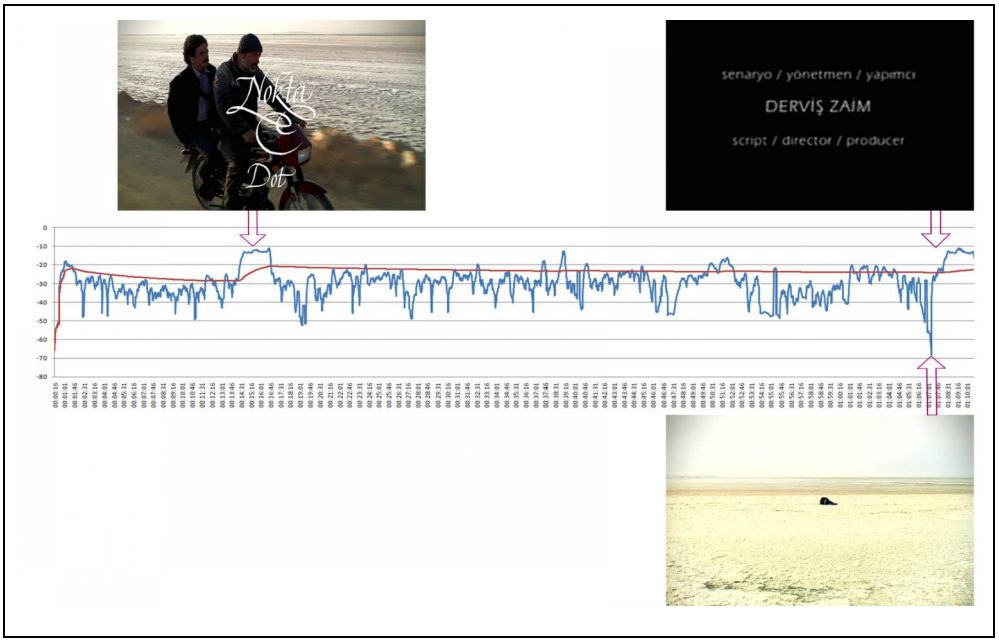

Figure 3.9 : Quietest final scene followed by loud non-diegetic music in "*Nokta.*"

In these examples mentioned above, loud non-diegetic music appeared always in the final credits, either beginning from the final scene or starting right after the end of the movie, with the credits.

But sometimes, depending on the narration, directors prefer to emphasize the very last scene or sequence in terms of music and loudness, in order to build a strong and high-tension *finalé*, like a strong cadence, which gives examples of the loudest final sequence followed by a quiet or silent moment for a dramatic emphasis. In these situations, loudest music is along with the final sequence and probably less loud music will follow in the credits just after being separated from each other with a silent moment in between. "*Kosmos*" by Reha Erdem and "Mommo – Kız Kardeşim" are examples of this type of non-diegetic music usage.

As it can be seen in Figure 3.10, In "Mommo – Kız Kardeşim," Ayşe is being taken away in a loud car scene with non-diegetic music, followed by a quiet scene with her brother desperately giving up on chasing them with bicycle. The credits start to roll with an extreme long shot of the car leaving the town along with a softer musical theme.

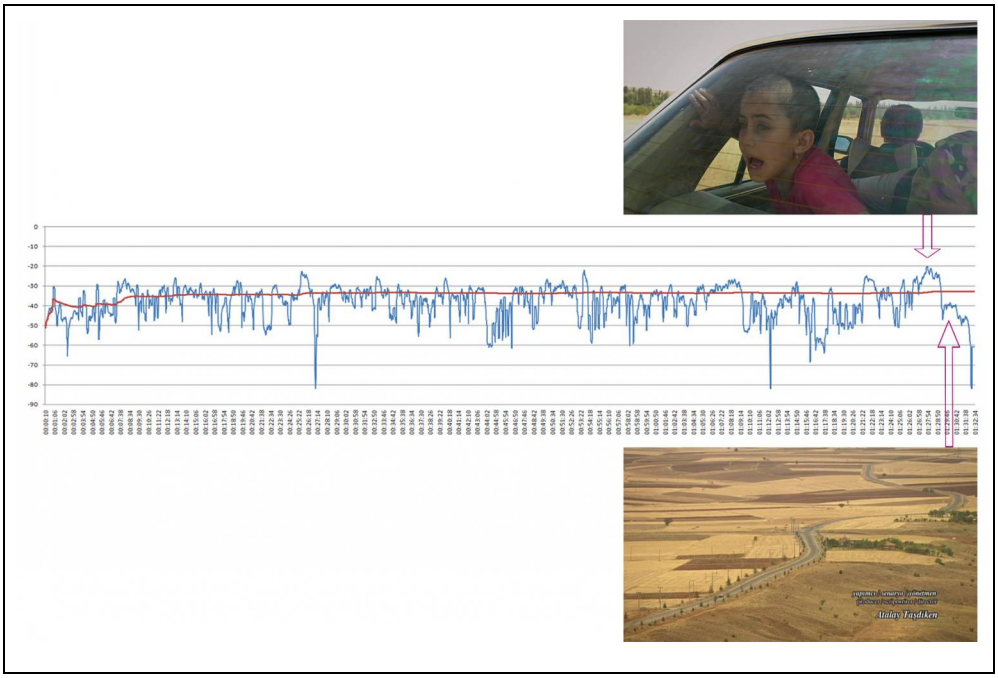

Figure 3.10 : The ending in "*Mommo – Kız Kardeşim*" by Atalay Taşdiken.

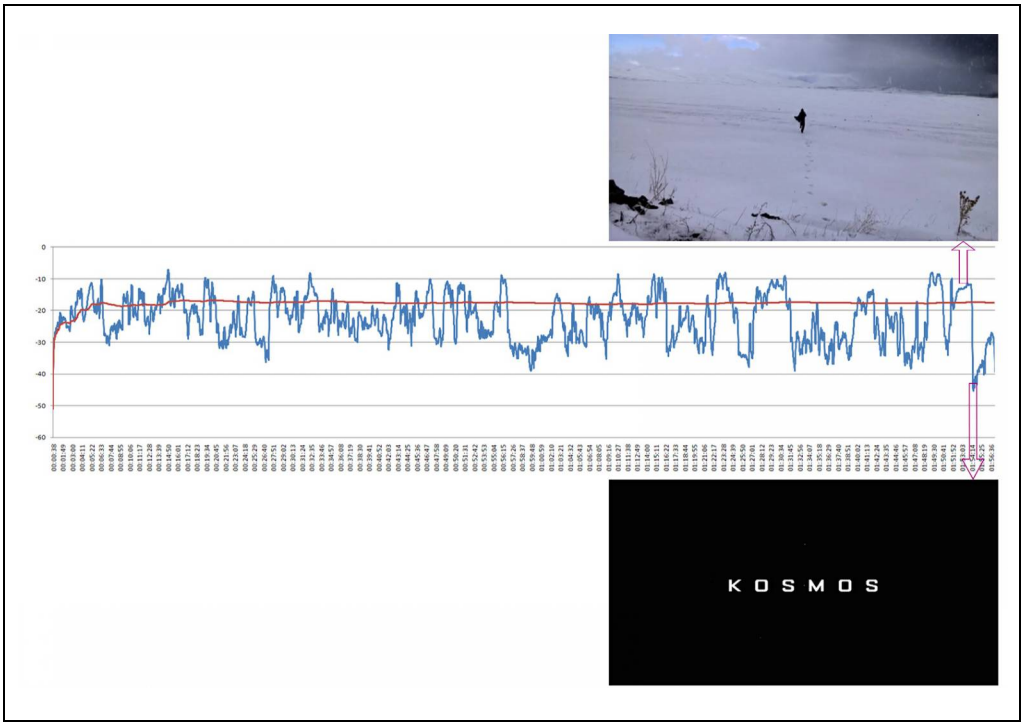

Figure 3.11 : The ending in "*Kosmos*" by Reha Erdem.

Reha Erdem prefers a similar form of non-diegetic music usage in the final sequence of "Kosmos." While looking at Figure 3.11, it can be observed that the movie starts to get louder towards the end around 1:48:50. In this final sequence, the hero tries to escape from the town after being busted by the soldiers. The high-tension sonic texture with non-diegetic music is contrasted with quietness at 1:50:35, in a key point when he receives help and then ensures his way out of town. The final scene when he is leaving the town is accompanied with another theme of loud non-diegetic music again, and the movie finalizes in a sudden decrease in loudness, then the credits roll along with a softer theme.

While looking for louder elements in a movie besides music, vehicle and transportation sounds stand out. Motor vehicles usually generate loud and continuous noises in reality, so it is possible to expect them to be loud in a movie too; but it is interesting to see that in several movies, those vehicles, transportation or a journey might have a significant point related to the story. For example, in "*Bir Zamanlar Anadolu'da,"* the search for the murder victim's body in rural areas with a motorized convoy takes a major part in relation to the story, not only in terms of sound, but also with its duration, being the longest section in the movie as seen in Figure 3.12.

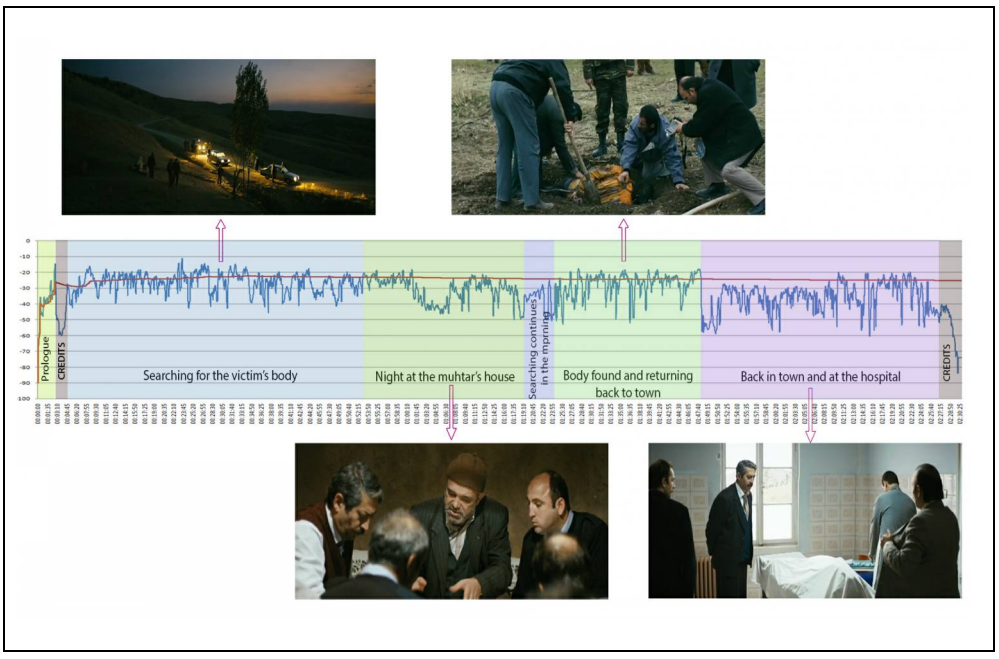

Figure 3.12 : The first section of "*Bir Zamanlar Anadolu'da*" consists of motor vehicle sounds during search for victim's body.

In some cases, these transportation scenes can easily be detected by looking at the loudness charts, because they are significantly loud, especially when they are combined with music. In "*Mommo – Kız Kardeşim,*" for example, the final sequence in which Ayşe is being taken away with a car is the loudest part in the movie as mentioned before. Non-diegetic music is the main reason behind that; but car noises add loudness to the sonic texture, which helps to establish a peak point at the end of the movie in terms of loudness.

Considering the means of transportation, road transportation may come to mind first, but İstanbul provides another alternative due to Bosphorus. In "*Eylül,"* for example, after his wife was discharged from hospital, they take the ferryboat in a scene while going back to home, enjoying the open air along with the view of Bosphorus and sounds of seagulls, which also creates a loud sonic texture. The scene is probably designed to emphasize the relief of being out of the hospital; no other significant relation to the story exists. On the other hand, another example in which loud sea transportation scenes play a part for the story, "*Hayat Var"* can be given. Boats are again the means of transportation, fishermen's boats this time, are the main vehicle that utilize the connection of Hayat to outer world extending her perimeter; and finally she escapes with one of them. In addition to this, director Reha Erdem designs sound of the boat scenes as if bigger ships showing response to small fishermen's boats with horns in various pitches.

Derviş Zaim's "*Cenneti Beklerken*" presents horses as the mean of transportation since the movie takes place in 17th century. The horses' hooves generate loud sounds, but besides sound design, the journey has a fundamental role for the story since it begins with putting a "*minyatür*" artist, Eflatun on a duty to find and paint a portrait of a rebel prince, Danyal. This yields another observation about New Cinema of Turkey that in many examples; a journey is either an important aspect for the narrative or has a definitive attribute for the characters. Looking at the other examples from Derviş Zaim, it can be said that a journey has an initiating role in the narration. In "*Nokta,*" Ahmet travelled from İstanbul to *Tuz Gölü* to meet Selim in the first place, and in "*Gölgeler ve Suretler*," a Turkish Cypriot family was obliged to leave their home and move to a safer village due to the conflict between Greek and Turkish sides on the island.

With a similar manner, Reha Erdem's movies can be considered. "*Hayat Var*" was already mentioned earlier because of the loud non-diegetic music involved in the final sequence together with the sounds of boats; but it is equally important to mention that Hayat finally sets herself free and she is heading towards somewhere we do not know. Similarly, in "*Kosmos*," the hero comes from an unknown place at the beginning and at the end leaves the town for another unknown location, which makes the movie represent an excerpt from the life of a mysterious character who is in a journey that the audience do not know how it started or how will it end. On the other hand, for the character in "*Jin*," this journey has an absolute end.

Sometimes the journey reveals how far a couple can be distant from each other, like in Nuri Bilge Ceylan's "*İklimler*," or it can be about following someone beloved, like in "*Kader*" or "*Masumiyet*" by Zeki Demirkubuz or someone dead, like in "*Bir Zamanlar Anadolu'da.*" It can also be the hope for a new beginning, like in "*Yozgat Blues*" even if it ends in returning back empty handed.

The journey sometimes defines the character's will of escape, like in "*Gözetleme Kulesi*" by Pelin Esmer. Nihat gets off the intercity bus in the middle of nowhere to go his work at the watchtower, because he wants to be far from everyone, because of his guilt, while the bus is the workplace of Seher, defining her unsettled and unsecured situation.

On the other hand, "*Araf,*" by Yeşim Ustaoğlu focuses on a character that stays in a place where everyone else's journeys pass through, because she works in a highway resting station. In order to follow their own individual paths, people come and leave where she waits, until she interacts with one of the passengers. This situation is analogous to the title of the movie, which means purgatory.

Semih Kaplanoğlu's Yusuf Trilogy shows another aspect of sound-transportation relation. "*Yumurta*" begins with Yusuf's journey back to his village, with a car being the mean of transportation. In "*Süt,*" a motorcycle is the vehicle for the family that connects their village to the town. These motor vehicles are loud in the movies like the examples mentioned earlier; but it is "*Bal*" that is interesting with regard to transportation sound, because Yusuf is a kid and he travels on foot. In that movie,

director marks Yusuf's motion on foot with the sound of a bell that is attached to him.

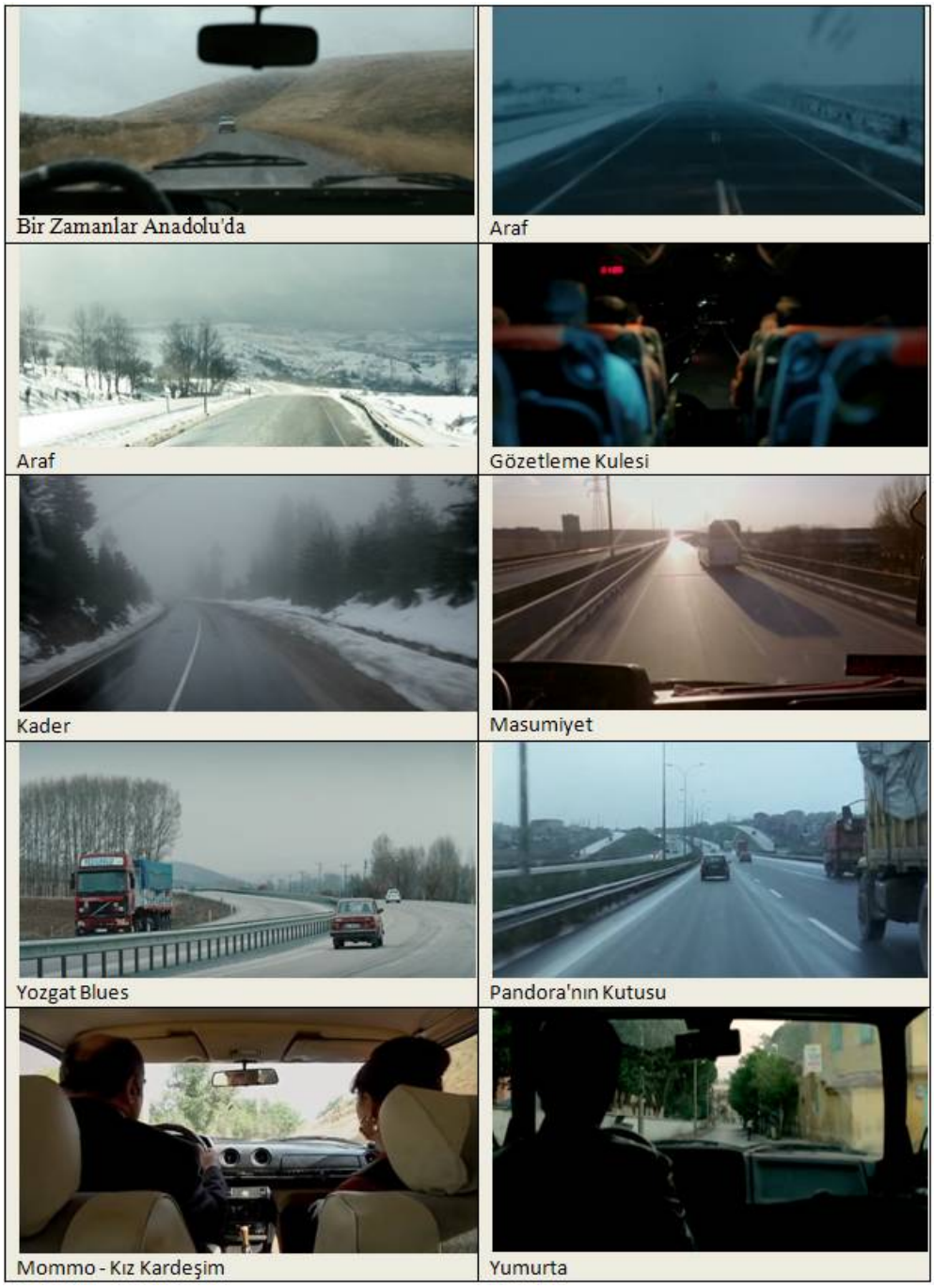

Figure 3.13 : A journey is a frequently encountered theme in several examples: "*Bir Zamamlar Anadolu'da,*" "*Araf,*" "*Gözetleme Kulesi,*" "*Kader*," "*Masumiyet,*" "*Yozgat Blues,*" "*Pandora'nın Kutusu,*" "*Mommo – Kız Kardeşim,*" "*Yumurta.*"

3.1.1.2 Investigating quietest sonic events

Apart from the loudest sonic events, investigating quiet passages also provides statistical information. The observations show that ambiance sounds are usually the quietest ones, which can belong to indoor or outdoor scenes. In these scenes, quiet sections usually stay within -40 ~ -50 or -50 ~ -60 LUFS range in most of the examples and can be slightly higher or lower depending the overall loudness levels of the movie, generally being 20 or 30 LU below the average dialogue level. This range can be considered as a window for natural quietness, meaning that any scenes with lower loudness values than these, although statistically considered as being background noise by EBU, are intentionally designed to be the quietest or "silent." This means that focusing on these scenes provides information how the sound designers and directors utilize silence as a narrative tool.

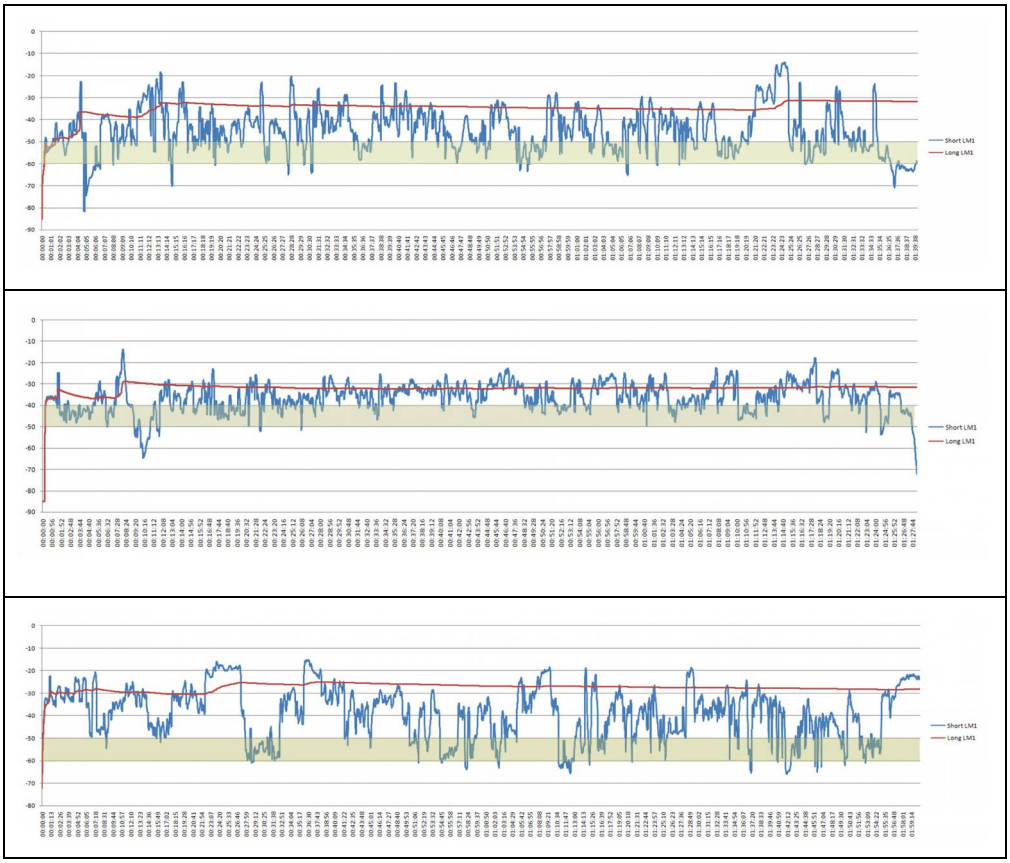

Figure 3.14 : Windows for natural quietness are highlighted in "*Bal"* (Semih Kaplanoğlu), *"Bekleme Odası"* (Zeki Demirkubuz) and *"Araf"* (Yeşim Ustaoğlu).

In previous examples in which usage of loud non-diegetic music was being investigated, it was mentioned that the final scenes before the credits might be among the quietest scenes. Observation of the charts yields that there are two cases of this situation. In the first case, the final shot of the movie is the quietest and the loudest music comes after. Derviş Zaim's "*Nokta*" can be given as an example for this type of usage, as it was seen in Figure 3.9. In the second case, the loudness of the final scene may vary; but the silence comes right after the movie ends, with most possibly a black screen followed by credits and a musical theme. Zeki Demirkubuz's "*Kader*" and Reha Erdem's "*Kosmos*" can be given as examples for this situation, which were shown in Figure 3.8 and 3.11, respectively.

Besides the finals of the movies, intentionally silent moments in the movies might have a narrative role. For example in *Mommo*, by looking Figure 3.15 below, two strong dips in loudness charts can be observed around 00:26:58 and 01:12:13, and the corresponding scenes are the shots of the hole in the cellar wall both Ayşe and her brother respectively look at with fear. The hole is not only dark, but also presented to the audience in silence.

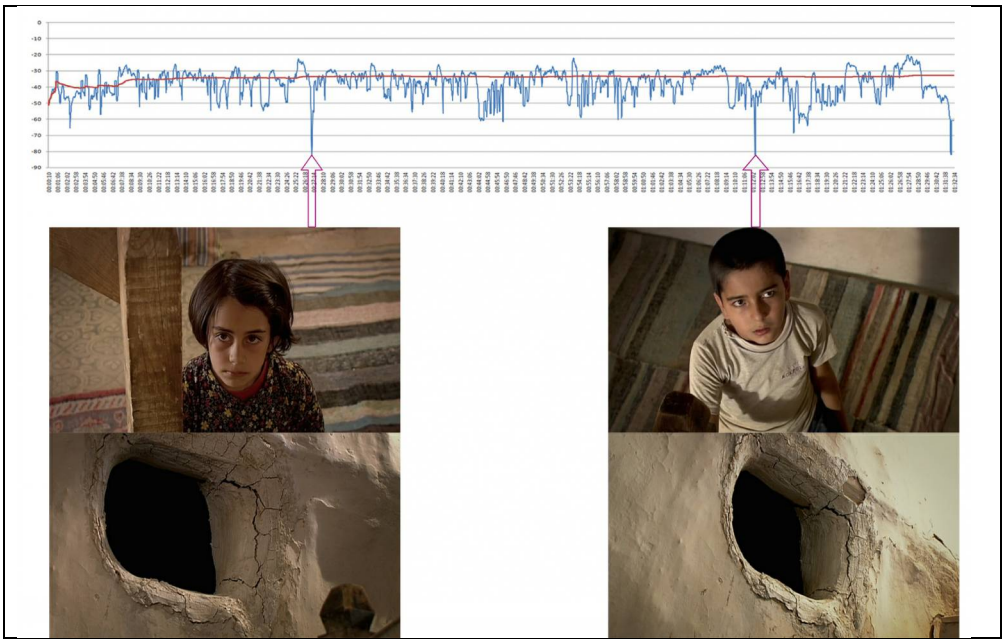

Figure 3.15 : The quietest scenes in "*Mommo – Kız Kardeşim"* are both close shots of the hole in the wall.

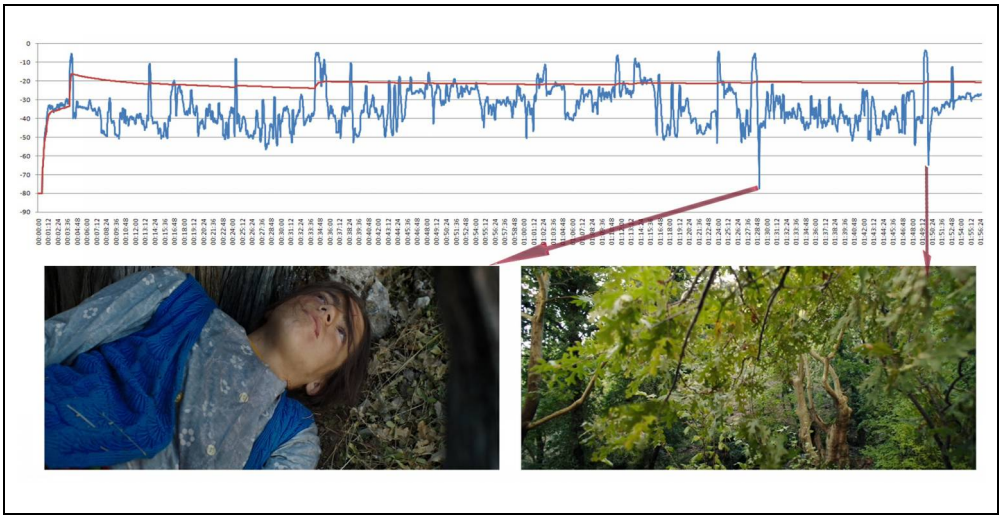

Figure 3.16 : The scenes of silence in "*Jin.*"

As seen in Figure 3.16 provided above, there are two strong dips in loudness towards the end of "*Jin*" by Reha Erdem. In the first scene, there is severe bombing and continuous gunfire, it is very loud as it can be seen in the graph, located just before the dip. This bombing/gunfire might aim humans as enemy targets; but the nature is also getting struck by it, which had terrible effect on animals. As the bombing continues, Jin lays down, getting tired of it, breathes and blinks slowly, and the scene turns into slow motion while loud noises fade away into silence. Combining slow motion with sound fade out has a strong effect; it informs the audience about how she had enough of destruction while it expands the story time; presenting a very long event in relatively shorter screen duration.

The second dip in loudness occurs later on, towards the ending of the movie. In that scene, Jin is under attack again; loud gun sounds are being heard. She tries to hide by climbing a tree as she usually does; but this time she gets shot and falls down from the tree. We see her falling down in a distant shot as she screams, and after that scream, sudden silence is introduced, putting an emphasis on the situation. The same distant shot is kept on screen for about 20 seconds in silence until the next cut comes in, where we see her lying on the ground, and a music theme slowly fades in.

It is also important to mention that in both scenes, silence comes after a very loud event, which increases the effect of silence due to the contrast between loud and quiet; providing an example of micro dynamics in film sound.

Another interesting example of the utilization of silence can be seen at "*Bal*" directed by Semih Kaplanoğlu. When looking at the loudness chart in Figure 3.17, it can be seen that there are three major dips in loudness. Last one is at the credits section in the end and other two are located towards the beginning of the movie. The first one is between 00:04:49 and 00:06:43 and this section is credits again, this time screened after the prologue about Yusuf's father. This prologue is also important for both the movie and the rest of the trilogy because it informs the audience about the destiny of the father of Yusuf, although it implies but does not reveal it, which will become clear towards the end of the movie.

The second dip in loudness can be observed around 00:14:40. In that scene, Yusuf is at his desk in the classroom. He is a first grade primary school student and studying how to read. His classmates are succeeding to achieve this goal one by one, by reading a story from their course book. Yusuf, already being able to read on his own, even memorized the story his friends are usually asked by the teacher to read, volunteers to show his capability in front of the class, but this time, his teacher asks him to read another story from the book. Being shocked by this unexpected request, Yusuf turns the pages hopelessly, finds the new story; but fails to read. The silence grows as the camera zooms in while all his classmates are looking at him, emphasizing his stress, failure and disappointment. His silence is presented to the audience in a scene that is the quietest of the movie.

Figure 3.17 : The scene of silence when Yusuf struggles to read in "*Bal.*"

3.1.1.3 Between the loudest and the quietest

The observations about the relations of maximum and minimum sound loudness values with the filmic narration may provide a tool for understanding the extremes in both ends; but a movie does not consist only of those extremes. The sonic texture of a movie usually swings between the peaks and the previously mentioned window of natural quietness, mostly staying in a region close to the overall average loudness in between. The wideness of the window between loudest and quietest provides a clue about the dynamic range of a movie, which will be discussed later in this chapter.

While investigating what is in between the loudest and quietest, observations can be made by looking at the charts for the detection of loudness windows and trends. This means focusing on the loudness if it swings within a range for a meaningful duration for the narration or if it follows an increasing or decreasing trend for a period of time, in order to figure out if a movie follows a loudness trend as the story develops. To determine the width of the loudness window for a focused duration, loudest or quietest momentary events can be discarded to obtain an average value. Then, the sections determined can be compared with the story.

In most cases, consequent scenes belong to different environments in a movie, yielding different sonic textures with varying loudness values, making it difficult to label loudness ranges and trends on a large scale. For example by looking at the loudness charts of "*Yeraltı*" by Zeki Demirkubuz or "*Araf*" by Yeşim Ustaoğlu, that can be seen at the Appendix section, it is hard to comment on long term loudness trends. In that case, it might be possible to focus on smaller segments to figure out how loudness alters within short, probably at scene-level, sections of the movie.

In Figure 3.18, an example of short-term loudness trends in the first section of "*Araf*" can be seen. The movie starts with the work routines of Zehra, working in a highway restaurant facility and Mahur, a truck driver. The sonic textures defines their work life, noisy and rushing environment of Zehra contrasts with Mahur who is steadily driving on the highway accompanied with a constant road/engine humming and predictable rhythm of windshield wiper sound. Another contrast is that although being in a rush, Zehra can be considered as "waiting in between" at a place where

everyone passes by, while Mahur is always on the move, this time in bad weather and slippery road conditions.

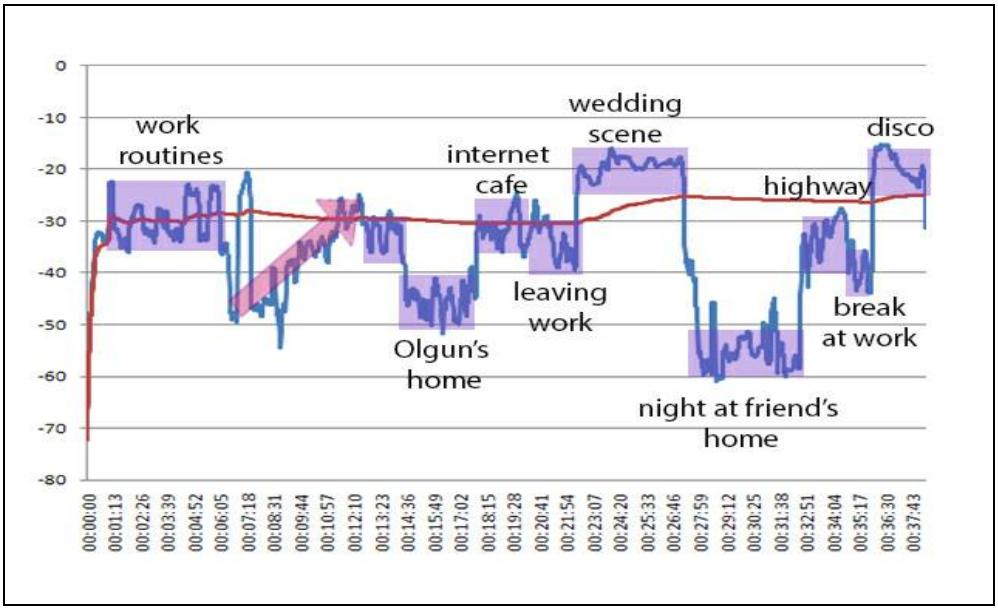

Figure 3.18 : Example of short term loudness trends in "*Araf*" by Yeşim Ustaoğlu.

The introductory scene ends with an abrupt decrease in volume implying the end of rush hours for Zehra towards the end of her night shift, while again in contrast, Mahur's approach is highlighted with a loud truck pass-by noise this time. After that, their paths cross when tired and unhappy Zehra is waiting to go home, almost asleep.

The following scenes provide more information about daily life, routines and relations between the characters, and the loudness follows an increasing trend. This trend ends when Zehra is at the home with her mother. It seems that they get along well, joking to each other. This positive condition is in contrast with Olgun, who is a friend of Zehra from work. His home is a quieter place, marking the anxious condition between he and his father. The he leaves home and goes to an internet café, providing clues for his adolescent habits.

After the day-off at work, Zehra goes to a wedding with friends, and both Mahur and Olgun are there, too. The scene is among the loudest of the movie due to diegetic music accompanying the dances at the wedding. The night at her friend's home, as opposed to the wedding, is very quiet, as Zehra and Mahur spend the night in the same room.

The morning after, everyone goes on to his or her own work. Mahur starts to drive along the highway but his journey becomes more dangerous after his encounter with Zehra, snow is getting more and there are accidents along his way. On the other hand, Zehra and Olgun decides to go to town after their shift at work, and they go to a disco in which Zehra declares that she wants to travel the world and doesn't want to "stay."

As it can be seen from this short excerpt, it is possible to identify events and places with their loudness values, which helps to see how loudness changes as the story develops. In some cases, the story development has strong connection with the locations involved, making it possible to identify loudness trends on a larger scale, such as "*Bir Zamanlar Anadolu'da*" by Nuri Bilge Ceylan or "*Jin*" by Reha Erdem.

In "*Bir Zamanlar Anadolu'da,*" after the prologue and credits section, a long sequence of search for a murder victim's body begins as it can be seen in Figure 3.19. The characteristics of the sonic texture of that section are defined by the car/engine noises, rural ambiance and dialogue. Although there are louder and quieter moments, general loudness swings within a range, until they decide to have a rest for the night at *muhtar*'s house. While they are having something to eat, there happens to be a power failure that causes a blackout. With the poorly lit surroundings under the candlelight, everyone starts to turn into their own selves while it is getting quieter slowly. The crowd divides into smaller groups of people start chatting here or there around the house and backyard, the story keeps developing with conversations and silences in between.

In the morning, they resume searching and the loudness starts to follow an increasing trend until they find the victim's body. After that, prosecutor follows required legal actions and then they take the body to town. Although there are louder and quieter moments again within this section, the most dramatic variation occurs at the moment when the doctor enters his room at the hospital, with an abrupt drop in loudness, marking the last main location of the movie as the hospital and the perspective strongly turns into doctor's point of view. He follows his daily tasks, wanders around town and the next morning, the morgue/autopsy sequence begins, with an increase in the loudness of the sonic texture with increased dynamics.

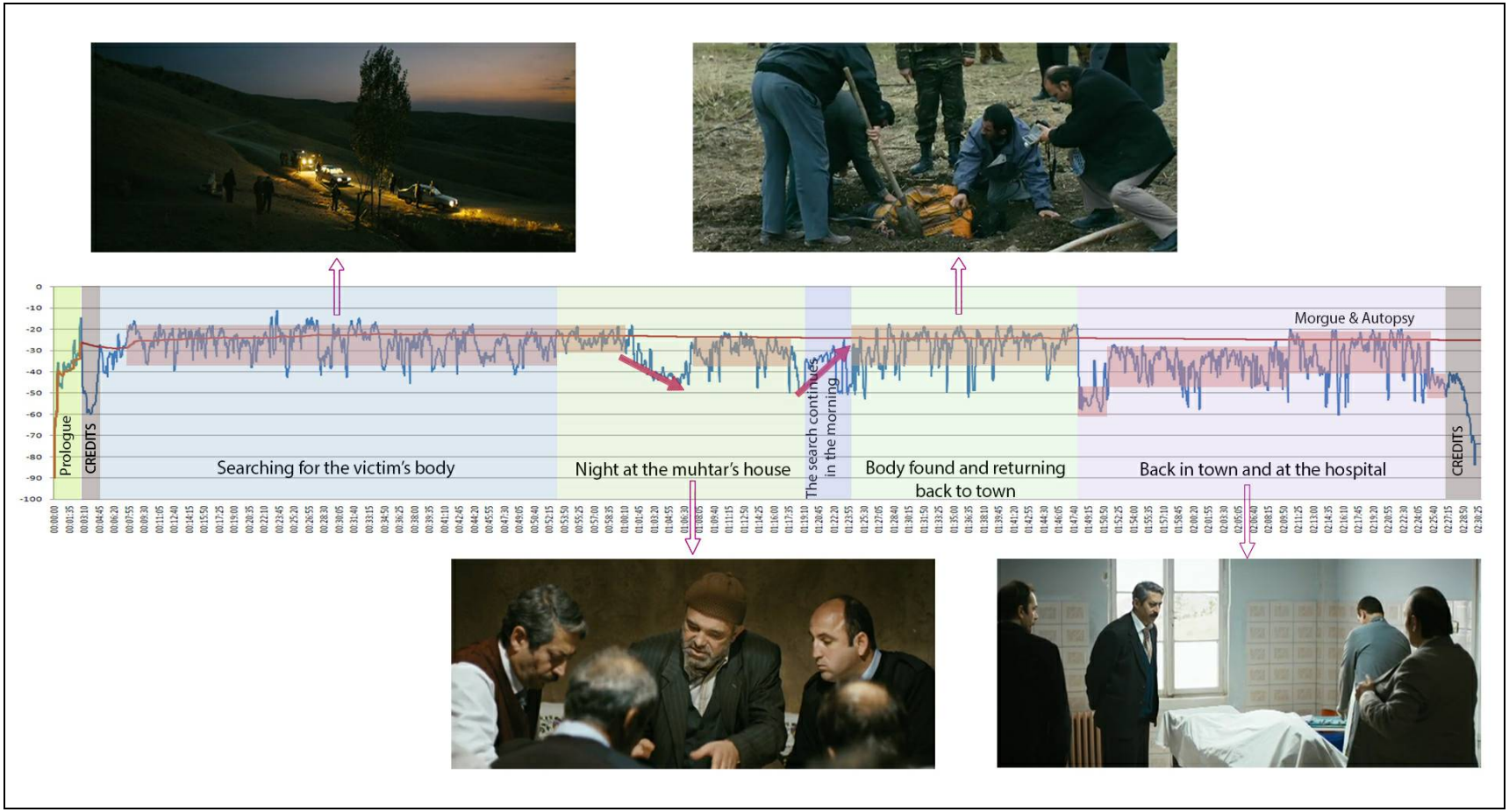

Figure 3.19 : Example of loudness trends in "*Bir Zamanlar Anadolu'da*" by Nuri Bilge Ceylan.

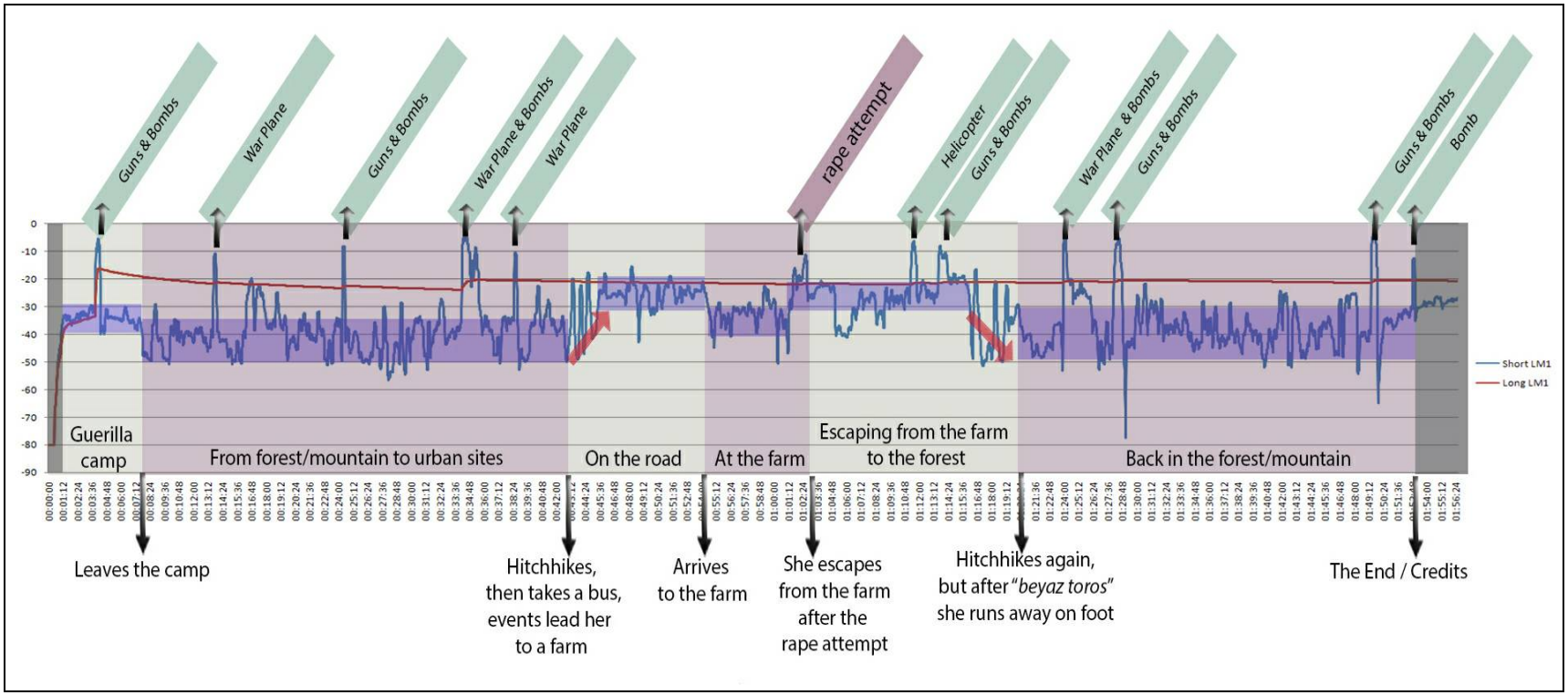

Figure 3.20 : Example of loudness trends in "*Jin*" by Reha Erdem.

The ending of "*Bir Zamanlar Anadolu'da*" comes as the autopsy scene goes on, as the doctor starts to gaze through the window, seeing the kids playing at the schoolyard and the wife and kid of the victim walk away. It gets quieter towards the very end, leaving the audience alone with a shot of the unclosed window as the doctor moves away, accompanied only by the noises of children playing outside passing through the window.

With a similar manner, the sonic texture in "*Jin*" by Reha Erdem, shown at Figure 3.20, is again highly interactive with the environment that the story takes place in. As the vivid pastoral introduction of the highlands meets the human activity, the beauty and the harmony within the nature is interrupted by the cacophony of guns and bombs. Since the loud interventions of the war machines appear several times within the movie as a narrative refrain, it might be more suitable to ignore them in order to define the loudness trends.

The introduction is followed by a section in which Jin is together with a group of guerrilla in the mountains; but she decides to leave the camp at night. The initial loudness range has a narrower and louder window until she leaves, and then, with the start of her journey, the sonic texture becomes quieter but more dynamic.

This first section of her journey is from the mountain/forest towards villages and urban areas[8] is interrupted regularly by guns and bombs, until she reaches an unpaved highway, which represents a border with the territory she comes from and the rest of the "civilization" she is heading up to. She tries to hitchhike and succeeds to reach a town nearby; but she doesn't have money to take the intercity bus, so she goes to work in a farm with the people she met along the way.

She tries to earn more money by volunteering hard work at the farm, she pushes herself to the limits for a while but when she is about to get her payment, the work master abuses her, then tries to rape her in the loudest scene of the movie other than the ones with war machines.

---

[8] Through this first section of journey, a very significant event takes place; Jin intrudes a house in a village and after leaving this house, she changes her clothing to a daily outfit with the clothes she obtained from there.

She manages to escape from this rape attempt and the second part of her journey begins. She runs away from the farm on foot, gets to town and takes the intercity bus with money she earned; but along the way, she is taken under custody at a military control point since she doesn't have her ID with her. The military outpost that she is taken to can also be considered as another important location for the story that can be investigated on a micro-scale; but in long term loudness analysis, the moment she reaches again to the unpaved highway after being released is more important. The hitchhiking now becomes a reoccurring theme; this time decreases the loudness of the sonic texture as each of her attempts fail, as opposed to the first hitchhiking scene, in which loudness followed an increasing trend.

The last car that she hitchhikes is a white car, "*beyaz toros,*" which is a symbol associated with many unsolved extrajudicial killings in Turkey in the name of the state, so Jin runs away back to the mountains, to her territory.

In this final section of her journey, assaults on her continue with guns and bombs, and the quietest scene of the movie is presented to the audience while she and surrounding nature had enough of the destruction.

Later on, she walks around to explore the devastated grounds, and she finds a wounded soldier. Still being in her daily outfit, she takes the soldier to the cave she resides, applies first aid and leaves him to rest. By the morning, the soldier wakes up and she already has changed clothing into guerrilla outfit.

She allows the soldier to stay with her for a while as he gains strength, and then lets him leave to unite the military force. With the soldier's cell phone, before he leaves, she calls her mother to say that she changed her mind and she will stay at the mountains. She sends off the soldier, says her name for the first time in the movie as a goodbye, and they both depart to opposites sides.

Her journey is again interrupted with an assault; but this time she gets shot, and that moment is marked with a powerful silence after her scream.

The nature responds her struggle to live on the next scene; the residents of the forest come along to her side, the music gradually increases; but a final bomb ends it for all; leaving the scene for the credits.

These examples show that it is possible to correspond variations in sonic textures with the filmic narration. This method might provide a useful visual representation in terms of story development for both film and film sound studies, since it can include audio-visual data on the same diagram.

3.1.1.4 Loudness distribution

The observations previously mentioned provides information about how loudness changes through time, making it possible to investigate relation between loudness values and narration of the story at a given time.

The last aspect of time versus loudness observations is the loudness distribution, which means the investigation of how frequent a sonic event at a given loudness appears throughout the whole movie, regardless of the narration.

In 2009, Skovenborg and Lund presented a paper at the 127th AES Convention, which introduced loudness descriptors for wide-loudness range material, including movies. As mainly focusing on finding a way to standardize and overcome loudness differences across in broadcasting various audio-visual materials, the paper focused on descriptors that can be applied to various types of programme material, which are adopted by EBU later on, providing a basis for related measurements and applications.

The methodology measures loudness again as a function of time, but this time it uses statistical interpretation to look for overall density rather than momentary variations. After the density of loudness is figured out, the average overall loudness value called "integrated loudness" is calculated. The statistical measurements continue to define which regions as foreground audio and which regions as background audio. Also decisions are being made to label the minimum threshold of loudness value that the audio below should be considered as noise; thus will be gated out in calculations.

The examples provided within the paper mentioned above points out the differences in these values within various wide-range materials, among which there is a movie and an episode of a TV show, as it can be seen in Figure 3.21 below.

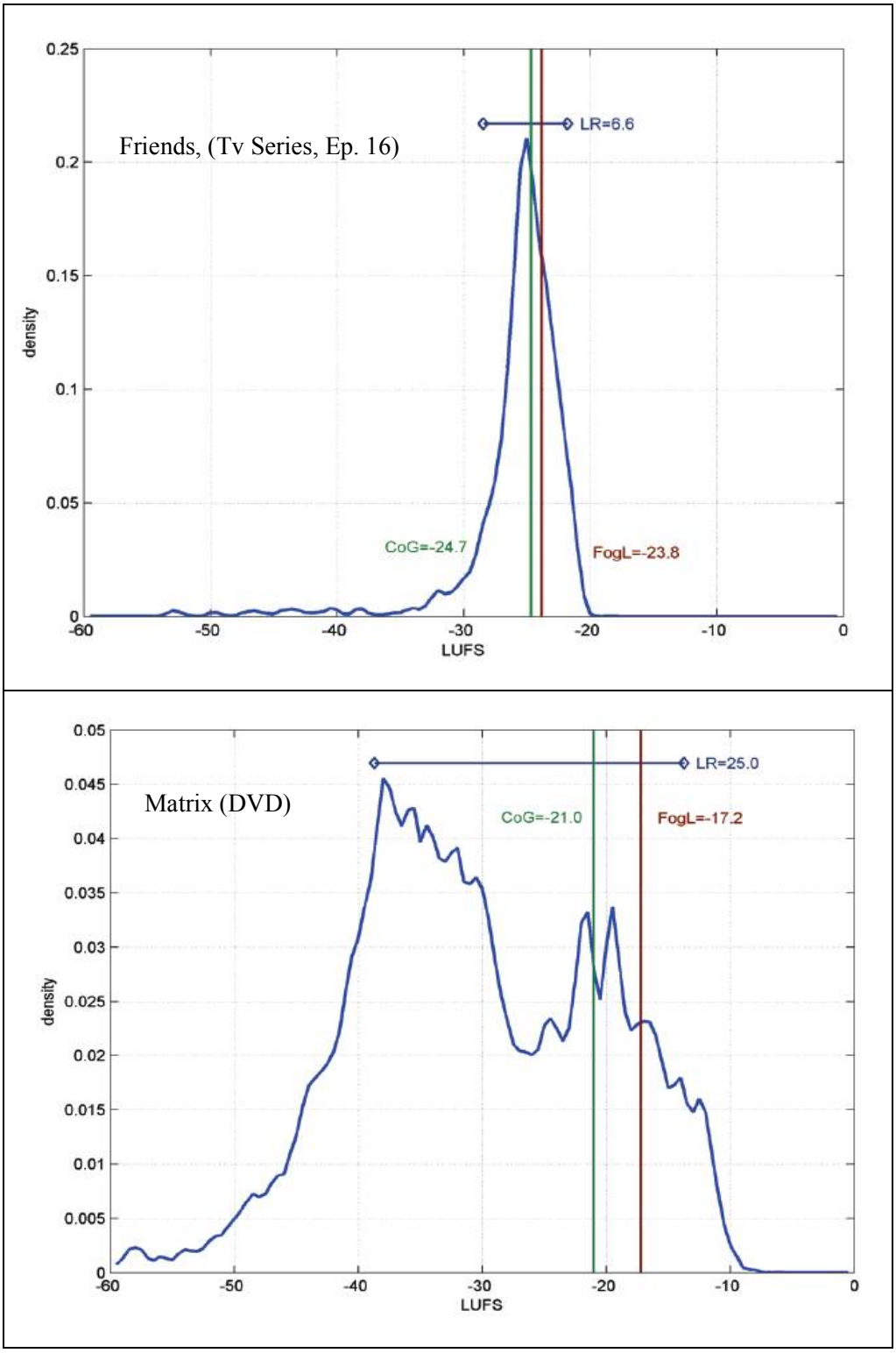

Figure 3.21 : Loudness distribution in "Friends" (Tv Series, Episode 16), above, and "Matrix," (DVD), below (Skovenborg and Lund, 2009).

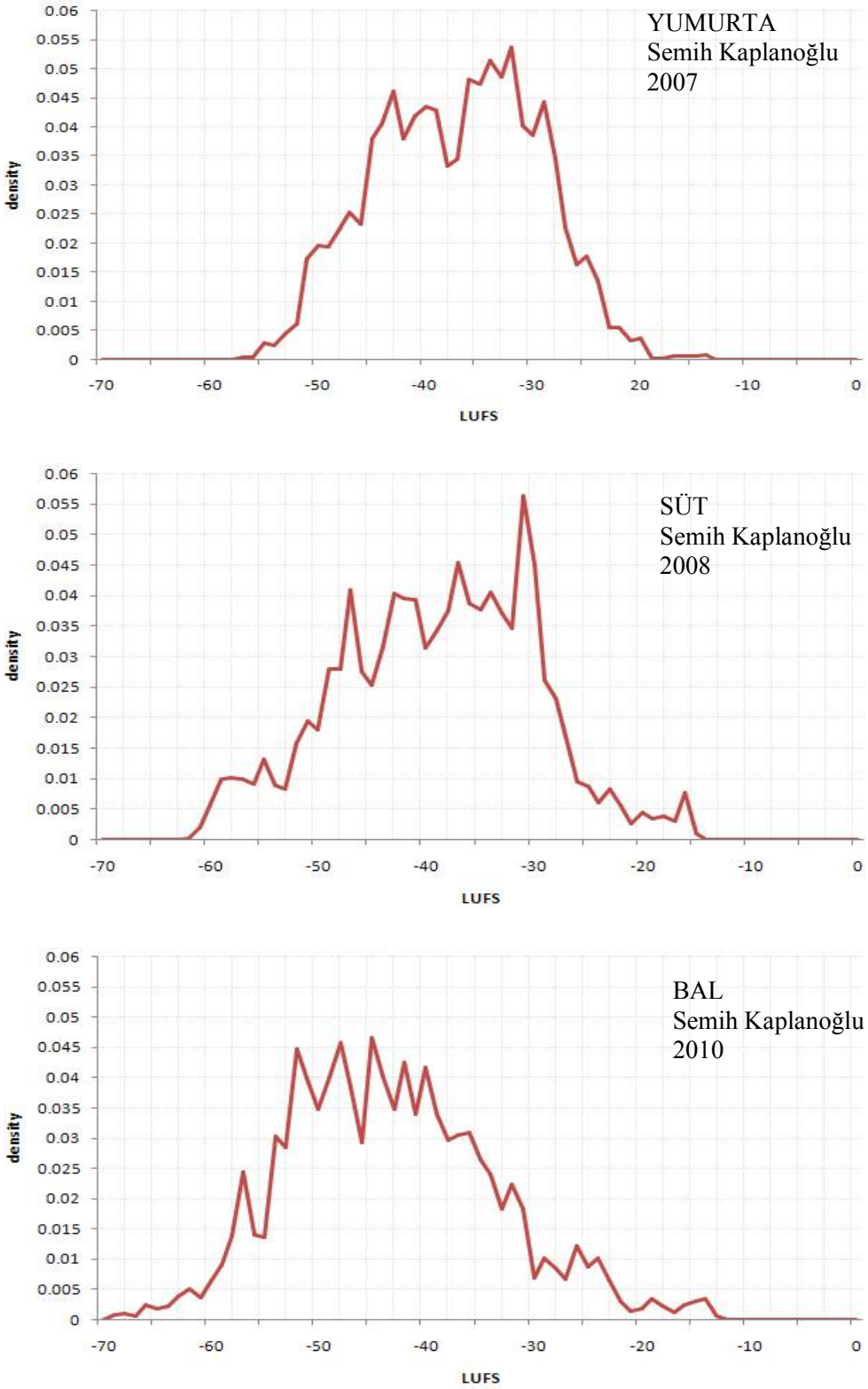

Figure 3.22 : Loudness distribution in Yusuf Trilogy by Semih Kaplanoğlu.

Although the idea is derived to provide a measurement algorithm consistent among various materials in order to provide even loudness levels for the audience, especially in broadcasting, its methodology can be used to observe loudness density in the movies under the scope of this study. In addition to the graphics obtained from the article by Skovenborg and Lund (2009), some examples from the new cinema of Turkey are prepared according to the methodology provided. In Figure 3.22, loudness distribution of the movies "*Yumurta,*" "*Süt*" and "*Bal*" from Yusuf trilogy by Semih Kaplanoğlu can be seen.

At first glance, it can be observed that loudness distribution is different among all of these examples. The example from the television series "*Friends"* seems to have a robust peak-shape graph, which means that the sample mostly consists of sonic events with closer loudness values, in that case most possibly originating from the dialogue.

The evident dual peak structure in the graph of "*Matrix,*" directed by Wachowski Brothers, implies that the movie consists of two major layers of loudness; first one cumulates around normal dialogue level and the other is at loud action scenes with or without dialogue. It can also be seen that with the integrated loudness value around -21 LUFS (labelled as CoG in the figure short for *center of gravity,* an earlier proposal for the term integrated loudness), "*Matrix*" is the loudest example presented above.

In Yusuf Trilogy, on the other hand, it can be observed that the integrated loudness increases as years pass by, making "Bal" loudest while "Yumurta" is the quietest, with the integrated loudness values of -28.8 for "*Yumurta*", -27.2 for "*Süt*" and -25.3 for "*Bal.*" With this information in mind, it can be said that the highest average loudness of the three belongs to "*Bal,*" although the loudness distribution of the movie shows a tendency to stay in a quieter range more than the other two.

When considering the utilization of quiet passages in a movie, "*Yeraltı*" by Zeki Demirkubuz presents a profile with significantly more duration with the quietest passages compared to other examples.

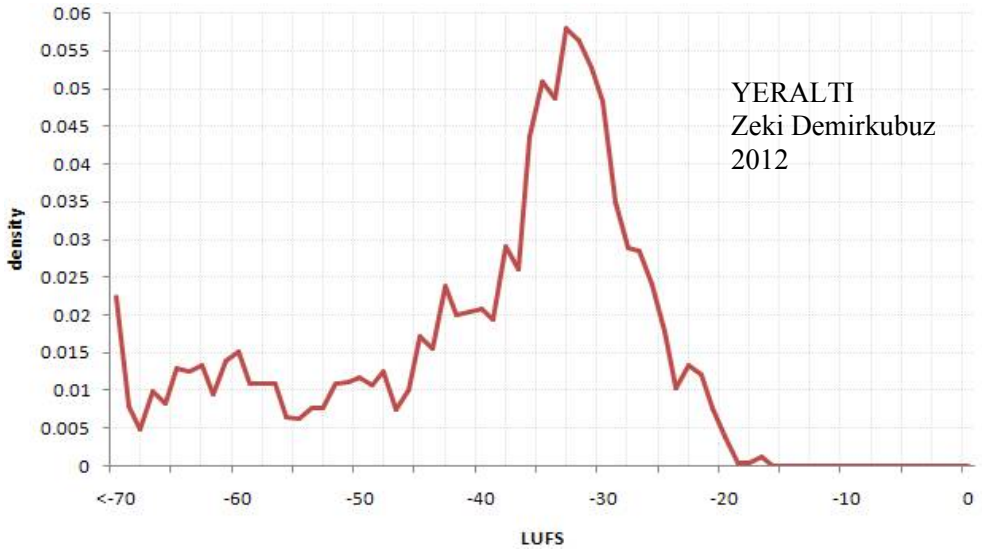

Figure 3.23 : Loudness distribution in "*Yeraltı*" by Zeki Demirkubuz.

The measured integrated loudness value of the "*Yeraltı*" is -27.5, which is located near the peak point in the graph that can be seen in Figure 3.23. The interesting observation that can be made with this graph is that the movie utilizes more duration below -60 LUFS than the other movies and also it expands below -70 LUFS[9].

As a result, it can be said that the loudness density graphics provide a visual representation for understanding how each movie utilizes various loudness regions. As far as the given examples are concerned, although provided examples of movies from Turkish cinema have close overall average loudness values, the loudness is distributed in each of them significantly different. To provide a better understanding of the loudness characteristics of these movies, another parameter adopted by EBU can be used besides integrated loudness.

In the same article by Skovenborg and Lund (2009) mentioned before, the term "Loudness Range" (LRA) was introduced. The concept is then included in EBU R-128 recommendation for loudness normalization. Skovenborg (2011) defines Loudness Range as "a statistical measure of the difference in loudness level between the soft and loud parts of the programme" (p. 1). As the name implies, this concept can be discussed under the title of Dynamic Range, in the following section.

[9] Note that "*Yeraltı*" loudness distribution chart labels the lowest loudness value as <-70 wile others only as -70 since there is no information below this point in other examples

3.1.2 Dynamic range: Macro and micro dynamics of film sound

In sound engineering practices within the field of music production, especially recording and mixing, the term “dynamics” is mostly referred to as “volume envelope of a sound” (Owinski, 1999, p. 47). In the same perspective, mastering engineer Bob Katz (2002) defines the term “dynamic range” as “the ratio between the loudest and softest passages of the body of the music” (p.109). Katz also introduced the terms “microdynamics” and “macrodynamics” and he describes microdynamics as “music’s rhythmic expression, integrity or bounce” while macrodynamics is “the loudness differences between sections of a song-cycle” (p.109).

The same concept of dynamic range can also be implemented for film sound studies with some alterations in the definitions. Dynamic range in a movie can still be described as the ratio or the difference between the loudest and quitest sonic event. Since a movie spans over a duration longer than an usual pop music song, it should be considered seperately for entire movie (macrodynamics) and for individual scenes (microdynamics). In this manner, being slightly different from music production, macrodynamics of film sound will refer to the difference in loudness of the loudest and quietest sonic event in a movie, regardless of their position in time. Microdynamics on the other hand refers to the diffrence in loudness of two consequent sonic events in a movie; for example a loud event following a quiet one or a quiet event followed by a loud one can be investigated under microdynamics.

The macrodynamics observations can be expanded with the LRA values calculated with the methodology recommended by EBU, as described in the previous section. These observations about macrodynamics can provide clues for the technical and perceptual properties of the medium while they can also help figuring out different attitudes among directors in terms of dynamics. In addition to that, it can help to observe changes in movie peroduction trends withinin a specified period of time.

Microdynamics on the other hand, combined with the data obtained from loudness measurements, gives information about how directors and sound designers employ drastic loudness differences as a creative tool.

3.1.2.1 Macrodynamics of film sound

Since macrodynamics is about the loudest and quietest elements of a soundtrack, it is closely related with the technical specifications of the medium. Technological advancements in film sound sytems not only provided wider spectral range and better sonic fidelity; but also lower noise floor and more headroom, resulting in wider dynamic range. This increase in dynamic range, with the largest leap due to the introduction of digital audio to film sound, can be seen in Figure 3.24 below:

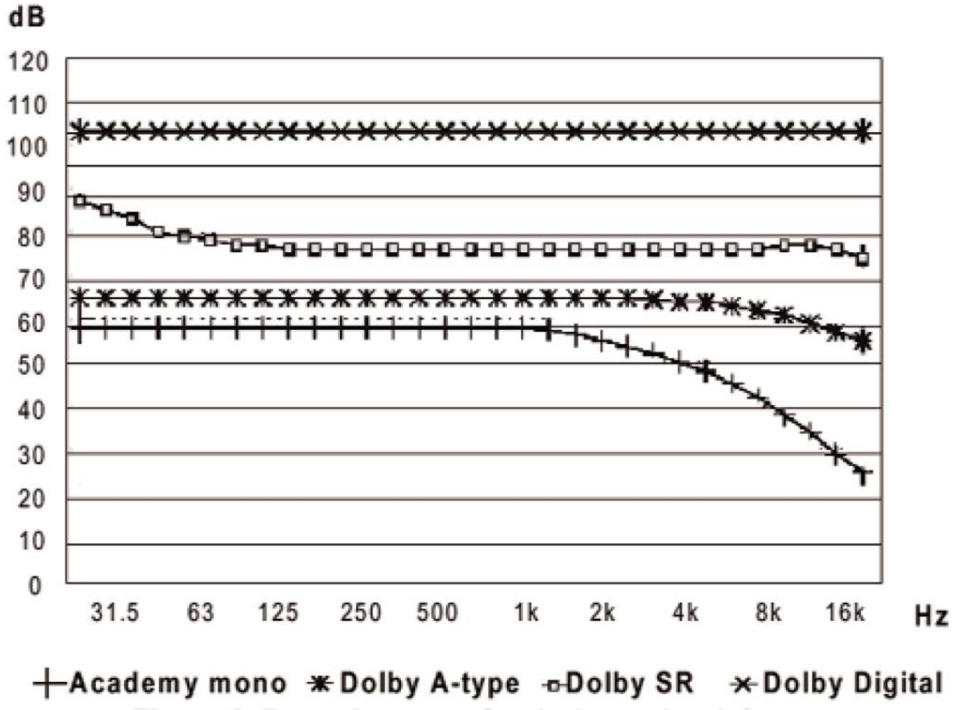

Figure 3.24 : Dynamic range of optical soundtrack formats (Allen, 1997).

The available headroom provides directors to employ louder sonic events without distortion, for occasional sound effects or partial sections rather than continuous loudness. The lower noise floor on the other hand, helps to keep quiet passages intelligible without being masked by noise.

In order to observe how directors make use of this dynamic range within movies, the loudness range (LRA) algorithm provided in EBU R-128 recommendation can be used as a starting point. Measured LRA values of the movies included in this study can be seen in Table 3.3:

Table 3.3 : Loudness range (LRA) values of the movies included in this study.

DIRECTOR	TITLE	YEAR	LOW (LUFS)	HIGH (LUFS)	LRA (LU)	INTEGRATED LOUDNESS (LUFS)
Atalay Taşdiken	Mommo, Kız Kardeşim	2009	-49.1	-26.4	22.7	-29.6
Cemil Ağacıkoğlu	Eylül	2011	-45.8	-21.8	24	-25.6
Derviş Zaim	Filler ve Çimen	2001	-34.8	-18.3	16.5	-22.4
Derviş Zaim	Cenneti Beklerken	2006	-26	-3.7	22.3	-8.8
Derviş Zaim	Nokta	2008	-38.3	-13.3	25	-19.2
Derviş Zaim	Gölgeler ve Suretler	2010	-42.6	-22.4	20.2	-26.1
Emin Alper	Tepenin Ardı	2012	-50.3	-25.6	24.6	-28.2
Mahmut Fazıl Coşkun	Yozgat Blues	2013	-43.2	-22.2	21.1	-26.6
Nuri Bilge Ceylan	İklimler	2006	-46.6	-23	23.7	-25.3
Nuri Bilge Ceylan	Üç Maymun	2008	-46.6	-20.2	26.4	-24.2
Nuri Bilge Ceylan	Bir Zamanlar Anadolu'da	2011	-41.2	-18.7	22.5	-22
Nuri Bilge Ceylan	Kış Uykusu	2014	-40.3	-24.1	16.2	-26
Pelin Esmer	Gözetleme Kulesi	2012	-44.8	-22.2	22.6	-25.2
Reha Erdem	Hayat Var	2008	-42	-15.9	26.1	-21
Reha Erdem	Kosmos	2010	-32.6	-11	21.6	-15.5
Reha Erdem	Jin	2013	-38.6	-14.5	24.1	-15.3
Semih Kaplanoğlu	Yumurta	2007	-48	-26	22.1	-28.8
Semih Kaplanoğlu	Süt	2008	-48.1	-24.6	23.4	-27.2
Semih Kaplanoğlu	Bal	2010	-50.3	-25	25.3	-25.7
Yeşim Ustaoğlu	Pandora'nın Kutusu	2008	-40.2	-17	23.2	-21.7
Yeşim Ustaoğlu	Araf	2012	-45.1	-19.2	25.8	-24.5
Zeki Demirkubuz	İtiraf	2002	-40.2	-17.4	22.8	-20.4
Zeki Demirkubuz	Bekleme Odası	2004	-45.4	-25.7	19.8	-29
Zeki Demirkubuz	Kader	2006	-46	-21.5	24.6	-25.5
Zeki Demirkubuz	Yeraltı	2012	-45.6	-23.5	22	-27.5

By looking at the LRA values in the table, it can be said that the vast majority of the movies reside within 20~25 LU range[10]. "*Araf,*" "*Hayat Var*" and "*Üç Maymun*" slightly exceeds this range with an approximate loudness range of 26 LU; but this is not a significant difference. "*Filler ve Çimen*" and "*Kış Uykusu*" on the other hand, have significantly lower loudness range values. "*Filler ve Çimen*" was produced in 2001, the earliest example in this study; so it is possible for the production practices of the era and limitations in sound department in terms of equipment and facilities to have a part in this low loudness range value, since the movie has loud and quiet elements that can benefit from a wider dynamic range. "*Kış Uykusu*" on the contrary,

[10] Example LRA values for Hollywood movies: "*The Matrix*" (1999) and "*Lord of the Rings: Return of the King*" (2003) have both 25 LU while "*Pulp Fiction*" (1994) has 16 LU of loudness range (Skovenborg, 2012).

is produced in 2014, so the lower loudness range is the result of dialogue driven narrative rather than technical conditions. The movie does not have many loud scenes as it can be seen in the loudness chart in Appendix A, but it employs several quiet passages. Since the movie is relatively longer than other examples included in this study, the percentage of these occasional quietest and loudest sections becomes negligible, so the statistical algorithm of LRA measurement easily discards these sections yielding a lower value. Although these observations show that the LRA values can provide clues about how the movies make use of the sonic texture and available headroom, results obtained with the EBU measurement algorithm fall short of pointing out occasional use of loud and quiet elements, which are also part of the narrative.

In order to overcome this issue, maximum, minimum and avarage loudness values obtained from the loudness measurements mentioned in the first section of this chapter can be used. A chart for the macrodynamics of film sound containing these values can visualize the use of dynamic range with a wider perspective than the methodology of LRA values which gates out the loudest and quietest parts for statistical purposes. True peak values can also provide an alternative observation; but they represent too much transient information, because of that, short term values with slightly longer time scale are more useful for this purpose. It is also possible to use only minimum and maximum short-term values could to build chart, but adding average loudness value gives a better representation of the movie dynamics.

In the following pages, from figure 3.25 to 3.30, there are charts showing the macrodynamics of the movies from the directors included in this study with more than one movie. In the measurement process, attention paid to include sonic events only belonging to the narration, so if a movie has the quietest or loudest point at the credits section (with no audio-visual connection to the movie), it is discarded. In order to provide an anchor point in between minimum and maximum values, average loudness value is also used, and this average value is also calculated as mentioned in the first section of this chapter[11].

[11] Long term LM-1 values are are used for this purpose, an example can be seen in Table 3.1.

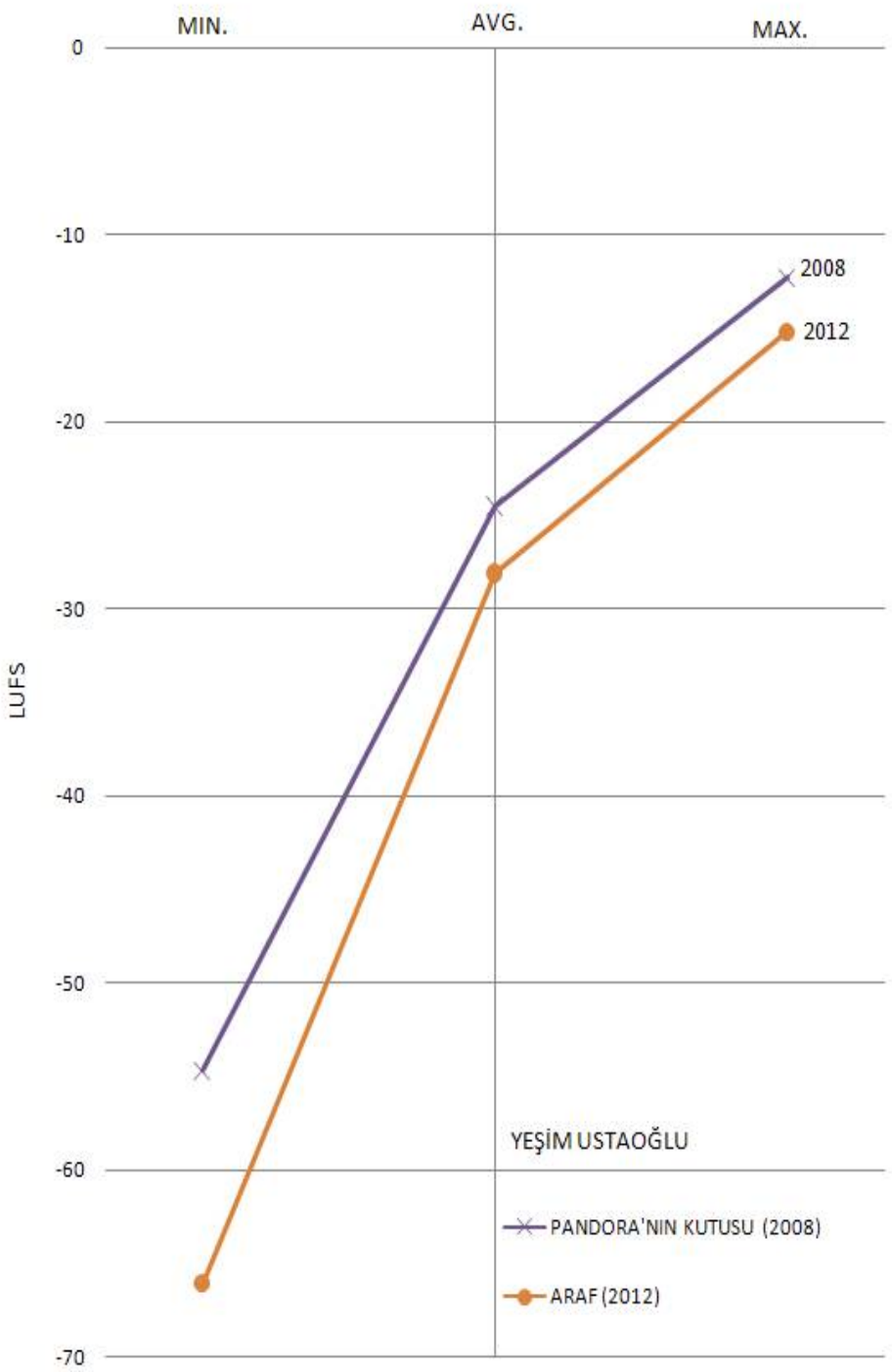

Figure 3.25 : Macrodynamics of the movies by Yeşim Ustaoğlu.

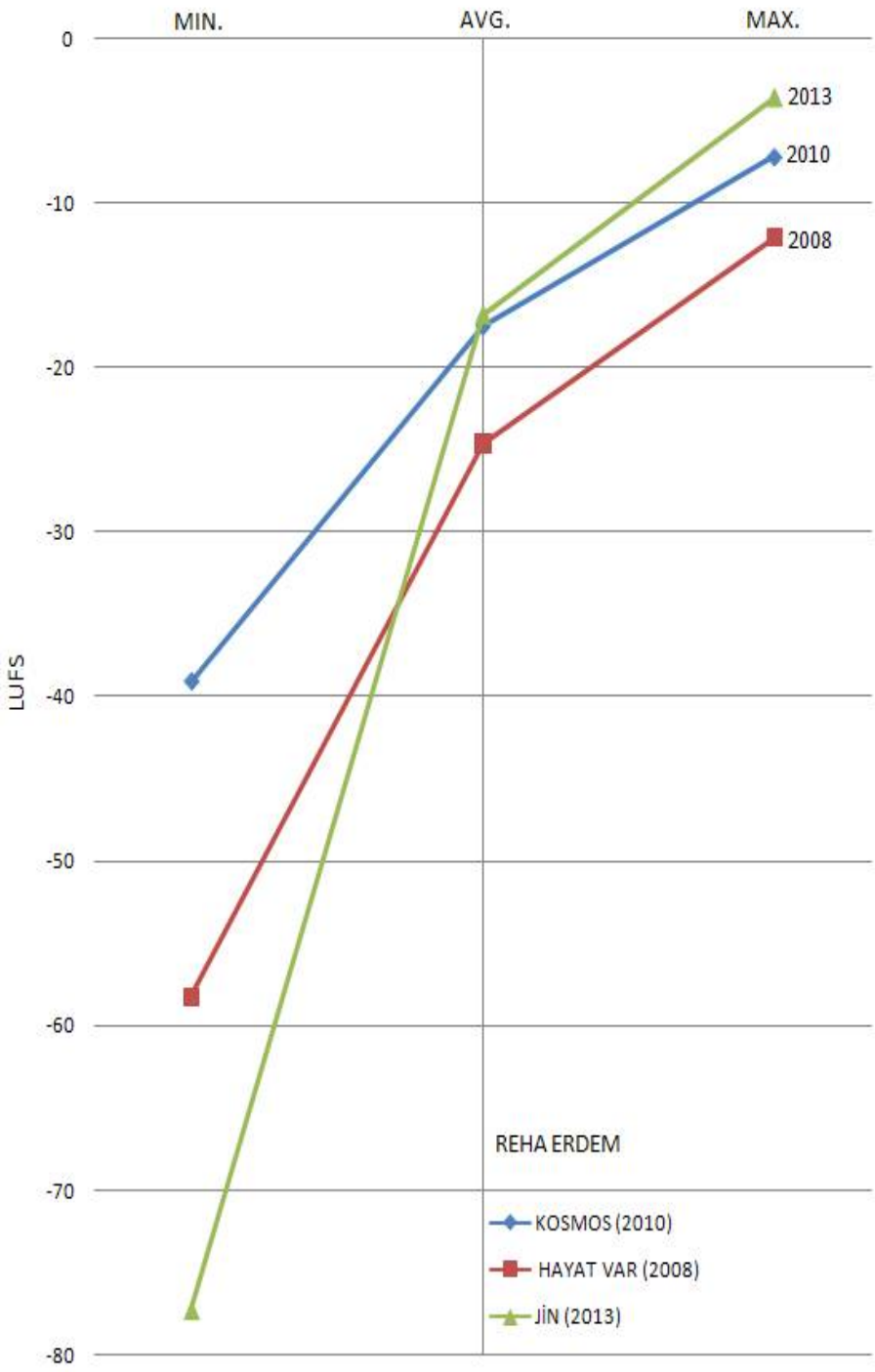

Figure 3.26 : Macrodynamics of the movies by Reha Erdem.

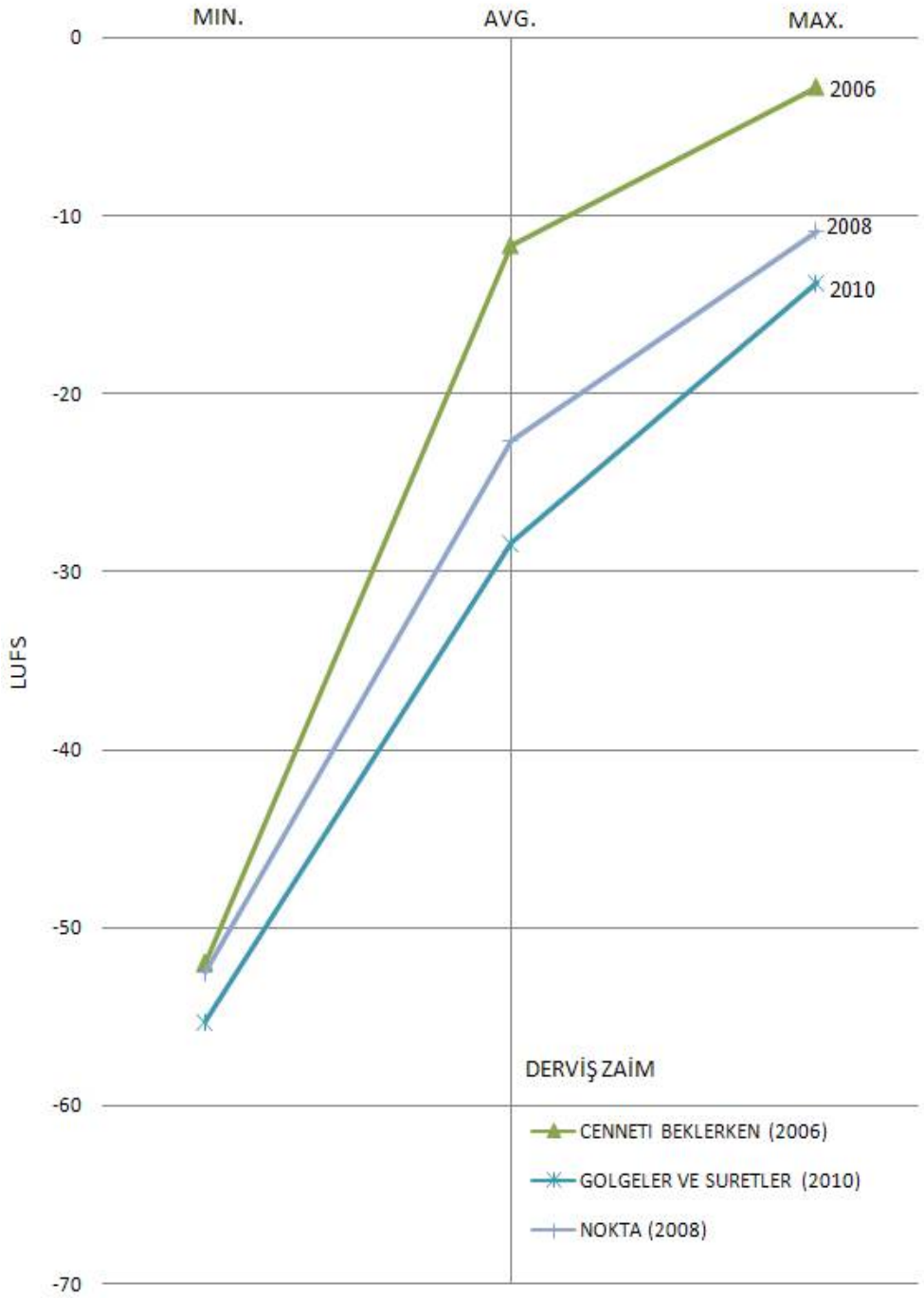

Figure 3.27 : Macrodynamics of the movies by Derviş Zaim.

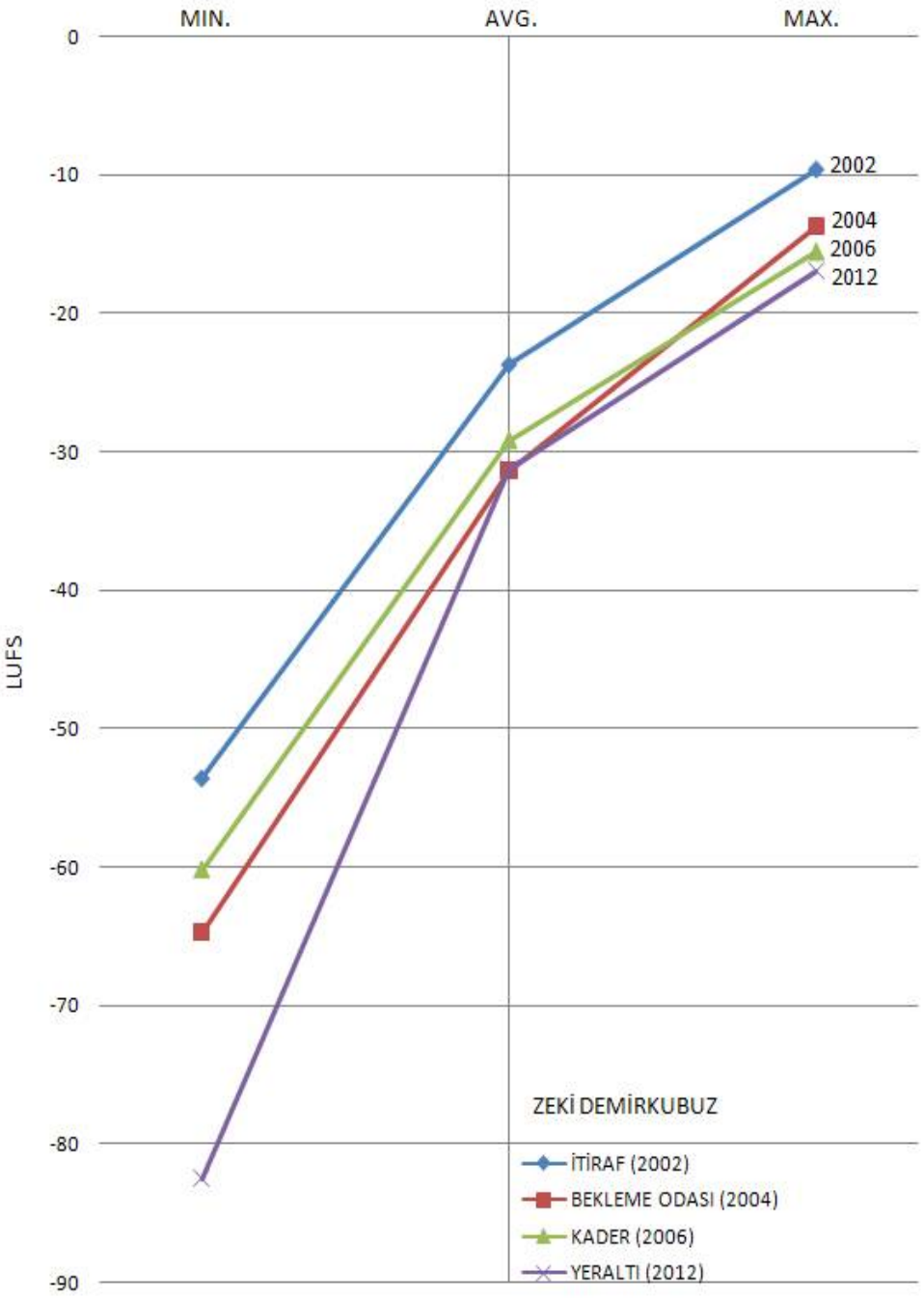

Figure 3.28 : Macrodynamics of the movies by Zeki Demirkubuz.

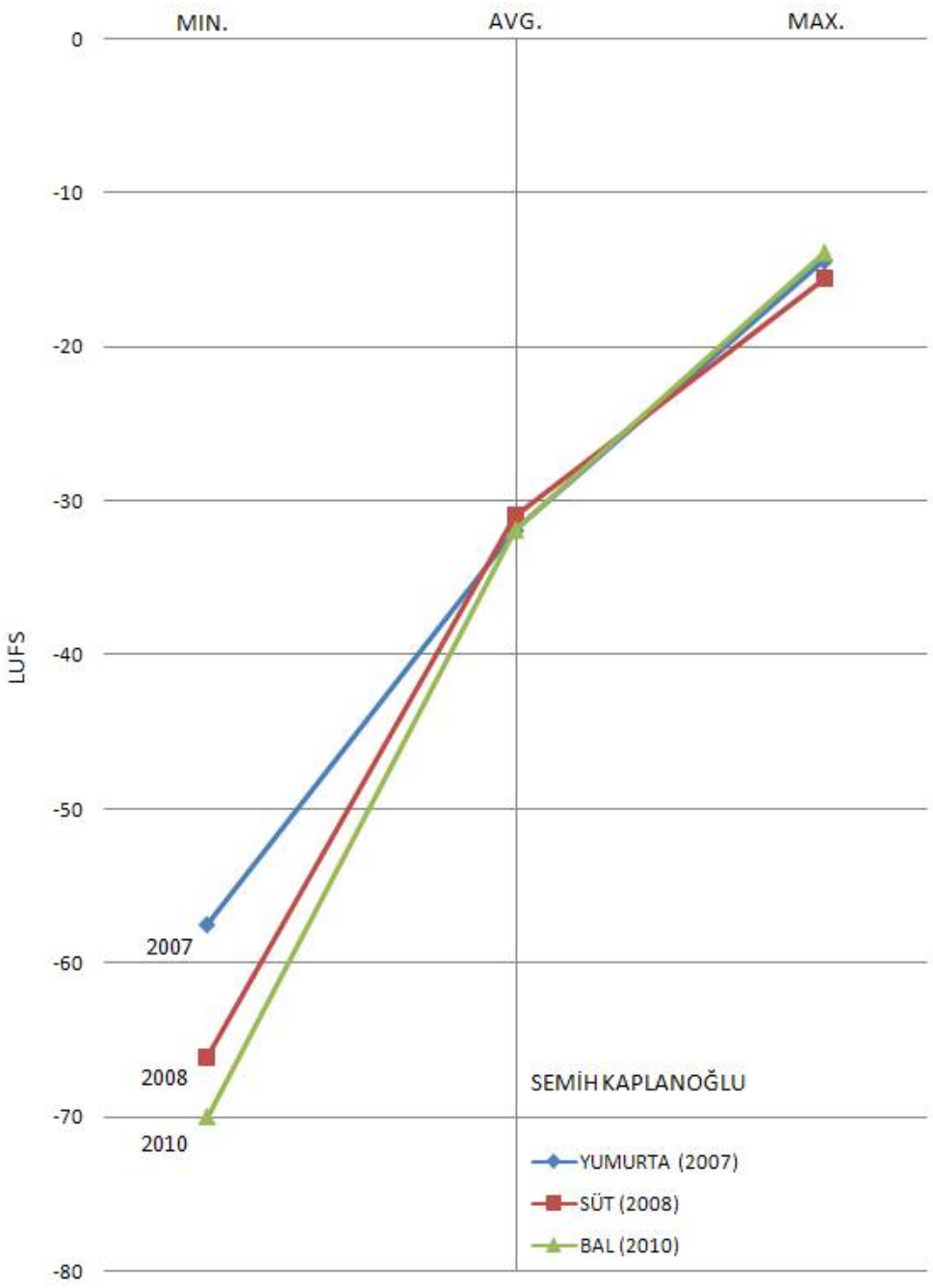

Figure 3.29 : Macrodynamics of the movies by Semih Kaplanoğlu.

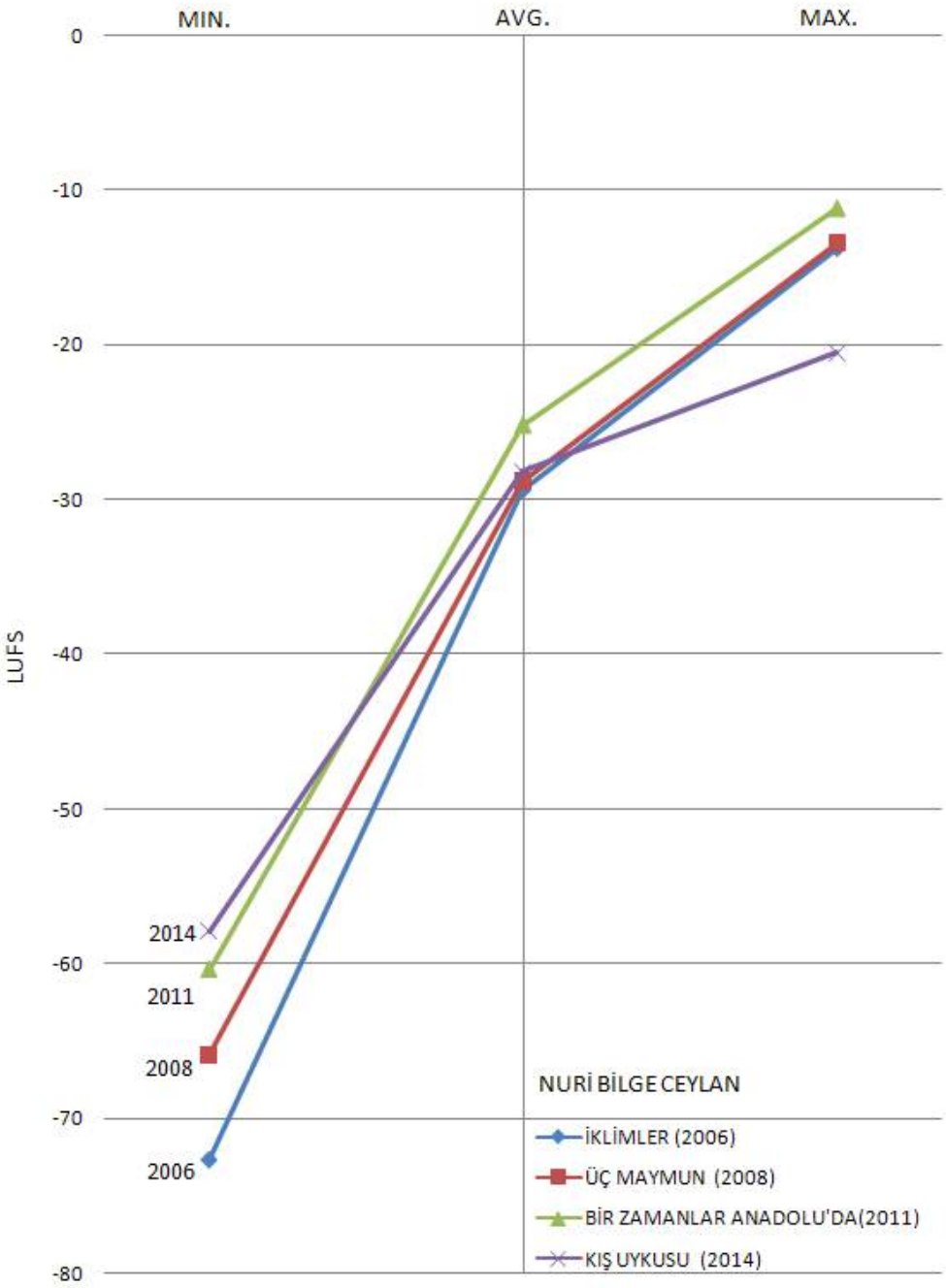

Figure 3.30 : Macrodynamics of the movies by Nuri Bilge Ceylan.

There are several observations that can be derived from these charts. First of all, in most of the examples, maximum loudness values stay around or below -10 LUFS, which is a reasonable point to provide compatibility among various sorts of medium without causing any annoyance to the audience. The exceptions are from Derviş Zaim and Reha Erdem. Excessive loudness encountered at several points in "*Cenneti Beklerken*" by Derviş Zaim may not be intentional[12]; but it seems that Reha Erdem is gradually forcing his movies to become louder. The average and maximum loudness values of his movies are all increased from 2008 to 2013; but the dynamic range became narrower in "*Kosmos*" as compared to his previous movie, "*Hayat Var.*" On the other hand, his last movie "*Jin,*" being the loudest of all his movies (probably due to the explosions and gun sounds), is also the most dynamic of all. In fact, this movie is the most dynamic movies of the examples included in this study, followed by "*Yeraltı*" by Zeki Demirkubuz.

"*Yeraltı*" has a lower maximum loudness value compared to other movies by Zeki Demirkubuz; but since the quietest point is lower than every other example, the movie has more dynamic range than the others.

"*Kış Uykusu*" by Nuri Bilge Ceylan is still among the least dynamic movies even with this method of measurement. It also has the lowest maximum loudness value among the movies presented above, verifying the observations mentioned earlier that are derived from LRA values.

Semih Kaplanoğlu's Yusuf Trilogy in Figure 3.29 shows an interesting anomaly with all three movies having almost the same dynamic range, especially with almost identical average and maximum values; only varying slightly in minimum loudness values.

Besides individual directors and movies, it can be observed that there is an overall trend towards "quietness." The average or maximum loudness values of the movies of Yeşim Ustaoğlu, Derviş Zaim and Zeki Demirkubuz have decreased in years. Semih Kaplanoğlu's movies may not show the same trend in average and maximum

[12] It is worth mentioning that the loudness values of "*Cenneti Beklerken*" by Derviş Zaim looks erroneous as if there is a technical problem with the soundtrack. To provide double check, the source DVD is measured with two different computers and two different software but the results did not change. So, the problem can be originating from either a faulty DVD or a problematic soundtrack mix.

values; but the minimum loudness values are getting lower from "*Yumurta*" to "*Bal,*" which shows that he started to employ quieter scenes more and more in each movie. Even Reha Erdem, previously mentioned as pushing his movies louder year after year, ensured that his last movie "*Jin*" stays among the most dynamic of all with the inclusion of the quietest scene compared to his other movies included in this study.

3.1.2.2 Microdynamics of film sound

As mentioned earlier, microdynamics of the film sound is related with the differences in loudness of consecutive sonic events. Before discussing microdynamics in a movie, it might be helpful to understand sound levels in real life. The most common way to measure sound level at a given point is to measure the pressure difference, referred to as Sound Pressure Level (SPL). For ease of use, SPL is measured with decibel (dB) scale rather than other pressure units in physics. The dB scale starts from 0, being the threshold of hearing. Examples of approximate SPL levels for various sources can be seen in table 3.4 below:

Table 3.4 : Approximate sound levels for typical sources (Rossing, 1990, p. 86).

Jet takeoff (60 m.)	120 dB	Intolerable
Construction site	110 dB	
Shout (1.5 m.)	100 dB	Very noisy
Heavy truck (15 m.)	90 dB	
Urban street	80 dB	Noisy
Automobile interior	70 dB	
Normal conversation	60 dB	Moderate
Office, classroom	50 dB	
Living room	40 dB	Quiet
Bedroom at night	30 dB	
Broadcast studio	20 dB	Barely Audible
Rustling leaves	10 dB	
	0 dB	

By looking at the table, it can be said that the sound levels of various sources span over a wide loudness range and both extremes on the scale are either barely audible or intolerable. In order to transfer examples of these extreme ends to a film soundtrack, intolerable sound levels need to be reduced and barely audible ones need to be increased[13]. Sources with loudness levels in between these extremes also need to be adjusted accordingly to preserve relative loudness differences. The resulting loudness rage will be narrower; but the maximum levels will not disturb the audience and quiet passages will not be masked by the background noise.

Main methodology to ensure a proper dynamic range in a movie is to set a center point of loudness for the most important audible component, in most cases, the dialogue. Everything else then can be adjusted relatively, rather than trying to match actual levels. So, after setting the dialogue level in a movie, loud and quiet passages will be adjusted to be louder and quieter compared to it. The measurements conducted in this study shows that ±20~30 LU deviation from the average dialogue levels represents the range of loud and quiet levels for a movie.

In some cases, if an event that is supposed to be loud is not loud enough or something that should be quiet is mixed louder than it is supposed to be, then there is a chance that this situation might disorient the audience. One of the reasons behind that is the perception of loudness is inversely proportional with distance, which means if the sound source is more distant, then the loudness decreases. So, if the expected loudness of a source is different than that is in the soundtrack, there can be a contradiction between the audible and visual positioning of the source.

Another important aspect of perception of loudness is the adaptation capability of human auditory system. Under severe conditions, human auditory system shows an "*acoustic reflex.*" This means, when exposed to a very loud sound, hearing mechanisms physically adjust themselves to protect the ear; eardrum becomes tightened and *stirrup*[14] moves away from the inner ear, making the ear less sensitive to sound exposure (Rossing, 1990).

---

[13] As shown earlier in Figure 3.24, available headroom in a digital soundtrack can cover most of the levels in Table 3.4, this necessity of reduced dynamics does not arise due to technical reasons.
[14] Stirrup is one of the three small bones located in middle ear, called "ossicles." The other two are "hammer" and "anvil."

The adaptation to loudness is not only a physical phenomenon but also a cognitive process. Besides the extreme levels, loud sounds start to be perceived as less loud if they are presented at the same level for a period of time. In the same manner, quiet sounds become background noise in time and the audience starts to ignore them until a change occurs, for example continuous humming of a refrigerator is easily ignored until it disappears. Considering this fact, David Sonnenschein (2002) emphasizes the value of "contrast," as an important creative tool to demand attention from the audience. He states that in order to make sure a sonic event has the desired impact, it should be preceded by a contrasting moment. For example a series of explosions in an action sequence may become less powerful due to every explosion competing to be loud, but if the selected ones are preceded by quietness, the intended impact can be achieved.

The examples from new cinema of Turkey that are included in this study may not have that much amount of sound effects compared to an action movie; but this does not mean that there are no sound effects. "*Jin,*" for example, employs several bomb and gun sounds throughout the movie. In fact, these sounds gradually become a refrain, and by means of them, the inevitable threat is reminded both to the character and the audience regularly. This regularity at the first section of the movie makes the audience accustomed to these sound effects; but as the story develops, they contribute more to the narration. The assaults causing these loud warfare noises usually come right after quiet scenes especially consisting of ambiance sounds from the surrounding environment. This natural conflict between the tranquility of pastoral ambiance and the explosions helps to build the impact in the first place; but as long as these scenes continue with more and more explosions and gunfire, sound effects start to repeat themselves and they loose their impact. This situation could be a problem with an action movie; but in this case, it is not. The main reason behind that is the assaulting side, the cause of the threat is never on the screen (with the exception of a single scene showing an aircraft passing far away). Lacking the source of attack but seeing the target on screen distracts the perception of proximity for the audience, which helps to create feeling of being attacked on the audience rather than watching somebody being under attack.

There are other examples with loud gun shots or sound effects among the movies analyzed in this study such as the murders in "*Nokta*" or the suicide scene in

"*Masumiye*t." Also in some other cases, these loud sounds are used for emphasis or surprise effect, for example the thunder sound highlights a stone-carved figure in "*Bir Zamanlar Anadolu'da;*" but in general, the most common usage of sudden loudness changes is at scene transitions. Introducing loud music and taking it away or abruptly cutting into a a quiet scene after a quiet one is very common among the examples covered in this study, especially preferred by Reha Erdem in "*Kosmos.*"

This fact shows that the directors in this study usually prefer to keep the loudness consistent during a scene and highlight the separation with a significant increase or decrease in loudness. This observation also indicates important events in the story are usually stressed by quietness since loud sound effects are off the table in most cases.

The last observation about micro scale loudness differences encountered frequently within the examples covered occurs when a scenes has fewer dialogue. In these scenes, rarity of the dialogue turns it into the louder element compared to ambience sounds before and after, yielding the microdynamics of the scene to be driven by the human voice.

3.1.3 Frequency: Spectral information of film sound

The human ear can hear frequencies approximately from 20 Hz to 20 kHz, but this does not mean that a movie will make use of this complete range all the time with same intensity. Majority of the sonic events both in a movie and in real life, have the most energy in mid frequencies, which is the crucial band for intelligibility. Thus, whenever a sound needs to be transmitted or reproduced with minimal bandwith, such as in telecommunication, lows and highs are filtered out, leaving only the mid freqencies, just like the voices transmitted by radio in "*Gözetleme Kulesi*." Additionally, the human ear is also adopted accordingly, it is more sensitive to this mid-frequency region, especially between 3500 and 4000 Hz compared to the rest of the spectrum (Rossing, 1990).

The upper and lower ends of the spectrum also have cognitive and perceptual properties that should be investigated in film sound studies. A soundtrack rich in high frequencies increase sound definition and therefore evoke more demand on the audience to pay more attention (Chion, 1994). Considering the evolution of sound recording and reproduction devices, it can be said that the spectral charactersitics of

film sound rapidly changed after Dolby noise reduction sytems and after that, by the arrival of Dolby Digital. This transition can be observed by comparing soundtracks of pre-Dolby movies with the examples today, which shows that frequency content is extended in both ends of the spectrum.

The perceptual qualities of lower end of the spectrum are used in film sound to make things seem larger. On the other hand, this bulkiness implied by low frequncies may also refer to slowness. Thus, a source with low frequency content may be large and/or slow while a high frequency source can be small and/or fast. This aspect might require a comparison between same type of sounds, for example vehicles with vehicles and human voices with human voices.

On the other hand, sub bass frequencies are meant to be felt rather than being heard, and they are used only on special occasions. The possible candidates for sub-bass sounds in a movie are music or sound effects such as explosions.

These sub frequencies of a movie can easily be observed if the soundtrack is in a surround format, since these elements are located in their separate LFE channel. By investigating the examples incuded in this study, it can easily be said that these frequencies are rarely employed. There are some occasions that sound effects benefit from LFE channel, but generally, music employs sub frequencies.

In order to observe the rest of the spectrum, a detailed spectrograph of the soundtrack is required. An example spectrogram of "*Nokta*" by Derviş Zaim, combined with the loudness chart can be seen in Figure 3.31. The spectrograms of all of the movies included in this study can be seen in Appendix A. As it can be seen in the figures, spectrograms not only show the frequency content but also help to visualize how frequent loud events occur. This observation can provide a supplementary tool for the film scholars for analysis of rhythm in a movie.

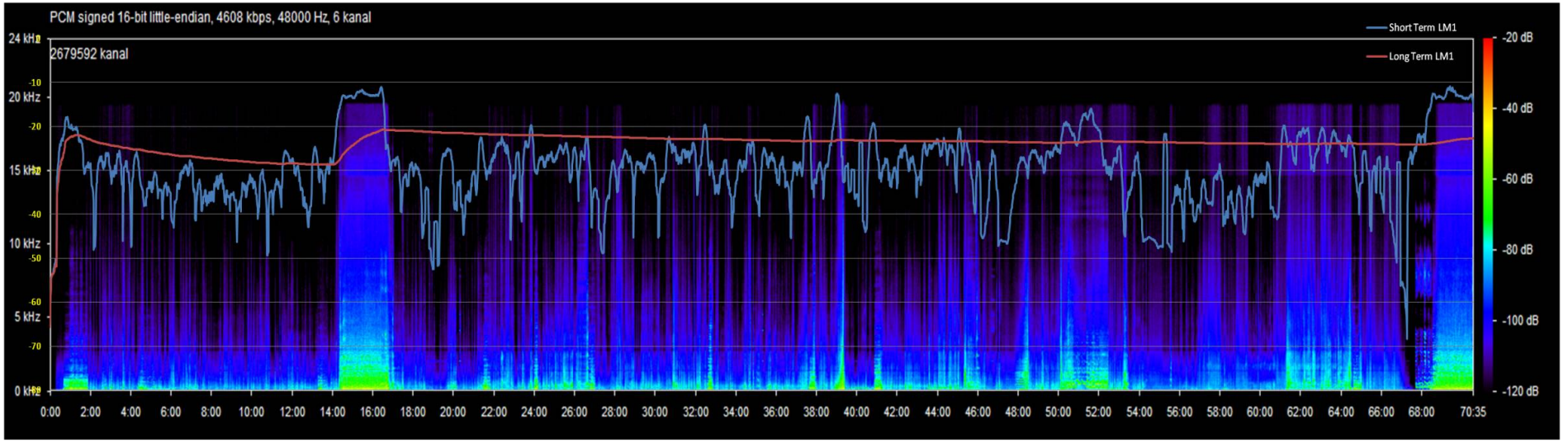

Figure 3.31 : Spectrogram of "Nokta" by Derviş Zaim, combined with the loudness chart.

3.1.4 Special Effects: Timbral manipulations in film sound

Timbre is one of the difficult terms to define in acoustics. Besides the scientific explanations, timbre can be summarized as the most distinguishing characteristics of the source, which separates a violin from a flute or a men's voice from a women's. In that respect, a lot can be said about the timbral properties of individual sources within a soundtrack of a movie, but this broad subject needs to be handled in a separate study.

Under the scope of this thesis, manipulations in the timbre of the sources and the tools of the sound engineer that can be used to perfom these manipulations will be investigated rather than the subject of timbre itself.

The first way to alter timbral characteristics of a source is to modify the spectral content of it, which can be performed by a *filter* or *equalizer*. The most common usage of this manipulation can be seen in the transmission of human voice by means of telephone, megaphone, radio or etc. For example, in "*Gözetleme Kulesi*" by Pelin Esmer, Nihat communicates with the watchers at other towers by a radio, which results in a band limited, telephonic human voice at the other side of the conversation[15].

Filters are also the most common audio supplement for visual point-of-view changes. Various examples of these changes can be seen in "*Bir Zamanlar Anadolu'da,*" directed by Nuri Bilge Ceylan. Since this movie employs several scenes with vehicles on the road, background ambiance and car noises are altered everytime the point-of-view switches between inside and outside of the car.

Scenes in slow motion does also benefit from timbral manipulation. Due to the practice of tape recording, sound engineers are familiar with timbral changes when a tape is gradually slowed down or fastened up. Expanding or compressing the time response of a sound signal also changes the frequency response. When slow motion technique is employed in a scene, soundtrack can also be manipulated accordingly. Slowing is associated with going towards low frequencies while fastening is towards high frequencies, thus alteration with slow motion and turning back to normal speed

[15] This situation is an example of "*acousmatic sound,*" which is a concept developed by Pierre Schaeffer. He described the term as "sounds one hears without seeing their originating cause" (as quoted by Chion, 1994, p.71).

means an alteration in the timbe, alternating between the original with proper high frequency content and slow motion with low frequency content. An example can be observed in "*Eylül,*" at the beginning of the movie, when the wife is being taken to the hospital. In the scene that she is being taken out from the car, director prefers slow motion, perhaps to emphasize the value of time in a situation of death and life. In that scene not only the high frequency content of the ambiance is filtered out; but also new sonic events with low frequency content are introduced such as the pulses of heratbeats.

The second occasion in a movie soundtrack that timbre manipulation of the source is conducted with the usage of special effects processings, such as reverb, delay or some other modulation effects. The most common usage of this method can be encountered in the flashback or flashforward scenes. Especially if a voice of a narrator exists, it usually employs one of those special sound effects in these scenes. The reason behind that is these sort of special effects help to seperate the ambiance of the narrator with the rest of the soundtrack by putting it in totally a different reverberant space. This method helps the audience to perceive the narrator as a separate entity in the movie.

The voice of an outer narrator may benefit from reverb or a similar effect, but inner voices of characters follow an opposite path, benefiting from "proximity effect." In these cases, the voice is separated from any sonic imprint, and no special effects means that the voice is recorded for only the ears of the audience. The voiceover process is conducted with a close microphone setup, resulting an increase at the low frequencies which helps to emphasize perception of close proximity on the audience. This method also distinguishes the inner voice from the rest of the soundtrack; but in a different way. Special effects such as reverb places the voice in a separate space and it is still distant while proximity effect places the voice closer to the audience than the rest of the soundtrack. An interesting usage of proximity effect can be seen in "*Bir Zamanlar Anadolu'da.*" In that scene, the driver, who is called Arap Ali and the doctor are having a conversation. Pğü gets Arap Ali starts with ordinary topics such as wheather and etc. and gets unwiling responses from the doctor. After he starts to answer doctor's question about owning a gun, the conversation evolves into a tirade of Arap Ali. The ambiance sounds become diminished, only some key points are punctuated with distant thunder sounds according to the mood and most

importantly, proximity effect can be heard in the voice. Because of that, his speech is perceived by the audience as if it is the inner voice of the character. Arap Ali keeps talking and while he seems to stay in topic, it can be felt that something is hurting him deeply and he is not revealing it all. The feeling of inner voice due to the proximity effect in the voice is also supported by image. First of all, after the transition from the conversation to the tirade is complete and the proximity effect is clearly audible, Arap Ali is seen from behind on the screen, as he keeps talking. Then this frame cuts into a close shot of his face and his lips are not moving while his voice is still heard.

In the end of his speech, Arap Ali asks doctor as if he is waiting doctor's approval, but doctor takes his time before saying anything. The doctor is seen from behind, just like the earlier shot of Arap Ali, and then, the doctor's speech, with a sad and hopeless mood, begins with the same audible proximity effect. This time there is not a front close shot of his face, but at the point he turns his head to right, it can be seen that his lips are not moving when his voice can be heard.

Figure 3.32 : The scene with proximity effect in "Bir Zamanlar Anadolu'da." Left: Arap Ali, Right: Doctor.

After the doctor's speech is complete, the soundtrack turns to initial perspective; background ambience becomes more audible and the voices turn to the earlier dialogue settings, discarding the proximity effect. The interesting point about this scene is that although the voices of both characters are presented as if they are inner voices, they are not. By employing this technique, director achieves to reveal the

characters inner moods and enforces their darker side into their voices with great strength within a scene started just as an ordinary conversation.

3.2 Spatial Properties of Film Sound

Space related dimensions of film sound include several key concepts for understanding sound and image relations in narrative films. Every sound within a film belongs to a source and spatial properties of these sounds and their sources effect the perceptions of the audience and influence how they understand the film. First of all, the story builds a space, a story world that all the events takes place in. Then, these events appear on a screen, which has its boundaries, enclosed by the frame. The events in the story occur within physical spaces in the image and finally the soundtrack is reproduced for the audience inside the space they watch the film.

These properties mentioned above can be categorized under two titles. The first one is about sounds and their sources in the story space, covering the subject of sounds in the story world and positions of their sources on the screen.

The second category is about physical space of film sound; both the actual spaces that the sources are in within the image and the physical reproduction of the auditory space by the speakers in the listening environment.

3.2.1 Sounds and their sources in the story space

3.2.1.1 Diegetic and non-diegetic sound

Bordwell and Thompson (2013) describe the term *diegetic* as "events taking place in the story world" (p. 284). Therefore, diegetic sound means that the source of that sound resides within the story world. This is by far the most common condition, every dialogue, every sound that comes from a source on screen falls into this category.

On the othe hand, some sounds in a film may originate from a source that is outside the story world. This type of sounds are refferred to as *non-diegetic sounds.* The most common example of non-diegetic sound is the added background music. The audience is accustomed to hear music accompanying a movie since the days of silent films, so usually it is possible for them not to find it distracting and in these cases, the audience don't question the source of music. Claudia Gorbman (1987)

investigated the reasons behind this phenomenon in her book entitled as "*Unheard Melodies,*" which resembles an idiomatic expression describing the situation.

Although the audience are claimed to be accustummed to non-diegetic music, directors questioned the usage of it in their movies. Pramaggiore and Wallis (2011) quote from Prendergast about an anectode related to this subject:

> On the set of *Lifeboat* (1944), Alfred Hitchcock questioned the logic of scoring a film set entirely on a lifeboat in World War II. Hitchcock wryly asked, "But where is the music supposed to come from out in the middle of the ocean?" Hearing the director's reluctance to include a score, composer David Raskin suggested that Hitchcock should be asked "where the cameras come from" (p. 255).

As it can be understood from the quote above, the choice of employing non-diegetic music is a matter of aesthetic perspective and creative decision of the director. On the other hand, music is not the only non-diegetic sound source in a film. Inner voices of the characters are diegetic; but narrators and voice-over commentaries are non-diegetic if they belong to someone out of the story world. In some cases, identfying the source of a narrator can be difficult depending on the choice of director to hide it or not. For example, a narrator that appears to be out of the story world may be revealed as one of the characters at the end of the movie making it a diegetic sound.

Non-diegetic sounds sometimes can be used as sound effects for specific purposes although this types of diegetic sounds can also be considered as a part of audio-visual counterpoint depending on the perspective of the analysis.

The attitude of the directors towards non-diegetic sounds shows a clear distinction among the examples included in this study. Non-diegetic music appear in several movies; but even a considerable number of these cases employ music very rare, sometimes only in the credits, showing that some of the directors actually prefer the sounds to reside in the diegetic world.

Nuri Bilge Ceylan, Pelin Esmer, Semih Kaplanoğlu and Zeki Demirkubuz seem either not to employ or very rarely use non-diegetic music. "Tepenin Ardı" by Emin Alper uses non-diegetic music only at the end of the movie while "Yozgat Blues" employs a musical theme closely tied to the diegesis. Derviş Zaim, Yeşim Ustaoğlu and Reha Erdem seems to prefer using non-diegetic music in their movies. Reha

Erdem not only uses music; but also he extends the usage of non-diegetic sounds to the boundaries of audio-visual dissonance or counterpoint. There are several points that he uses non-diegetic sounds to stress the mood of a character or to define the atmosphere of a situation.

3.2.1.2 On-screen and off-screen sound

The image presented to the audience is enclosed by the boundaries of the screen; but it is evident that the story space is not limited with the frame the camera captured. Therefore, a given source of sound can either be on the screen or off the screen at the moment audience hear the sound of it. Obviously, if the source is within the frame on screen, then it is called "on-screen sound" while if it is not, than it is called "off-screen sound" (Bordwell and Thompson, 2013, p.285).

The great strength of on-screen sounds come from the principles of Gestalt psychology. According to this theory, "the whole of anything is greater than its parts" ("Gestalt psychology", 2015). According to this perspective, on-screen sound provides the essential tool for sound film to fuse sounds and their sources into something greater than its components. In order to bring an outlining expression for the concept, Michel Chion (1994) introduced the term "*synchresis,*" which is a word derived from the combination of *synchronism* and *synthesis*. He defines the term as "the spontaneous and irresistible weld produced between a particular auditory phenomenon and visual phenomenon when they occur at the same time" (p.63). To summarize the effect of this phenomenon, it can be said that the sound effects, foley, dubbing to a foreign language and etc. are all blend in persuasively to a movie because of these sounds combined with the sources on the screen convince the audience what they hear actually belongs to what they see on the screen. In addition, due to *synchresis*, sound can add emphasis, create impact, define a mood or expand the perspective on the subject. The sound of breaking a carrot can appear as a sound of breaking a bone or smashing a watermelon in front of a microphone can be matched with a terrifying moment of smashed skull in a movie, and they can all sound convincing. It is also worth remembering one of the historical aspects of using sound effects in silent film era, which was mentioned earlier in the previous chapter of film sound history. There was an example in that chapter about an exaggerated sound effect used to create humor, which was about using sound of pulling cork out

of a bottle to match the scenes of kissing in comedies. This can be considered as extending the boundaries of *synchresis*. It means that the effect of *synchresis* works reciprocal, sound adds to image and image adds to sound to create an audio-visual event that is larger than both and depending on the context, the effect may become more drastic as the contrast created between sound and the source grows. One great example is the resurrection scene in "*Solaris*" by Tarkovski. In that scene, already resurrected wife commits suicide when she figures out that she is non-human, by drinking liquid oxygen. She dies freezing from inside; but soon after, she comes back to life again. As she starts to move, breaking glass sounds are being heard, emphasizing the nature and agony of her.

In a similar manner, exaggerated sound for a kiss works in a comedy and a watermelon may be suitable for disturbing sound of crashed skull in a terrifying scene but there is an undefined and unpredictable limit for stretching synchresis, a point where the sound becomes out of context and this phenomenal connection between the sound and its source is lost and audience starts to be distracted by the sound effect. It is also worth noting that the cinema is an art with visual priorities; thus the sound and its designer will be blamed for the problems in those cases.

Off-screen sound, on the other hand, is among the most valuable gifts that synchronized sound introduced to filmic narration because it expanded the available choices for the directors to display events and actions. Directors can define the general character and setting of the environment by sound, such as using sounds of seagulls and waves for a seashore setting. This is called "establishing sound," and off-screen sound makes it possible to use establishing sound to define surroundings without showing them on screen (Altman, 1992, p.250).

In addition to help establishing the settings for a scene aurally, off-screen sound also made it possible to narrate an action without showing its source; thus directors started to benefit from the extended space that is not in front of the eyes of audience. With the off-screen sound, it became possible for the director to place a single shot in which a character perhaps just standing still while the story keeps going, for example when a character leaves the room, it can be understood by only the sound of a closed door, and when he departs the house with a car, it can be understood by the engine and veichle noises.

The potentials provided by off-screen sound are widely used in the cinema for a long time, and also resulted in several side effects through the history of sound film, such as increased shot lengths of earlier examples of sound films compared to silent movies, as mentioned earlier in this study.

Another effect of off-screen sounds on the audience is that, they also lend some part of meaning to the imagination of the audience by not showing the sources of sounds. In these examples, audience starts to think about the source and they build their own versions about them, thus the director achieves to bring out an event that he can fail to get the effect he wants if the source was shown.

The off-screen sound is a strong tool for the new cinema of Tukey, too; since there are several points that it is employed to extend narration, create tension or provoke the imagination of the audience. The autopsy scene in "*Bir Zamanlar Anadolu'da*" is a strong example of a scene that using only sound for the autopsy and not showing what is going on manages to create an athmosphere for the audience feeding upon their imagination.

In "*Kader,*" which is a prologue for "*Masumiyet,*" both directed by Zeki Demirkubuz, there is a scene where Zagor and Cevat start to fight. Cevat takes his gun out when Zagor challenges him closely, and a gunshot is heard. The image shows only the faces of both men, and although it is known that a gun is fired off-screen, the consequences are not clear. Soon after, it is revealed that Cevat missfired and Zagor stabbed him.

There are several other interesting examples of off-screen sounds among the examples in this study since off-screen sound is a common tool for filmic narration; but "*Kade*r" has one more specific moment to mention. In a scene, taking place at the hotel where Uğur resides, the off-screen sound from the television implies that "*Masumiyet*" is on TV. That little and insignificant information is a surprise provided by off-screen sound that can be appreciated by only the careful audience aware of the works of Zeki Demirkubuz.

3.2.2 Sounds and their sources in the physical spaces

3.2.2.1 Physical spaces in the story world

The most significant sonic imprint that a physical space induces on a sound source is the reverberation due to the reflections from the surfaces. Since reflective surfaces are required for the reverb to build up, it usually occurs within enclosed spaces in the nature (Izhaki, 2008). If the reflective surfaces in that enclosed space, such as walls and ceilings are made up of materials capable of absorbing sound, then the amount of reverb in that room will be reduced proportional to the capability of the materials to absorb acoustic energy. It is also worth stating that the ability of the surface materials to absorb sound waves is also a function of sound frequency, thus their efficiency of absorption may vary with the frequency of the sound. This condition defines the tonal characteristics of the room, resulting that some spaces sound brighter with more high frequency content while others sound darker due to absorbed high frequencies.

When recording a source within a room, microphone picks up both the source and reflections. As quoted by Bordwell and Thompson (2013), Walter Murch says that "I like to think that I not only record the sound but the space between me and the sound: The subject that generates the sound is merely what causes the surrounding space to resonate" (p. 292).

If the microphone is close to the source, then the direct sound will arrive to the microphone sooner than the reflections, yielding lesser amount of reverb compared to a microphone set up further from the source. This point brings on an important issue about the evolution of production practices in the movie industry and aesthetical choices about auditory perspective in a film. The developments in microphone technology changed the restrictions for microphone placement, from practice of placing multiple microphones in fixed positions to the mobility provided by booms. The fixed position microphone placement technique in the era when editing sound separately was not possible yielded several side effects on the narration. Since the microphone was ought to be placed outside of the camera sight, medium or distant shots could only employ distant microphone placement. This type of recordings had lots of reverberation, which reduces the intelligibility of human voice. Thus, the early practice to overcome this situation is to cut into close shots,

which makes it possible to place a microphone closer to the source when recording of a dialogue was necessary (Altman, 1992, 53). This was a solution to overcome reverberation due to the distance; but it couldn't solve the problem of directivity. Even if the microphone is close to the source, any change in the direction of the actor causes the microphone pick up less direct sound and more of the room, resulting in a loss of volume and increased reverberation. *The Dueling Cavalier* scene in "*Singin' in the Rain"* also makes fun of this problem.

The most practical and economical solution came with the newly designed microphones in mid-thirties. The reduced weight and size of the microphones combined with the elimination of amplifier electronics nearby the microphone, made using the mobile boom significantly practical (Altman, 1992, p.53).

This technological development in microphones changed film production practices and solved previous problems but introduced a new issue. As Rick Altman states, with the benefits of boomed mike, Hollywood gradually turned towards "the *construction* of a soundtrack rather than the direct *recording* of already constructed sounds" (p. 53). This trend was also backed up by the development of sound processing tools and electronic devices that can emulate reverb characteristics of rooms which made it possible to record with a close microphone and add artificial reverb to desired taste later in post production process. Thus, a question about narration appeared about how to present this *constructed* soundtrack, which is already freed from the image, to the audience. Sound perspective became a subject of narrative decision in that respect. An approach seeing the camera and the microphone as the eyes and ears of the spectator adjusts the sound perspective according to the image within the frame, creating an point-of-audition closely tied to point-of-view. This can be seen as an interesting option, which brings the spectator into the film, but it does not always work well. If there are several shots in a single space with varying image scales, changing auditory perspective fights against principles of Gestalt psychology. Frequently changing sound according to the image between close and distant shots can confuse audience and they may not be able to perceive the surroundings as a single space. Using fixed point-of-audition and not interrupting the soundtrack with cuts help to establish unity in space and as a result, audience perceives image and sound as a whole.

3.2.2.2 Reproducing film sound for the audience

Even before the talkies, loudspeaker arrangement in theaters was a matter of discussion. As quoted by Rick Altman (1992), Lee De Forest, an American inventor famous with the invention of audion tube, insisted to place a loudspeaker in the orchestra pit "to simulate a fifty piece orchestra" (p. 47). This placement of the pit speaker, with the horn facing upwards became the common practice of the era, and with the arrival of talkies, a second speaker placed over the screen facing the audience (Altman, 1992, p.48). With this two-speaker set-up, there was a switching mechanism operated usually by the projectionist, who selects the appropriate speaker when music changes to dialogue and vice versa.

Before the arrival of stereophonic sound to movies and introduction of the concept of phantom images[16], using multiple speakers to match sounds with the position of their sources was also investigated. In 1928, J. C. Kroesen suggested to divide the screen into sections and place speakers in each of them so that when a source moves on screen, loudspeaker on that section will reproduce the sound (Altman, 1992, p.48).

Multiple frontal speaker layouts similar to Kroesen's proposition appeared later in history of film sound, but they were difficult to implement due to the unavailability of automated switching systems. Several years later, in 1940, Disney tried a new approach with "Fantasound," a sound system developed for "*Fantasia.*" In that system, there was a control track, which was capable of automating the routing of other channels to their dedicated speakers. The result was interesting, but the experimental sound field created by abrupt changes of the source locations between channels was distracting.

Stereophonic sound became widely used in music production beginning from 1950's, and there were also some experimentations regarding stereo sound in film, too. But especially due to economical reasons, stereo sound was not able to become a narrative tool for the cinema in that period. Monaural sound dominated the filmic narration while music was being reproduced in stereo.

It was the Dolby stereo that made the transition to multichannel systems inevitable, especially with the screening of Star Wars in 1977. The system was named as

[16] Phantom images are created in between speakers and the localization of these sources is determined by the time and level differences between speakers.

"stereo" but it also employed a surround channel. The movie and sound system received great attention, and sound designers of the era started to explore narrative possibilities they obtained with multichannel surround sound, marching to a new era of film sound design. The initial outcome was not that positive as expected:

> At first, a new generation of sound specialists labored mightily to employ the surround speakers to enhance spatial fidelity. Having failed to learn a lesson from the mistakes of Fifties stereo technicians, the sound designers of the post-Star Wars era regularly placed spatially faithful narrative information in the surround channel. Recalling the 3-D craze in mid Fifties, for a few years, every menace, every attack, every emotional scene, seemed to begin or end behind the spectators. Finally, it seemed, the surround channel had become an integral part of the film's fundamental narrative fiber.
>
> But not for long. Listening to theatrical reproduction of the sound he had designed for Star Wars and its sequel, The Empire Strikes Back, Ben Burtt discovered due to poor equipment and managerial disinterest the narrative sound events he had carefully placed on the surround channel were simply not being properly played in theaters. Starting in 1983 with the third film in series, The Return of the Jedi, Burtt initiated a new strategy, soon emulated by other sound dsigners. All narrative information would henceforth emanate from the front speakers, with the surround used for spectacular (but nonessential) enhancements. Thus freed from any responsibility to present narrative events or even spatial fidelity, the surrounds began a new career (especially in fantasy or horror films) as purveyors of spectacular effects. Not since the antics of the vaudeville-trained drummer accompanying silent comedy had cinema accorded such a place of independence and honor to sound effects. (Altman and Handzo, 1995, pp. 70-71).

The sound practice of filmmaking, from mid 80's until today behaved in line with the observations quoted above, placing the frontal channel at upmost priority for the narration and leaving the surround channels for only additional enhancements. The examples of movies included in this study from new cinema of Turkey also show similar attitude towards the usage of surround channels. An initial observation yields that the DVDs produced after year 2000 usually employ surround sound while some early examples have only stereo soundtrack. Multichannel sound files extracted from the source DVDs made it possible to investigate means of surround sound usage for the purpose of this study.

The first fact shows that surround sound is mostly used by music in the examples under focus of this study. The second most common usage of surround channels is for the ambiance sounds. By considering these observations, it can be said that new

Turkish cinema acts parallel to the general trends in the world in terms of surround sound, with the most narrative elements residing in the frontal channels.

There are always exceptions and in this case, although being rare, there are examples that employ surround channels for narrative purposes. The most significant example comes from Zeki Demirkubuz, in "*Yeraltı.*" In this movie, there is a scene in which Muharrem is disturbed by a noise outside. In this scene, the source of the noise is reproduced at rear surround channels. This is interesting because a similar event takes place in his other movie "Bekleme Odası", which also has inspirations from Dostoyevsky. Both movies employ an outer threat or distraction for the safety/serenity of the characters while they are inside their haven, which is their home, and in both movies, the characters do not hesitate to look beyond the boundaries of their havens to face the unknown threat/distraction ahead.

3.3 Temporal Properties of Film Sound

When discussing the history of film sound in the previous chapter, it was mentioned that the term "sound film" is actually related with the arrival of synchronous sound in motion picture. Bearing this in mind, it can easily be said that placing sound in sync with the image is the first and one of the most important temporal aspects of film sound in a sound film. From today's perspective the experience of synchronous sound may not be very special, but the additional dimension gained by it, helped directors to take advantage of extra resources for storytelling and also it changed how films are narrated.

On the other hand, the arrival of synchronized sound initiated several discussions about creative and artistic decisions in filmmaking, based on how to match image with sound. René Clair, for example, decided to experiment with "asynchronous sound," which means employing "sounds mismatched with images that do not 'belong' to them in the real world" (Kickasola, 2012, p. 64). As an example for this perspective, Clair used music and songs to replace the dialogue in some his musicals such as "*Le Million"* and he also ironically contrasted dialogue with non-synchronous images (Giannetti, 2001, p. 211).

In some cases, film scholars from the early sound film era used the terms "synchronous" and "asynchronous" sound in a similar manner with "on-screen" and

"off-screen" sound. In that perspective, when the source is on the screen, sound can be considered as synchronous and when it is not, then the sound can be considered as asynchronous. This point of view appreciates the possibilities provided by asynchronous/off-screen sound as it can serve as a continuity element that brings a new perspective to the filmic narration.

The asynchronous sound, or out-of-sync sound, to be more precise in this case, can also be used for humor in a movie. Bordwell and Thompson (2013) give two examples for this case. First one is a "film in a film" situation in "*Singin' in the Rain.*" The sequence mentioned is about a pair of actors and theatrical preview of their first talkie called *The Dueling Cavalier.* The preview turns into a failure and the audience makes fun of the movie due to the soundtrack turning out-of-sync.

The second example is a Woody Allen movie, "*What's Up Tiger Lily?"* In this case, an Asian spy movie is dubbed with a new soundtrack in English to create a new story rather than a translation. As a result, actors' lips are out-of-sync with the voices, setting the base for the comedy.

Another theory related with asynchronous sound in film was based upon "counterpoint" in music. Initially backed up by Soviet directors such as Eisenstein and Pudovkin, counterpoint in film theory considered sound as a new montage element that enlarged the expressive possibilities and it is often used in conjunction with asynchronous sound (Neumeyer, 2014). Introducing his dialectic approach to film form, Eisenstein (1949) mentioned the "synthesis of two counterpoints – the spatial counterpoint of graphic art and the temporal counterpoint of music" (p.52). As a part of his formulations of conflicts in cinema, Eisenstein (1949) declared the sound film as the result of conflict between acoustic and optical experience, which can also be referred to as "audio-visual counterpoint."

Theory of counterpoint in film sound is still a popular subject among scholars; but Michel Chion holds a different stance. Chion (1994) finds the vertical relationship between the sound and image more evident than the lateral one. He also states that a soundtrack looses its *raison d'étre* when it is detached from the image, so it shouldn't be considered as a coherent entity.

3.3.1 Influence of sound on the perception of time

Michel Chion introduced several key concepts that are very useful for understanding or describing issues with film sound. While discussing the projections of sound on image, he introduced the term "added value." With this term, Chion (1994) refers to:

> … the expressive and informative value with which sound enriches a given image so as to create the definite impression, in the immediate or remembered experience one has of it, that this information or expression "naturally" comes from what is seen, and is already contained in the image itself (p. 5).

Among various effects of the concept of "added value." influence of sound on the perception of time in the image takes an important place. While discussing the aspects of temporalization of the image with sound, Chion (1994) mentions three major points, which are temporal animation, temporal linearization and how sound vectorizes shots. Temporal animation refers to the effect of sound on the perception of time in the image. Temporal linearization is about how sound "does impose a sense of succession" (Chion, 1994, p. 13). Third one is about how sound directs the shots toward an intended goal and destination (Chion, 1994).

Chion (1994) categorizes image and sound combinations under two cases when considering temporalization of image with sound. First case happens when the image is static or it only has a simple motion such as the ripples in the water. In this case, temporality of the image mainly relies upon the sound. The second case occurs when image has motion; thus sound and image cooperate and interact with each other in terms of time perception.

The example provided by Chion (1994) for the temporal animation is the opening sequence of "*Persona*" by Ingmar Bergman, which presents an extreme case of the concept since it mostly employs rapid cuts between static shots and still images, animated by a soundtrack almost like a *musique concréte* piece. This type of narrative is a rare example and it can't be observed in the examples included in this study; but scenes with longer shot lengths and minimal motion are quite common. There are several examples of relatively long and static shots within the movies included in this study, even the directors such as Nuri Bilge Ceylan and Semih Kaplanoğlu employs this type of shots as one of the major elements of their cinema language. "*Nokta*" by Derviş Zaim is even an extreme example since it is edited as if

the whole movie is a single shot in order to mimic the practice of traditional Turkish calligraphy.

In an interview with Uygar Şirin (2010), Semih Kaplanoğlu describes his perspective about 'time' in the Yusuf trilogy. First, he brings out the significant difference between the hustle of metropolitan life and the slowness of countryside to emphasize the relativity of time perception. Then he adds that he prefers fewer cuts in his movies to avoid breaking down the motion, which helps him to match the slowness of the country life with the time in the image of his movies (p.128-129).

An example about the interaction of sound and image that effects the perception of time occurs within the conversation/tirade scene in "*Bir Zamanlar Anadolu'da,*" which was mentioned in the previous section. In that scene, after Arap Ali completes his tirade and waits for an answer from the doctor, doctor's head is seen from behind, as shown in the in Figure 3.32. In the background, a smooth but evident wind blows over the grass, waving the grass and the doctor's hair in a horizontal pattern. The camera zooms in very slowly, and the only motion added to that is the waving of grass and the hair of doctor. The final sentences of Arap Ali animates the shot at the beginning; but after he completes his words and starts to wait a reply from the doctor, quietness and stillness in the image takes over. Wind causes a steady and a smooth rustle over the grass accompanied with sounds of crickets. The stillness in the image is combined with the background sounds, which add up to the prolonged wait for doctor's answer and they altogether cause the perceived time become slower. It might be expected that with the beginning of the doctor's speech, scene would be animated again; but on the contrary, it keeps on adding to the mood of stillness. A distant rumble[17] warns about a stormy weather far away, and then the doctor starts to speak, very slowly. His voice is deep and low pitched with a significant proximity effect, and more importantly, the subject he talks about is also 'time' and insignificance of human life compared to it.

The hallway scene at the beginning of "*Bekleme Odası*" by Zeki Demirkubuz provides another example of how sound implies action and temporalizes image. The scene shown in Figure 3.33 consists of a single static shot with duration of 1 minute

[17] The low frequency rumble mentioned here is the result of the distance, since air absorbs high frequency content of the distant lightning sound; but it is worth mentioning that low frequency sounds are also associated with slowness as mentioned in the section 3.1.4.

and 42 seconds, and it starts with Ahmet sitting on a coach in his living room. Sound from the television is being heard at first, then Ahmet stands up, his body leaves the screen, followed by the disappearance of the sound from television, implying that he has turned it off. Then he turns off the lights one by one, and goes to toilet. The image becomes still; but soundtrack implies that he is urinating. After he flushes out, he gets out of the toilet and keeps on turning off remaining lights before going to bed. At the end of the scene, dark and still image is only animated by the sound of water filling the flush box in the toilet, and the shot ends right after it gets filled.

Figure 3.33: The hallway scene in "*Bekleme Odası.*"

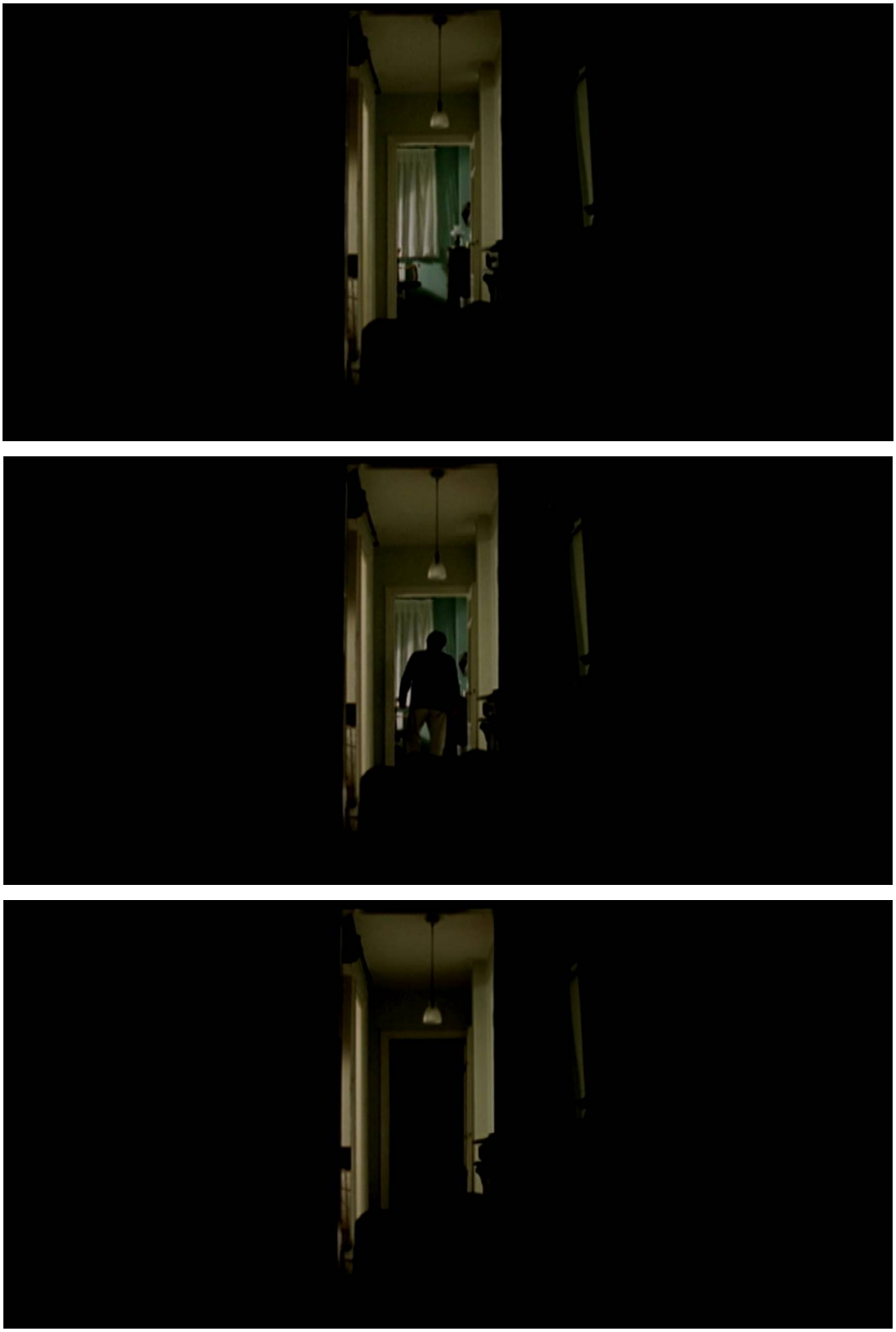

Figure 3.33 (cont.): The hallway scene in "*Bekleme Odası.*"

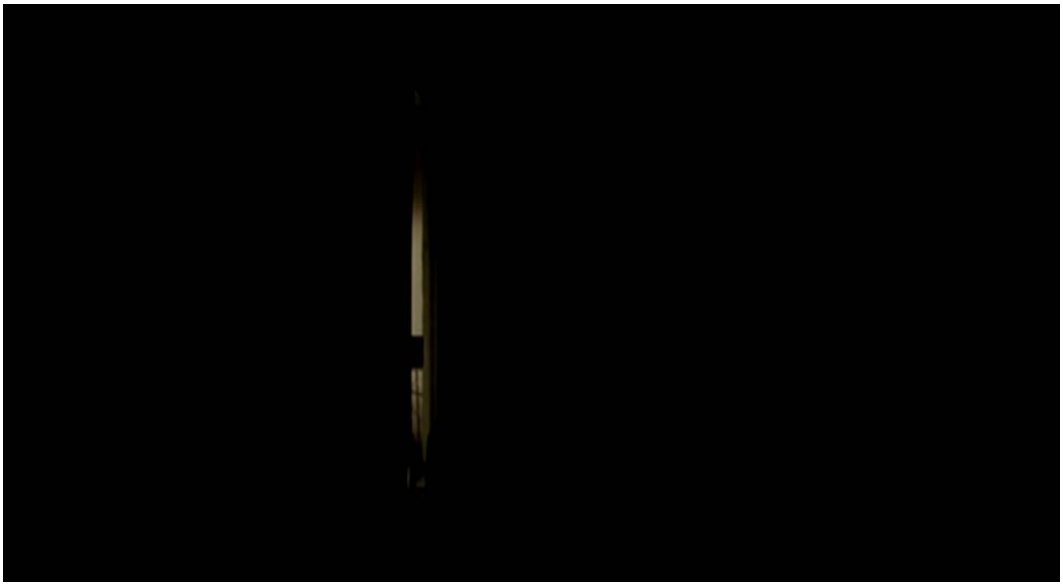

Figure 3.33 (cont.): The hallway scene in "*Bekleme Odası.*"

The interaction between sound and image that effects the perception of time is dependent upon four aspects of sound, which are how it is sustained, how predictable it is, its tempo and its frequency content (Chion, 1994, p. 14-15). Continuous and smooth sounds have a tendency to emphasize steadiness, such as the sounds of wind and rustling grass in the scene of doctor's speech in "*Bir Zamanlar Anadolu'da,*" which was mentioned earlier in this section. The sound at the ending of hallway scene in "*Bekleme Odası,*" when the flush box is getting filled by water is also continuous, but on the other hand, changing timbre and increasing pitch of the sound as the box gets filled more and more gradually speed up the time perception as it directs the attention of the audience towards the foreseeable end of the process.

The predictability of a sound also increases the tendency to emphasize steadiness. For example, the vehicle sounds, which are very common among the movies included in this study, produce continuous humming sounds, yielding a steadiness as described above. Predictability on the other hand, is usually determined by other factors in those scenes, such as the sounds of windshield wipers. In "*Araf*" for example, during the first highway scene of Mahur's truck at the beginning of the movie, Ustaoğlu prefers to use wiper sounds at a stable tempo fixed by the nature of the automated mechanism of the device to enhance the feeling of long and a steady journey. That condition is contrasted by the random sounds of forks, spoons and dishes at the diner Zehra is working, emphasizing the rush she is in. The second appearance of Mahur's truck on the highway later in the movie introduces an

additional sonic element, which is a musical theme. This time windshield wiper sounds are barely noticeable but their movement indicates a visual tempo, while the accompanying music, although employing a steady texture, fluctuates in an unpredictable way that creates a contrast with the visual rhythm implied with the motion of the wipers. This conflict also enhances the unsecured feeling imposed by the accidents along the highway and implies what already happened and the unpredictability of the events to come in a metaphorical way.

In some other cases, these wiper sounds can become the source of unpredictability as well. They are usually operated by a mechanism that works at an adjusted speed and frequency, causing a steady tempo in motion; but there are exceptions. In "*Bir Zamanlar Anadolu'da,*" when the crew leaves the *muhtar*'s house in the morning, a folk song is heard from the car's tuner. The humming road and engine noise is steady in the background, and the song sets a tempo for the scene; but the overall predictability is interrupted by random actions of the windshield vipers, both in a visual and audible way.

In the final scene of "*Hayat Var,*" Reha Erdem utilizes the conflict between the steadiness of the sounds of boat over the sea and the unpredictability of the texture he created with the sirens of ships.

The typing sounds at the beginning and the end of "*Bekleme Odası*" by Zeki Demirkubuz, serve two opposite purposes due to the different conditions in each scene. At the beginning, these typing sounds create a nervous atmosphere, because Ahmet is facing a writer's block, deleting what he has already typed. However, in the final scene, in which he is continuously typing the script for a movie called "Bekleme Odası," same sounds of typing, which can still be considered as unpredictable due to the nature of action, concludes that Ahmet is out of writer's block and his creativity is on the flow.

In, "*Yeraltı,*" another movie directed by Demirkubuz, the scene, in which Muharrem furiously wrecks his furniture, employs static shots in between and at the end of his nervous breakdown. The actions and sounds of crashed glasses, home appliances and furniture are already random and they contribute to the emotional peak within the scene, but in a shot when Muharrem is off-screen and the image of a decorative item is on the foreground (Figure 3.34); nervous, deep and unpredictable breathing of

Muharrem is being heard at a close proximity although he is in another room. That sonic texture strongly contrasts with slow and calm motions of the fluid inside the item. The scene continues with Muharrem crashing that item and he keeps on wrecking more of his furniture, and at the end, he crashes the window, then he stands still and his breathing gradually turns to regular implying that he is calming down.

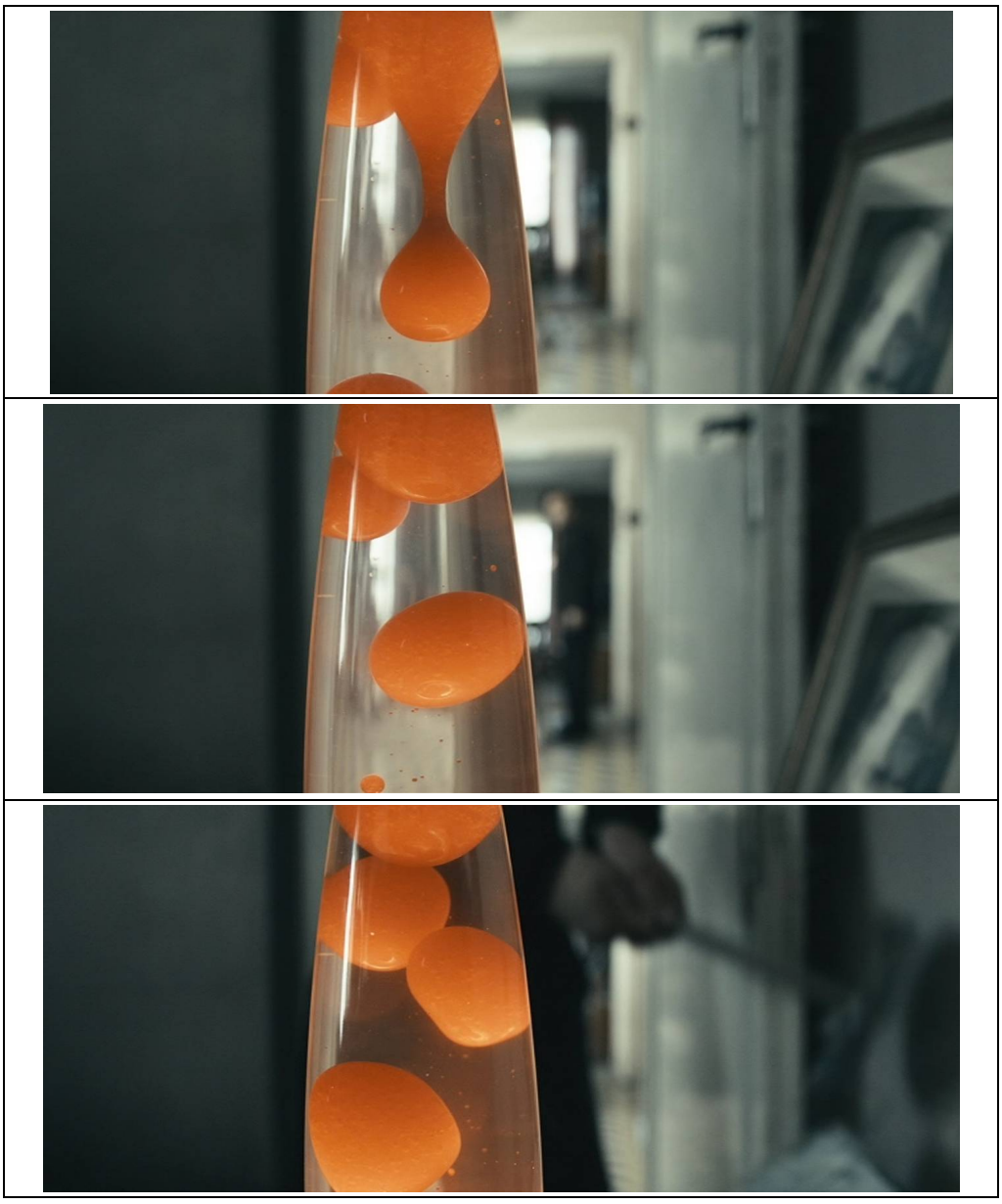

Figure 3.34 : The rage of Muharrem in "*Yeraltı.*"

The tempo of the sound does also effect the temporalization of the image; but it doesn't always mean that an up-tempo soundtrack means a faster perceived time, or vice versa. The defining aspect of tempo that effects the temporalization is the regularity or the irregularity within, resembling the situation of predictability. Thus, regularity in tempo enhances steadiness in the image; and the irregularity behaves in the opposite way (Chion, 1994).

The last aspect about influence of sound in the temporalization of image is the result of frequency content of the soundtrack. As Chion (1994) states, higher frequencies keep the audience more alert, which is the obvious outcome of the technological advancements in film sound that provide wider spectral range for the soundtrack.

3.3.2 Temporal relations of sound and editing

Herbert Zettl (2008) states that as long as an event is recorded on film or tape, it will become prone to the subject of aesthetic entropy, because it will stay the same through time while the perceptions about it will change (p. 241). Editing is the main tool for fighting this energy loss in the first place, because it can help expanding or condensing time in the image in order to regain energy and it leaves the audience alone with matters of aesthetics.

By the traditional perspective, editing can be described as the process of "joining together multiple shots to convey the cause-and-effect logic of the plot" in a narrative film (Pramaggiore and Wallis, 2011, p. 201). According to this definition, editing sets the order of the shots, thus it directly defines the chronology of the events and it shapes the temporal relation between story and plot.

Editing can manipulate perception of time in the film by itself, and sound can assist to establish that intended perception. To begin with, editing can expand or condense time. In several cases, a story event with a longer duration can be condensed so that only crucial parts that represent the whole action take screen time, which is called "elliptic editing" (Bordwell and Thompson, 2013). For example, when a character sleeps and nothing will happen in that period, there is no need for that action to consume screen time, so a sleep that might represent a story time of several hours is

condensed to take a few seconds on screen[18]. Previously mentioned hallway scene in "*Bekleme Odası*" provides an example for this situation. At the end of that scene, it is not shown but implied that Ahmet went to bed. The next shot starts with a noise from outside that wakes him up, it is still night, but it can be understood that he had slept for a while.

There are several other shots in the same movie, which are showing Ahmet at night and then waking up, and between these successive shots, several hours are skipped by means of a single cut. In this kind of condensing time, sound can help the transition to be less distracting for the audience by providing additional information about the time elapsed. At the end of the hallway scene, the noise that wakes Ahmet late at night immediately directs the attention of the audience towards the source of that sound. In other examples from the same movie, the transitions from night and waking up in the morning are highlighted by both audible and visual cues.

Figure 3.35 : Consecutive shots of night and morning in "*Bekleme Odası.*"

[18] This is valid for narrative films. There are examples of non-narrative films that experiment with the concept of 'time' such as "*Sleep*" by Andy Warhol, in which a man is shown sleeping for more than five hours.

For example, the shots provided in Figure 3.35 are consequent, and between them, several hours passed in story time. Night is dark and the morning is sunny, which is an expected visual outcome and the soundtrack contributes to this visual contrast by associating night with quietness and morning with birds singing. As a result, the transition from night to morning is achieved not only by editing but also by the contribution of the soundtrack.

"*Jin*" by Reha Erdem has several points of time ellipsis, at which the soundtrack provides significant support for editing. In that scenes, Jin is travelling on foot, and the visual cues that represent the time elapsed while she is walking and covering a long distance are limited. Transitions between day and night are easily implied by the image due to existence or lack of sunshine; but to represent the elapsed time during day time when the main action is only her walk is more difficult. As she keeps walking, changing the surroundings between consequent cuts could have implied elapsed time, but this becomes harder since the landscape does not change very much in some situations. Reha Erdem overcomes this issue by selectively using the layers of ambiance sounds for different landscapes. For example he introduces a wind noise with a cut and takes it out later on the sequence of Jin's journey, implying that she has travelled a distance, weather has changed and time has passed between the shots. In the same manner, other sound sources such as birds, insects and water streams and their combinations used in "*Jin*" for layering different ambiance sounds to create various soundscapes. These unique soundscapes are altered between shots when needed, to define environment and ambiance along the path travelled, and to imply the elapsed time.

Expansion of time in a movie, especially as a result of editing, is more infrequent than condensation. Slow motion is one of the methods to stretch time, and editing alternative for prolonging an action is to use multiple overlapping shots of the same event. In this method, end of an action in one shot is repeated partially at the beginning of the next one, and this is called "overlapping editing" (Bordwell and Thompson, 2013). This type of editing emphasizes the significance of an event as it can be observed in the bridge scene of Eisenstein's "*October."* Action sequences benefit from this method too, for example, a single colossal explosion in an action scene that would end in a few seconds can be expanded to have more screen time than its story time in order to stress every aspect of its destruction; but in that case,

prolonging the action with slow motion can undermine the desired effect. Because of that, overlapping editing with multiple shots showing different angles and aspects of the explosion may provide a better alternative.

Another temporal condition that editing can help to establish in a film is the simultaneity of events. Method of "parallel editing"[19] helps achieving that condition by using "cuts back and forth between two or more events occurring in different spaces, usually suggesting that these events are happening at the same time" (Pramaggiore and Wallis, 2011, p. 203). In these cases, soundtrack can provide support for parallel editing in two ways. First, different ambience sounds associated with different spaces make it easier for the audience to distinguish spatial changes in between cuts. Unique ambience sounds become emblematic for the spaces make them identifiable even if the new shot does not have enough visual cues defining the space in the first place. An example of this type of editing and soundtrack cooperation can be seen in "*Silence of the Lambs,*" directed by Jonathan Demme. In that movie there is a scene in which the criminal Buffalo Bill is at home with his hostage while at the same time police forces are preparing for an operation outside. The irregular and unpredictable squeaks and howls of the criminal's dog are combined with the aggressive voices of arguing criminal and hostage create a contrasting sonic texture compared with the quiet preparations of the policemen outside. The abrupt changes in the sonic texture while going back and forth between cuts make it easier to distinguish changes in space.

Secondly, a sonic element, usually a non-diegetic music, can be prolonged over consequent shots to establish a temporal unity. This method is usually combined with the previous one of employing different sonic textures to highlight changes in space while music helps to hold parallel events together. "*Inception*" by Christopher Nolan has several examples of this since parallel events have a significant part in the story.

As Michel Chion (1994) states, sound can linearize the temporalization in the image, and because of that, sustaining a sonic event over several consequent cuts can impose a sense of succession between the events in these shots. This is important for editing, because in some cases, directors may prefer to change the order of the events rather than using a sequential narration and in these situations, sustaining a sonic element

[19] Parallel editing can also be called "cross-cutting."

such as non-diegetic music should be avoided when jumping to another point of time in the story.

3.3.3 Simultaneous and nonsimultaneous sound

Technical achievement of placing a sound at any intended time in a movie with the arrival of synchronization does not mean that a sound always should occur at the same time with the source on screen. Considering that point, another important issue that needs to be discussed is the insertion time of the sound element with respect to its source in the image. Sound occurring at the same story time with the image is the most common way for the filmic narration; but for specific purposes, especially when the plot manipulates the order of events, sound can be introduced earlier or later than the image. Bordwell and Thompson (2013) discuss this subject under two categories. If "the sound takes place at the same time as the image, in terms of the story events," it can be called "simultaneous sound," as opposed to sound being introduced earlier or later than the corresponding event, which then can be called "nonsimultaneous sound" (Bordwell and Thompson, 2013, p. 295).

Off-screen sounds may cause confusion since their source is not on screen when they are being heard; but this doesn't disprove the fact that sound and its source exist at the same time in the story. Thus, off-screen diegetic sounds are considered as simultaneous sounds in these situations and need not to be confused with nonsimultaneous sounds.

In addition, the sounds that are used when manipulating the order of events are usually diegetic, which means that they belong to the story space since a non-diegetic sound such as music does not always need to have a temporal connection with story time. On the other hand, sometimes voices of narrators may be used over images of different story time, earlier or later, and examples for possible situations are listed in Table 3.5 below.

Table 3.5 : Temporal relations of sound in cinema (Bordwell and Thompson, 2013, p. 295).

Time	Space of source	
	Diegetic (Story Space)	**Non-diegetic (Story Space)**
1. Nonsimultaneous; sound from *earlier* in story than image	Sound flashback; Image flashforward; Sound bridge	Sound marked as past put over images (e.g., sound of John Kennedy speech put over images of United States today)
2. Sound *simultaneous* in story with image	*External*: dialogue, effects, music *Internal*: thoughts of character heard	Sound marked as simultaneous with images put over images (e.g., narrator describing events in present tense)
3.Nonsimultaneous; sound from *later* in story than image	Sound of flashforward; Image flashback with sound continuing in present; Character narrates earlier events; Sound bridge	Sound marked as later put over images (e.g., reminiscing narrator of *The Magnificient Ambersons*)

Leaving the simultaneous sound aside, as it is the most common situation, there are two different temporal conditions for nonsimultaneous sound as it can be seen from the table. In these conditions, sound can either belong to an earlier or later point in story than image. The possible reasons for sound to be earlier in the story than image are sound flashback, image flash-forward and sound bridge. Sound flashback means that the images are in present; but the sound belongs to an earlier event. For example in "*Mommo,*" grandfather receives a letter from his daughter living abroad, and in that scene, he listens to his brother reading the letter to him. When he is delivered the bad news, the scene cuts into a night setting in which the grandfather is thinking desperately in front of window. In this second shot, his brother's voice is still being heard reading the letter, stating that the grandfather is remembering the letter[20].

[20] It is worth noting that in that second shot, the voice of the brother has reverb effect on it to distinguish its source from the physical space on the screen. I also think that repeating sentences from the letter in both scenes is unnecessary. Since non-diegetic music already provided a thematic connection between shots and reverb effect already separated the space for the source of off-screen voice, interrupting the flow of the text by re-reading these sentences harms continuity.

Image flashforward means that the sound is in the present but image belongs to a point later in the story. This is not a very common situation within the movies included in this study.

The term "sound bridge," on the other hand, means that a sound from a shot is slightly prolonged over the next, or it precedes a shot before it comes in, aiming a smooth transition between cuts. This is a fairly common method as it helps editing to create flowing transitions between one cut to the next. Sound engineers are quite familiar with this subject; fade in, fade out and crossfade are major tools for manipulating auditory perception that make transitions less audible, just like the blinking reflex of an eye is important for editing as Walter Murch (2001) states.

Sound may also belong to a later point in time than the image. Besides a sound bridge, this situation appears when a character narrates an earlier events similar to those in court scenes in which a witness on screen talks about an earlier event while the image cuts into that point in time in the next shot. In these scenes, witness's voice is heard but the image belongs to the past. Sound flashforward also falls into same category, like the end of the first scene of "*Eylül,*" in which the husband and wife are in a taxi going to hospital. While the image of them in the backseat of the car is on screen, voice of a doctor starts being heard, which belongs to a later time that they reach to the hospital.

There can also be other exceptional situations about temporal relations of image and sound that do not fall under the categories listed in the table. Bordwell and Thompson give the opening scenes of Alain Resnais's "*Providence*" as an example of a creative exception. At the beginning of that movie, an old man is being chased by a group of armed men and this action is crosscut with a court scene in which one those men is being interrogated as a suspect. During the interrogation, prosecutor pauses for a moment and then we hear the word "werewolf" whispered by someone. After that, the prosecutor asks the suspect "A werewolf, perhaps?" The source for the whispering voice is unclear, making it harder to identify its temporal and spatial relationship with the image. I believe, these types of extraordinary examples should not only be labeled as exception but also need to be investigated separately to understand how they work. In this example, the situation looks like an audiovisual dissonance, which resembles a melodic dissonance that can be encountered in Western tonal music from common-practice period. To be more specific, the

"werewolf" moment in "Providence" is similar to a "suspension,"[21] which means that a suspended tone from previous beat creates an accented dissonance before it resolves to consonance (Gauldin, 1997, p.82). The suspension has three stages, preparation, suspension and resolution. Resnais prepares the audio-visual dissonance in one of the first shots of the movie in which hand of a man mistakenly hits and makes a wine glass fall. Suspension occurs when we hear a voice whisper "werewolf" in the courtyard and resolution comes when the source of the verbal commentaries is revealed.

3.4 Functional Properties of Film Sound

Until this section, physical, spatial and temporal properties of sound are covered. The final subject that completes the framework of this analysis is the functional properties of sound. There are several studies that concentrate on functions of film sound or its components. Claudia Gorbman (1987) focuses on music in the movies while Bordwell and Thompson (2013) prefers to discuss functions of sound along with an analysis of a movie. I had the chance to access two different editions of their book "Film Art," and benefited from both. Under the section of functions of film sound in 8th edition, Bresson's "*A Man Escaped*" was under scope and in 10th edition "*The Prestige*" by Christopher Nolan. On the other hand, I think rather than focusing on individual movies, a brief categorization of functions of film sound with a wider perspective will be more useful for the scope of this study. In that respect, the following categorization is mostly adapted from Michel Chion (1994), since his work provides most suitable categorization to discuss sound in terms of filmic narration. These categories are Punctuation, Anticipation, Unification and Separation. There is one more category I decided to add in order to extend this section to meet the scope of the thesis, which is Description.

---

[21] The term "suspension" has another meaning in film sound studies. David Sonnenschein (2001) defines suspension as "the selective elimination of sound" occurring "when the sounds that we would naturally expect in a situation disappear" (p.127). He gives the snowstorm sequence from Akira Kurosawa's "*Dreams*" as an example; in which the sound of wind fades away and hair of the women still waves with the wind. The same term used here belongs to the field of harmony practice in tonal music.

Combined with the information provided previously in this chapter; this section provides a very useful perspective to establish the functional link between the soundtrack and the filmic narration.

3.4.1 Punctuation

The term punctuation is defined as all the marks in a text such as commas and periods that make the meaning clear and separate the text into sentences, clauses and etc. (punctuation, n.d.). Michel Chion (1994) starts with discussing how actors punctuate text of a play by means of intonation, breathing, or gestures. In a similar manner, opera can employ music as a punctuative tool. Thus, when cinema emerged as an art in silent form, it benefited from the traditions of stage arts for punctuation while adding some of its own. Use of cuts and transmitting the text by intertitles created new means of punctuation for the film. With the arrival of synchronized sound, cinema gained another tool for punctuation. As Chion (1994) states, the concept of punctuation is not arrived with sound, but sound introduced "subtle means of punctuating scenes without putting a strain on the acting or the editing" (p. 49).

There are several moments in a film that sound punctuates a scene. Most obviously, actors can punctuate their lines with their voices and this can even be off-screen. Non-diegetic music can be used in a similar purpose, and especially mickey-mousing and imitative themes can extend the meaning of the image on screen by a great margin.

At this point, I believe it is beneficial to slightly move away from Chion's perspective and turn back to the textual analogy. Looking again at the punctuation marks in detail, it can be said that they serve several functions that need to be discussed separately. For example "period" may refer to a sound that marks end of a scene or sequence while "comma" would be the separation between shots before the scene ends. For example, as it was mentioned in the first section of this chapter, several directors from new cinema of Turkey included in this study utilize silence as a full stop at the end of their movies.

Additionally, a "colon" may be used for descriptive functions of sound while "semicolon" may create anticipation for a new clause. It is possible to lengthen this list; but as it can be seen each of these examples require in depth analysis and in that manner, they will be discussed under their own sections later on. Thus, it is worth

looking into another aspect of punctuation, which is highlighting an event to help image to make clear of the meaning or to create surprise, analogous to the exclamation mark.

There are several ways to urge attention from the audience, and one of them is to use an unexpected and loud sound that emphasizes a visual event or creates a surprise effect. For example in "*Bir Zamanlar Anadolu'da,"* when the doctor looks for a place to urinate in a weather alerting a storm approaching, he finds a place that he believes nobody is seeing him. When he starts to urinate, a thunder strikes and under the sudden light of it, he catches a glimpse of a stone-carved face figured just in front of him. The loud crackle of thunder increases the surprise effect on audience and puts an exclamation mark on to the image not by sound but also by giving a reason to the sudden light over the stone figure.

Loud and unexpected sounds may create surprise effect and may enhance the image due to the *synchresis*, but it is not the only way of highlighting an action. Silence can also be employed to stress the meaning of an event, as observed in a scene from "*Bal*" in which Yusuf struggles to read in front of his classmates.

3.4.2 Anticipation

One of the greatest strengths of sound in a movie is its capability of directing the attention of the audience to an intended point or action and creating anticipation (Bordwell and Thompson, 2013). When the source of a sound is on screen, sound makes it the focal point of attention, for example when Yavuz starts to sing in a wedding to earn money in "*Yozgat Blues,*" he gets looked at, not the attendees of the wedding.

Off-screen sounds on the other hand, help the director not only to direct attention to a specific event, but also create anticipation about it. For example when the noise that wakes up Ahmet late at night is heard in "*Bekleme Odası*," audiences expect to figure out the source, creating anticipation about it. This type of off-screen sounds frequently used in filmic narration; but perhaps their most significant role takes place in the horror and thriller genres. Bordwell and Thompson (2013) discuss this aspect of off-screen sound:

> If we hear a door creaking, we anticipate that someone has entered the room and that we will see the person in the next shot. But if the film draws on conventions of the horror genre, the

> camera might stay on the man, staring fearfully. We would then be in suspense awaiting the appearance of something frightful from offscreen. Horror and mystery scenes often use a sound from an unseen source to engage the audience's interest, but all types of scenes can take advantage of this possibility (p.268).

The sounds that are used to create anticipation may also be non-diegetic. In these cases, the source of sound is not the point of attention unlike the off-screen examples mentioned above. A non-diegetic sonic event, most probably music or sound effect, can be used to cue in or fade out an incident or a mood. The main mechanism of creating expectation with this type of non-diegetic sound mostly relies upon pattern recognition. As Michel Chion (1994) states that the audience "recognizes the beginning of a pattern (a crescendo or an accelerando) then verifies whether it evolves as expected" (p.56). This type of sounds can be employed at transitions, between shots or scenes or it can help increasing tension or creating relief. For example, when the villains interrogate a woman they kidnapped in "*Filler ve Çimen*," a thrilling high-pitched sound fades in and informs the audience that something unpleasant will happen, and then the scene cuts into a close shot of the woman at first, than distant shots of her lying on the ground, followed by the fade out of the thrilling noise. In this scene, the moment of murder is not shown; but the sound builds up the tension and helps the director to create anticipation about the unpleasant action.

Figure 3.36: Anticipation of a murder in "*Filler ve Çimen.*"

Figure 3.36 (cont): Anticipation of a murder in "*Filler ve Çimen.*"

3.4.3 Unification

The most common function of sound that can be observed in a movie is unification. First of all, as Bordwell and Thompson (2013) states, sound can be used to smooth out transitions between scenes by slightly prolonging sound from one scene to the next, creating a "sound bridge" between scenes. By this method, sound can conceal visual breaks and can create a perception of continuous and unified flow of images.

The sound bridges are used at scene transitions and they have fairly short durations, not more than a few seconds. On the other hand, method of prolonging a sonic event through several shots is also a common unification tool. For example, in "*Bir Zamanlar Anadolu'da*," the continuous dialogues play a crucial part for narrative unification of several consequent shots.

Moreover, sound can help establish spatial unification in a scene. The ambiance sounds in a scene such as urban settings, birds, ocean waves and etc. create an environmental setting that extends beyond the image on screen. In these scenes, regardless of the information provided visually, a "heard space" is created that becomes a container for the image (Chion, 1994, p.47).

Finally, non-diegetic music can also function as a unifying device in a film. As Michel Chion (1994) suggests, "music is independent of the notion of real time and space it can cast the images into a homogenizing bath or current" (p.47). This independence of non-diegetic music from story space and time makes it possible to be employed at a desired point in a movie, regardless of the event taking place in the image.

In addition, music does not only unifies consequent shots or scenes, it can also be used to establish a narrative link between them independent of plot time. For example, associating a particular musical theme to a mood or a character and introducing same theme whenever this mood or character is in a scene, creates a narrative link between the scenes with the same mood or character.

3.4.4 Separation

To serve the function of separation in a movie, not the sound but lack of it is required, which means silence. As Robert Bresson (1997) mentions in his *Notes on the Cinematographer*, "soundtrack invented the silence" (p. 48). This quote highlights the most important aspect of silence; that silence needs sound to exist as a sonic event that can be used for narrative purposes on its own.

Silence is not meant to be absolute, and if it is the case, then the audience usually perceives it as a technical problem. Thus, the quietest ambient sound in a location when no action is taking place is considered as the natural silence unique for that space. Because of that, sound crew usually records the ambiance of a location separately before or after the shooting. In his interview with Uygar Şirin (2010),

Semih Kaplanoğlu, states that especially in "*Bal*", it took up to several days for the sound crew to record each location after the shooting. This pre-recorded ambiance can later be used in post-production, and by adjusting its volume, perhaps to a quite level, a sense of silence can be achieved in between actions.

When considering the general usage of silence as a separation tool in a movie, it can be observed that a loud section precedes silence. As Michel Chion (1994) points out, "the impression of silence in a film does not simply come from an absence of noise;" which means that silence needs to be in a context and it needs to be prepared accordingly, so "it is the negative of sound we've heard before-hand or imagined; it is the product of contrast" (p.57). Otherwise, it only becomes an ambiance sound not a narrative tool.

When discussing unification, I stated that sound bridges might help to achieve a continuous flow between scenes. On the other hand, not using a sound bridge and instantly switching from a loud scene into a silent one creates a narrative separation between both scenes. For example Reha Erdem employs abrupt cuts of music at scene transitions especially in "Kosmos, " as a tool of narrative separation.

3.4.5 Description

The last function that will be mentioned here is the descriptive aspect of film sound. The previous four functions of film sound discussed above were based on Michel Chion's study, and together they represent a comprehensive outline analogous to a grammar of sound in filmic narration. I decided to add this fifth subject because I believe it is also worth discussing how sound acts as an adjective to the source.

There was a borderline I always considered to keep this study in, which is to concentrate on objective, observable and measurable *properties* of film sound while staying clear of subjective interpretations about *meaning* of them as much as possible. Thus, this last function of film sound, which I call "description," will focus on the subject of how film sound describes physical, spatial or temporal attributes of a source, space or an event in the image.

First of all, sound can describe time and space that the events are taking place in. Several aspects of sound and space relationship were discussed earlier, such as how sound sets the scene by employing symbols of various ambiances, like using sounds of seagulls for seashore settings or traffic noises for urban settings. In addition to

that, reverberant characteristics of sound also define the size or structure of the space, for example longer reverbs indicate large or highly reflective spaces[22].

The audio elements that are used to provide information about the space, which are called "elements of auditory setting"[23] by Michel Chion (1994) also help describing characteristics of the space. For example, although being on the verge of becoming ambiance, the distant explosions in "*Kosmos*" by Reha Erdem indicates the town is neighboring to a combat zone.

Film sound can describe time in the move, by employing ambiance sounds or "elements of auditory setting" that provide unique information referring to a specific point in time. For example, hearing an important event or news that resides in the collective memory of the society from television or radio in a movie can help audience to match story time with the actual date of that news. Additionally, it was mentioned that the ambiance for urban setting is associated with traffic noise for modern days, but for a story time dating earlier than the days of fossil fuels and combustion engines, the urban setting might be linked with sounds of horses, bells and wheels of horse carts.

Finally, sound can also help describing physical properties of the source. Low frequency content is usually associated with larger sources than the higher pitched ones in the same category. For examples in the opening scene of "*Star Wars Episode II – Attack of the Clones,"* small spaceships escort a larger one on an interplanetary voyage. Although it is not possible to know how an actual spaceship sounds, sounds designed for them help audience to figure out their physical attributes. High-pitched short sounds of escort ships imply that they are small but agile resembling a jet plane while the larger ship has a sound designed to resemble a rumbling bulky propeller aircraft.

---

[22] Turkish Bath is large space with a long reverb time. On the other hand, a bathroom can have longer reverb time than a decorated living room, although being smaller. This is due to the reflection characteristics of the surfaces. Turkish bath is large and reflective and has the longest reverb time. Bathroom is small, but reflective, thus having longer reverb time than a medium sized living room.

[23] As opposed to ambient sounds that are continuous and prolonged, this term refers to sounds that are momentary, isolated and intermittent and that help to construct and populate a given space (Chion, 2009, p. 476).

4. CONCLUSION

Throughout this study, the relationship between image and sound was investigated. Initially the soundtrack was considered as a whole, rather than the sum of its components, which are generally named as dialogue, music and noise. Further in the study, these components came under focus from time to time, depending upon the context.

The historical investigation of film sound technologies yielded that the developments in sound recording and reproduction technologies had significant importance in the evolution of filmic narration. It was also mentioned that the silent movies were not exactly silent, since there were usually some sort of musical accompaniment or spoken commentaries. The employment of sound related elements in silent films; such as intertitles or visual implications of sonic events yielded that the sound had its place in the narration although it could not be heard.

The transition to synchronized sound, on the other hand, had both positive and negative sides. The primitive sound technologies at first, actually limited the visual expression possibilities of cinema; but the amazement that the synchronized sound created upon the audience, especially due to the human voice on screen, enforced the sound film to become the norm immediately.

After the birth of "*talkies*", there had been several advancements in sound and film technologies and most of them had effect on production practices. Improved microphones increased practicality, optical recordings made it possible to edit sound and film separately and so on. These advancements gradually increased the sound quality and helped directors regain their expressive freedom with the additional tools of sound, such as the powers of off-screen sound; but the next big milestone had been the arrival of Dolby Stereo. Music industry had already been using stereophonic sound, and music used in films employed examples from this stereo music occasionally, but monophonic sound was the norm for narration in cinema until Dolby Stereo.

The name implied a stereophonic sound but actually it employed a single surround channel. The result again received great attention from the audience and the new trend towards multichannel audio in films was initiated, which will evolve into today's surround sound.

The historical context provides useful information about how the narrative form of contemporary cinema is formed in terms of sound usage, and in order to investigate the interaction of this form and the soundtrack, an analysis framework is needed to be built, by combining the film sound literature with newly designed methodology.

The analysis method has four components, which are physical, spatial, temporal and functional properties of sound. It is also aimed to keep this study in an objective perspective, thus it is mostly based upon measured data and observations rather than subjective comments. In some cases, especially when discussing the perceptual qualities of sound, subjectivity was required since the name implies, they are 'perceptual'.

The first section in the analysis is about physical properties of film sound. Loudness measurements, as being one of the most important aspects of this study, formed the main structure of this section. Short term and long term loudness values are measured according to the specifications provided in related EBU and ITU recommendations. With the help of obtained data, loudness versus time charts of movies are prepared, so it was possible to observe when a movie employs a loud sonic event or when it uses silence.

The initial results from evaluation of examples included in this study showed that if a piece of music is used in a movie, it appears among the loudest sections. More importantly, if this music is non-diegetic and appearing either in the credits or in the very last scenes, than it becomes the loudest element. This is probably a natural outcome since music is a continuous sonic element and in addition to that, most pieces of music employ all channels including surrounds and occasionally LFE channel, which contribute to the overall loudness.

On the other hand, there can be a reason for music in the final being the loudest. In most of the examples that employ non-diegetic music, beginnings of the movies either do not employ music or they use the same theme both at the beginning and in the end. If it is the first case, then it means that the director prefers a quiet beginning and builds up loudness as the story develops later on, and in the end, finalizes the movie with a loud and strong ending, like a powerful cadence. It is also observed that this loud music usage in the end is usually contrasted with moments of silence, either before or after the music, which functions as a narrative tool especially employed to emphasize a key story event towards the end of the movie.

The second case in which a movie employs music both at the beginning and in the end shows that the director prefers to place his story in sonic brackets, which distinguish the story world and real world aurally, when the movie starts and when it ends.

Silence, on the other hand, is a narrative tool that became available with only the existence of sound, or as Robert Bresson (1997) briefly states, "soundtrack invented the silence" (p.48). While silence does not mean total lack of sound, there is a slight difference between quiet ambiance and intentional silence. In most cases, quiet ambiance sounds that reside within a window 20 – 30 LU below the average dialogue loudness can be considered as silence, and I call this range "window of natural quietness."

Intentional silence, on the other hand, refers to the moments particularly mixed below the window of natural quietness. These moments can usually be missed out while observing only by ear, since the background noise in the listening environment mask these points of intentional silence; but the measurement charts can help spot these points. The observations regarding this subject showed that silence is occasionally employed as a narrative tool, mostly performing highlighting function for dramatic moments.

Besides the loudest and quietest events, loudness data can provide a tool for analyzing events scene by scene, because usually different scenes employs different sonic textures. If investigated in detail, scene based loudness data can provide information about story progression and soundtrack relationship.

It is also possible to employ a similar approach on a larger scale. As in the examples of "*Bir Zamanlar Anadolu'da*" by Nuri Bilge Ceylan and "*Jin*" by Reha Erdem, story development can also be associated with environment, which results in observable loudness changes depending on the ambiance differences.

The observations mentioned above focus on the value of loudness for a specific point in a movie; but it is also possible to investigate how loudness is distributed throughout a movie regardless of the story. This type of measurement does not focus on loudness and image relationship, because it only includes data for the soundtrack by concentrating on how frequently a movie employs a certain loudness value. As a result, loudness distribution charts of selected examples provide a tool for understanding the duration of different loudness settings in a movie, and this information can be combined with the maximum and minimum loudness values to obtain a wider perspective for the usage of available dynamic range of the medium.

The other physical properties of film sound are dynamic range and spectral content. Spectral content of a soundtrack can be observed with a spectrograph. The overall observation does not show any major differences in frequency content, mostly due to the high fidelity of contemporary sound recording equipment and improved production and post-production facilities.

On the contrary, this tool can be used by film scholars for comparative analysis between eras of different production practices to observe the changes in spectral characteristics through years. Additionally, spectrograms also show loud and silent sections more vividly, which makes it easier to compare employment of loudness rhythm between movies on a macro scale.

The lowest end of the spectrum, the sub-bass range, can be observed by looking at LFE channel. This range is used for creating a very low frequency effect and mostly it is meant to be felt rather than to be heard. In surround soundtracks, this sub-bass range has its dedicated channel, which is represented after the dot in channel configurations such as 5.1, 7.1 or 22.2, which makes it easier to analyze. Most common usage of this range can be seen in sound effects such as explosions, car crashes and etc. In addition, music in a movie can also employ these frequencies to increase the impact.

Dynamic range can be summarized as the difference in loudness between the loudest and quietest sonic event in a movie, and it can be analyzed both in a macro scale and micro scale. Macro scale dynamic range measurements, which is called macrodynamics, do not require the events under focus to be successive, loudest event can be at the beginning of the movie while the quietest can be an hour later. Thus, considering the dynamic range in macro scale provides an insight about the specifications of DVD medium and how directors make use of the available dynamic range through the movie. In addition, the macrodynamics charts prepared for the movies show the trends that directors are following in recent years. The most interesting result is that the trend is towards 'quietness', since either the average loudness or the quietest point in a movie decreases after each movie.

Microdynamics on the other hand, focuses on loudness differences in consecutive sonic events. The observations yield that the movies included in this study mostly employs drastic loudness changes at scene transitions. For example a quiet scene can follow a loud scene with non-diegetic music, and this type of transition usually serves a separating function between scenes. Most frequent usage of sudden loudness changes that takes place in the same scene occurs when a sound effect is used, for example a gunshot or an explosion. In these situations, it is also possible to observe silence following the loud sound effect, resulting in wider dynamic range. Since sound effects are not very common among the examples included in this study, it can be said that quietness or intentional silence is the most frequently observed tool that outcomes a wider dynamic range.

The last aspect of physical properties of film sound is related to timbral characteristics of sound; but rather that considering the timbre of the sources itself, this section focuses on the role of timbral manipulations of sound and the moments they can occur in a movie. The possible methods to alter the timbre of a source in a soundtrack require sound processing tools in mixing such as filters/equalizers, reverb, delay and etc.

The most common usage of filters/equalizers can be observed in scenes with voice transmission devices such as telephone or radio. In these situations, spectral content of the original source can be filtered depending on the point of audition, so that only midrange is being heard from the receiver device. Same filtering can also be employed at point-of view variations, especially at inside-outside changes. In these conditions, the outdoor ambiance is usually filtered out so that low mid to bass frequencies remain when the point-of-view switches to inside perspective.

The second component of the analysis, which is about the spatial properties of film sound include both topics of sounds and their sources in the story space and in the physical space. Properties of on-screen/off-screen and diegetic/non-diegetic sounds are already covered widely in film studies and in this study; this information is used to analyze examples from new cinema of Turkey to figure out how directors employ these types of sounds in their movies. It can easily be said that off screen sounds are equally important creative tool for narration as on screen sounds and there is an easily identifiable preference of directors about employing sonic events that reside or not reside within the diegesis. Reha Erdem stays on one end as he employs non-diegetic sounds and sound effects occasionally while Semih Kaplanoğlu or Nuri Bilge Ceylan on the other end with strong preferences of using sounds only from story world. It is also worth mentioning that Nuri Bilge Ceylan used music in his latest movie, "*Kış Uykusu,*" but his previous works shows his perspective in this subject. Zeki Demirkubuz also employs non-diegetic music in some of his movies; but it is evident that his preference leans towards keeping soundtrack remain within the diegesis.

The topic of physical spaces, on the other hand, discusses two subjects. First subject is the relation between the source and the physical space it is located in; thus, this topic is generally related with reverberation. The reverberation character of a physical space is connected to the size of the space and the reflection properties of its surfaces. Larger spaces usually have longer reverb decay times than smaller spaces if reflection properties of the walls are similar. In addition, sound absorption amount is a function of frequency, so reflection/absorption of different frequency regions are also related with the brightness or darkness of the space.

The other physical sound space that needs to be considered is created by the reproduction of film sound in the listening space. This topic includes the investigation of the surround sound and usage of it in the selected movies. The initial observations show that the examples included mostly uses surround soundscape for the ambiance sounds or music, if it exists. This result states that the directors included in this study prefer a frontal narration in terms of sound space.

Temporal properties of film sound discusses how sound effects the perception of time in a movie. As Michel Chion (1994) states, there are four major factors that effect how sound temporalizes the image, which are how sound is sustained, how predictable it is, its tempo and its frequency content. Additionally, sound also perceived as linear as it is always moving forward in time, thus sound helps to build temporal succession in the image.

Moreover the relation between sound and editing is investigated as the second aspect of temporal properties of film sound. Editing can manipulate the perception of time by itself. Events in the story can be edited so that they have less screen time than story time, which is called "elliptic editing." This type of editing condenses time and it can be supported by sound. For example a night scene can have a quiet ambiance while morning ambiance can be associated with birds or urban noises, thus, cutting from a night scene into a morning scene can be distinguished aurally in addition to the visual information. Expansion of time is less frequent and usually obtained by 'overlapping editing' of multiple consequent shots. The other method is the slow-motion technique, which can be supported by manipulating timbral content or selective reduction of sonic elements in the soundtrack.

Another temporal condition is the simultaneity of events, which can be achieved by "parallel editing" (also called cross-cutting). In this situation unique ambiances can be associated with each of the parallel events to make it easier to distinguish between cuts. Additionally, a sonic element such as non-diegetic music can be used to establish unification between these scenes.

Last aspect of temporal properties of sound is the subject of simultaneous/non-simultaneous sounds, which are mentioned by Bordwell and Thompson (2013) to discuss how sound utilized in flashbacks, flashforwards or sound bridges.

The last component of the analysis is the functional properties of film sound. This section is mostly derived from Michel Chion's theories, with an addition of a topic that I decided to include to complete the framework of the analysis. The topics discussed here are punctuation, anticipation, unification, separation and description.

Punctuation by sound is similar to the punctuation of text in stage arts, which employ gestures, mimics, intonation and etc. In that perspective, sounds that are used to make meaning clearer can be considered as punctuation. Additionally sound effects that are used to create surprise or emphasis also fall under this category, reminiscence of an exclamation mark.

Creating anticipation is another strength of synchronized sound in films. Sound directs the attention of the audience towards its source, thus if it is an on screen sound, audience distinguishes its source from the background. If it is an off-screen sound, then the audience pays attention to the source, awaiting the identification of it. For example if a door cracking sound is heard off-screen, it creates the feeling of somebody either entered or left the room. In this manner, anticipation is a strong narrative tool especially in horror and thriller genres.

Unification is a function of sound that helps to establish temporal or spatial unity in the image while separation is about highlighting the differences between scenes especially by employing silence.

Finally, function of description is considered, which is a broad subject that can be used in several aspects of film sound if needed. Describing a mood or defining a character by sound can be discussed under this topic, but to narrow down the scope and to retain unity within the study, description of only physical, temporal and spatial attributes of sources and images are discussed in this thesis.

The examples investigated in this study selected from the new cinema of Turkey also provided important clues of narrative preferences of directors. Rather than looking common tendencies between different examples or directors to obtain signs of general characteristics, it is a better way to concentrate on individual films and directors to spot the tools they employ while they build their own cinematic language.

In that perspective, there are major points to discuss about the examples included in this study. First of all, usage of non-diegetic music and sounds is a defining factor for narrative intentions of different directors. For those who employ non-diegetic music, it also becomes a tool that employs loudness differences as a narrative tool. Music can create a strong cadence in the end or it can be contrasted with silence for a dramatic effect of separation of scenes or spaces.

Another important observation is about silence. There is an evident preference of the directors that they employ silence or quietness as a narrative tool more than diegetic loud events. Also the macrodynamics observations yield that there is a tendency towards quietness in the recent years, either in terms of average loudness or in the quietest moments.

Investigation of spatial properties shows that the directors included in this study strongly prefer frontal narration with majority of story elements reside in front of the audience, but in specific cases, they make use of surround channels especially to highlight that the source is from "outside."

Time perception is another important aspect that both defined by the editing tempo and sound usage, so I also think that further studies that will be conducted on the same examples about average shot lengths and dialogue time distribution combined with the findings of this study can provide a wider perspective upon temporal aspects of films and narrative preferences of directors.

In conclusion, this study provides a comprehensive methodology for film sound analysis that can be used to figure out the role of sonic elements in terms of filmic narration. Through the study, physical, spatial, temporal and functional properties of film sound are investigated while pointing out which aspect of these properties effect the narration in film and how this link is established. Both film scholars and sound engineers can benefit from the tools introduced in this work for further studies.

REFERENCES

Allen, I. (1997). Are Movies Too Loud? In *SMPTE Film Conference,* March 1997, Reprint (2000): Cinema Technology Magazine, June 2000.

Altman, R. (1985). Evolution of Sound Technology. In E. Weis and J. Belton (eds.) *Film Sound: Theory and Practice.* (pp.44-53). New York: Columbia University Press.

Altman, R. (1992). Afterword: A Baker's Dozen Terms for Sound Analysis. In R. Altman (ed.) *Sound Theory, Sound Practice*. (pp.249-253). New York: Routledge.

Altman, R. (1992). Sound Space. In R. Altman (ed.) *Sound Theory, Sound Practice*. (pp.46-64). New York: Routledge.

Altman, R. and Handzo S. (1995). The Sound of Sound: A Brief History of the Reproduction of Sound in Movie Theaters. *Cineaste. Vol 21*, No 1/2 (1995), pp. 68-71. Retrieved from: http://www.jstor.org/stable/41688110

Altman, R. (2004). *Silent Film Sound*. New York: Columbia University Press.

Arslan, S. (2009). The new cinema of Turkey. *New Cinemas: Journal of Contemporary Film. Vol. 7*, No. 1, pp. 83-97.

Beck, J. (*Ed*) and Grajeda, T. (*Ed*) (2008). *Lowering The Boom: Critical Studies in Film Sound*. Chicago: University of Illinois Press.

Belton, J. (1992). 1950's Magnetic Sound: The Frozen Revolution in *Sound Theory, Sound Practice*, Ed. Altman, R., New York: Routledge.

Bernds, E. (1999). *Mr. Bernds Goes To Hollywood: My Early Life and Career in Sound Recording at Columbia with Frank Capra and Others*. Maryland: Scarecrow Press.

Blumlein, A. D. (1931). Improvements in and relating to Sound-transmission, Sound-recording and Sound-reproducing Systems, *British Patent* No: 394325, Partial reprint (1958): *JAES*, *Vol.6* No.2.

Bordwell, D. (1985). *Narration in the Fiction Film*. Wisconsin: University of Wisconsin Press.

Bordwell, D. and Thompson, K. (2013). *Film Art: An Introduction.* New York: McGraw-Hill.

Bottomore, S. (2001). Story of Percy Peashaker: Debates about Sound Effects in the Early Cinema. In R. Abel and R. Altman (*eds.*) *The Sounds of Early Cinema.* (pp.129-142). Bloomington: Indiana University Press.

Bottomore, S. (2005). Sound Machines in *Encyclopedia of Early Cinema,* Ed. Abel R., New York: Routledge.

Bresson, R. (1997). *Notes on the Cinematographer.* Copenhagen: Green Integer.

Cay, B. (Producer) (2009). *Meet The Art: Eadweard Muybridge Photographs of Motion.* [Video] USA: Stanford University Hass Center for Public Service.

Chion, M. (1994). *Audio-Vision.* New York: Columbia University Press.

Chion, M. (2009). *Film, A Sound Art.* New York: Columbia University Press.

Christie, I. (2001). Early Phonograph Culture and Moving Pictures in *The Sounds of Early Cinema.* In R. Abel and R. Altman (*eds.*) *The Sounds of Early Cinema.* (pp. 3 -12). Bloomington: Indiana University Press.

Curtin, A. (2014). *Avant-Garde Theatre Sound: Staging Sonic Modernity*, New York: Palgrave Macmillan.

Dowling, W. J. and Harwood, D.L. (1985). *Music Cognition.* San Diego: Academic Press.

Eisenstein, S. (1949). *Film Form: Essays in Film Theory.* New York: Harcourt Brace Jovanovich.

Fantel, H. (1981). 100 Years Ago: The Beginning of Stereo. *The New York Times,* 04 January 1981, Date retrieved: 30.05.2014 Retrieved from: http://www.nytimes.com/1981/01/04/arts/100-years-ago-the-beginning-of-stereo.html

Farmer, C. (2008). Every Beautiful Sound Also Creates an Equally Beautiful Picture: Color Music and Walt Disney's Fantasia. In J. Beck and T. Grajeda (*eds.*) *Lowering The Boom: Critical Studies in Film Sound*. (pp. 183-197). Chicago: University of Illinois Press.

Gauldin, R. (1997). *Harmony Practice in Tonal Music.* New York: W. W. Norton.

Gestalt psychology. (2015). In *Encyclopedia Britannica Online*. Retrieved from: http://www.britannica.com/science/Gestalt-psychology

Giannetti, L. (2001). *Understanding Movies.* (9th Edition) New Jersey: Prentice Hall.

Gomery, D. (1985). The Coming of Sound: Technological Change in the American Film Industry. In E. Weis and J. Belton (*eds.*) *Film Sound: Theory and Practice.* (pp. 5-24) New York: Columbia University Press.

Gorbman, C. (1987). *Unheard Melodies: Narrative Film Music.* Bloomington: Indiana University Press.

Grimm, E. (2013). Movie dynamics evaporated in recent years. Can we turn the tide?, 134th Convention, *Audio Eng. Soc.,* Loudness Day Session L4.

Hamasaki, K., Hiyama, K., Nishiguchi, T., and Ono, K. (2004). "Advanced Multichannel Audio Systems with Superior Impression of Presence and Reality", 116th Convention, *Audio Eng. Soc.,* Preprint 6053.

Hendricks, G. (1961). *The Edison Motion Picture Myth.* Berkeley: University of California Press.

Holman, T. (2001). "The Number of Loudspeaker Channels". *19th International Conference*, *Audio Eng. Soc.* Paper No: 1906.

Howard, David M. and Angus, J. (2001). *Acoustics and Psychoacoustics.* (2nd Edition) Oxford: Focal Press.

Izhaki, R. (2008). *Mixing Audio.* Oxford: Focal Press.

Katz, B. (2002). Mastering Audio: The Art and Science. Canada: Focal Press.

Kelley, R. D. G. (2001). Without A Song: New York Musicians Strike Out Against Technology in *Three Strikes: Miners, Musicians, Salesgirls, and the Fighting Spirit of Labor's Last Century.* Boston: Beacon Press.

Kerins, M. (2011). *Beyond Dolby: Cinema in the Digital Sound Age*. Bloomington: Indiana University Press.

Kickasola, G. J. (2012). Kieslowski's Musique Concrete. In J. Wierzbicki (*ed.*) *Music, Sound And Filmmakers*. (pp. 61-75). New York: Routledge.

Kurosawa, A. (1983). *Something Like an Autobiography.* New York: Random House Inc.

Leslie, M. (2001). The Man Who Stopped Time, *Stanford Magazine.* Date retrieved: 30.05.2014, address: <https://alumni.stanford.edu/get/page/magazine/article/?article_id=39117>

Loiperdinger, M. and Elzer B. (2004). Lumiere's Arrival of the Train. *The Moving Image. Vol 14*, No 1, pp. 89-118.

Millard, A. (2005). *America on Record: A History of Recorded Sound*. (2nd Edition) New York: Cambridge University Press.

Moncel, T. D. (1887). *Le Telephone.* (5th Edition) Paris: Hachette Librairie.

Morton, D. L. (2006). *Sound Recording: The Life Story of a Technology*. Baltimore: John Hopekins University Press.

Murch, W. (2001). *In the Blink of an Eye: A Perspective on Film Editing.* Los Angeles: Silman-James Press.

Musser, C. (1990). *History of the American Cinema Vol. 1: The Emergence of Cinema: The American Screen to 1907*. New York: Charles Scribner's Sons.

Musser, C. (1991). *Before the Nickelodeon: Edwin S. Porter and the Edison Manufacturing Company.* Berkeley: University of California Press.

Nasta, D. (2001). Setting the Pace of a Hearbeat: The Use of Sound Elements in European Melodramas before 1915 In R. Abel and R. Altman (*eds.*) *The Sounds of Early Cinema.* (pp. 95-109). Bloomington: Indiana University Press.

Neumeyer, D. (*ed.*) (2014). *The Oxford Handbook Of Film Music Studies*. New York: Oxford University Press.

Owsinski, B. (1999). *The Mix Engineers Handbook*. Auburn Hills: Intertec Publishing Corporation,.

Pisano, G. (2012). The Théatrophone, An Anachronistic Hybrid Experiment Or One Of The First Immobile Traveller Devices. In A. Goudreault, N. Dulac and S. Hidalgo (*eds.*) *Early Cinema* (pp. 80-98). Oxford: Wiley Blackwell.

Pramaggiore, M. and Wallis, T. (2011). *Film: A Critical Introduction.* London: Laurence King Publishing.

Punctuation. (n.d.). *Merriam-Webster Online Dictionary.* Retrieved from: http://www.merriam-webster.com/dictionary/punctuation.

Raynauld, I. (2001). Dialogues in Early Silent Sound Screenplays: What Actors Really Said in In R. Abel and R. Altman (*eds.*) *The Sounds of Early Cinema.* (pp. 69-78). Bloomington: Indiana University Press.

Rossing, T. D. (1990). *The Science of Sound.* (2nd Edition) USA: Addison-Wesley Publishing Company.

Rumsey, F. (2001). *Spatial Audio*. Oxford: Focal Press.

Salt, B. (2009). *Film Style and Technology: History and Analysis.* (3rd Edition) London: Starword.

Sergi, G. (2005). *The Dolby Era: Film Sound in Contemporary Hollywood.* Manchester: Manchester University Press.

Sonnenschein, D. (2002). *Sound Design: The Expressive Power of Music, Voice and Sound Effects in Cinema.* Studio City: Michael Wiese Productions.

Skovenborg, E. and Lund, T. (2009). Loudness Descriptors to Characterize Wide Loudness-Range Material in 127th Convention, Paper No: 7948, *Audio Eng. Soc.,* October 9-12, New York.

Skovenborg, E. (2012). Loudness Range (LRA) – Design and Evaluation in 132th Convention, Paper No: 8816, *Audio Eng. Soc.,* April 26-29, Budapest.

Steinberg, J.C. and Snow, W. B. (1934). "Auditory Perspective – Physical Factors", *Electrical Engineering*, 1934 January, pp.12-17.

Şirin, U. (2010). *Yusuf'un Rüyası.* İstanbul: Timaş

Talbot, F. A. (1914). *Moving Pictures: How They Are Made And Worked.* Philedelphia: J. B. Lippincott Company.

Url-1 <http://cylinders.library.ucsb.edu/history-early.php>, Date retrieved: 29.05.2014.

Url-2 <*http://www2.iath.virginia.edu/albell/ear.2.html*>, Date retrieved: 29.05.2014.

Url-3 <*http://www.nineteenthcenturydisability.org/items/show/42*>, **"**The Ear Phonautograph," *Nineteenth-Century Disability: Cultures & Contexts*, Date retrieved: 29.05.2014.

Url-4 <*http://www.americaslibrary.gov/aa/edison/aa_edison_phonograph_1_e.html* >, Date retrieved: 29.05.2014.

Url-5 <*http://purl.stanford.edu/ff991hz8300#gallery/1* > Stanford Digital Recipitory, Date retrieved: 29.05.2014.

Url-6 <*http://earlyradiohistory.us/1881opr.htm*> (1881). The Telephone At The Paris Opera. *The Scientific American.* 31 December 1881, 422-423. Date retrieved: 31.05.2014.

Url-8 <http://www.kingston.gov.uk/info/200246/museum_collections_and_exhibitions/539/eadweard_muybridge/3 > Date retrieved 01.07.2014

Url-9 <http://en.wikipedia.org/wiki/Kinetoscope**>,** Date retrieved 13.11.2014

Url-10 < http://en.wikipedia.org/wiki/Cinematograph**>,** Date retrieved 13.11.2014

Url-11 <http://www.musee-orsay.fr/en/collections/index-of-works/notice.html?no_cache=1&nnumid=345 >, Date retrieved 15.11.2014

Url-12 <http://www.fine-arts-museum.be/fr/la-collection/fernand-khnopff-en-ecoutant-du-schumann?artist=khnopff-fernand >, Date retrieved 15.11.2014

Url-13 <*http://blogs.smithsonianmag.com/paleofuture/2012/02/musicians-wage-war-against-evil-robots/>,* Date retrieved 25.11.2013

Url-14 <http://www.soundandvision.com/content/sound-matters-high-definition-audio-high-defintion-video-page-3>, Date retrieved: 06.04.2015

Url-15 <http://www.dolby.com/us/en/experience/dolby-atmos/movies.html>,Date retrieved:07.04.2015

Url-16 <https://www.congress.gov/bill/111th-congress/senate-bill/2847>, Date retrieved: 18.04.2015

Url-17 <http://gameaudiopodcast.com/ASWG-R001.pdf > Date retrieved: 18.04.2015

Url-18 <http://www.dolby.com/us/en/technologies/a-guide-to-dolby-metadata.pdf>, Date retrieved: 18.04.2015

Weis, E. (*ed.*) and Belton, J. (*ed.*) (1985). *Film Sound: Theory and Practice*. New York: Columbia University Press.

Wierzbicki, J. (2009). *Film Music: A History.* New York: Routledge.

Zettl, H. (2008). *Sight, Sound, Motion: Applied Media Aesthetics*. (5th Edition) Belmont: Wadsworth Publishing.

APPENDICES

APPENDIX A: Loudness charts and spectrograms of the movies

APPENDIX B: Video clips of the scenes mentioned in the figures (DVD)

APPENDIX A

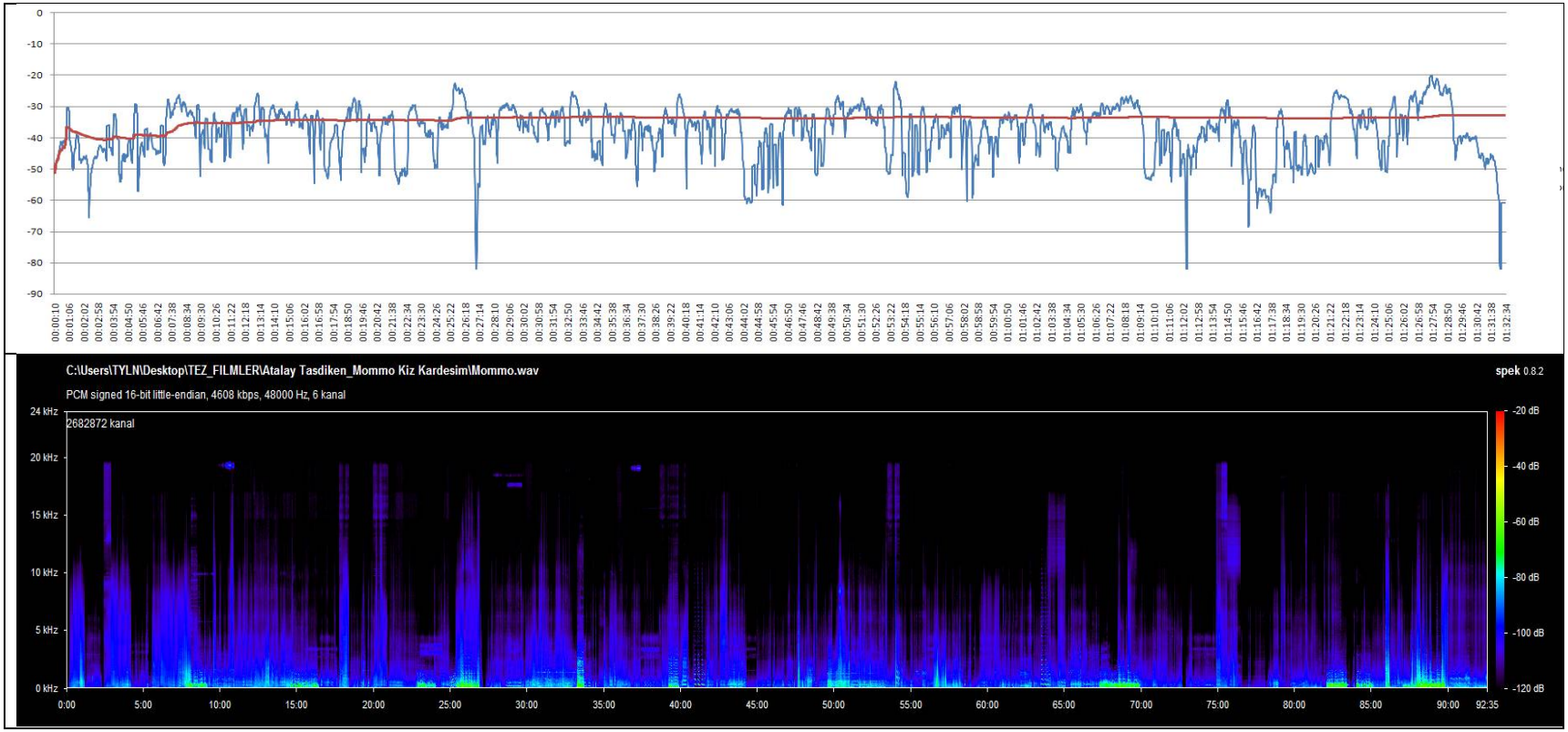

Figure A.1 : Atalay Taşdiken – Mommo, Kız Kardeşim

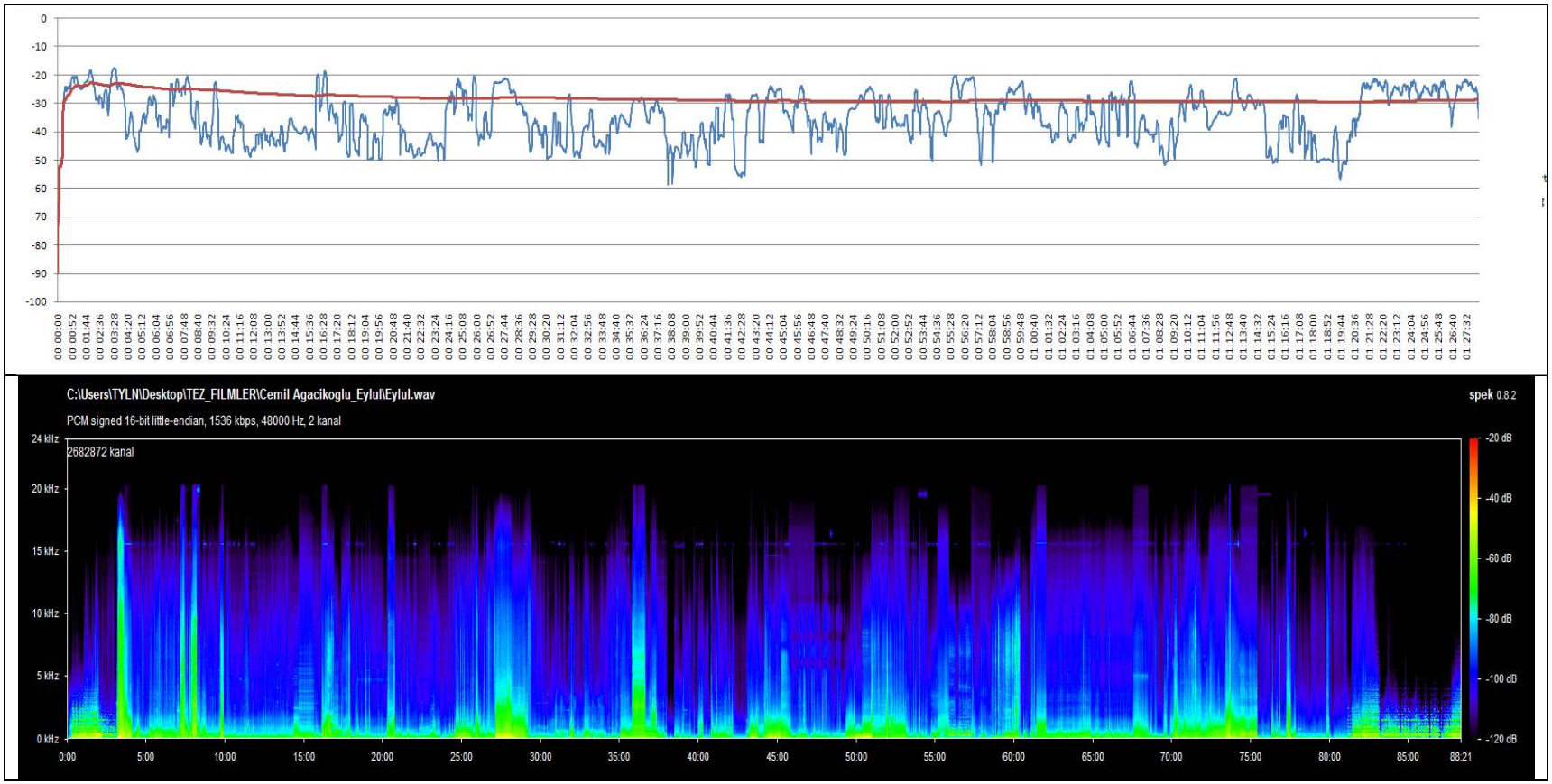

Figure A.2 : Cemil Ağacıkoğlu - Eylül

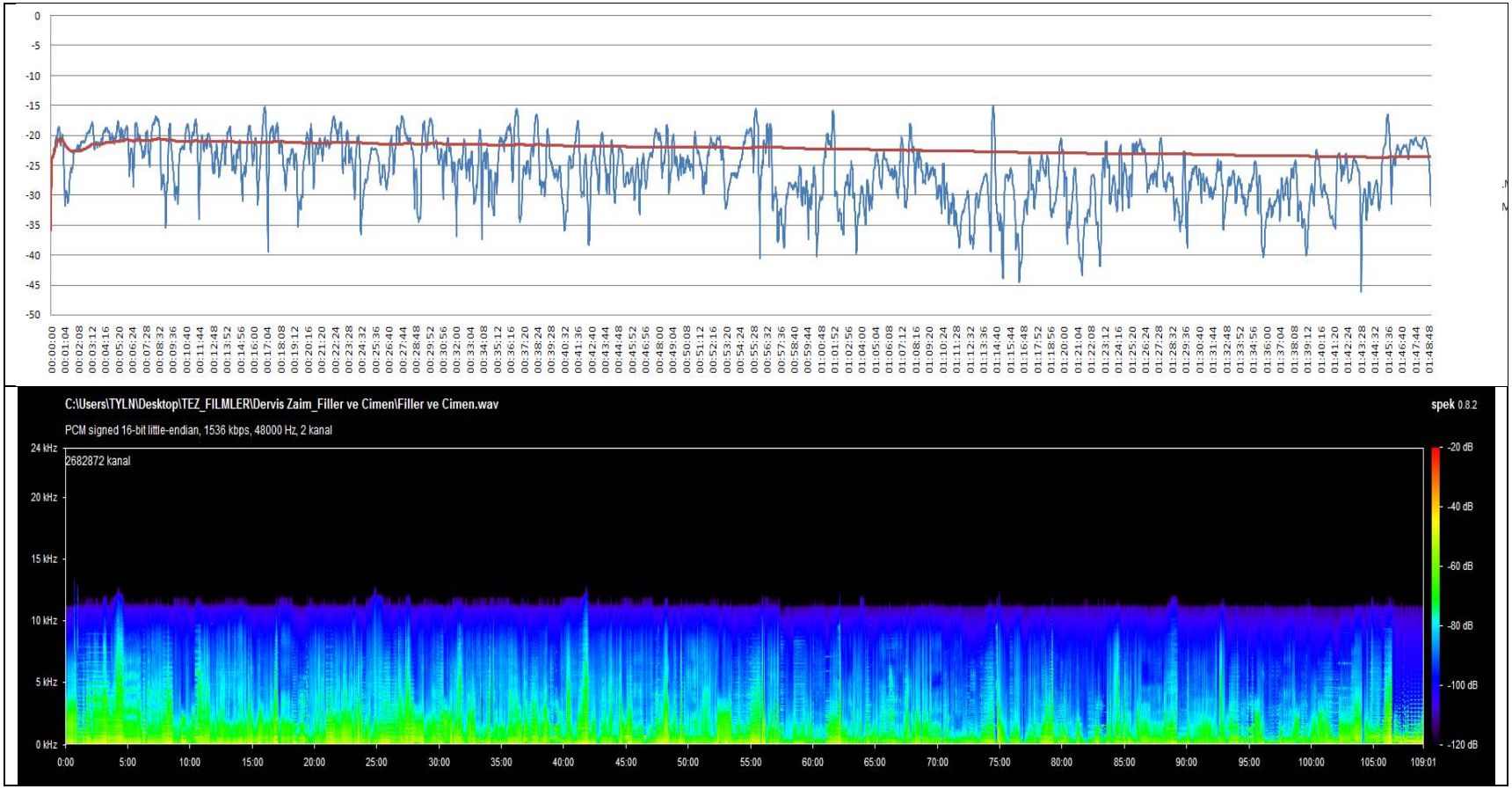

Figure A.3 : Derviş Zaim – Filler ve Çimen

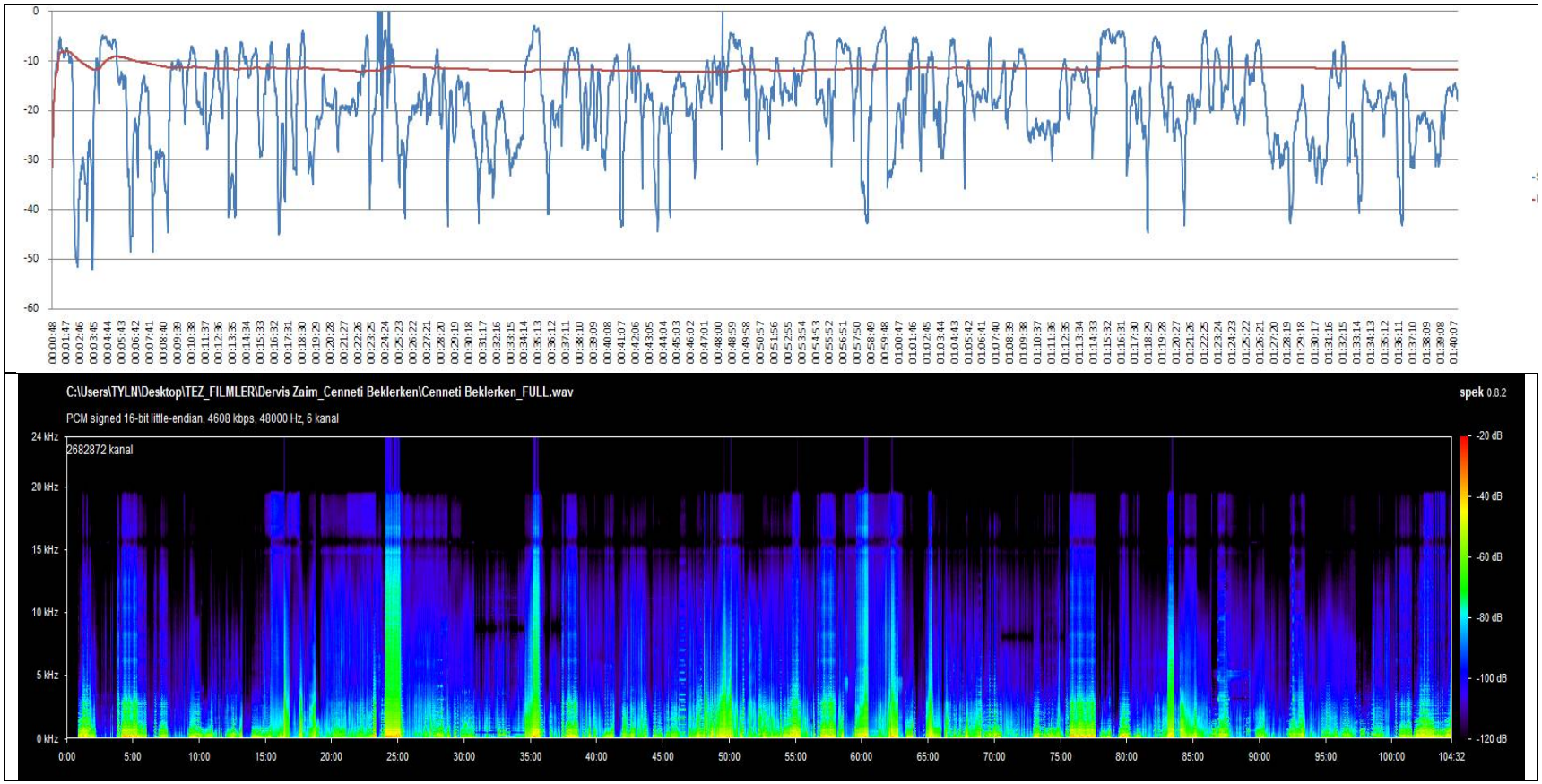

Figure A.4 : Derviş Zaim – Cenneti Beklerken

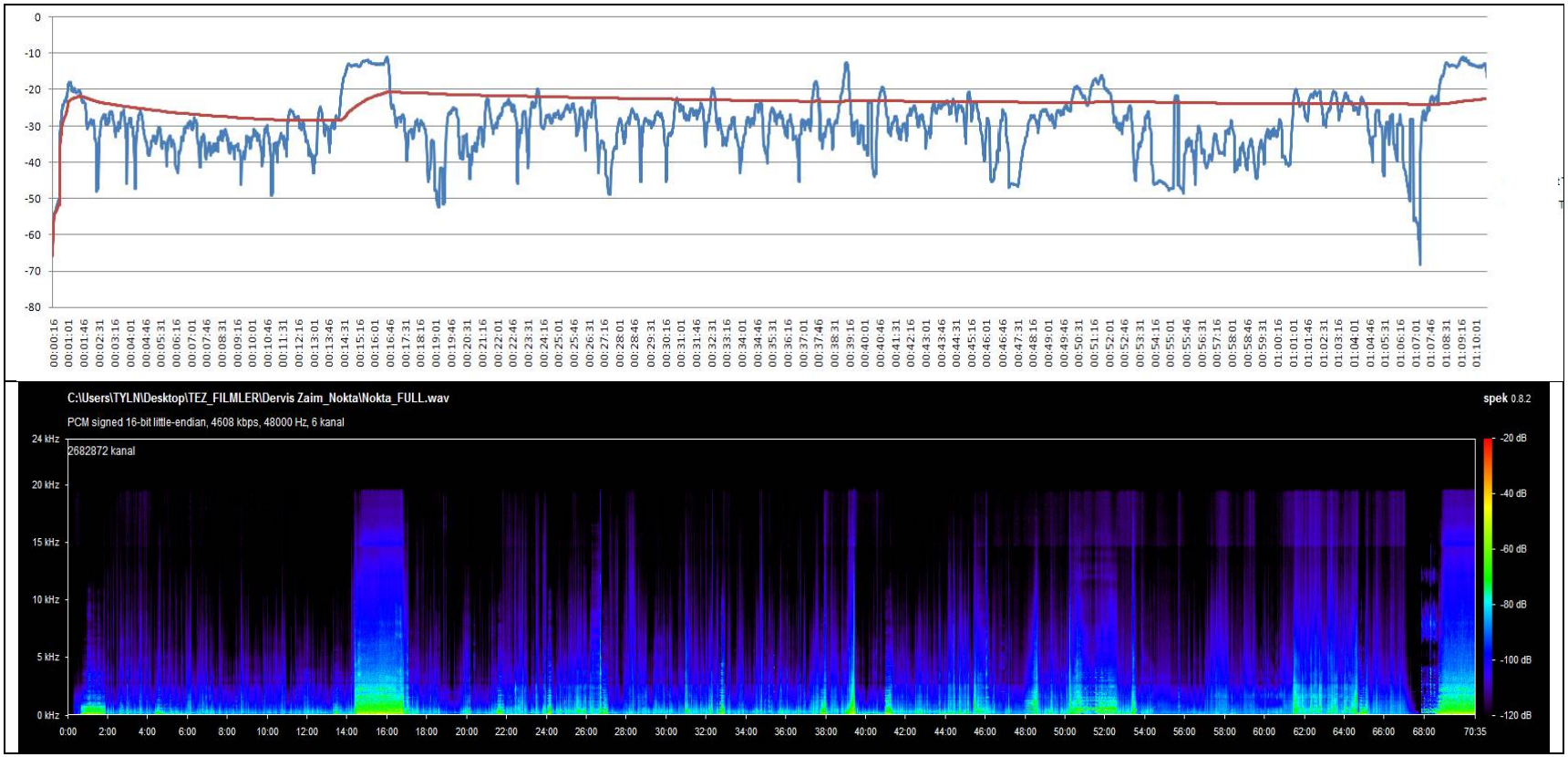

Figure A.5 : Derviş Zaim – Nokta

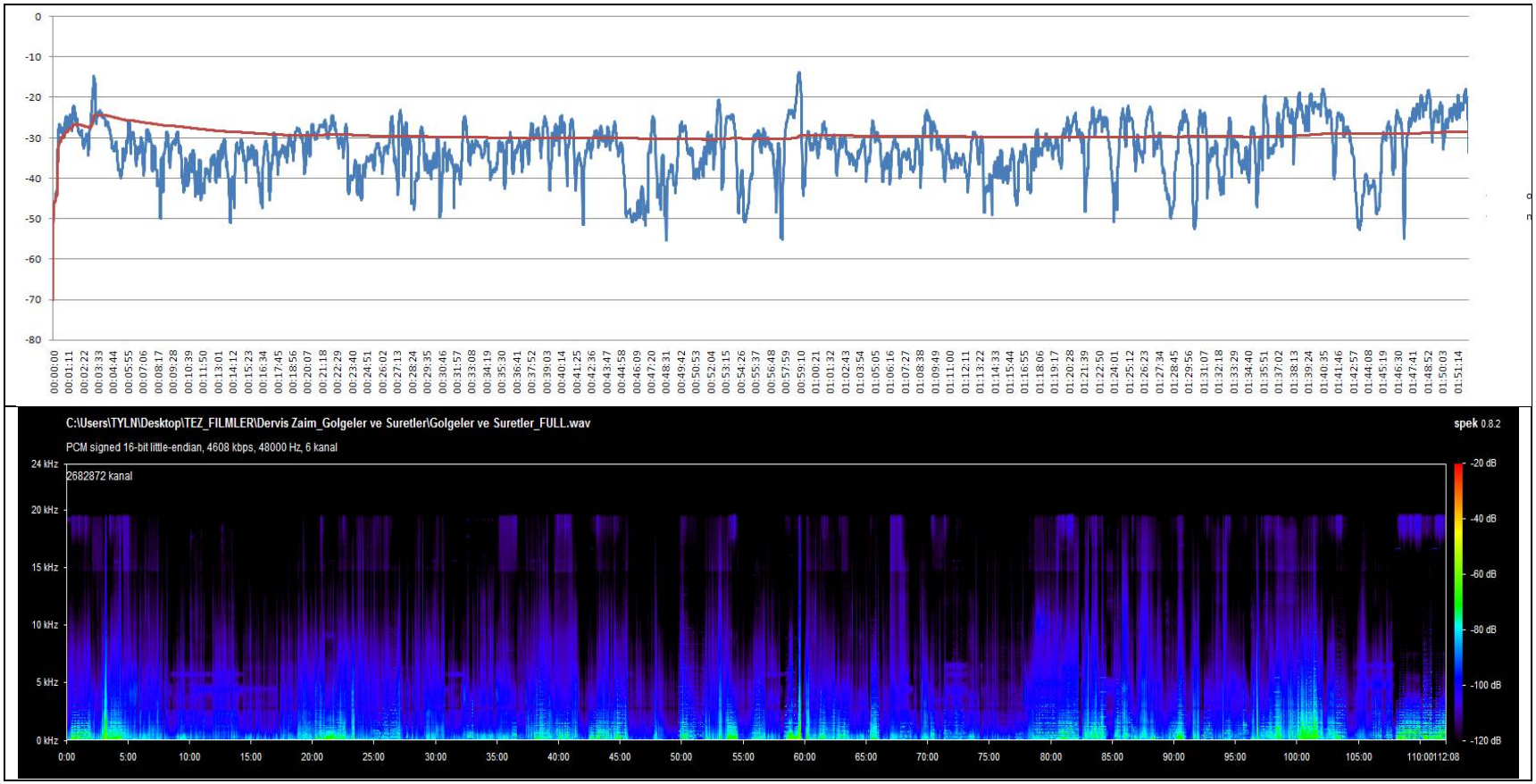

Figure A.6 : Derviş Zaim – Gölgeler ve Suretler

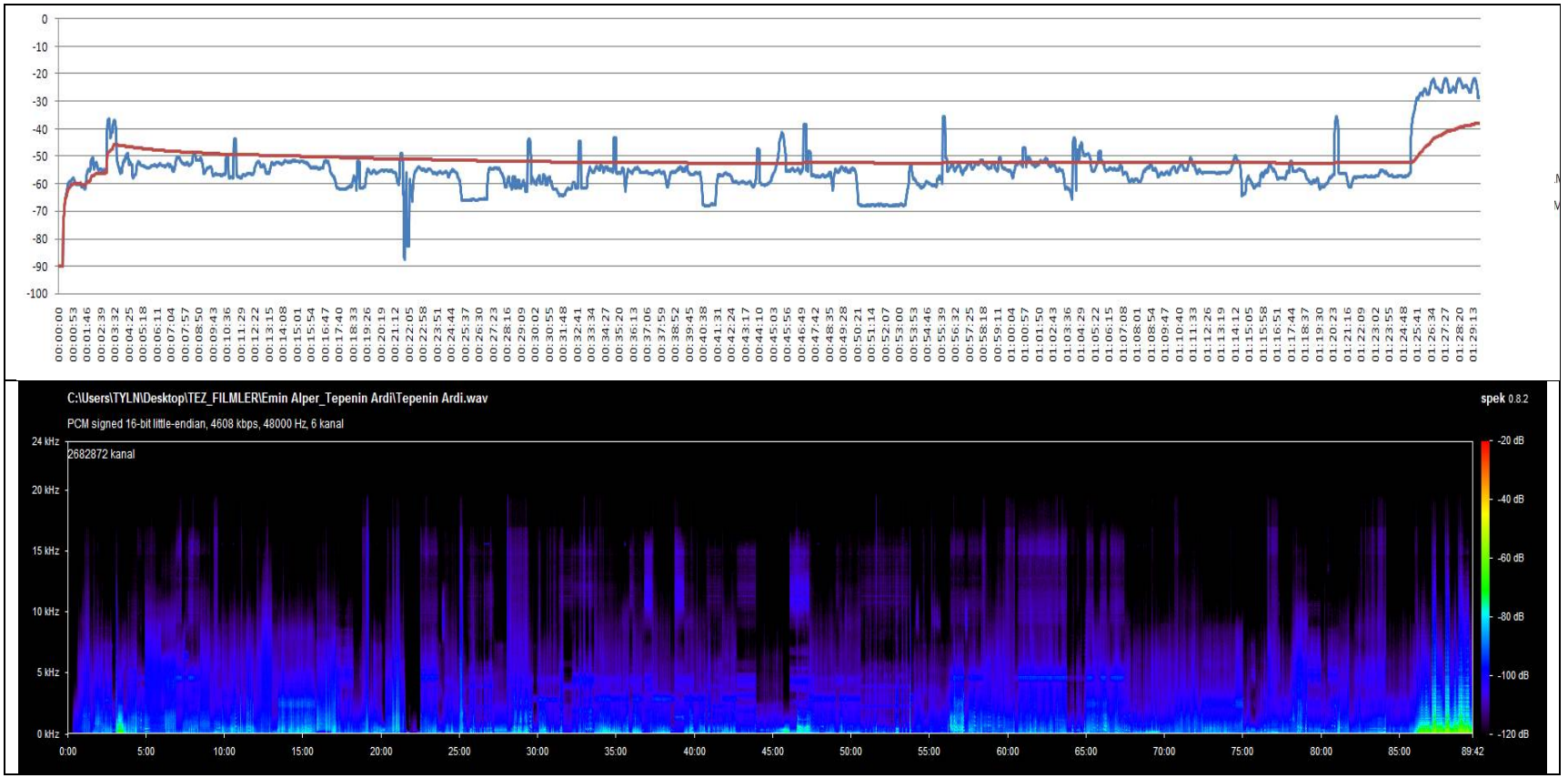

Figure A.7 : Emin Alper – Tepenin Ardı

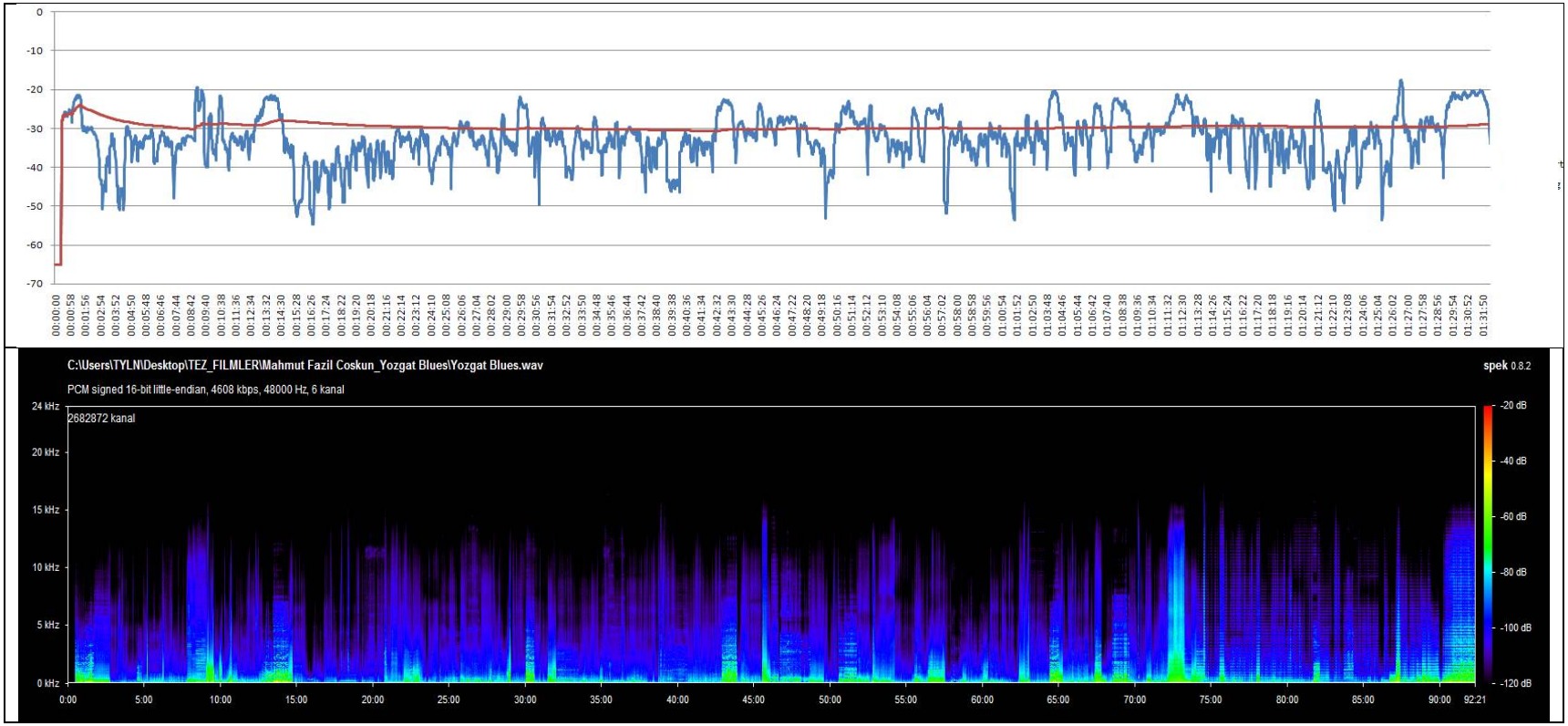

Figure A.8 : Mahmut Fazıl Coşkun – Yozgat Blues

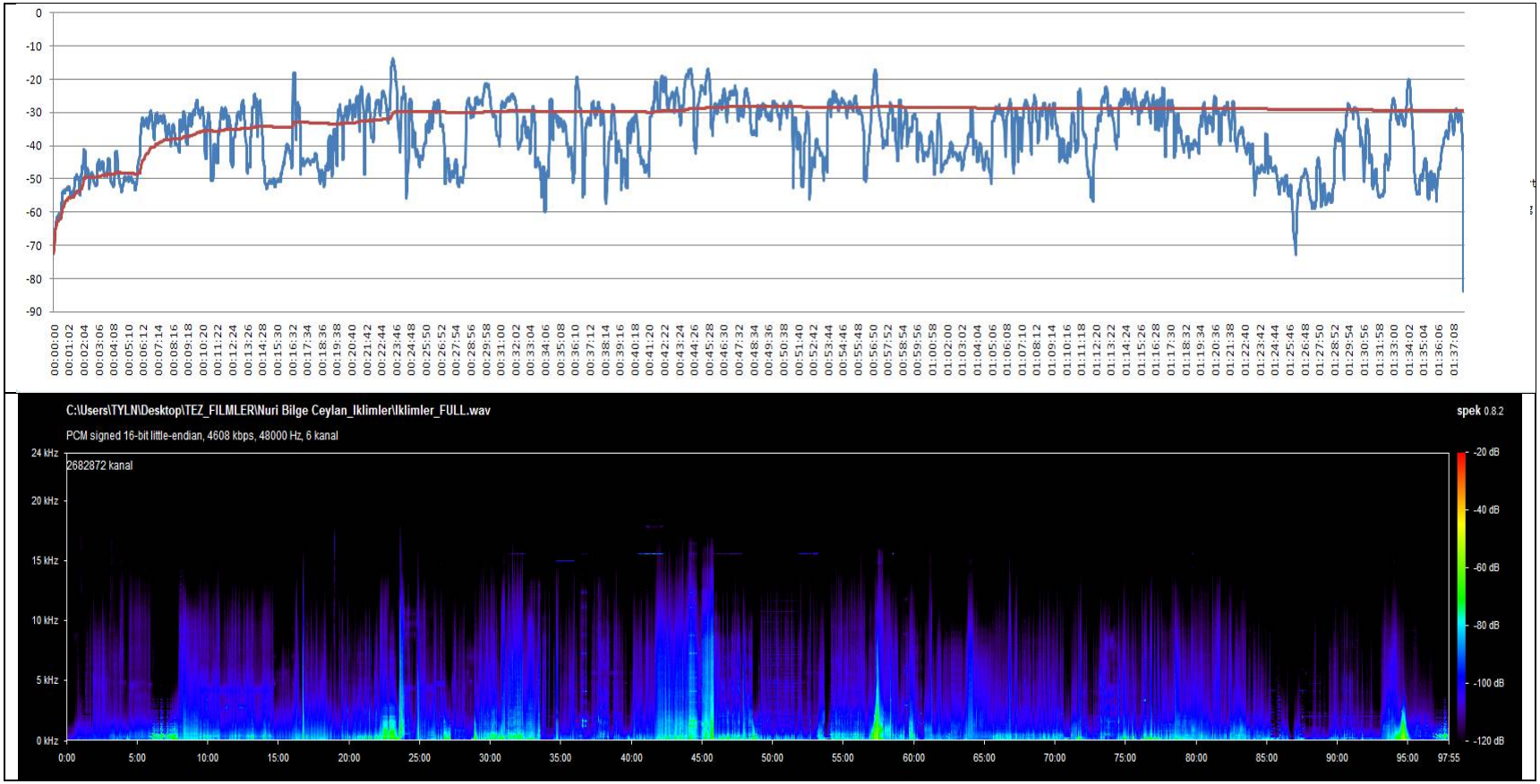

Figure A.9 : Nuri Bilge Ceylan – İklimler

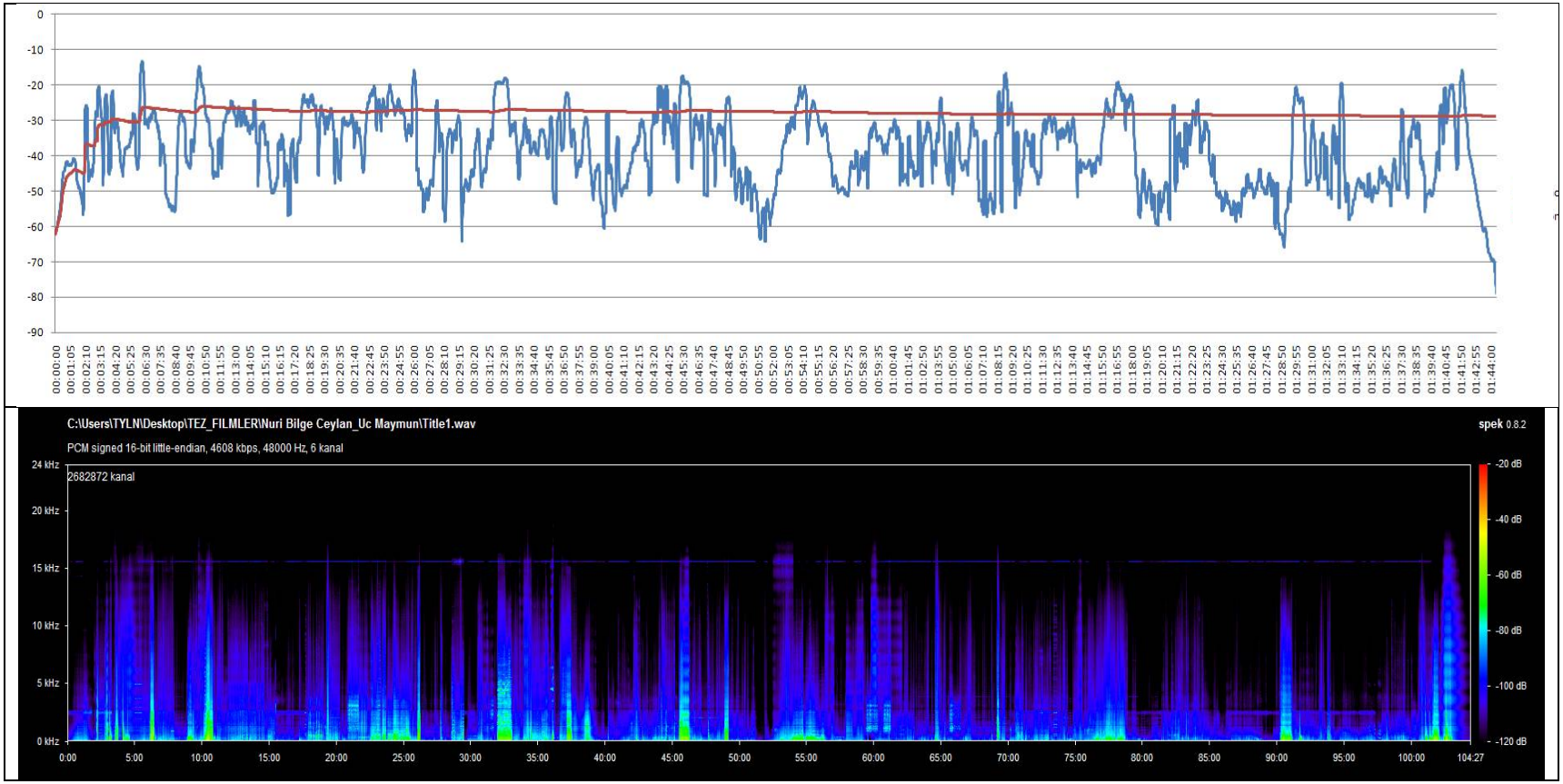

Figure A.10 : Nuri Bilge Ceylan – Üç Maymun

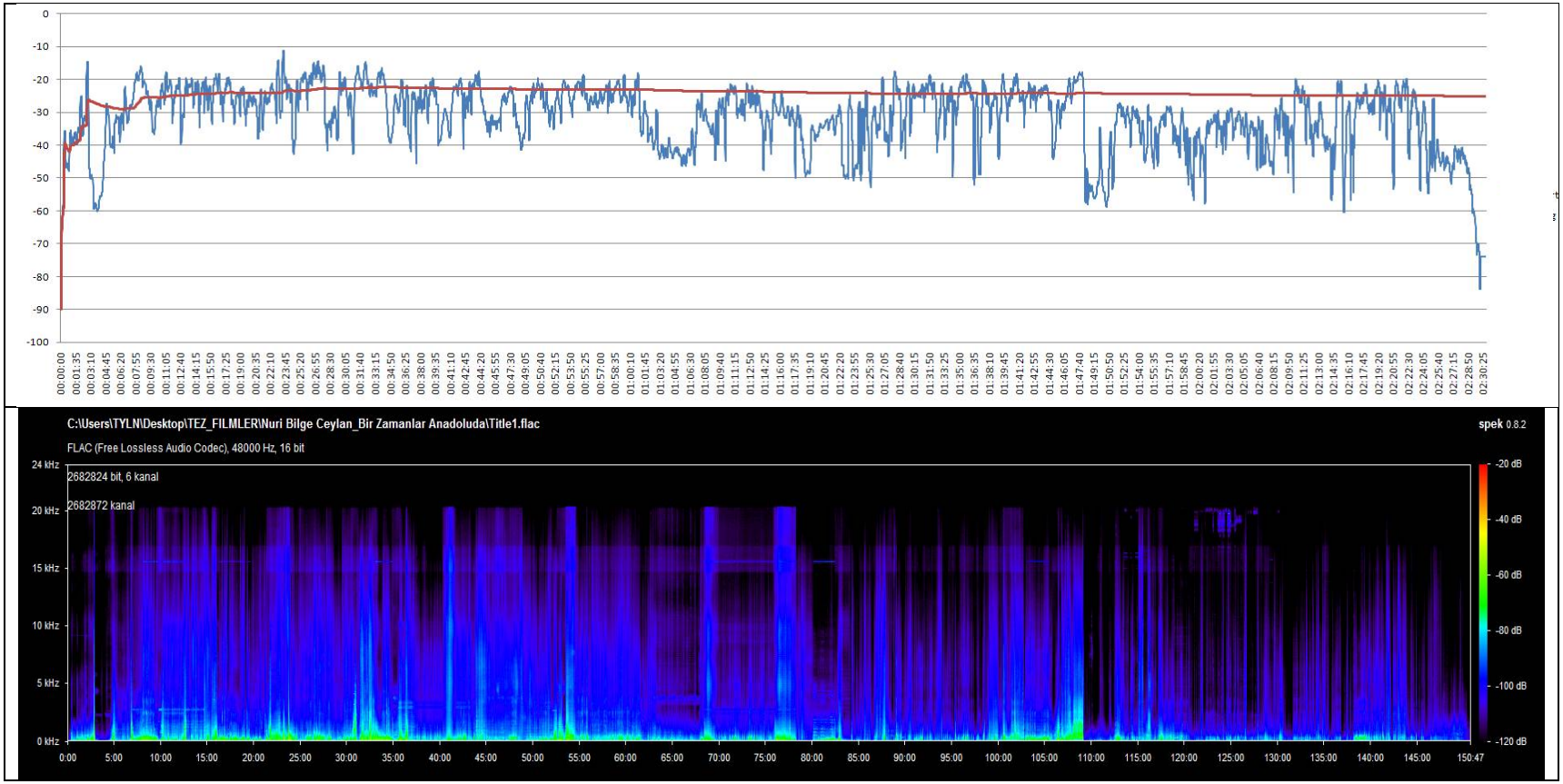

Figure A.11 : Nuri Bilge Ceylan – Bir Zamanlar Anadolu'da

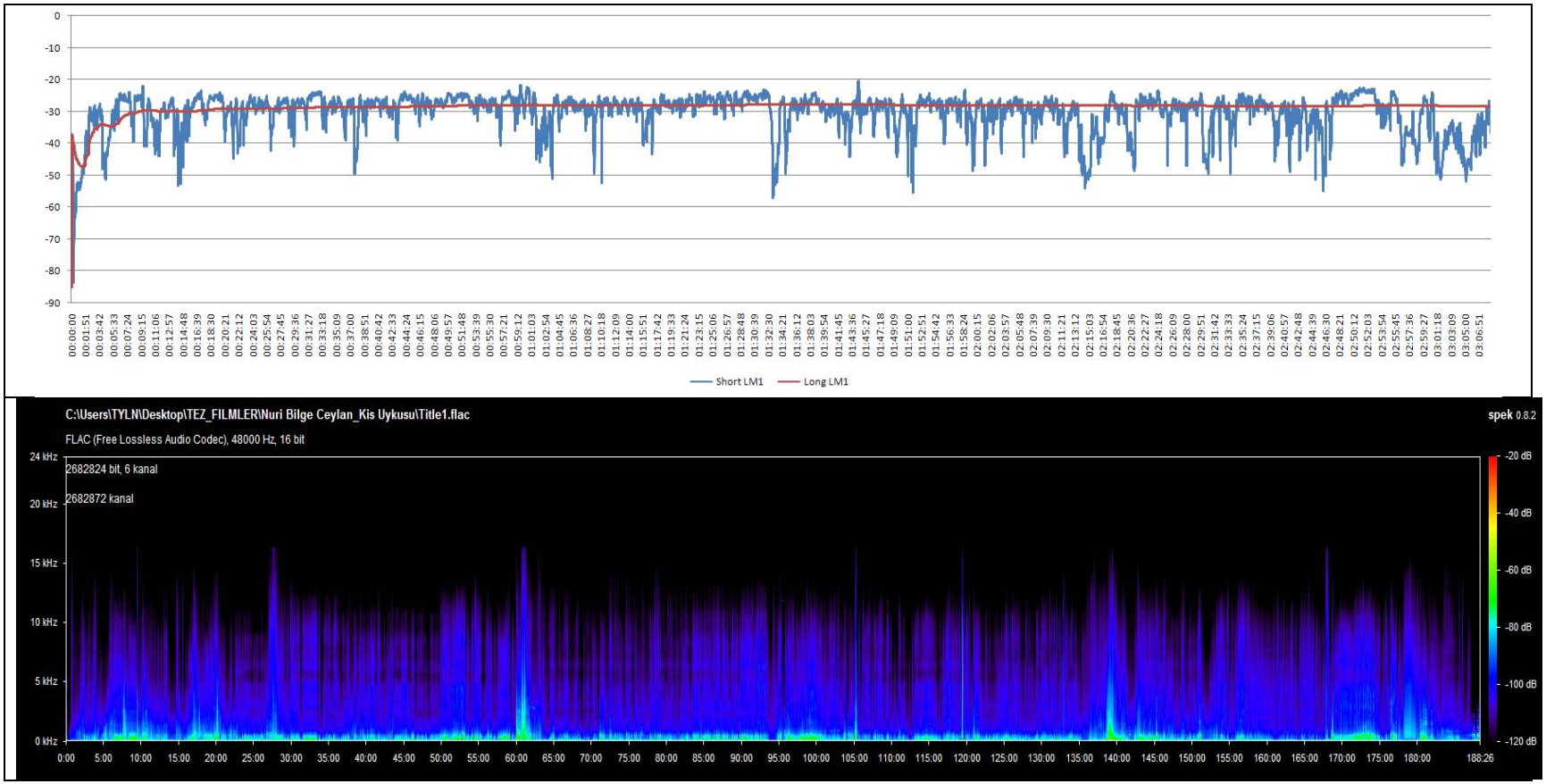

Figure A.12 : Nuri Bilge Ceylan – Kış Uykusu

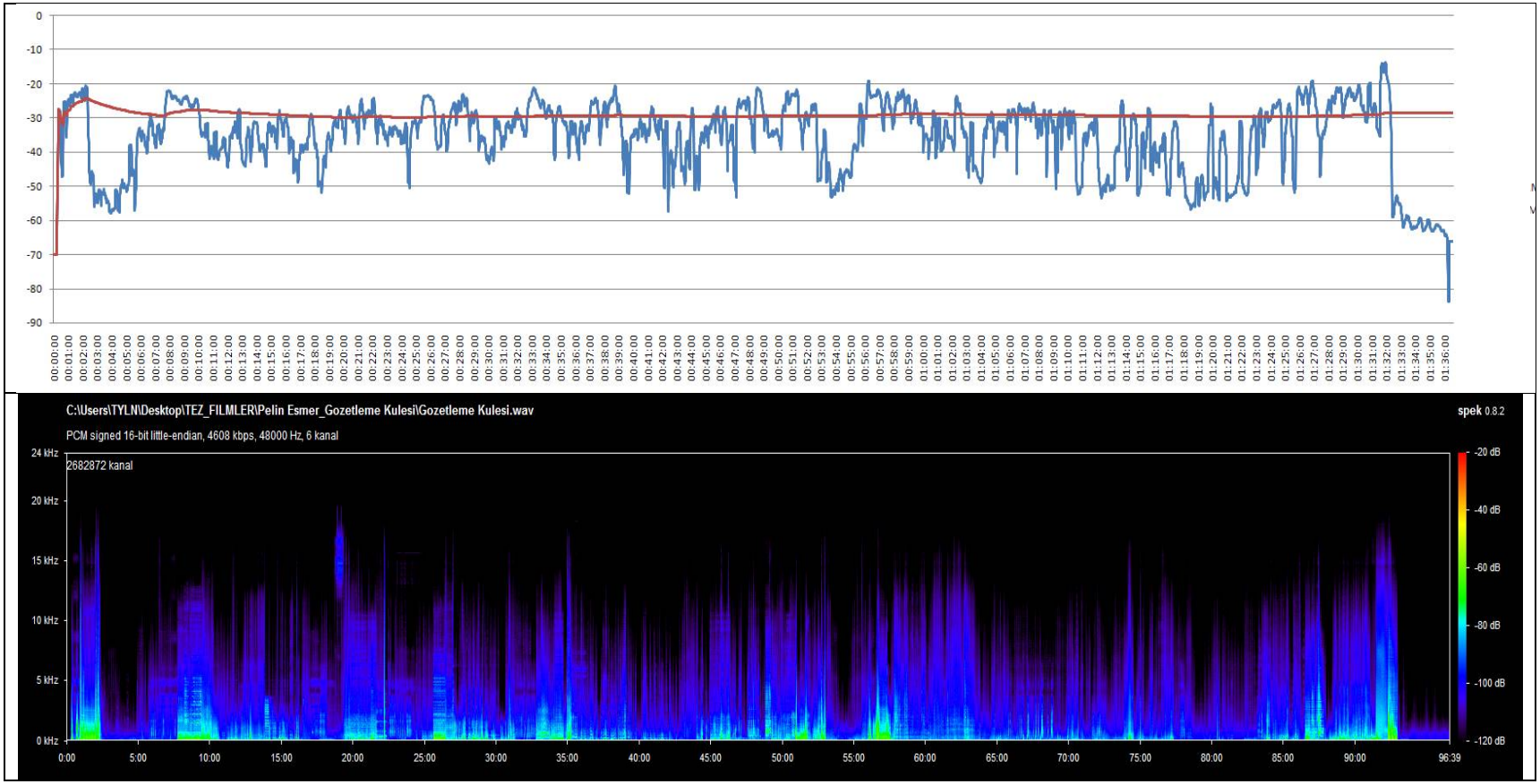

Figure A.13 : Pelin Esmer – Gözetleme Kulesi

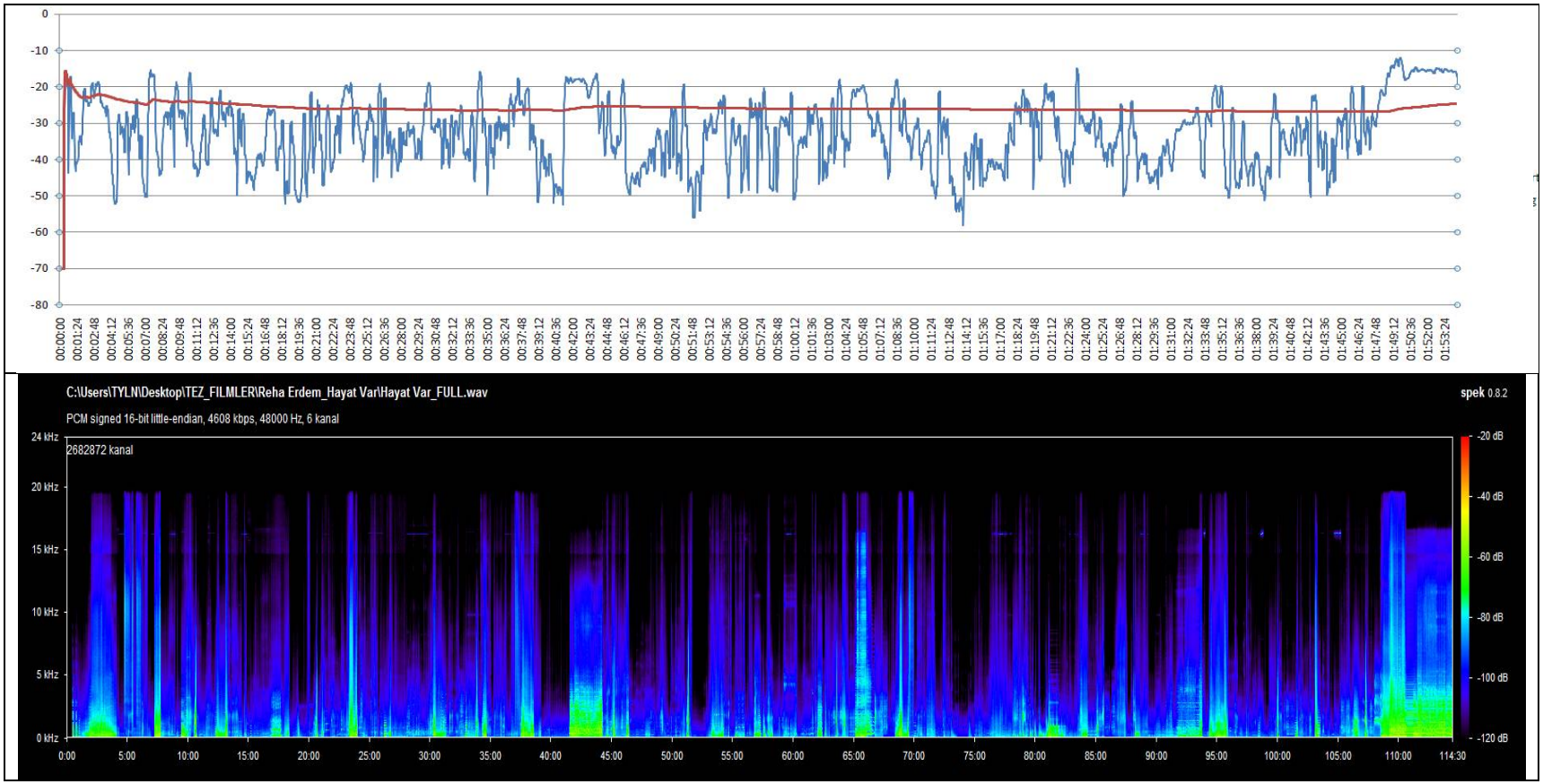

Figure A.14 : Reha Erdem – Hayat Var

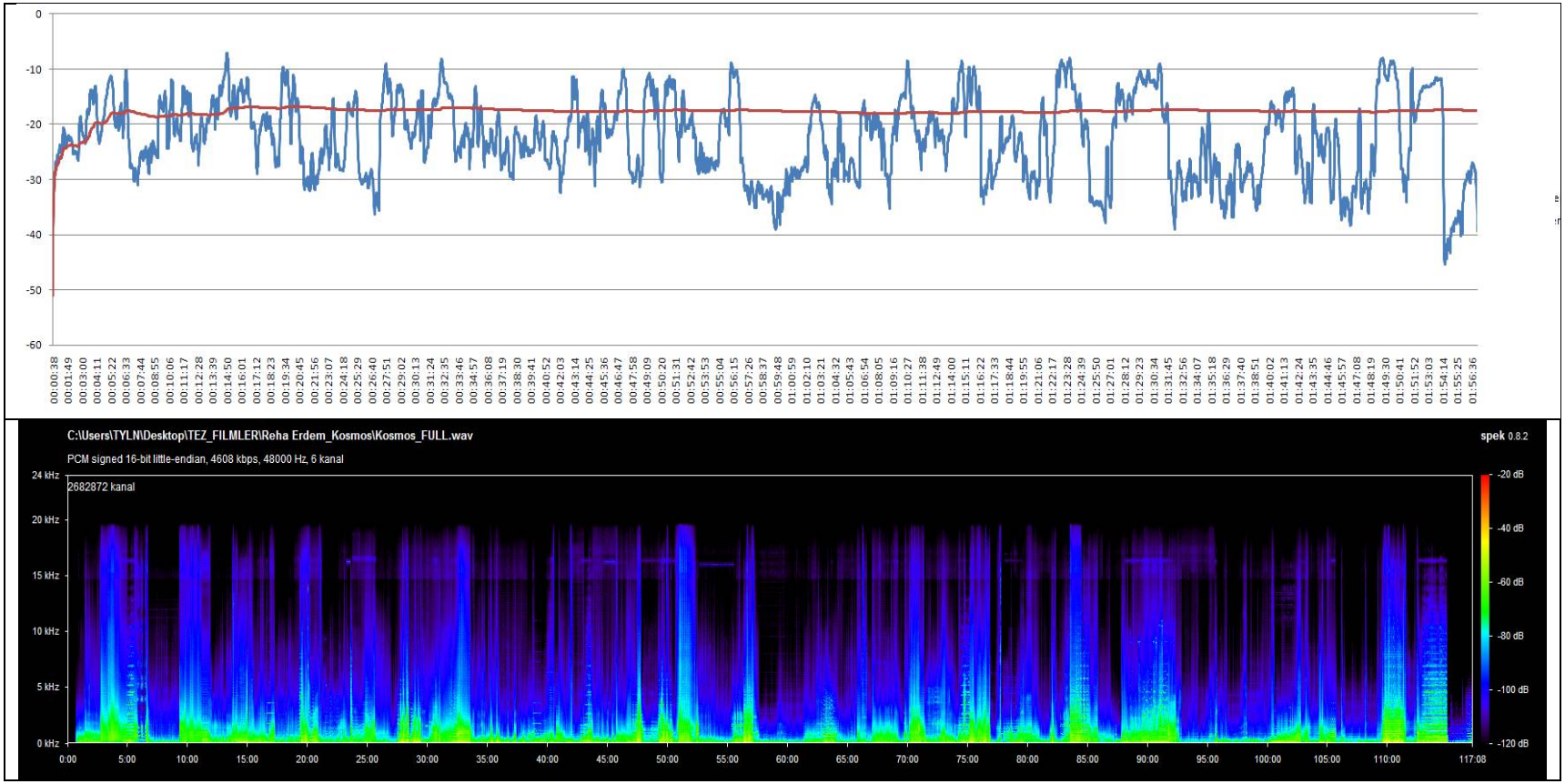

Figure A.15 : Reha Erdem - Kosmos

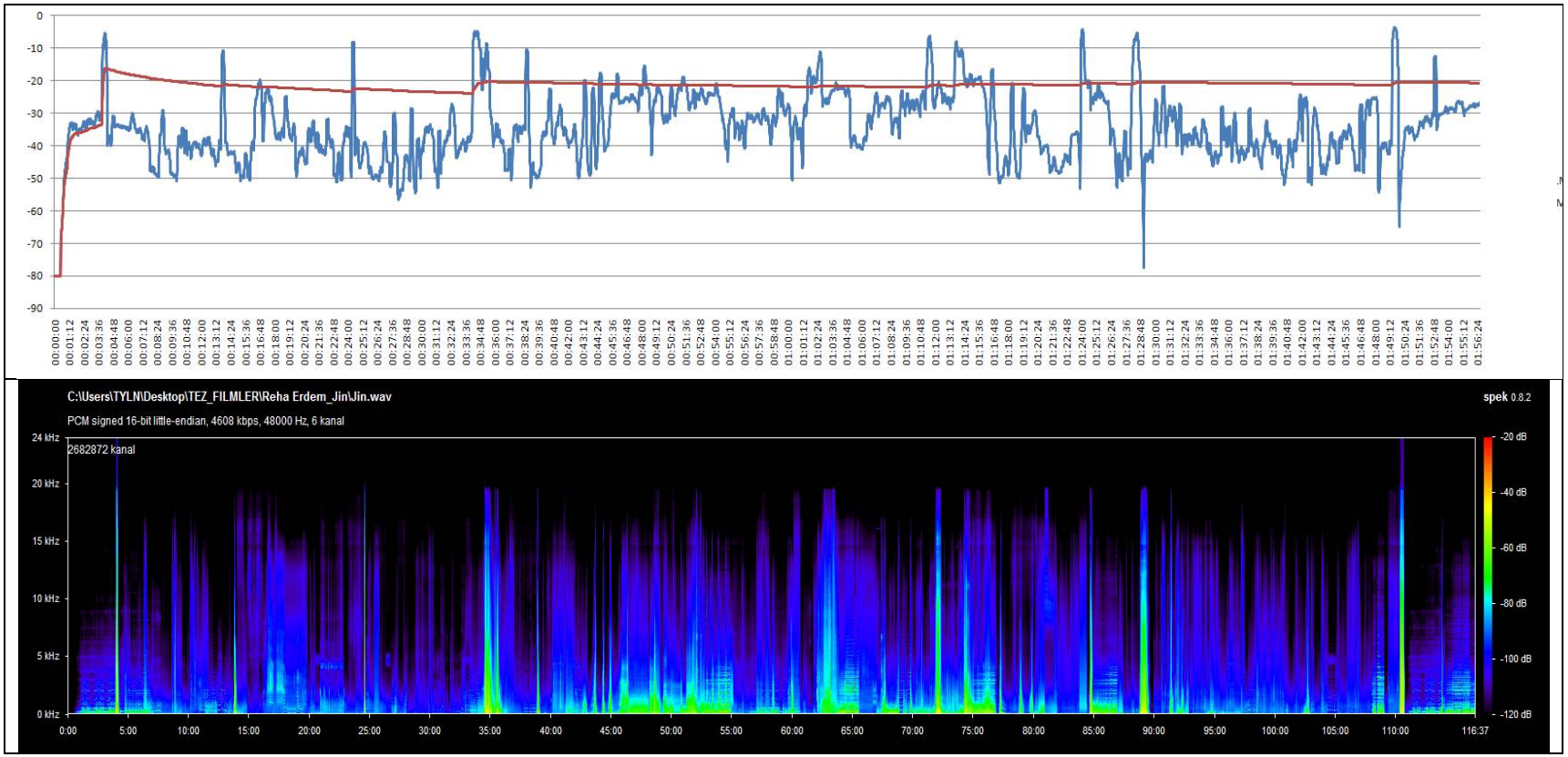

Figure A.16 : Reha Erdem – Jin

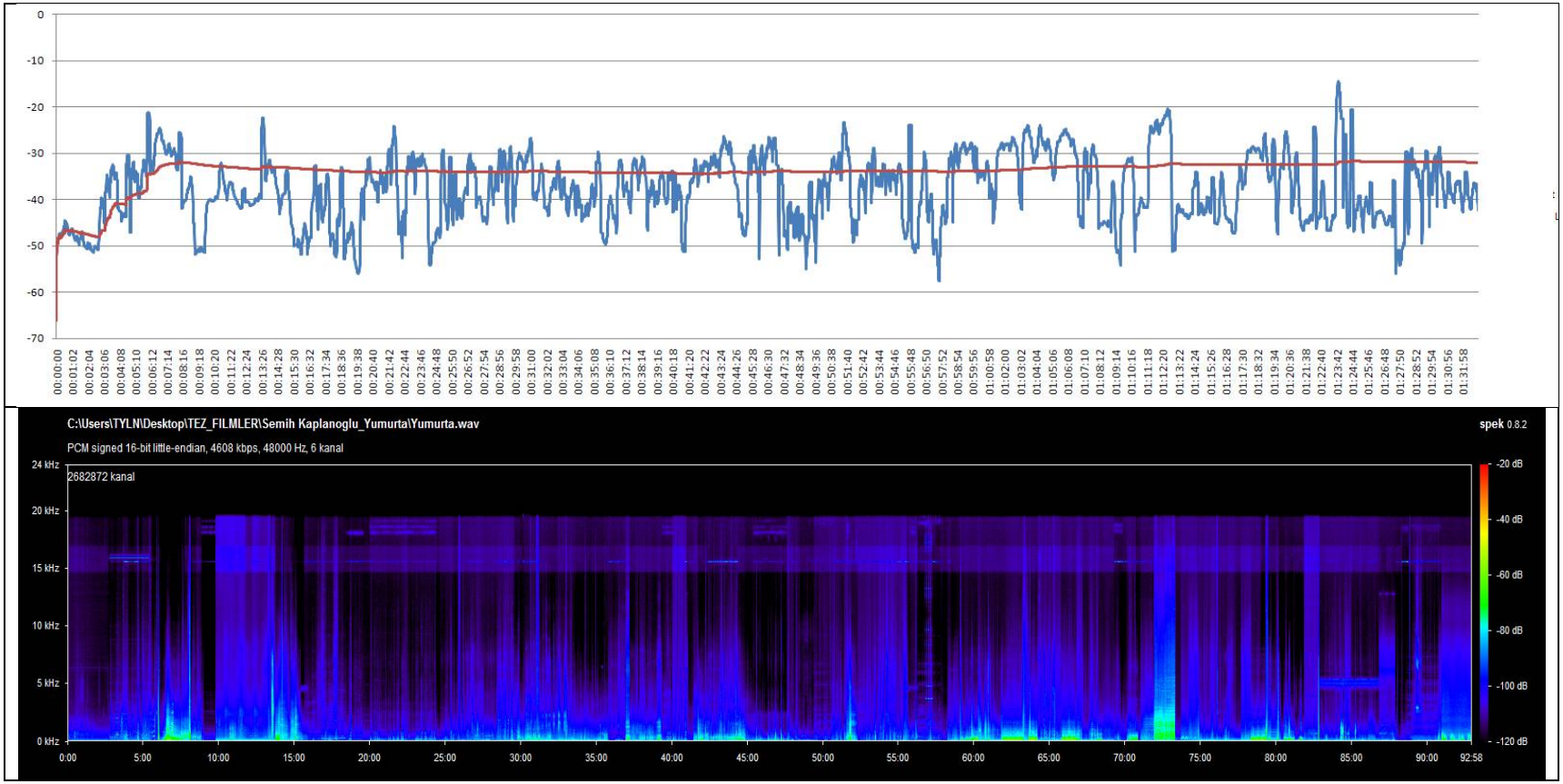

Figure A.17 : Semih Kaplanoğlu - Yumurta

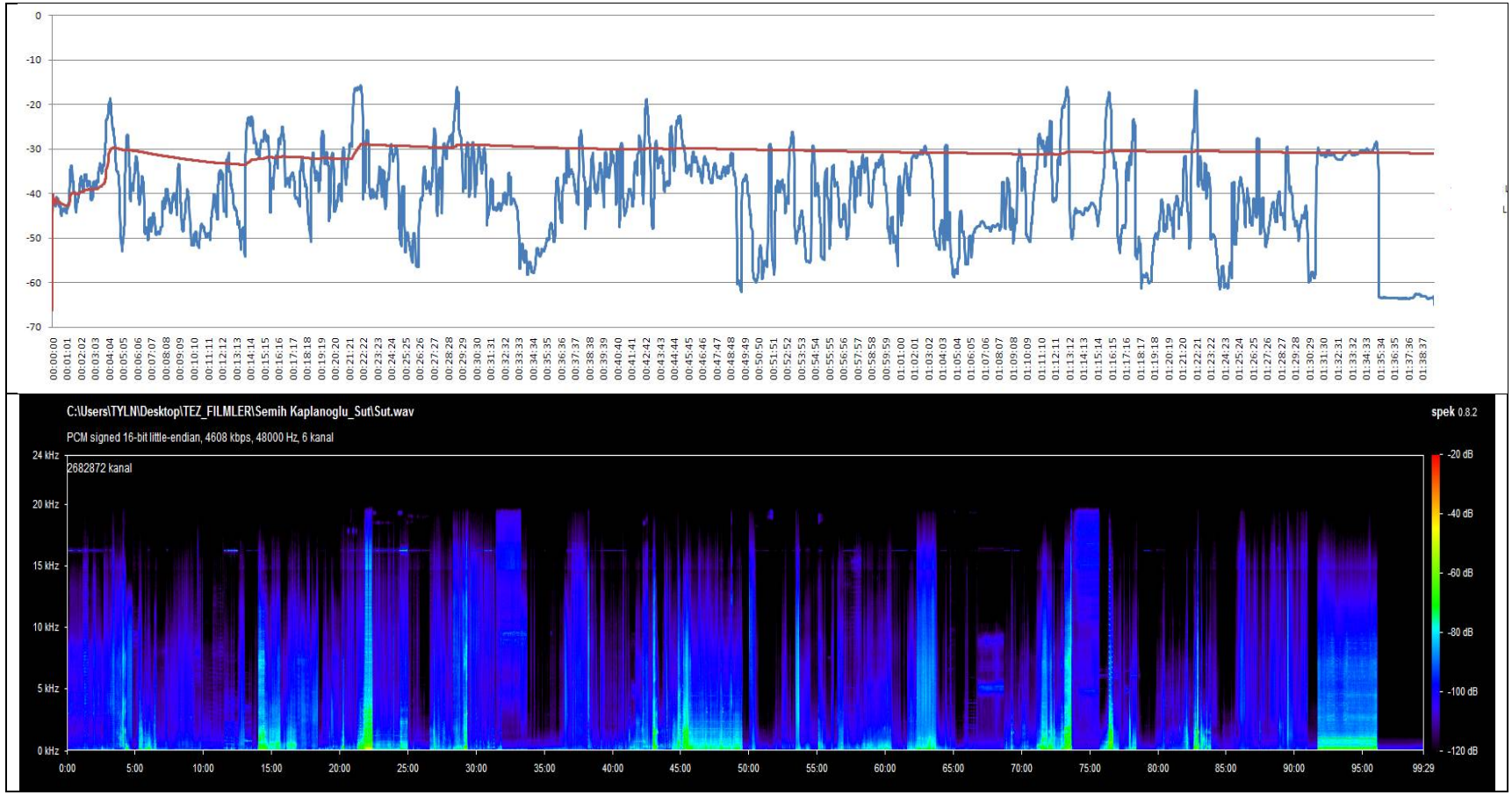

Figure A.18 : Semih Kaplanoğlu - Süt

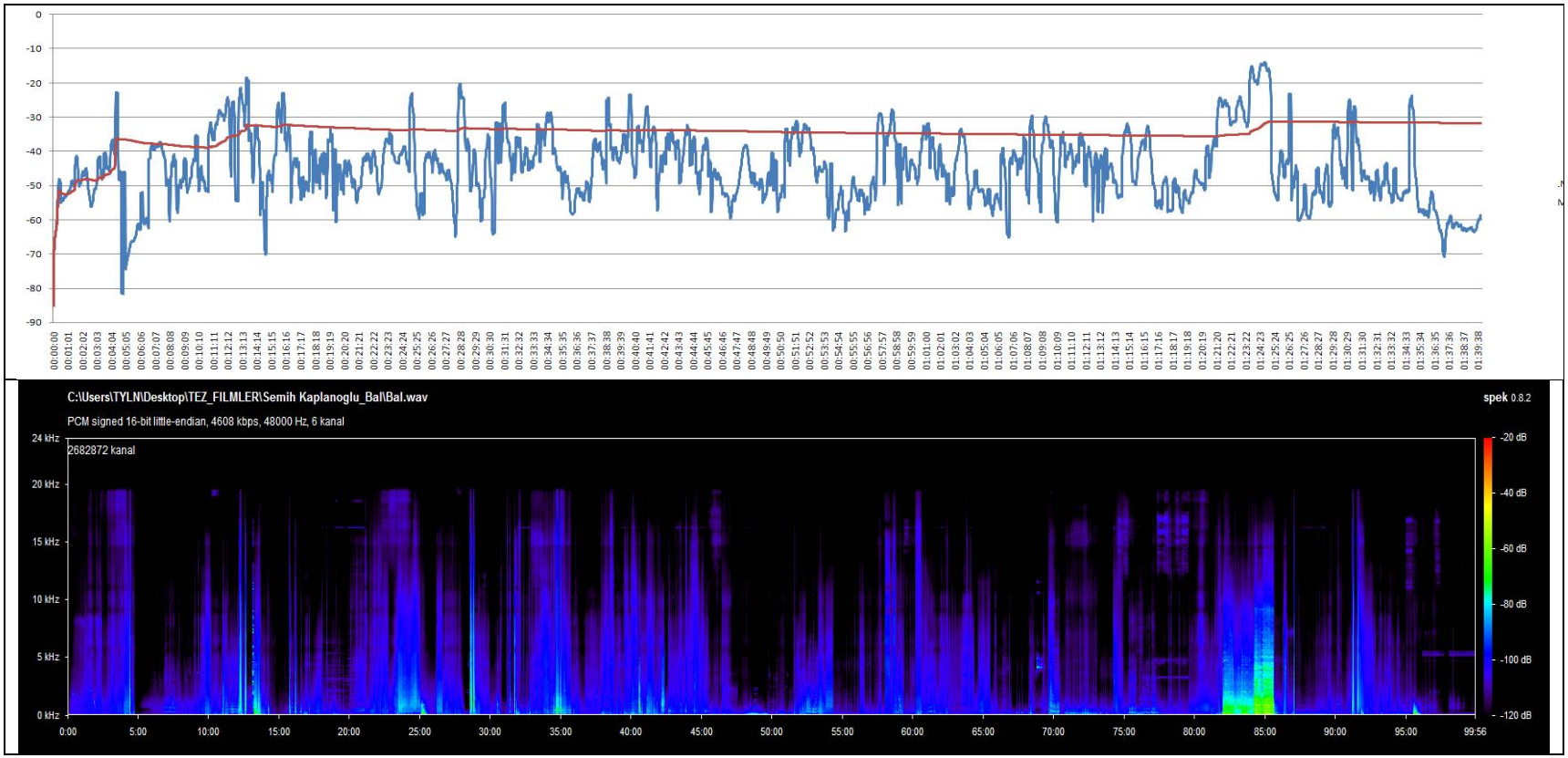

Figure A.19 : Semih Kaplanoğlu - Bal

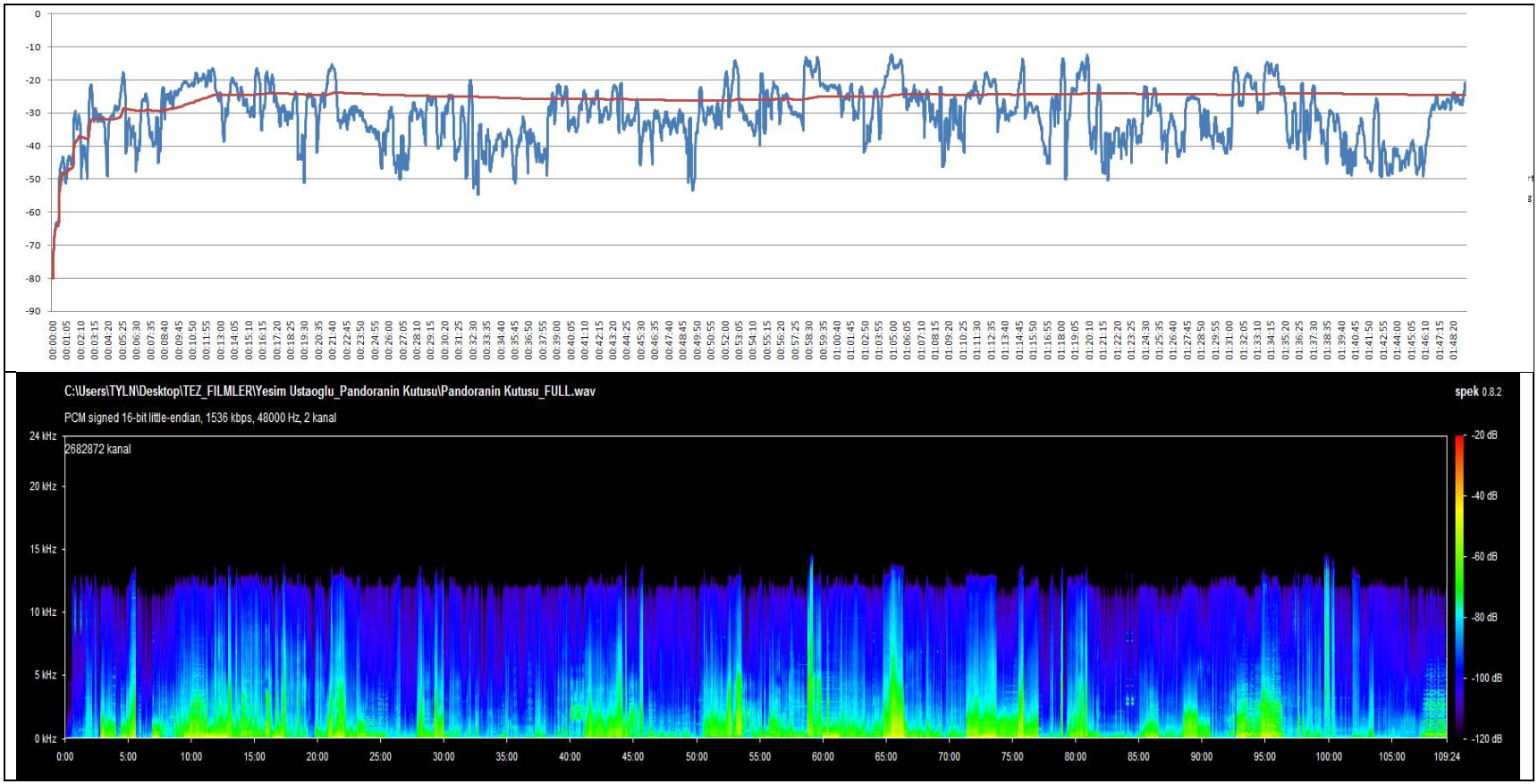

Figure A.20 : Yeşim Ustaoğlu – Pandora'nın Kutusu

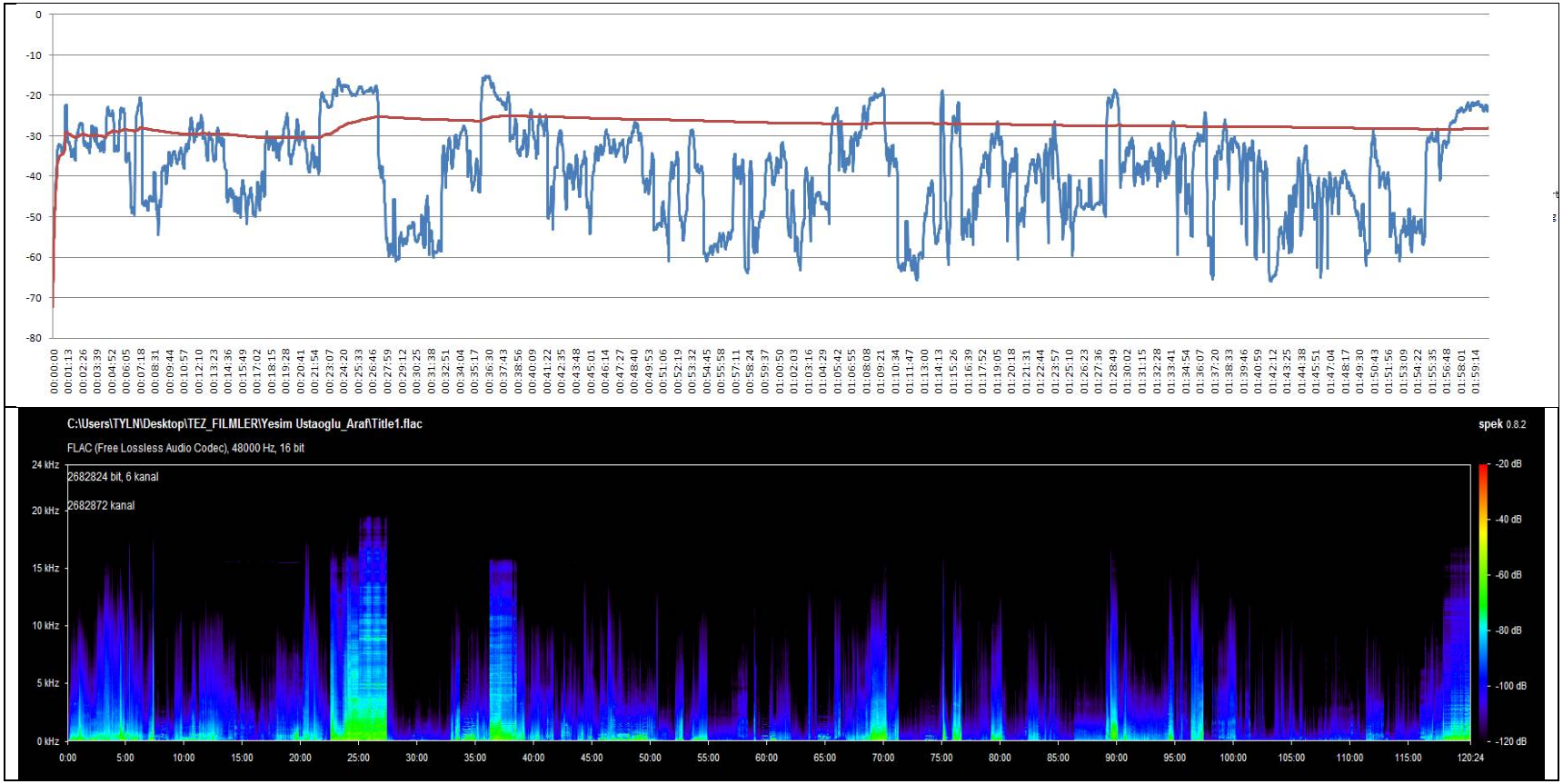

Figure A.21 : Yeşim Ustaoğlu - Araf

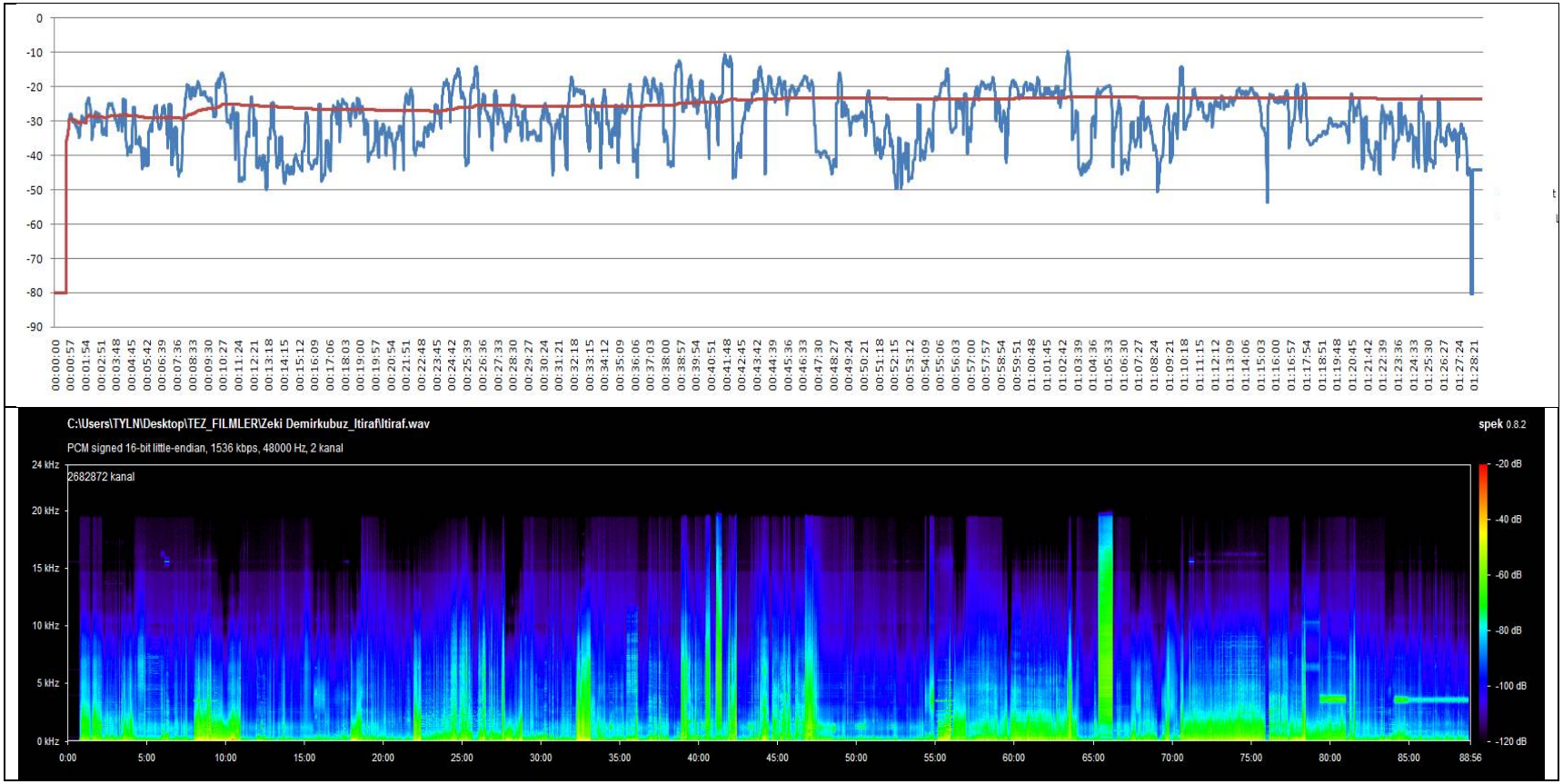

Figure A.22 : Zeki Demirkubuz - İtiraf

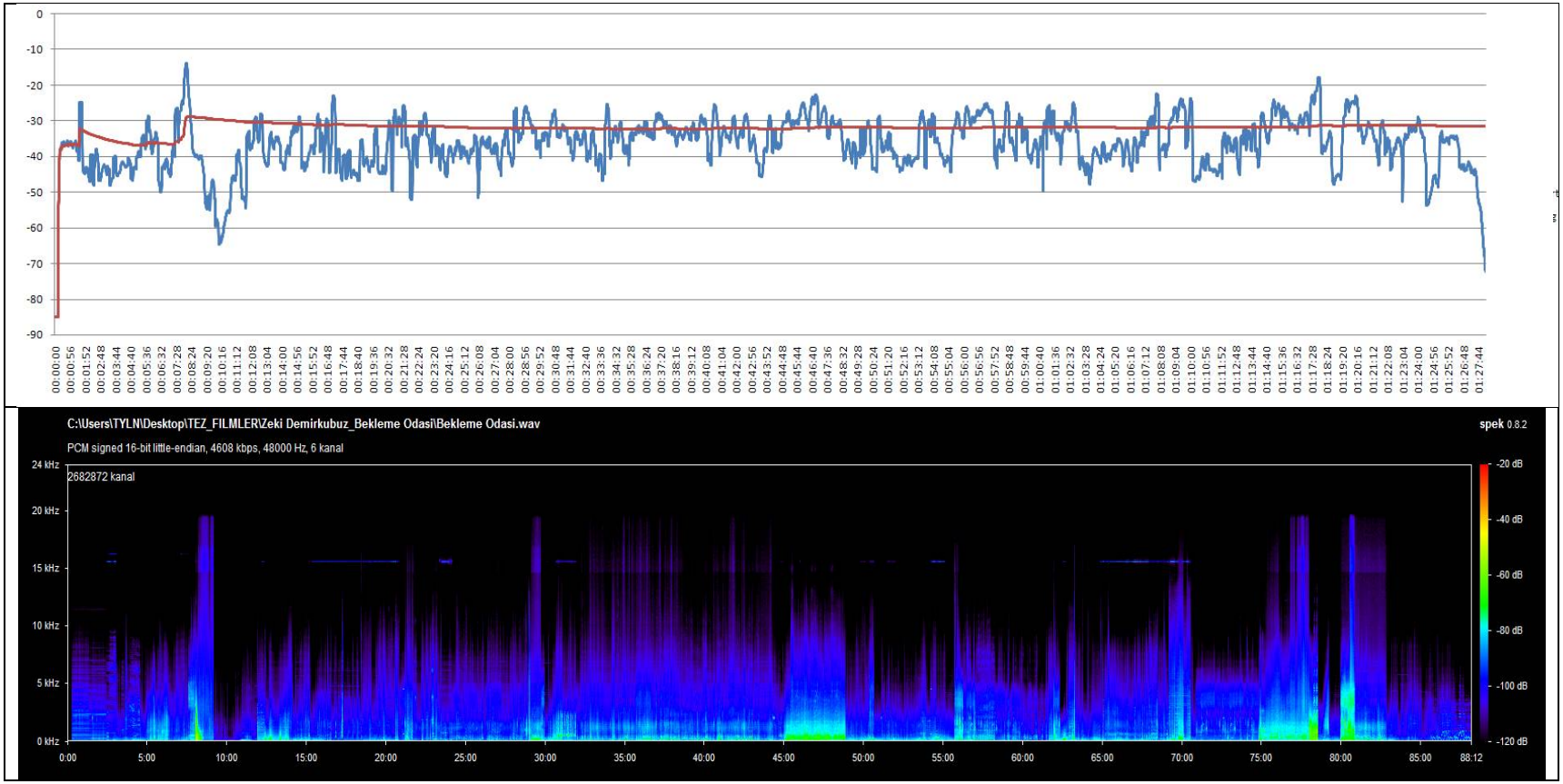

Figure A.23 : Zeki Demirkubuz – Bekleme Odası

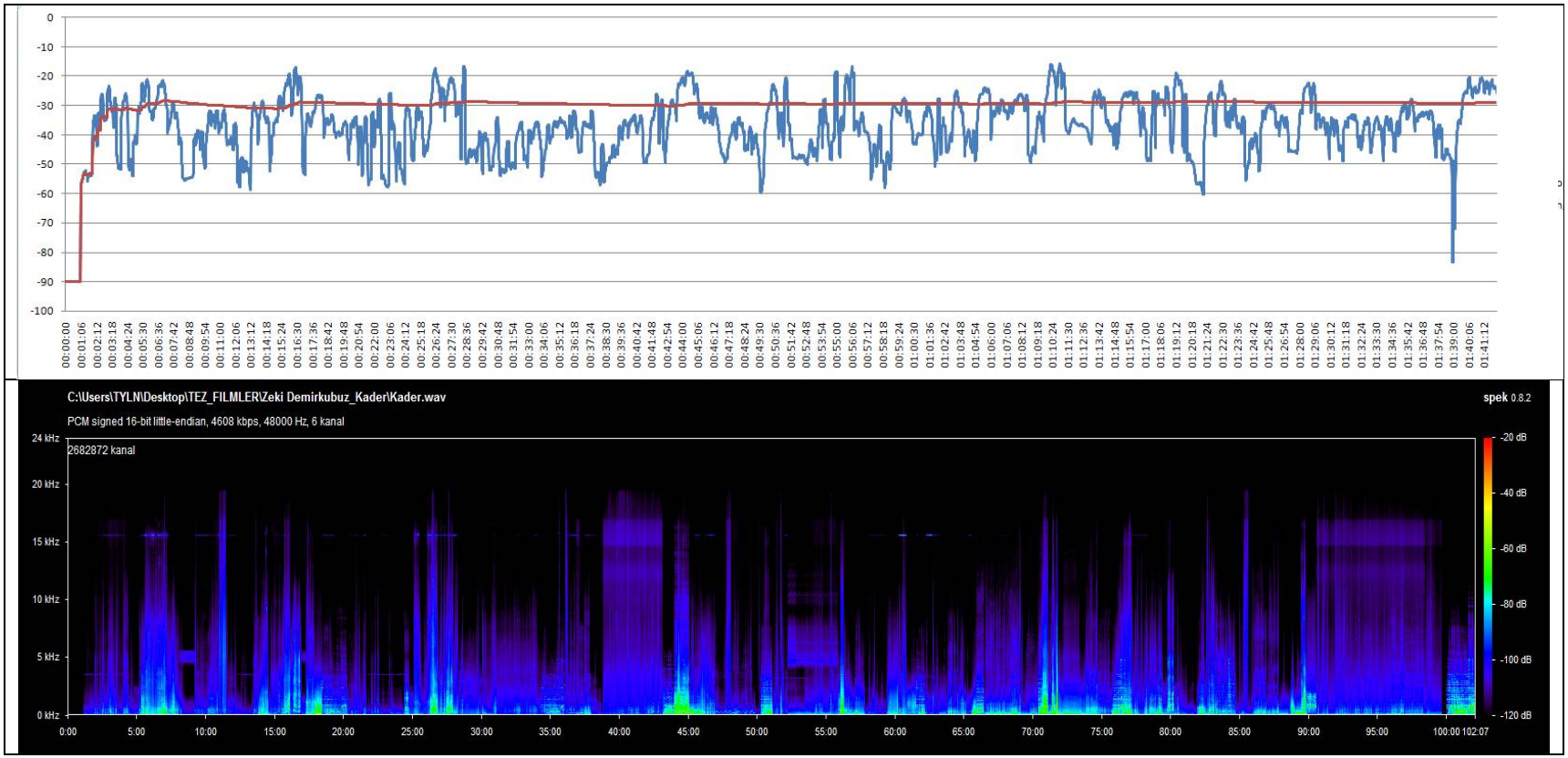

Figure A.24 : Zeki Demirkubuz - Kader

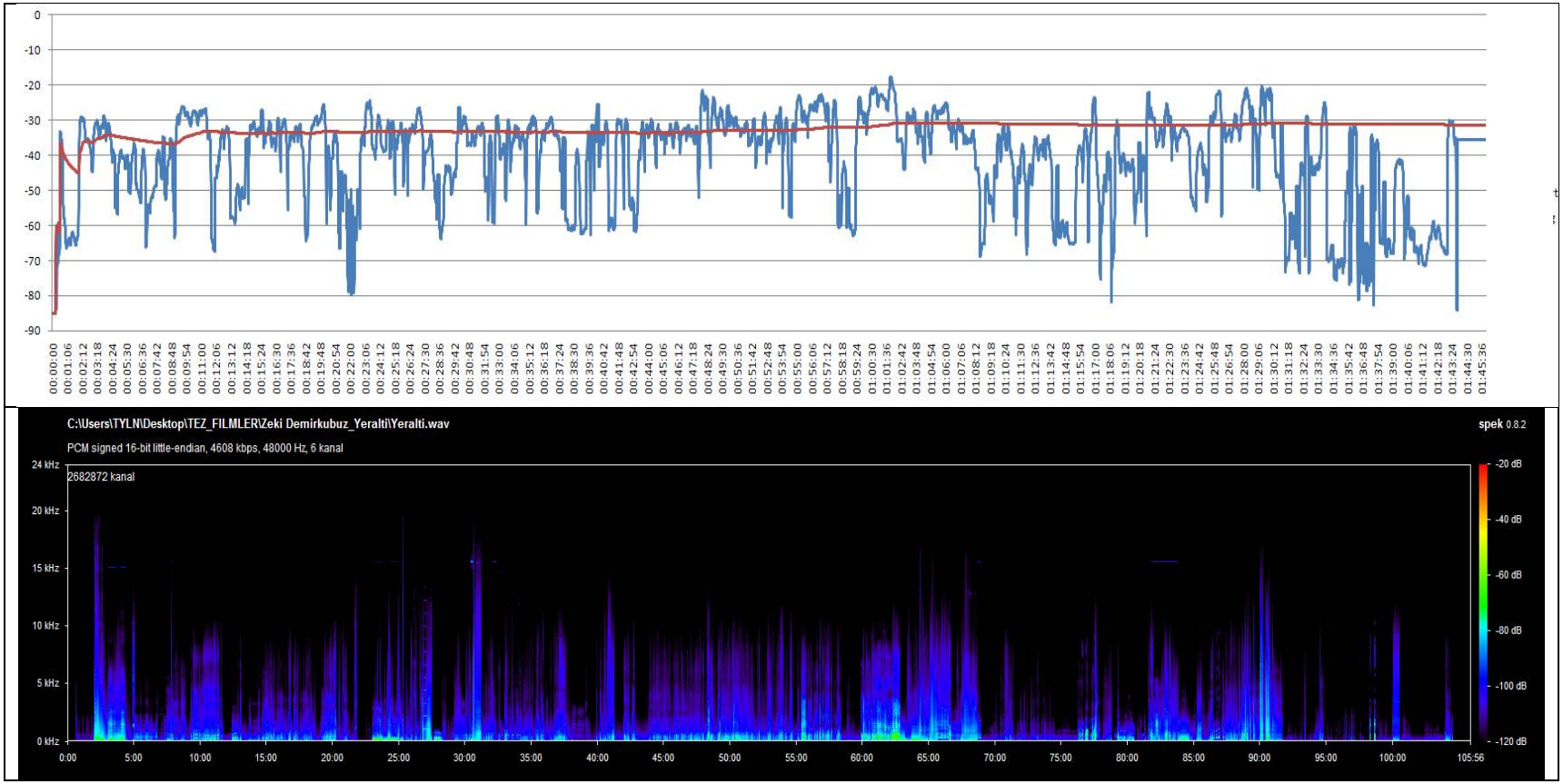

Figure A.25 : Zeki Demirkubuz - Yeraltı

CURRICULUM VITAE

Name Surname:	TAYLAN ÖZDEMİR
Place and Date of Birth:	Bursa, 22/05/1980
E-Mail:	ozdemirtaylan@yahoo.com
B.Sc.:	Middle East Technical University
M.Sc.:	Istanbul Technical University
Ph.D.:	Istanbul Technical University

PUBLICATIONS/PRESENTATIONS ON THE THESIS

- **Özdemir, T.,** 2013: Sinemada Ses ve Ses Teknolojilerinin Tarihçesi. *Seminer*, İTÜ TMDK Bilimsel ve Sanatsal Etkinlikleri Düzenleme Kurulu, November 27, İstanbul, Turkey.
- **Özdemir, T.,** 2015: Sinemada Sesin Fiziksel Özelliklerinin İncelenmesi. *International Conference* – New Directions in Turkish Film Studies: Cinema and Sound, 7-9 May 2015, İstanbul, Turkey.