Introduction

My first curiosity regarding the topic of film sound preservation and presentation came from the simultaneous development of two interests: on one hand, an interest in film preservation, derived from academic studies as well as some experiences in the field, and on the other an interest in sonic experiences and sound technologies, which I developed through an amateur interaction with sound engineering techniques and practices. Through these experiences, my hearing became trained to recognize the nuances of sound. Because of this, when watching old films, restored or not, in the theatre or at home, I paid an increasing attention to the sound dimension: I discovered a range of little noises that did not belong to the filmic narrative word: cracks, clicks, hums, rustles, hisses. I started to wonder how film sound ages, how the sound of an old film is different in present day from how it was in the past, and how it can be preserved. Intrigued by these queries, I started to investigate film sound from a preservation perspective, with the aim of better understanding the nature of film sound and the related practices of preservation and presentation.

The preservation and presentation of film sound refers to the activities of preserving, restoring, and presenting the sound of film heritage. These activities belong to the broader field of film preservation and presentation, which can be defined as the cultural and social practices aimed at the preservation, restoration, presentation of, and access to audiovisual heritage.

Film sound preservation and presentation activities are hardly acknowledged by general audiences, even if they are habitual film spectators. When people who are not professionally involved in film preservation inquire about my research, the reaction usually falls between the incredulous and the astonished. They ask what exactly it means to preserve film sound. In the attempt to elaborate a clear explanation, I found it effective to reference fine art restoration: I associate film preservation with taking care of and restoring a piece of art, pointing out that as a painting or a sculpture can be ruined with the passage of time, so can film. As an old fresco can lose pieces of plaster and color, so film image can be damaged with tears, scratches, little dots. Similarly, film sound can be damaged. Most of the people that watch old films have experienced the
signs of sound aging: that particular crackling during the silences, a sudden click or hissing noise, the strange tone of some voices.

In response to this explanation, I once got the following reply: “How is it possible to preserve or restore film sound, which cannot be touched or seen?” This remark demonstrates that film sound is commonly perceived as immaterial, probably because it is not visible or touchable. My experiences with preservation practices, however, revealed to me the many material and physical dimensions of film sound, such as the carrier that holds the recorded sound, the playback device and the amplification system that allow us to hear it. The gap between, on one hand, the common belief of film sound as immaterial and the fundamental importance of its material and physical dimensions, on the other, raises the fundamental questions of this research: What is the nature of film sound? What does it consist of? What are its core dimensions? How can it be conceptually defined? To answer these questions, I decided to examine film sound preservation and presentation practices, for it is here that the different characteristics of film sound most clearly come to the fore.

The Hegemony and Permanence of the Visual

The ontological nature of film sound has yet to be widely investigated. Within academia, the first studies dedicated to film sound were conducted during the late 1970s and the 1980s, fifty years after the introduction of synchronized sound, and were focused mainly on the transition from silent to sound cinema.1 The changes to film sound technologies that followed the coming of sound as well as their effects on the ontological nature of film sound have rarely been investigated. As Michel Chion, one of the first film sound theorists, states: “Theories of the cinema until now have tended to elude the issue of sound, either by completely ignoring it or by relegating it to minor status.”2 One reason for this lack of attention to film sound in academic studies is that film, from its inception, has been defined as a fundamentally image-oriented medium. The academic field of film studies can there fore be considered as driven by a hegemony

2 Michel Chion, Audio-Vision. Sound on Screen (New York: Columbia University Press, 1994), XXV.
of the visual, since the image and visual component of film has predominance over the sound component.³

Far from being unique to film studies, this hegemony of the visual is considered as a general tendency in Western culture, so often described as – or accused of – being “dominated” by vision, and not only by philosophers or anthropologists, but also in everyday social discourse. The use of language is in fact a clear litmus test for this tendency. In his critical analysis of ocularcentric culture, intellectual historian Martin Jay starts from the “ocular permeation of language,”⁴ which can be traced in the most commonly used Western languages (English, French, German) and whose roots can be found in ancient Greek and Latin: “With all of these dimensions to the phenomenon we call vision – and other can doubtless be added – it is no surprise that our ordinary language, indeed our culture as a whole, is deeply marked by its importance.”⁵ Historian Karin Bijsterveld also refers to a dominant visual regime in Western culture: “In the West’s hierarchy of the senses, the eye dominates the ear. This makes sound into a neglected issue.”⁶

However, sound is always omnipresent in our experience. If we want to avoid seeing something, we can turn our back to it or shut our eyes. If we want to avoid a sound, we cannot just turn our back or close our ears. We need external elements, such as earplugs, for that. Also if we have earplugs in, we still hear some sounds from our external environment, even if extremely attenuated. In fact, we cannot experience absolute silence, not even in an acoustic anechoic chamber, where there is no sound producing element, since the perceiver’s body still makes some sounds. As Bijsterveld suggests, “Unlike our eyes […] we cannot close our ears. We continuously need our

⁴ Martin Jay tries to demonstrate “how ineluctable the modality of the visual actually is” through this paragraph, which contains more than twenty visual metaphors: “Even a rapid glance at the language we commonly use will demonstrate the ubiquity of visual metaphors. If we actively focus our attention on them, vigilantly keeping an eye out for those deeply embedded as well as those on surface, we can gain an illuminating insight into the complex mirroring of perception and language. Depending of course, on one’s outlook or point of view, the prevalence of such metaphors will be accounted an obstacle or an aid to our knowledge of reality. It is, however, no idle speculation or figment of imagination to claim that if blinded to their importance, we will damage our ability to inspect the world outside and introspect the world within. And our prospects for escaping their thrall, if indeed that is even a foreseeable goal, will be greatly dimmed.” Martin Jay, Downcast Eyes, 1.
⁵ Martin Jay, Downcast Eyes, 11.
ears for information and communication, so sound, even though inherently transient, is always around."\(^7\) Along the same line, music composer and educator Raymond Murray Schafer argues that:

The sense of hearing cannot be closed at will. There are no earlids. When we go to sleep, our perception of sound is the last door to close and it is also the first to open when we awaken. [...] The ear’s only protection is an elaborate psychological mechanism for filtering out undesirable sound in order to concentrate to what is desirable.\(^8\)

Sound is unavoidable in everyday experience: as long as we are conscious, we always experience sound in some form. We are continuously immersed in a *soundscape*, which is the term used by Schafer to define a specific acoustic field.\(^9\) If a landscape comprises the visible features of an area, a *soundscape* refers to the acoustic features of a delimited space. Since sound is unavoidable, *soundscapes* shape our sensory and perceptual experience in every moment.

Even if our perceptual experience demonstrates that sound is unavoidable, the supremacy of vision over the other senses, and particularly over hearing, has been widely confirmed. In Western culture, vision is believed to be the main sense for perceiving and knowing the world. Significantly, *light* is probably one of the most recurring metaphors for knowledge.\(^10\) Another metaphor for knowledge is the *word* of god(s), which was initially linked to sound, especially in oral cultures. With the transition to writing, the written word acquired a visual form. The word of god(s) became visual, and in non-iconoclastic religions the god(s) that pronounced the word also assumed a visual form, becoming the subjects of sacred visual arts. Schafer interprets the hegemony of the visual in these terms:

In the West the ear gave way to the eye as the most important gatherer of information about the time of the Renaissance, with the development of the printing press and perspective painting. One of the most evident testaments of this change is the way in which we have come to imagine God. It was not until the Renaissance that God became

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7 Ibid.
9 Ibid., 7.
portraiture. Previously he had been conceived as sound or vibration. [...] Before the days of writing, in the days of prophets and epics, the sense of hearing was more vital than the sense of sight. The word of God, the history of the tribe and all other important information was heard, not seen.\textsuperscript{11}

Despite the fact that the sonic form of language (the spoken word) remained the main form of language used in social life – at least until the mass alphabetization of the twentieth century – the visual form of language (the written word) became predominant in the cultural field, since it insured the transferability of the word to the future, especially when preserved in an archival environment. Written documents in fact enable the permanence of the word through the passage of time: not only the word of god but also the word of human intellectual activity expressed in all fields of knowledge (science, literature, politics and economics, philosophy, history, and so on) found a way to be transmitted to the future.

This phenomenon of the \textit{hegemony of the visual} detected in language and culture can be related to what is defined as \textit{permanence of vision} in human perception. Visual perception is scientifically explained in fact with the persistence of vision phenomenon, which is clearly exposed by film restorers Paul Read and Mark-Paul Meyer:

\begin{quote}
It has been proved that vision is discontinuous, and that the brain’s vision centre recreates 10-12 images/second. In some way which has not yet been fully elucidated, the transmitting organs or the brain itself organizes the signals given out by the cones and rods into sequence of signals. These are routed from the retina to the vision centre in the brain and are stored on an orderly fashion until the time at which they are fully scanned and then interpreted in a proper order. The sight mechanism does not allow a new image to be scanned until the scanning of the previous one is complete. This stop-start aspect of vision is provided for by means of a ‘memory’ mechanism which ‘holds’ each image in the brain’s vision centre until it is replaced by the next one in line. This memory, formerly refereed to as ‘retina lag’, is now known as persistence of vision.\textsuperscript{12}
\end{quote}

The following analysis of the phenomenological aspects of visual and sound perception made by Edward Branigan can help to further clarify this point. Branigan places the

\begin{footnotes}
\item[\textsuperscript{11}] Ibid., 10.
\item[\textsuperscript{12}] Paul Read, and Mark-Paul Meyer, \textit{Restoration of Motion Picture Film} (Oxford: Butterworth-Heinemann, 2000), 11.
\end{footnotes}
concept of permanence of vision side by side with what he defines as transience of sound. Both these concepts are central to the further analysis of this dissertation, therefore I report this analysis integrally:

A phenomenology may provide important clues to what we believe sound to be. Sound and light may have the same physical basis in wave motion, but they are perceived differently. Lightness and color appear to reside in an object – to be a quality of the object – rather than to emanate from an object. By contrast, we think of sound as coming from a source, from an object: a radio, a door, a boot. Color is (seemingly) possessed, but sound is made. Thus we tend to hear sound as transitory and contingent – an on/off phenomenon – while vision is more absolute (a reference point, if you like). We do not think of objects as fundamentally colorless (which of course they are); instead, we believe the book has a red cover even when the lights are off. We do however think of background noise and silence as having no sound and hence of objects as being fundamentally quiet unless touched, or otherwise put into motion. Furthermore, these sorts of beliefs may well be tied to universal features of human language. There is evidence that in many languages the five major sense modalities have been arranged into a hierarchy with verbs of sight given precedence over verbs of hearing. It would seem, therefore, that a persistence to vision and a transience to sound is built into our perceptual activity and into our use of language.\(^{13}\)

The conceptualization of the vision / sound dialectic through the distinction between the permanence of vision and the transience of sound is a fundamental assumption for my investigation on film sound. The immanent and permanent aspect of vision concerns not only how something is perceived in the present, but also in the future: objects of vision (written and visual works of art above all) are transmissible to the future, so they have to be transmitted as witnesses of the past. On the other hand, the transitory aspect of sound relegates sound forms to the present, and thus ties them to the past instead of the future, since sound events do not persist over time. The development of different forms of musical notation allowed music to be coded and partially transmitted (as a structural form) to the future, but music still remained bound to live performance: the sound event was therefore condemned to oblivion before the use of recording media.

The introduction of audiovisual recording media, starting with the phonograph and cinematograph, put the distinction between the permanence of vision and the transience of sound into question. Thanks to the phonograph, sound events become permanent in the future, since a sound event recorded on media carriers becomes reproducible and playable multiple times after the performance. On the other hand, with the cinematograph image representations assume the character of transition becoming moving images and integrating the time dimension. Film in fact consists of a series of single images recorded on a carrier that allows them to be viewed in sequence. At a sufficient speed (16 frames per second or more), due to the phenomenon of the persistence of vision described above, the human eye perceives the images running through a projector not singularly but as a continuous flow, so that we experience the images as a representation of the movement of reality and as a reproduction of events in their duration. Considering the phonograph and cinematograph, the supposed linguistic affinity between the terms image and representation on one hand and sound and event on the other becomes critical: image representation becomes an event that takes place over time, while sound event gains a long-lasting representation through sound recording.

Nevertheless, the idea of the permanent image and transitory sound persisted in some ways even after the introduction of recording media in cultural analysis, and in particular in film studies. Considering film preservation theory, for instance, the great attention dedicated to image restoration has a counterpart in the lack of consideration for the restoration of sound. In film preservation theories, a lot of emphasis is placed on the issue of color rendition, since the colors of film can change remarkably through time due to physical and chemical decay of the film base. This attention could be interpreted, recalling Branigan’s consideration, as a consequence of the fact that color is believed to be an intrinsic characteristic of the film stock, so it has to be preserved and restored as close to the original as possible. The issue of sound preservation, on the other hand, did not gain adequate attention and dedicated study. I individuate a possible reason for this in the concept of sound transience. Film sound is believed to be transitory, evanescent, fleeting. Moreover, film sound is not considered to be an inherent characteristic of the film carrier, since the way it is perceived and experienced greatly depends on the space.

14 The emergence of cinema as a mean of capturing the time dimension, and its consequences in the cultural domain, are elaborated in Marie Anne Doane, The Emergence of Cinematic Time. Modernity, Contingency, The Archive (Cambridge-London: Harvard University Press, 2002).
and amplification of the specific venue. These considerations make film sound appear less important, or more difficult, to preserve in its original form in comparison to the image.

**Film Sound: Lost in Transience**

Before the introduction of recording media, the social context of celebrating sound in its different forms (voice, noise and music) was the field of performance arts and spectacles, from the high-brow theatre to the low-brow vaudeville and fair exhibition. It was exactly in these contexts – theatres, vaudevilles, fairs, and exhibitions – cinema became a popular form of entertainment. Therefore, not surprisingly, early cinema was filled with live sounds (barkers’ commentaries, live dubbing, music and sound effects). Despite the presence of these multiple forms of sound, early cinema has been for long time, and to some respects still is, labeled as *silent* cinema: this label persists even though most theorists and historians today agree that film has never been silent and that sound has been an essential part of film exhibition already in early cinema.\(^{15}\)

Although the first attempts to add recorded sound to moving images dates back to the very beginning of cinema, in the traditional narration of film history sound is generally recognized as part of cinema starting from the so called “coming of sound” in the late 1920s. This period marked the introduction of synchronized and standardized film sound, which was obtained by optically recording a synchronized sound track on the film strip alongside the image, running at a standard 24 frames per second projection speed. The “coming of sound” is certainly one of the more studied aspects of film sound.\(^{16}\) Aside from this period, the dimension of sound was not adequately covered in film studies. Film sound theorist Rick Altman critically notes that “[e]ven the massive research devoted to the conversion from silent to sound film reinforces the sideshow

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\(^{15}\) See among others Rick Altman, *Silent Film Sound* (New York: Columbia University Press, 2004).

nature of the most work on sound: only at the odd moments when sound appears as a novelty or a freak is it fully worthy of our attention.”

The underestimation or neglect of sound in film studies can be read as the counterpart of the hegemony of the visual. In order to identify this phenomenon, it is productive to return to language: is there an ocular permeation of language, as previously described by Martin Jay, also in film studies? Is the language of film studies orientated towards a visual semantic? The answer is affirmative for many film sound theorists, including Rick Altman:

The source of the image’s current dominance is closely linked to the vocabulary developed by three-quarters of a century of film critics. With few exceptions film terminology is camera-oriented. The distance of the camera from its object, its vertical attitude, horizontal movement, lens, and focus all depend quite specifically on the camera’s characteristics and provide the field of cinema studies with a basic language. Another sets of terms concentrates on the noncamera aspect of the film visual component: film stock, punctuation, aspect ratio, lighting, special effects and so forth. While these terms and many others constitute part of any introductory film course, the corresponding audio terms remain virtually unknown. The type and placement of microphones, methods of recording sound, mixing practices, loudspeakers varieties, and many other fundamental considerations are the province of a few specialists.

Sound is not only mainly absent in the use of language, but is also not considered to be a primary subject of study: “Like its vocabulary, film criticism’s problematics have remained consistently visual in nature. Outside of a spate of reaction to the coming of sound, the concerns of the soundtrack have remained excluded from the nodal points of film criticism.” Altman argues that film historians, theorists and critics have studied film principally as a visual form either for historical reasons, since cinema was introduced in the social sphere as a medium to record moving images, or for ideological reasons, which supports the belief that film is essentially a visual medium and that the images are the primary transmitters of meaning.

17 Rick Altman, Silent Film Sound, 6.
19 Ibid.
20 Rick Altman, Silent Film Sound, 6.
In light of this observation, sound is researched just as a subject of film studies—similar to genre, gender, national cinema—not the subject of study: this means that sound is considered as a secondary component of the cinematic experience. It is almost impossible to analyze a film without talking about images, but it is very common that sound is not even mentioned. This happens despite the fact that, as demonstrated by Chion’s cut out the sound experiment, sound contributes heavily to the interpretation and meaning attributed to a film. According to Chion, sound has an added value, “the expressive and informative value with which a 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.” The value of sound is difficult to detect and define, though, as proved again by the use of language. Edward Branigan recalls film theorist Christian Metz’s thoughts on this subject:

Metz holds that all perception derives from the naming function of verbal language. When we see a “lamp” and can name it, the identification is complete and all that could be added would be merely adjectival—a “tall, reading” lamp. When we hear and name a sound, however, the identification remains incomplete. A “whistling” sound still needs to be specified: the whistling of what? from where? The whistling of the wind in the trees from across the river. According to Metz, sounds function as adjectives which merely describe or characterize substances which are fundamentally visual and properly named by a noun. This is true even if our identification of a sound happens to be expressed linguistically as a noun: “I heard the whistling.” Again, who or what is making the whistling sound? Metz traces this notion of sound and vision to the subject–predicate structure of Indo-European languages and to the Western philosophic tradition.

Considering this to be a valid reading of vision as linked to noun and subject while sound is adjectival and needs further specification, it is possible to state that the process of naming and making sound a subject in film theory is still not complete.

In order to identify when and how film sound became “a subject” of study I now briefly trace the history of film sound studies. The first discovery of sound as a

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21 See Michel Chion, *Audio-Vision. Sound on Screen*, 4. Here Chion considers how the image and sound create a meaning together, by analyzing a sequence of *Persona* having cut out the sound and a sequence of *Les Vacances de Monsieur Hulot* having cut out the visual.

22 Ibid., 5.

“subject” of study can be detected during the late 1970s and the 1980s: as I have already noted, the first studies covered the “coming of sound” and considered the late 1920s as the establishing moment under a technological, economic, stylistic and aesthetic point of view. In the 1980s, a number of studies on film music and voice were conducted: in these studies, influenced by the disciplines of semiotics and musicology, film sound was referred to as the soundtrack and analyzed as a text composed of three elements (musical score, dialogue and sound effects). Sound was also defined mainly in terms of its semantic relationship with the text-image and the narration.

In the 1990s, new attitudes emerged due to a renewed interest in the sound of silent films and in early sound technologies. The attention shifted from the text itself, the soundtrack, to new dimensions of film sound, such as the technology used to produce and present sound and the context of reception. This shift echoed a more general revolutionary tendency in the field of film studies: the change of focus from the analysis of a particular film-text or author to the contexts (technological, economic, social) in which the film is produced and received, and the way in which these contexts changed the text itself.

Film sound was not specifically addressed by the first theorization of film preservation and archiving of the late 1980s and 1990s partly because this theorization inherited the scarce attention to sound from film studies, and partly because it was focused on the restoration of early silent cinema. Therefore, the issues faced by this

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24 See note 3.
first theorization concerned mainly the image (how to recover the original image and its colors) and the text (how to reconstruct the film textual integrity).

In the 2000s, the new academic discipline of media archaeology provided a different way of analyzing film sound. Media archaeology is one of the first approaches in media studies that recognized the importance of audio and sound on the same level as image: sound is considered not just “a” but “the” unavoidable subject of study, together with the visual image. One can detect this equal treatment in the titles of media archaeology publications, which very often refer to sound as well as to the image: for instance, Mémoires de l’ombre et du son : Une archéologie de l’audio-visuel; Gramophone, Film, Typewriter; Audiovisions: Cinema and Television as Entr’actes in History; Deep Time of the Media. Toward an Archaeology of Hearing and Seeing by Technical Means. Media theorists Erkki Huhtamo and Jussi Parikka, introducing one of the first attempts to define media archaeology, emphasize the role of a rediscovery of sound in new terms for a different type of understanding of old and new media: “How does one avoid reducing all other media to a footnote to the history of the moving image? One alternative is the recent influx of archaeologically oriented works concentrating on the audible dimension of culture and history.” Sound is unsurprisingly rehabilitated by media archaeology, since this discipline is concerned with all that is lost, forgotten, or neglected. This last consideration demonstrates that, despite increasing attention to the sound component of film, work aimed at making sound the subject of film studies is still at its beginning.


Considering the different theoretical approaches to film sound described above, I argue that much more than having been forgotten or neglected because of the sole hegemony of the visual, sound has been lost in transience: the transitory and ephemeral nature of sound, the difficulty to define it easily through a language which is very often inadequate, and the impossibility to duplicate it as an event are the main reasons for the underestimation of sound in film and film preservation studies. The consideration of sound as an element of the cinematic experience that has been lost in transience is the premise for my research. My interest in this subject increased in fact as I recognized the lack of literature and theorization on the subject of film sound in preservation theories.

Moreover, this observation led me to reflect on the concept of transience. The term transience, used in this section to describe the transitory nature of sound in comparison to the persistent nature of image, will be further elaborated in the final part of this dissertation with reference to film preservation theory. Transience is thus associated with the established term transition, which indicates the relevant and continuous transformation of the nature of media in general and of film in particular.\textsuperscript{32} Transience can be interpreted as the counterpart of transition: if the concept of transition emphasizes the introduction of new features as well as the persistence of old elements in the new form taken by film and media, the notion of transience indicates that something will be forever lost in this transition.

\textbf{Method, Sources, and Structure of the Research}

To conclude the introduction, in this section I will briefly describe the research process, its method and sources, and finally the structure of the dissertation. The core questions of the research are: What is the nature of film sound? What does it consist of? What are its core dimensions and components? How can it be conceptually defined?

I first looked for answers to these questions in film studies, but what I found were only partial answers. As I argued in the previous section, recent literature in the field demonstrates an increased attention to the sound component of film. Nevertheless, the process of \textit{naming and making sound a subject} in film theory is still not complete.

\footnotesize{\textsuperscript{32} The concept of film transition from a preservation perspective is described by Giovanna Fossati, who observes that has an “inhernently transitional nature.” Giovanna Fossati, \textit{From Grain to Pixel: The Archival Life of Film in Transition} (Amsterdam: Amsterdam University Press, 2009), 13.}
There is still a gap to be filled in the definition of film sound. The theories regarding film sound cover few dimensions, in particular the textual dimension and the technological dimension, and examine film sound by focusing on the soundtrack, considered as a static text that does not change over time. In fact, most studies focus on film sound as text, composed of music, dialogue, and sound effects, where the majority of attention was given to music. In these studies I could not find references to the little noises - cracks, clicks, hums, rustles, hisses - that can be heard while watching old movies. Yet the consideration of film sound reception and experience highlights other elements of film sound, such as these little noises in old films, which do not belong to the soundtrack and do change over time. These elements and dimensions have not yet been considered by film studies at all.

I then approached film preservation and restoration theory, searching for a more complete conceptualization of film sound. Instead, in this field as well I noted a lack of literature on film sound. Studies on film preservation mainly address the image and visual components, while only a few articles specifically discuss film sound preservation and restoration issues.\textsuperscript{33} The debate on film preservation and restoration, both in the academic and professional fields, is still image-driven and sound is rarely discussed. Even today, when the practice of restoring film sound is very common, often very invasive, and generally not documented or analyzed, there still remains a lack of literature and discussion on this topic.

Considering that the nature of film sound has yet to be fully investigated in all its core dimensions and components by both film theory and film preservation theory, I decided to directly analyze film preservation and presentation practices. At first, my personal experience with those practices at the Chace Audio, Technicolor, and Haghefilm\textsuperscript{34} film laboratories confirmed that it was there that I could find what I was looking for: the different noises of old film sound, the sound dimensions of the material carriers and the technological devices. Film preservation and presentation practices


\textsuperscript{34} Chace Audio is an audio post-production facility located in Los Angeles, specializing in film sound preservation and restoration. The Technicolor headquarters in Rome is a laboratory dedicated to film postproduction services. Haghefilm is a film laboratory in Amsterdam specialized in film restoration. As an intern, I worked at Chace Audio in 2008, at Technicolor in 2009, and at Haghefilm Foundation in 2011.
highlight features of film sound that are mostly not considered in film studies, such as
the material and performance dimensions.

Throughout this research, I intend to investigate the different dimensions of film
sound that have emerged from film sound preservation and presentation practices, as
well as their interconnections. This multidimensional approach, described in the
following paragraphs, reveals the dynamic nature of film sound, which rather than a
static object or text can be considered as an event that changes over time and through
space. The dynamic nature of film sound recalls the concept of transience, described in
the previous section: film sound changes because of the time and space where it is
experienced. There are elements that persist and others that change, while something is
always lost. In order to investigate these fluctuations, I chose to study film preservation
and presentation practices, for it is primarily these practices that demonstrate the
dynamic and transitory nature of film sound.

The dissertation is structured in five chapters. The first two chapters outline the
theoretical framework of the research. In chapters three and four I analyze the practices
of film sound preservation and presentation through relevant case studies. Finally, in
chapter five I elaborate a theoretical model for the description of film sound, a model
that can be valuable for film preservation as well as film theory. In the final part I also
argue that a new consideration of film sound in its different dimensions can be
fundamental for redefining the cinematic experience as a whole, consisting of both
visual and sound components. In elaborating a conceptual definition of film sound, I
found it productive to use ideas and concepts borrowed from different fields: film and
media theories, film preservation theories, media archaeology, fine art preservation
theory.

The first feature that emerges from preservation practices is the material
dimension of film sound, which is related to the material carrier: the nature of film
sound depends first of all on the carrier on which it is recorded. To better understand
this dimension, I will revert to fine arts preservation theory, and in particular to the
notion of material form elaborated by art critic and historian Cesare Brandi.\footnote{Cesare
as \textit{Teoria del restauro} (Torino: Giulio Einaudi Editore, 1977).} The concept of material form, discussed in the final chapter, provides the ability to describe
the relation between the material carrier and the form that film sound takes when
displayed in a particular cinematic event.
However, the carrier alone does not represent film sound: the carrier requires a technological device in order for the sound to be played: if the carrier is not played back, there is no sound to be heard. The playback device highlights the technological dimension of film sound. But the technological device alone is not sufficient, it requires a human subject to be activated and operated. The human and technological dimensions of film sound are in fact strictly interrelated. These dimensions can be interpreted in the light of sociological theories of technology.\textsuperscript{36} In particular I will interpret the human and technological dimension as defined by the interrelation between technological actors, the devices and equipments that allow the film to be produced and displayed, and the human actors, the subjects that interact with the devices.\textsuperscript{37}

To describe the interrelationship between human and technological actors, I use the concept of dispositif elaborated by film theorist Jean-Louis Baudry.\textsuperscript{38} Film presentation can be defined as a dispositif situation where human actors (the projectionist, the audience) and technological actors (the devices, such as the projector and sound diffusion system) interact and determine a network of material and symbolic relations. This concept is also applicable to film preservation, which can be defined as a dispositif situation where human actors (the preservationist, the restorer, the operator) and technological actors (the technological devices needed for preservation) interact in order to preserve the image and sound components of film. The notion of dispositif is further elaborated in chapter three in relation to film sound preservation practices.

The actions and decisions made in preservation do not only depend on the human actors and the technological actors involved. Film sound preservation and presentation practices also require an institutional dimension. These practices are in fact usually driven by institutional actors, which I indicate with the term film heritage institutions, referring to film archives, museums, and cinémathèques. To understand the institutional

\textsuperscript{36} Among these theories, I took inspiration in particular from the actor-network theory (ANT), which argues that human and non-human actors have an equal importance in determining the network relations in material-semiotic networks. As actor-network theorist Madeleine Akrich points out, “like a film script, technical objects define a framework of action together with the actors and the space in which they are supposed to act.” See Madeleine Akrich, “The De-Scription of Technical Objects,” in Shaping Technology, Building Society. Studying in Sociotechnical Change, ed. Wiebe E. Bijker and Law John (Cambridge, Mass: MIT Press, 1992), 208. Similarly, it can be stated that in film preservation human and technological actors have equal importance in defining how the sound of the past is presented in the present and preserved for the future.

\textsuperscript{37} The use of the term “actor” is also influenced by actor-network theory. See Bruno Latour, Science in Action: How to Follow Scientists and Engineers Through Society (Milton Keynes: Open University Press, 1987).

\textsuperscript{38} Baudry distinguishes between appareil de base, the set of apparatuses used for film production and projection, and the dispositif, which refers to the screening situation, and include also the audience. See Jean-Louis Baudry, L’Effet cinéma (Paris: Albatros, 1978), 31.
dimension and the role of film heritage institutions in film sound preservation and presentation, I refer to new developments in film preservation theory, and in particular to the analysis of the role of collective agencies and institutional groups made by film curator and film scholar Giovanna Fossati.39

The investigation of film sound presentation practices brings us to a final point: the reception of film sound by the audience. This reception is described as part of two domains: the audience’s experience and memory. The experiential dimension regards how film sound is perceived and experienced by the audience in a particular cinematic event. To understand this aspect, I use the concept of soundscape elaborated by Schafer.40 The soundscape of film exhibition is the acoustic field of the audience’s experience. This soundscape is not determined solely by the film sound recorded on the carrier, but it is also affected by the dispositif (the playback and amplification devices), the physical configuration of the space and its acoustics, and the institutional context. Both the institutional and experiential dimensions in particular will be examined in chapter four, through the analysis of film sound presentation practices.

Finally, film sound is not just what we hear in the moment of perception, but also what we remember to have heard in the past. The memorial dimension refers to how film sound enters the domain of individual and cultural memory. To clarify this point, in chapter one I elaborate the notion of film sound souvenirs, drawing on Schafer’s suggestion of sound souvenirs.41 Since film sound is usually experienced in collective events, it becomes part not only of individual memory but also of collective, cultural memory.42 As part of cultural memory and cultural heritage, film sound is a cultural object that needs to be preserved, taking into account all the dimensions that I have described here.

Throughout the five chapters of this research, these multiple dimensions of film sound are investigated through a continuous interplay between theories and practices. In chapter one I discuss the memorial dimension of film sound (film sound souvenirs). I will also refer to other types of recorded sounds, such as music, to understand how recorded sounds of the past entered our cultural memory. With this purpose, I examine social practices (soundstalgia) and artistic practices (cracked sounds), where the

39 See Giovanna Fossati, From Grain to Pixel, 23.
40 Raymond Murray Schafer, The Soundscape, 7.
41 Ibid., 240.
42 For the theorization of cultural memory, see Jan Assman, Cultural Memory and Early Civilization: Writing, Remembrance, and Political Imagination (Cambridge: Cambridge University Press, 2011).
relevant concept of noise emerged as a mark of the recorded sounds of the past. This chapter highlights the cultural and social value of film sound, and justifies preservation activities by providing answers to the fundamental question: why is it important to preserve film sound?

In chapter two the memorial dimension of film sound is analyzed on a theoretical level, conceptualizing how recorded sound relates to our individual and collective memory. I elaborate on the notion of media memory, recalling Sigmund Freud’s famous mystic writing pad model and its interpretation by film historian Thomas Elsaesser.43 Related to the concept of media memory, I define the notion of audiovisual trace, which helps to understand on a theoretical level how film as trace can become part of cultural memory. The trace refers in fact to the physical trace, the inscription of visual and aural data on a carrier, but also to a mnemic trace, intended as the trace that a film leaves in cultural memory. In this chapter I also give a first theoretical definition of the main objects of this research: film sound, preservation, presentation, and film heritage institutions.

The following two chapters are dedicated to analyzing case studies that involve film sound preservation and presentation practices. The main questions are: how is film sound preserved and presented and how can the analysis of preservation and presentation practices contribute to a definition of film sound? In chapter three I consider as a case study the preservation of early sound systems, focusing on the Biophon, Chronophone, Phono-Cinéma-Théâtre, and Vitaphone systems. The choice of early sound systems is relevant for two reasons. First, these systems date from before the so-called “coming of sound” of the late 1920s: this aspect raises the question of why these systems were not considered as part of the sound period in film historiography, and what is the consequent conception of sound sustained by film historiography. The analysis of these systems can offer some answers to these questions. As a second factor, these systems are characterized by the separation of image and sound in two different carriers: the image is recorded on film while sound is recorded on disc or cylinder. The restoration of these films is a relevant case for defining sound preservation: the rejoining and synchronization of image and sound pose specific problems that highlight the material, human, and technological dimension of film sound. These dimensions are

analyzed through the identification of the following film sound elements: the material carrier, the technological device, the human actor, and the *dipositif*.

Chapter four focuses on film sound presentation practices, investigating the institutional and experiential dimension of film sound. I analyze the case of the EYE Film Institute Netherlands, an institute with an experimental tradition in film sound presentation. I consider how film sound was presented in this institution in the past and at present. Here, particular attention is given to the auditory perception and experience. Using the concept of *soundscape*, I investigate how film sound is perceived and experienced in the new building, and how the space and institutional context influence film sound experience.

In light of the socio-cultural and theoretical considerations on film sound made in the first two chapters and of the case studies analyzed in the third and fourth, chapter five presents a theoretical model for film sound. On one hand, this model contributes to film theory, since it helps to define the dynamic and transitory nature of film sound, its different dimensions, and the interrelations between the different dimensions. On the other hand, the model can serve as a potential tool for arriving at and interpreting decisions in preservation and presentation practices, through the identification of the relevant aspects of film sound that are to be considered when preserving or exhibiting film heritage.

The theoretical model will explain and illustrate in theoretical terms all the different dimensions of film sound that emerged from preservation and presentation practices analyzed in the case studies: the material, human, technological, institutional, experiential, and memorial dimensions. With the aim of including all these dimensions, the definition of film sound is constructed on three conceptual nucleuses: *material form*, *trace*, and *performance*. The concept of *film sound as material form* defines the material, human and technological dimensions of film sound; this concept in fact includes the interrelation of the film’s material carrier, the film’s text and the film’s *dispositif* composed of human and technological actors. The concept of *film sound as performance* relates to the experiential and institutional dimensions of film sound, how film sound heritage is presented and how it is perceived and experienced by the audience in a cinematic event. Finally, the concept of *film sound as trace* refers to the memorial dimension of film sound, how film sound relates to individual and cultural memory.
In the perspective of film preservation and presentation, the three key concepts can be described in their interrelations through a biaxial model. The x-axis, related to the dimensions of experience and space, is defined by the concepts of *film (sound) as material form* and *performance*. The y-axis, linked to the dimensions of time and memory, is designated by *film (sound) as trace*. This double axis model can be interpreted as the field of action of film preservation and presentation. Although principally informed by an analysis of film sound preservation and presentation practices, the biaxial model can be used to describe the preservation and presentation of film in general, considering not only the sound but also the image, as will be discussed in the final part of the research.

In order to examine and understand the various dimensions and elements that emerge in the field of film sound preservation and presentation, I begin with investigating the dimension of film sound that exemplarily reveals the transitory yet simultaneously permanent nature of film sound: film sound souvenirs.