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Table of Contents

Introduction 1

The Hegemony and Permanence of the Visual 2
Film Sound: Lost in Transience 8
Method, Sources, and Structure of the Research 13

1. Recorded Sound Souvenirs

1.1 Film Sound Souvenirs 21
1.2 *Soundstalgia* 28
1.3 Noise and High Fidelity 33
1.4 Cracked Sounds 39

2. Film Sound Traces

2.1 Media Memory 47
2.2 Audiovisual Traces 51
2.3 Film Sound, Preservation, and Presentation 57
2.4 The Work of Film Heritage Institutions 60

3. Film Sound Preservation: Early Sound Systems

3.1 Film Sound Preservation 65
3.2 Early Sound Systems 67
3.3 *Tonbilder* Carriers, *Dispositifs*, Texts, and Exhibition 70
3.4 The Preservation of *Tonbilder* films 82
3.5 Synchronization, Sound Reconstruction, and Denoise 87
3.6 The *Phono-Cinéma-Théâtre* and the *Chronophone* Systems 95
3.7 The *Vitaphone* System 100
3.8 Conclusion: Preserving Film Sound Traces 106

4. Film Sound Presentation: Space and Institutional Context

4.1 Film Sound Presentation 109
4.2 Sound in Early Films: Experiments between Preservation and Presentation 112
4.3 The Case of the EYE Film Institute Netherlands 119
4.4 An Experimental Tradition in Film Sound Presentation 122
4.5 A New Space for Presentation 127
4.6 Film Sound Presentation: Sounds in Spaces 130
4.7 Spaces for Presentation: Cinemas and Exhibition 136
4.8 Spaces for Access: *Panorama*, *Pods*, *Arena* and the Web 141
4.9 Conclusion: Presenting Film Sound in Space and Institutional Context 145

5. Film Sound in Theory, Preservation, and Presentation

5.1 A Biaxial Model 149
5.2 Film Sound as Trace 152
5.3 Film Sound as Performance 158
5.4 Film Sound as Material Form 162
5.5 Preservation and Presentation of Film Sound: Between Experience and Memory 170

Conclusion 179

Bibliography 185
List of Electronic Sources 203
Figures 205
List of figures 233
Acknowledgments 237
Curriculum Vitae 239
Summary 241
Samenvatting (Dutch summary) 245

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*

[1] See among others Harry M. Geduld, *The Birth of the Talkies: from Edison to Jonson*, (Bloomington: Indiana University Press, 1975); Evan W. Cameron, William F. Wilbert, and Joans-Evans Cameron, *Sound and the Cinema. The Coming of Sound to American Film* (New York: Redgrave Publishing Company, 1980).
[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

[3] For an investigation of the hegemony of the visual in Western culture, see David Michael Levin, ed., *Modernity and the Hegemony of Vision* (Berkeley and Los Angeles: University of California Press, 1993), and Martin Jay, *Downcast Eyes: The Denigration of Vision in Twentieth-Century French Thought* (Berkeley and Los Angeles: University of California Press, 1993).

[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.

[6] Karin Bijsterveld, *Mechanical Sound. Technology, Culture, and Public Problems of Noise in the Twentieth Century* (Cambridge Massachusetts: MIT Press, 2008), 2.

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

[7] Ibid.
[8] Raymond Murray Schafer, *The Soundscape: Our Sonic Environment and the Tuning of the World* (Rochester: Destiny Books, 1994), 11.
[9] Ibid., 7.
[10] Refer to Hans Blumenberg, "Light as Metaphor for Truth," in *Modernity and the Hegemony of Vision*, ed. David Michael Levin (Berkeley and Los Angeles: University of California Press, 1993).

> 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.[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 *hegemony of the visual* detected in language and culture can be related to what is defined as *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:

> 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.[12]

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

[11] Ibid., 10.
[12] Paul Read, and Mark-Paul Meyer, *Restoration of Motion Picture Film* (Oxford: Butterworth-Heinemann, 2000), 11.

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.

[13] Edward Branigan, "Sound and Epistemology in Film," *The Journal of Aesthetics and Art Criticism* 47 (Fall 1989): 311.

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.[14] 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

[15] See among others Rick Altman, *Silent Film Sound* (New York: Columbia University Press, 2004).
[16] See among others Douglas Gomery, "The Coming of Sound: Technological Change in the American Film Industry," in *Film Sound Theory and Practice*, eds. Elisabeth Weis and John Belton (New York: Columbia University Press, 1985); Adam Williams, "Historical and Theoretical Issues in the Coming of Recorded Sound to the Cinema," in *Sound Theory/Sound Practice*, ed. Rick Altman (New York: Routledge, 1992); Douglas Gomery, *The Coming of Sound: A History* (New York: Routledge, 2005).

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."[17]

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.[18]

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."[19] 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.[20]

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[17] Rick Altman, *Silent Film Sound*, 6.
[18] Rick Altman, "The Evolution of Sound Technology," in *Film Sound Theory and Practice*, ed. Elisabeth Weis, John Belton (New York: Columbia University Press, 1985), 44.
[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 of a film.[21] 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."[22] 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.[23]

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

[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.
[23] Edward Branigan, "Sound and Epistemology in Film," 4.

"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"[24] 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).[25] 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.[26] 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.[27] 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.[28]

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.[29] Therefore, the issues faced by this

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[24] See note 3.

[25] See among others Mary Ann Doane, "The Voice in the Cinema: the Articulation of Body and Space," *Cinema/Sound: Yale French Studies*, no. 60 (1980); Michel Chion, *La Voix au cinéma* (Paris: Cahiers du Cinéma, Editions de l'Etoile, 1982); Michel Chion, *Le Son au cinéma* (Paris: Cahiers du Cinéma, Editions de l'Etoile, 1985); Michel Chion, *L'Audiovision. Son et image au cinéma* (Paris: Ed. Nathan, 1990); Ennio Simeon, *Manuale di Storia della Musica nel cinema* (Milano: Rugginenti Editore, 2006).

[26] See among others Gillian B. Anderson, *Music for Silent Films (1894-1929): A Guide* (Washington, DC: Library of Congress, 1988); Scott Eyeman, *The Speed of Sound: Hollywood and the Talkie Revolution, 1926-1930* (London: Johns Hopkins University Press, 1999); Richard Abel and Rick Altman, eds., *The Sounds of Early Cinema* (Bloomington: Indiana University Press, 2001); Douglas Gomery, *The Coming of Sound*; Rick Altman, *Silent Film Sound*.

[27] See among others Elisabeth Weis and John Belton, eds., *Film Sound Theory and Practice*; Rick Altman, ed., *Sound Theory/Sound Practice* (1992); Mario Calzini, *Storia tecnica del film e del disco. Due invenzioni una sola avventura* (Bologna: Cappelli, 1991); Barry Salt, *Film Style and Technology: History and Analysis* (London: Starword, 1992); Leo Enticknap, "Sound," in *Moving Image Technology: From Zoetrope to Digital*, id. (London and New York: Wallflower, 2005).

[28] Altman proposes this change of perspective from a text-centred approach to a multidimensional consideration of cinema. See Rick Altman, "General Introduction: Cinema as Event," in *Sound Theory/Sound Practice*.

[29] See the first publications addressing the issue of film preservation: *The Preservation of Motion Picture Film: Handling, Storage, Identification* (Los Angeles: Hollywood Museum, 1984); Paolo Cherchi Usai, ed., "Film da salvare: guida al restauro e alla conservazione," *Comunicazione di Massa* 3 (1985); Vincent Pinel, "La Restauration," *La Cinémathèque Française* 4 (1985); Raymond Borde, "Film Restoration:

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*..[30] 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."[31] 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.

Ethical Problems," *Archives* 1 (1986); Eileen Bowser, "Alcuni principi del restauro del film," *Griffithiana* 38/39 (1990); Michele Canosa, ed., "La Tradizione del Film. Testo, filologia, restauro," *Cinema & Cinema* 63 (1992); Michele Canosa, Gian Luca Farinelli, and Nicola Mozzanti, "Nero su bianco. Note sul restauro cinematografico: la documentazione," *Cinegrafie* 10 (1997); Gian Luca Farinelli and Nicola Mazzanti, *Il cinema ritrovato. Teoria e metodologia del restauro cinematografico* (Bologna: Grafis Edizioni, 1994).

[30] Jacques Perriault, *Mémoires de l'ombre et du son : Une archéologie de l'audio-visuel* (Paris: Flammarion, 1981); Friedrich A. Kittler, *Gramophone, Film, Typewriter* (Stanford, CA: Stanford University Press, 1999), originally published as *Grammophon Film Typewriter* (Berlin: Brinkmann & Bose, 1986); Siegfried Zielinski, *Audiovisions: Cinema and Television as Entr'actes in History* (Amsterdam: Amsterdam University Press, 1999), originally published as *Audiovisionen. Kino und Fernsehen als Zwishenspiele in der Geschichte* (Reinbeck bei Hamburg: Rowohlt Verlag, 1989); Siegfried Zielinski, *Deep Time of the Media. Toward an Archaeology of Hearing and Seeing by Technical Means* (Cambridge, MA: MIT Press, 2008), originally published as *Archäologie der Medien: Zur Tiefenzeit des technischen Hörens und Sehens Geschichte* (Reinbeck bei Hamburg: Rowohlt Verlag, 2002).

[31] Erkki Huhtamo and Jussi Parikka, "Introduction," in *Media Archaeology. Approaches, Applications, and Implications*, eds. Erkki Huhtamo, Jussi Parikka (Berkeley and Los Angeles, CA: University of California Press, 2011), 13.

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.[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.

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 *naming and making sound a subject* in film theory is still not complete.

[32] The concept of film transition from a preservation perspective is described by Giovanna Fossati, who observes that has an "inherently transitional nature." Giovanna Fossati, *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.[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[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

[33] See Jean Pierre Verscheure, "The challenge of sound restoration from 1927 to digital," *Film History* 7, no. 3 (1995); Claude Lerouge and Richard Billeaud, "Steps, Techniques, and Ethics of Sound Restoration," in *The Use of New Technologies Applied to Film Restoration: Technical and Ethical Problems*, ed. Gamma Group (Bologna: Gamma, 1996); Paul Read and Mark-Paul Meyer, "Restoration of Film Sound," in *Restoration of Motion Picture Film*; Robert S. Birchard, "Saving Sound Tracks," *American Cinematographer* (Sept. 2007).

[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 has 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.[35] 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.

[35] Cesare Brandi, *Theory of Restoration*, (Firenze, Nardini Editore, 2005). Originally published as *Teoria del restauro* (Torino: Giulio Einaudi Editore, 1977).

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.[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.[37]

To describe the interrelationship between human and technological actors, I use the concept of *dispositif* elaborated by film theorist Jean-Louis Baudry.[38] Film presentation can be defined as a *dispostif* 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

[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.

[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).

[38] Baudry distinguishes between *appareil de base*, the set of apparatuses used for film production and projection, and the *dipositif*, 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

[43] Thomas Elsaesser, "Freud and the Technical Media: The Enduring Magic of the Wunderblock," in *Media Archaeology. Approaches, Applications, and Implications*, eds. Erkki Huhtamo, Jussi Parikka, 95-115.

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.

CHAPTER 1.
Recorded Sound Souvenirs

1.1 Film Sound Souvenirs

This chapter investigates the socio-cultural value of audiovisual heritage. Before addressing the key object of this research, film sound in preservation and presentation, it is necessary to ask: why is it important to preserve film sound in the first place? This question, far from being just spurious or rhetorical, is fundamental not only to this research, but also, and more generally, to work involving the preservation of audiovisual heritage.

While trying to articulate a simple, essential and effective answer to this question, I remembered the words of a female voice saying: "Lost at the end of the world on my island, Sal, in the company of my dogs strutting around, I remember that January in Tokyo, or rather I remember the images I filmed in Tokyo in January. They have now put themselves in place of my memory, they are my memory. I wonder how people who do not film, take photos, or record tapes, remember, how humankind used to go about remembering. I know: it wrote the Bible. The new Bible will be an eternal magnetic tape of a time that will have to reread itself constantly just to know it existed."[44] However, I could not remember which images accompanied this voice: the temple dedicated to cats in the suburbs of Tokyo, or the look in the camera of the women in Guinea Bissau, or maybe the protest against the Narita airport in the 1960s. What I could clearly remember was the calmness of the voice of that woman reading the letters of Sandor Krasna, the alter ego of Chris Marker, at the end of *Sans Soleil* (1982): "I remember that January in Tokyo, or rather I remember the images I filmed in Tokyo in

[44] Chris Marker, *Sans Soleil* [DVD], New York: Criterion, 2007. English translation from the original French: "Perdu au bout du monde, sur mon île de Sal, en compagnie de mes chiens tout farauds, je me souviens de ce mois de janvier à Tokyo, ou plutôt je me souviens des images que j'ai filmées au mois de janvier à Tokyo. Elles se sont substituées maintenant à ma mémoire, elles sont ma mémoire. Je me demande comment se souviennent les gens qui ne filment pas, qui ne photographient pas, qui ne magnétoscopent pas, comment faisait l'humanité pour se souvenir... Je sais, elle écrivait la Bible. La nouvelle Bible, ce sera l'éternelle bande magnétique d'un Temps qui devra sans cesse se relire pour seulement savoir qu'il a existé."

January. They have now put themselves in place of my memory, they are my memory." These words alone offer a simple and essential explanation of the necessity of preserving audiovisual heritage, which lies in the need to preserve our memories. These words seem to suggest that our memories are not only mediated, but also shaped, if not created, by the use of recording media to the extent that the recorded images and sounds themselves become our memories. The survival of recorded images and sounds, thus, has become a method of guaranteeing the persistence of our individual as well as collective memories. By recording our memories, audiovisual documents contribute to the construction of our individual as well as collective identities, since the way we perceive and express our identity is strongly influenced by the narrative of our past.[45]

Furthermore, two levels of memorial mediation are at play here. Firstly, Chris Marker's memories about Tokyo are mediated by the images he filmed while in the city, and secondly, my memory of the film *Sans Soleil* is mediated by the female voice reading Krasna-Marker's letters. This voice has become part of my personal *film sound souvenirs*. In defining the concept of film sound souvenirs, I refer to the idea of *sound souvenirs* as outlined by Raymond Murray Schafer:[46] to clarify the concept of "soundmark," a sound characterizing a particular community, Schafer remembered some "soundmarks" from his own memory, such as "the brilliant slam of the doors of the old carriages of the Paris Métro, followed by a sharp click," or "the virtuoso drumming of the Austrian bureaucrats with their long-handled rubber stamps."[47] He concludes: "The world is full of uncounterfeiting and uncounterfeitable *sound souvenirs* such as these, indelible for the aurally sensitive tourist, and always in need of protection against replacement by duds from multinational factories."[48]

Even if Schafer does not go deeper in defining the concept of *sound souvenirs*, he recognizes the value of sounds to our individual and collective memory. Sound indeed has a particular value for our memories, which can also be grasped by comparing sound memories to visual memories, as Carolyn Birdsall does by exploring the concept of "earwitnessing" and the role of sound in personal and social contexts of remembering:

> In juxtaposition to visual memories, it is important to establish that sound (as echo) tends

[45] On this subject see among others José van Dijck, *Mediated Memories in the Digital Age* (Stanford, CA: Stanford University Press, 2007).
[46] Raymond Murray Schafer, *The Soundscape*, 91.
[47] Ibid., 240.
[48] Ibid.

> towards an indexical, rather than an iconographic relationship to remembering. Rather than fixing a determined linear narrative or image, sounds can be drawn upon to prompt certain moods or feelings. These echoed sound memories can be actively used for memory recall or can unexpectedly – and sometimes unintentionally – evoke the context and feelings associated with a past era.[49]

Among all the natural and artificial sounds that constitute the sonic environments in which we live, this research focuses on recorded sounds. Recorded sounds assume a particular value for our daily experience, individual and cultural memory. The form of recorded sound that primarily affects our memories and the construction of our identities is recorded music: we have personal memories related to particular tunes and songs, and we often use music to talk about ourselves, our moods and our past.

Recorded music came to be part of our daily experience due to the mobilization of music listening, which started with portable record players, portable radios, walkmans and stereo headphones in the 1980s. In present day most digital portable devices that we always carry with us in our everyday life, such as mobile phones and personal computers, have a music player function: this gave us the possibility to always potentially be immersed in a personal music environment.

The need and desire to have our favorite music close at hand is perceived as so urgent and important that it can be extended after death: the Swedish company Pause has recently marketed a coffin, the CataCombo Sound System,[50] that has a built-in hi-fi system that plays music for the deceased. The sounds and music can be chosen by the deceased's relatives online using a Spotify-based[51] system. The marketability of such a product is based on a supposed desire to enjoy music and songs once we pass away, as if *sound souvenirs* are considered to be a necessary accompaniment to be taken with us to the grave similar to an ancient burial ritual. Although exceptional, this example suggests recorded sounds are socially considered to be a key element for the definition and survival of people's memories and identities in contemporary times.

Recorded sounds are important not only for our individual memory and personal narrations, but also for collective memory. From the first appearance of the first sound

[49] Carolyn J. Birdsall, "Between Noise and Silence: Sound, Technology and Urban Space during Nazi Germany," PhD Dissertation, Universiteit van Amsterdam, 2010, 208.
[50] See http://catacombosoundsystem.com/, accessed April 2013.
[51] Spotify is a music streaming service system that allows access to a library of, at the time of writing, approximately 20 millions songs.

recording media, the phonograph and the gramophone, the scientific community has also used recorded sounds for documentary purposes; for example, anthropologists and ethnomusicologists used these devices to document exotic languages and music. In Germany, the *Königlich Preußische Phonographische Kommission*, a scientific committee headed by Carl Stumpf, was established to study and document foreign languages by recording the colonial soldiers imprisoned in German war camps during the First World War. Within this scientific and military context, the recordings were used for two aims: first, for the analysis and study of the languages, and second, in order to build an archive of voices of the populations. This collection, named *Stimmen der Völker*, consisted of recordings of around 250 different languages; the shellac discs of these recordings were collected and stored in the Berliner Lautarchiv.[52]

The value of this collection with regard to collective memory can be read on two levels. On one hand, the collection has historical and documentary value with respect to colonial cultures, since it comprises the first sound recordings of many African, Indian and Asian languages. On the other hand, the value of this collection extends to European and German culture, since the discs testify to the practice and attitude of the scientists and how they approached and studied colonial cultures. An example of this attitude can be found in the words of Erich von Hornbostel, the Austrian ethnomusicologist working with Carl Stumpf: "it is possible to fix the chaos of exotic music assailing European ears by first interpolating a phonograph, which is able to record this chaos in real time and then replay it in slow motion."[53] As this example shows, the values and meaning for collective memory attached to sound recordings are different according to the culture that plays, hears and interprets them.

Another important example of the value of recorded sound for collective memory, this time in the light of historiographical research, can be found in the documentation of the International Military Tribunal (IMT) at Nuremberg, which was the process organized to hold leaders of the Nazi's political and military apparatuses accountable for their actions during World War II. The whole process was recorded in two forms: as written transcripts (the official documentation of the proceedings with legal status) and as audio recordings (on tapes and discs). Audio recording was a new procedure in court rooms at this time, and it was decided that recordings would help facilitate the

[52] For more information, see http://publicus.culture.hu-berlin.de/lautarchiv/bestaende.htm, accessed April 2013.
[53] Erich von Hornbostel, cited in Friedrich Kittler, *Gramophone, Film, Typewriter*, 4.

functionality of the trial, since it was the first international criminal tribunal to involve people speaking four different languages (English, German, French, Russian). The audio recordings were used during the trial to compare the transcripts and verify if the translations were accurate. After the process, it was decided that these recordings were to be kept even though the proceedings were published in forty-two written volumes in order to make them accessible to a wider public.[54]

This example poses some questions: why was it necessary to preserve the audio recordings, since the testimonies given during the trial were transcribed and published? In other words, what do the audio recordings add to the transcripts? An answer to these questions is given by Anne van Es, who investigated the specific value of the audio recordings compared to the transcripts in order to demonstrate that the audio recordings have an added value and should therefore be preserved, digitized and made accessible to the public. According to Van Es, the audio recordings convey some aspects of the liveness of the event: the performance, emotions and attitude of the protagonists of the trial, the intonation of voices, the moments of silence, the response of the audience present in the court, the emotional reactions as laughs or cries.[55] All of these aspects, which give interesting information on how testimonies were given and experienced, are lost in the transcripts. Van Es believes that "preserving the sound recordings of the IMT proceedings is to preserve the liveness of the trial, an experience of being physically present at the proceedings with its expressed nuances of meaning."[56] The sound recordings give access to the live performance aspects of the trial, which are lost in the transcripts. The example of the Nuremberg Trials maintains the idea that recorded sounds have a specific value for collective memory, which is different from other forms of recording events (writings, photos, films): different media records convey different aspects of an event. Therefore it is important to preserve the diverse records in order to preserve memory of the event in all of its facets.

The previous two examples show the use and value of sound recordings as documents for research in fields such as historiography, musicology, ethnography, and their role in the construction of collective memory narrations. It should be considered that, even if the discs of the *Stimmen der Völker* collection and the recordings of the

[54] Trial of the Major War Criminals before the International Military Tribunal 42 vols. International Military Tribunal (Nuremberg 1947-1949) - the 'Blue Series' / IMT.
[55] See Anne M. van Es, "Audio Dimensions of the International Military Tribunal at Nuremberg, 1945-1946," 58, Mater Thesis, Universiteit van Amsterdam, 2007.
[56] Ibid., 60.

Nuremberg Trials are stored in public archives, they are consulted by a relatively limited number of people, mainly researchers, because of their specific nature and content. However, the process of reassigning memorial value to the sound recordings regards the majority of people if we broaden the discourse from unique archival documents to commercial music or other popular audio recordings.

The pervasive use of audio technologies in everyday life, which has exponentially increased in the last fifty years, has had a central role in universalizing the importance of recorded sound for individual and collective memory. The relation between audio technologies and cultural practices of remembering has been recently examined in the publication *Sound Souvenirs: Audio Technologies, Memory and Cultural Practices*, edited by historian Karin Bijsterveld and media scholar José van Dijck. The definition of audio technologies as "artefacts that enable people to listen to the sounds of the past"[57] highlights their function of prompting memories: "Technologies, especially certain audio technologies, have become an intrinsic part of our acts of remembrance, of individual and collective processes of remembering."[58] In this publication, many social phenomena regarding the use of domestic or portable audio technologies in everyday life are analyzed: radios, record players, tape and cassette recorders, hi-fi stereos and walkmans, and the more -recent digital players and mobile phones.

If the majority of academic studies that investigate the relationship between recorded sounds and memory concern music, songs, radio and home recordings, this dissertation focuses on a less-considered type of recorded sound: film sound. Like other types of recorded sounds, film sound contributes to our personal and collective memories, but in a very specific way, since film sound is consistently associated with moving images. I return here to the question that began this section: why is it important to safeguard film sound and its related memories? In the following paragraphs I elaborate a possible answer to this question on the basis of the considerations made so far concerning the value of sound for individual and collective memory and narratives.

Let me consider the extreme: what happens if the sound of a film is irreparably damaged or lost? It is possible to simulate this situation by watching a movie with the sound on mute, recalling Chion's *cut out the sound* experiment: it is not just the comprehension of dialogue that is missed, but the film as a whole is fatally lost. The

[57] Karin Bijsterveld and José van Dijck, *Sound Souvenirs: Audio Technologies, Memory and Cultural Practices* (Amsterdam: Amsterdam University Press, 2009), 14.
[58] Ibid., 15. Cultural practices are defined here as "the ways in which people are used to doing things and commonly attribute meanings to these routines." Ibid., 16.

impact of this loss on collective memory is perhaps even more evident if we consider documentary film footage: how would the collective memory have been affected if the sound of Hitler or Mussolini's filmed public discourses were lost and only the images survived? As demonstrated in the case of the Nuremberg Trials, even if the text of these discourses had survived, the collective meanings and memories attached to the discourses would have been very different if the images were not accompanied by the corresponding recorded voices, capturing their emotional impact as well as the rhetorical influence of mass media technologies. The reading, understanding, and narration of that period are widely influenced by the sounds of those public discourses.[59]

The importance of audio technologies, including loudspeakers and radio, in the propagation of 1920s' and 1930s' European dictatorships has been recognized from an early period. Hitler himself wrote in 1938: "Without motor vehicles, without airplanes and without loudspeakers we would have not conquered Germany!"[60] With regard to this, Schafer observes that:

> We know that the territorial expansion of post-industrial sounds complemented the imperialistic ambitions of the Western nations. The loudspeaker was also invented by an imperialist, for it responded to the desire to dominate others with one's own sound. As the cry broadcasts distress, the loudspeaker communicates anxiety.[61]

The sound component of a film, be it narrative or documentary, thus plays a decisive role together with the image in defining a viewer's cinematic experience and memory of the film. Hence, it is important to preserve the sound together with the image.

Film sound can be considered as one of the many different *soundscapes* that we experience in our everyday life, recalling this notion as formulated by Schafer: "the soundscape is any acoustic field of study. We may speak of a musical composition as a soundscape, or a radio program as a soundscape or an acoustic environment as a soundscape."[62] What differentiates film sound from environmental *soundscapes*, which

[59] The *soundscape* of the Nazi Germany period is analyzed in Carolyn J. Birdsall, *Nazi Soundscapes: Sound, Technology and Urban Space in Germany, 1933-1945* (Amsterdam: Amsterdam University Press, 2012).
[60] The original words of Hitler were: "Ohne Kraftwagen, ohne Flugzeug und ohne Lautsprecher hätten wir Deutschland nicht erobert." Adolf Hitler, *Manual of the German Radio*, 1938-39.
[61] Raymond Murray Schafer, *The Soundscape*, 91.
[62] Ibid., 7.

refer to the sound of the events happening in a specific environment, is that film sound is a *soundscape* recreated by human and technological means. Firstly, film sound is not a record of the sound of reality but a record of how human beings interpreted and recreated the sound of reality through technological media. Second, film sound is a record of how humans associate these sounds with a recreated *visualscape*, the moving images. The recreated *soundscape* together with the recreated *visualscape* shape the way we experience and remember films, and become part of our personal and collective memory in the form of audiovisual heritage. Since both the *visualscape* and the *soundscape* shape the form that film takes in our perception, experience, and memory, they both need to be preserved as part of our film heritage.

1.2 *Soundstalgia*

After tracing the significance of recorded sounds, and more particularly of film sound, for individual and cultural memory, this section considers the importance of recorded sound in our everyday experience, and how it currently affects everyday life. In the frame of research on film sound preservation and presentation, it is productive to understand how images and sounds recorded in the past become part of contemporary experience and memory on an individual and collective level.

Looking at contemporary cultural and social practices, it is striking to notice how many of these practices are related to audiovisual heritage. The nostalgic recovery of cultural products of the past has been part of modern culture, but present time seems to be particularly touched by the revival of audiovisual content of the recent past. As relevant contemporary tendencies, these phenomena of nostalgia can be productively analyzed with regard to the processes of the memorial valorization of cultural products.

Simon Reynolds, who made a recollection of nostalgia practices in contemporary sound cultures, provides an incisive interpretation of these phenomena. Reynolds maintains that the first ten years of the twenty-first century can be nominated as *re*-decade, since the cultural domain was dominated by *re*vivals, *re*issues, *re*makes, *re*-enactments and *re*cycling.[63] Reynolds includes all these phenomena in what he calls

[63] See Simon Reynolds, *Retromania: Pop Culture's Addiction to Its Own Past* (New York: Faber and Faber, 2011), XI.

"retromania," which comprises phenomena that revive cultural products of the "immediate past," of "living memory:"[64]

> We've become victims of our ever-increasing capacity to store, organise, instantly access, and share vast amounts of cultural data. Not only has there never before been a society so obsessed with the cultural artifacts of its immediate past, but there has never before been a society that is *able* to access the immediate past so easily and so copiously.[65]

"Retromania" is made possible by the wide availability of these products in the market, but also by the possibility to freely and instantly access archived documentations (photographs, video, music recordings, images) of these products on the Internet. The old recording media and the new digital media create the conditions for "retromania," making accessible the cultural products of the past and other related materials. Reynolds observes that "[a]udio recordings and other types of documentation (photographic, video) not only provide retro with its raw materials, they also create the sensibility, based as it is on obsessive repeat-play of particular artifacts and focused listening that zooms in on minute stylistic details."[66] The old and new media not only make the content of the products accessible, they also create new ways of experiencing these products.

Reflecting on the "retromania" phenomena, what I find most interesting in the frame of this research is that they not only concern the content of the cultural products (a song, an image, a text), but also the technologies and the material carriers of these contents. In other words, recording media are not just the means of existence for these phenomena, but they themselves can become the object of these practices.

Within music culture, for instance, listeners not only enjoy the songs of the 1960s and 1970s, but they are also interested in the playback technologies, such as record players and hi-fi stereos, as well as the material carriers, such as vinyl records and audiocassettes. It seems that the way through which individual and cultural memory recalls the audiovisual media of the past is closely related to their material carriers and

[64] "Earlier eras had their own obsessions with antiquity, of course, from the Renaissance's veneration of Roman and Greek classicism to the Gothic movement's invocations of the medieval. But there has never been a society in human history so obsessed with the cultural artifacts of *its own immediate past*. That is what distinguishes retro from antiquarianism or history: the fascination for fashions, fads, sounds and stars that occurred within living memory." Ibid., XIII.
[65] Ibid., XXI.
[66] Ibid., XXXV.

their recording and playback devices: vinyl discs, audio cassettes, record players, tape players, and hi-fi stereos become objects of nostalgic value, and as such, they re-enter the commercial market and acquire new economic value.

In recent years, the market for vinyl records had increased remarkably, despite - or maybe because of - the music industry crisis. Vinyl discs survived the advent of magnetic tape, CDs and digital files. The market for vinyl discs was first renewed in the late 1990s thanks to collectors and professional DJs, and then in the early 2000s because of a more general public of music listeners. *Washinghton Post* journalist Caitlin Dewey observes that "[a]ccording to a new industry report, vinyl record sales in 2012 hit their highest point since 1997."[67]

Interestingly, the re-evaluation of analog technologies happened during the same decades of global diffusion of digital recording and playback formats and devices. Dewey observes that "the real reason for the digital-age popularity of such a distinctly analog item might lie right there, in that weird conceptual divide between 'real' things and the less tangible, more transient virtual ones."[68] A corresponding interpretation of this phenomenon is given in the report "The Revival of Vinyl: Back to Black" in *The Economist*: "Now that almost every track is available free on music-streaming services like Spotify or on a pirate website, music fans need something else to boast about. That limited-edition 12-inch in translucent blue vinyl will do nicely."[69]

Similarly to vinyl, the audiocassette is also returning to the commercial music market. If the return of vinyl can be justified in terms of quality because of its high-quality rendition, this is not the case of the audiocassette, since its sound quality is low compared to that of the CD. Elisa Bray, in the article "Fast Forward: and Press Play Again – Cassettes are Back" in *The Independent*, explains this recurrence as follows:

> So what is the reason for bands and record labels putting out music on cassette? For a start there's the nostalgia attached to a cassette – the romantic, rose-tinted memories of creating mixtapes for friends and lovers, and of recording favourite radio shows. […] But for many super-fans, the cassette has become a novelty collector's item for treasuring on the shelf, and it often comes with a download code. As with as the surge in vinyl sales

[67] Caitlin Dewey, "Vinyl record sales have hit their highest point since 1997," http://www.washingtonpost.com/blogs/style-blog/wp/2013/04/11/vinyl-records-are-more-popular-now-than-they-were-in-the-late-90s/, accessed April 2013.
[68] Ibid.
[69] The Economist, "The Revival of Vinyl: Back to Black," Aug 20, 2011. http://www.economist.com/node/21526296, accessed April 2013.

> over recent years, many music fans want more than just a digital download: they want their music to be tangible, with all its artwork intact. […] It is also the sound quality of a cassette that has musicians releasing songs on the old format – featuring hissing that can add to the atmosphere of the music.[70]

The recovery and recirculation of old carriers and playback devices is just one aspect of phenomena related to what can be defined, recalling Reynolds, as *retrostalgia*. Another aspect of these phenomena is the simulation of old analogue technologies in the digital domain; this occurrence can be read by analyzing which characteristics of old technologies are simulated and accentuated through digital means in order to revive analogue media.

I am referring in particular to mobile applications that enable analog characteristics to be added to digital images, thus creating a retro looking photo that recalls that appearance of photographs taken with older cameras that use film stock. One of these applications, probably the most used at the time of writing, is *Instagram*, which adds "aging" filters to digital photos, making them appear as though they were taken with an analogue camera. *Instagram* imitates some characteristics of analogue photography, such as the squared format of the Polaroid or Kodak Instamatic photos, and the look of old photos with different filters that change the values of hue and contrast for reproducing the saturated look of color film stocks of the 1960s and 1970s. Some filters add a kind of interference that alters the definition of the image, in order to simulate the grain of film stock. Other filters allow users to add a border with letters, recalling the letters printed on film stock: this detail indicates that the old style photography is simulated reproducing characteristics of the material carrier and the physicality of the film stock. The changes carried out by these aging filters are so essential and invasive that an antibody has already been developed: for example, *Normalize it* is an application that cancels the *Instagram* filters and returns the photo to its "normal" state.

The success of *Instagram* and similar applications in recent years has been remarkable worldwide, enabling this kind of retro style photography to enter the common perception and experience of mobile photography, especially since photographs taken with a mobile phone are increasingly posted on social networking

[70] Elisa Bray, "Fast Forward: and Press Play Again – Cassettes are Back," 26 Apr 2013. http://www.independent.co.uk/arts-entertainment/music/features/fast-forward--and-press-play-again-cassettes-are-back-8588768.html, accessed April 2013.

spaces. It is interesting to note that the retro analog style has become a prevalent style for mobile and sharing photography, even though the most active users in these fields, the digital born generations, have likely never used an analog camera. This suggests that *retrostalgia* does not only appeal to individual memory, involving people who actually have experience with older media, but also exists in the field of cultural memory and experience.

There are similar "retro" mobile applications for videos, like the *8 mm Vintage Camera* or the *Super 8*. These applications make digital videos look like 8 mm film and simulate the look of home movies with aging filters. In the videos, the materiality of the film carrier is recalled with different tricks: many dots, dust and scratches are added as in a dirty stock; the colors are saturated and the light is flickering; the film grain is recreated through video noise; the frame bar jumps once in a while, simulating the projection, and the perforation is also visible. A piece of video can also be added by the application in the beginning or at the end, imitating the appearance of film stock leaders with their recognizable symbols and writing. It is interesting to note that these applications alter only the image, but not the sound recording: the sound does not have a filter that simulates, for instance, the noises of the Super 8 magnetic soundtrack or at least the noise of the projector during the screening. A discord therefore exists between the old and dirty looking image and the clear and clean sound recording. This disharmony can create an alienating effect in people who are used to associating 8 mm camera projections with the noise of the projector or with the magnetic soundtrack.

All of these applications for photos or videos can be related to the *retrostalgia* phenomena, and in particular, to what can be termed *imagestalgia*, which refers to the tendency to recover or recreate the appearance of images from the past. Similarly, it is possible to identify *soundstalgia* as the tendency to recover or recreate sounds of the past. The renewed market of vinyl discs is an example of a *soundstalgic* phenomenon that focuses on the buying and collecting of vinyl discs.

These examples of *imagestalgia* and *soundstalgia* demonstrate how audiovisual heritage is continuously evoked, simulated, and recreated in present recording and playback practices. It seems that the key unifying way to evoke old audiovisual forms is by recreating the signs or marks of the technological devices and material carriers of the past. For images, this means recreating the marks of film stock (visible frame and perforation, edge codes, grain, color properties, dust and scratches) and of the projection device (jumping border line, flickering). For sounds, it means recreating the marks of

the carriers (crackle of a record, hum of a tape, click of a CD) and playback devices (the noise of the vinyl needle, the sound of a CD player loading). The noises created by the carriers and the devices seem to be easily recognized as the best indicators of old images and sounds in individual and cultural memory practices: they recall the past in a more-direct way than the text or the conceptual content of cultural products.

1.3 Noise and High Fidelity

The description of the contemporary social phenomena of *soundstalgia* calls into question to the concept of noise, which is identified as related to technological devices and material carriers. In this section, I will further investigate the concept of noise for two reasons. First, as noted in the previous section, noise seems to mark and symbolize the images and sounds of our mediated memories, and therefore concerns the field of individual and cultural memory of audiovisual heritage. Secondly, as will be further discussed in the following chapters of this dissertation, the notion of noise is a key concept in the preservation of film sound, since the work of preserving film sound deals primarily with the dimension of noise.

I begin this investigation on noise by defining the term: what is noise and how does it differentiate from sound? In order to clarify this central point of the dissertation, I recall the definition given by film restorers Paul Read and Mark-Paul Meyer, who defines sound in physical terms:

> Just like light, sounds comprise part of a much broader family of waves ranging from the vibrations caused by earthquakes, frequencies even much lower than one cycle per hour, up to ultrasound. The longitudinal waves which are perceptible to human ear are defined as being sound waves. Longitudinal waves are vibrations of matter (involving stages of compression and rarefaction) which indicate the absorption and transmission of kinetic energy transferred by any type of impact. The total amount of energy in movement, the surface area covered, and the type of vibrating movement involved (depending on the material and its shape) determine the properties of these waves. When the waves strike and penetrate different mediums, their properties vary and change through the process of reflection, refraction or diffraction. […] A longitudinal wave of any type is characterized by its frequency or period, which measure the length of one cycle, by its amplitude or

> height of the wave front, and by its intensity. […] Sounds may be of several frequencies said to be in harmony (musical notes), or not in harmony (described as noise!) with one another.[71]

The last mention of noise as a sound "not in harmony" reveals the difficulty to define noise in physical terms: harmony, in fact, is a socially constructed concept, as indicated by the differences between the Western, Indian, Asian, or African music harmonic practices.

My investigation of the concept of noise starts with the consideration of acoustic noise, which can be defined as an unwanted or unexpected sound. This statement implies a subject, the listener, who perceives a sound as unwanted, sudden, annoying, irritating, or painful. Acoustic noise is then subjective. Bijsterveld, who studied noise on a cultural level, affirms that

> […] the perception of sound is now considered to be highly subjective. Psychologists argue that whether individuals are annoyed by a specific sound is not only dependent on the characteristics of that sound, such as its loudness, frequency, or periodicity; equally relevant are one's physiological sound sensitivity and compulsivity, as well as the social context and perceived control.[72]

On the same line, Hillel Schwartz notices that "[b]y its very definition, noise is an issue less of tone or decibel than of social temperament, class background, and cultural desire, all historically [and culturally, Ed.] conditioned."[73] The definition of noise is not only subjective, but also culturally and socially constructed: what is considered noise today is different from what was considered noise ten, twenty or fifty years ago.

The cultural and social conception of noise in modern societies primarily involves mechanical noises, which from the nineteenth century came along with industrialization, mechanization, and urbanization. The invasion of mechanical noises caused the spread of what Schafer calls "low-fidelity soundscapes," which are highly noisy places, such as city streets or industrial environments:

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[71] Paul Read and Mark-Paul Meyer, *Restoration of Motion Picture Film*, 9.
[72] Karin Bijsterveld, *Mechanical Sound*, 10.
[73] Hillel Schwartz, "On Noise," in *Hearing History. A Reader*, ed. Mark M. Smith (Athens, GA: University of Georgia Press, 2004), 52.

> The hi-fi soundscape is one in which discrete sounds can be heard clearly because of the low ambient noise level. The country is generally more hi-fi than the city; night more than day; ancient times more than modern. […] In a lo-fi soundscape individual acoustic signals are obscured in an overdense population of sounds. The pellucid sound – a footstep in the snow, a church bell across the valley or an animal scurrying in the brush – is masked broad-band noise.[74]

What really defines "low-fidelity soundscapes" is the presence of mechanical sounds made by technological machines and devices (cars, tram, trains, airplanes, radios, televisions, telephones, industrial machines and so on).

Studying public problems linked to noise, Bijsterveld observes that "[m]any columnists emphasize the omnipresent sounds of today's technology: the whirring of the video tape, the hiss of the television standing by, the hum of the refrigerator, the buzz of the electricity gauge, the click of the heating pipe, and the roar of the fan."[75] Along the same lines, music editor Rob Young echoes the predominance of sounds from mechanical devices:

> Crackles, pops, pocks, combustions, gurgles, buzzes, amplitude tautening, power spikes, voltage differentials, colliding pressure fronts, patterings, jump-slices, fax connections, silent interjections, hums, murmurs, switchbacks, clunks, granulations, fragmentations, splinterings, roars and rushes have overwhelmed the soundscape.[76]

Contemporary *soundscapes* are characterized by the omnipresence of noises generated by mechanical, electric, and digital devices. Among all these noises, the ones produced by recording media devices are especially relevant in the frame of this dissertation.

Regarding the noise of recording devices, a first distinction can be made between the noise made by the devices during their functioning and the noise embedded in the devices. To define the latter typology, I recall the information theory, according to which noise is an unwanted signal (random unwanted data) or disturbance that interferes with the operation of a mechanical device or system. In this sense, noise is "irrelevant or meaningless bits or words occurring along with desired information (as in

[74] Raymond Murray Schafer, *The Soundscape*, 43.
[75] Ibid., 5.
[76] Rob Young, "Worship the glitch," *The Wire* 190/191 (1999): 52.

a computer output)"[77] as defined in the dictionary. In this frame, noise can be considered as anything extraneous to the message, as the background of information, or the backdrop to communication: it fills in the silences, and also disrupts the message. The signal-to-noise ratio indicates the corresponding relation between wanted signal and unwanted background noise, and therefore the level of comprehensible meaning of the message. In the case of audiovisual media, the noise of the technological device (signal noise) can refer to both the image and the sound. Visual noise can be the grain of the film emulsion or the "snow" in an analog video image, which is a random dot pattern of static. Audio noise can refer to the residual low level sounds, like hisses and hums, which can be heard while there is no signal in the recording. Audio noise can also indicate the broadband noise of radio receptions existing within the space between two radio stations.

Early sound recording devices, such as cylinder phonographs and gramophones, produced high-signal noise levels. In fact, the first sound recordings are perceived as very noisy and disturbing by current listeners, as can be experienced by listening to the oldest recovered recordings, like the *Phonoautograms* made by Édouard-Léon Scott de Martineville in 1860,[78] the recordings made by Thomas Edison on a phonograph tinfoil in 1878,[79] or the voice of Alexander Graham Bell recorded on cylinder wax in 1885.[80] In these recordings, the noises and crackles overwhelm the sound signal, which is almost incomprehensible to a contemporary listener's ear. Therefore, early inventors and developers of sound recording technologies aimed to increasingly reduce noise and improve the sound signal.

As these technologies became part of the music industry, the need to reduce the noise inherent to the device and improve the signal-to-noise ratio became much more pressing in the name of *sound fidelity*. Sound studies scholar Jonathan Sterne, who describes the social genesis of sound fidelity, notices that:

> Sound fidelity was, ultimately, about faith and investment in these configurations of practices, people and technologies. It posited the technology to reproduce sound as a vanishing mediator. […] They had to be convinced of the general equivalence of the live

[77] Webster's New Collegiate Dictionary (Springfield: G. and C. Merriam, 1973), s.v.
[78] See http://www.firstsounds.org/sounds/scott.php, accessed April 2013.
[79] See http://www.nydailynews.com/new-york/soundtrack-history-1878-recording-unveiled-including-world-blooper-article-1.1191864, accessed April 2013.
[80] See http://www.wired.co.uk/news/archive/2013-04/26/hear-alexander-graham-bell, accessed April 2013.

> and the reproduced. Even when the sounds of sound-reproduction technologies were explicitly discussed, it was with an eye toward finding new ways for the medium to erase itself.[81]

The recording industry embraced what I would define as the *ideology of sound fidelity* and the *transparency of the medium*: the development of sound recording media followed the path of a progressive reduction of noise inherent to the recording and playback devices, and higher fidelity became a major selling point of new technologies. For instance, a 1929 advertisement for Lee De Forest's *Audion*, an electronic amplifying tube that served as the first amplifying radio receiver, declares "No hum, No buzz, No crackle!" (fig.1). Hum, buzz and crackle are the kind of noises inherent to the devices that the industry was trying to reduce in the development of new products. Technological development was driven by the assumption that there are some dirty or cracked sounds that prevent a clean sound from being perceived. Therefore the industry's objective was to reduce the cracked sound as much as possible in order to come closer – have more *fidelity* – to an ideal sound cleaned of the noises of the device. This assumption implicitly maintains that noises and dirty cracked sounds are objective factors, while instead their nature is subjective as well as culturally and socially constructed.

When sound films became popular in the late 1920s, the film industry adopted the ideology of high fidelity from the music recording industry and developed technologies to reduce noise in the recording of film sound. Dolby Labs, one of the main companies that manufactured film sound equipment, started making filters for audio noise reduction:

> Upon investigation, Dolby found that many of the limitations in optical sound stemmed directly from its significantly high background noise. To filter this noise, the high-frequency response of theatre playback systems was deliberately curtailed. […] To make matters worse, to increase dialogue intelligibility over such systems, sound mixers were recording soundtracks with so much high-frequency pre-emphasis that high distortion resulted.[82]

[81] Jonathan Sterne, *The Audible Past. Cultural Origins of Sound Reproduction* (Durham, NC: Duke University Press, 2003), 383.
[82] See http://en.wikipedia.org/wiki/Dolby, accessed April 2013.

To reduce the "high background noise" and increase the signal quality, Dolby developed analogue and digital formats for film sound (Dolby Stereo, Dolby Surround, Dolby Digital) as well as standards for film theatre and home theatre acoustics, thus becoming a leading company in the field over the last fifty years.

As illustrated by the example of Dolby, the industry involved in the development of audiovisual recording technologies aimed to reduce the noises inherent to the device and to improve the signal-to-noise ratio as much as possible. Noise greatly affects the supposed transparency of the medium, since it is a perceivable mark of the ongoing mediation and therefore has to be eliminated. As Mary Ann Doane observes,

> In the language of technicians, the term *noise* often refers to an interference generated by the apparatus itself, and from that point of view the idea of 'storing noise' suggests that the sharpness of the distinction between what is 'out there' to be recorded and what is traced by the machine is lost.[83]

The industry's battle against noise was supported by the ideology of high fidelity in the name of a supposed transparency of the medium. In reality, this battle is manufactured: the ideology of high fidelity and the continuous overcoming of technological limits in order to have the most faithful reproduction of reality are often used as a trigger for regularly introducing new products and innovative technologies into the commercial market. In this frame the concept of noise is revealed once again to be socially constructed.

As shown in this section, noise can be considered as the counterpart of sound. Therefore the investigation of noise is productive for understanding and defining the nature of film sound: the definition of film sound is inherently linked to the domain of noise. Noise is also a key concept in the perspective of film preservation: noise can be conceptually considered as the grey zone where time and other factors change the materiality of film sound. In this regard, two types of noises have emerged in this section and will be used later in the research for analyzing preservation practices: the noises inherent to the technological device and the noises inherent to the recording carrier. These two types of noise were progressively attenuated by the audiovisual industry, in the name of high fidelity. Sound recordings of the past are characterized by noises inherent to the technological device and to the recording carrier, hence these

[83] Mary Anne Doane, *The Emergence of Cinematic Time*, 65.

noises in particular are to be taken under consideration in film sound preservation and presentation. It should be noted that noise documents and evokes the past from which the film and its sound originate, and therefore can be considered as a component of film sound that should be preserved. As will be argued in the following chapters, film sound preservation and presentation often entail finding the right balance between reducing and keeping noise. Noise can therefore be considered as the field of action of film sound preservation, which can also be defined as the activity that deals with the marks and signs of the past audiovisual heritage.

1.4 Cracked Sounds

Since the sound recording industry was largely driven by the ideology of cleaned sound and high fidelity, artistic practices began to question this paradigm working on the notion of noise. A brief analysis of some artistic practices that experiment with the dimension of noise and how it can be created will help in a further understanding of what noise is and, ultimately, what sound is.

Noise entered the domain of Western music in the beginning of the twentieth century, becoming a component of classical music, experimental music as musique concrète, and pop music. Already during the interwar period, avant-garde music exalted noises and the sounds of mechanical machines. Italian Futurist Luigi Russolo, author of 1913 manifesto *The Art of Noises*, called for the use of modern technologies and mechanical sounds in artistic practice: "For many years Beethoven and Wagner shook our nerves and hearts. Now we are satiated and we find more enjoyment in the combination of the noises of the trams, backfiring motors, carriages and bawling crowds than in rehearsing, for example, the 'Eroica' or the 'Pastoral.' "[84]

Among all the different noises that can be used in artistic practices, what interests me in the frame of this dissertation is the artistic work on the noises inherent to sound technological devices and recording carriers. These types of noises are important with regard to film preservation, as stated in the previous section. The artistic work on the materiality of these carriers and devices offer very productive ideas that can be applied to film sound preservation and presentation. This is especially true because the artists

[84] Luigi Russolo, *The Art of Noises* (New York: Pendragon Press, 1986), 25.

involved in these practices, like archivists and preservationists, are concerned with the materiality of the carrier and the devices. Moreover, the artistic work aimed at manipulating the materiality of recording carriers and playback devices, in some cases up to the point of breaking and destruction, can be interpreted as similar to the damaging effects of time and other factors on media carriers, those same effects that preservationists aim to limit. For these two reasons, I focus in this section on some practices and works that give an idea of the possible modifications of material carriers and devices.

Since the 1980s, some sound art practices have reflected on the notion of noise, in particular the noise inherent to technological devices and material carriers. These artistic practices created sounds through manipulating, cracking, breaking, or destructing sound recording carriers and playback devices. This type of activity is also referred to as "cracked media practices" because it works on the notion of "the crack" as a physical break in the surface of an object or a point of rupture or interruption. Scholar Caleb Kelly, who analyzes the crack as a creative process in experimental sound and media arts, provides the following definition of cracked media:

> 'Cracked media' are tools of media playback expanded beyond their original function as simple playback device for prerecorded sound or image. 'The crack' is a point of rupture or a place of chance occurrence, where unique events take place that are ripe for exploitation toward new creative possibilities. […] the crack takes a variety of forms […] from gentle coaxing of faint crackle on the surface of a vinyl record to the total destruction of the playback tools. The practice utilizes cracks inherent in the media themselves – we can not play a vinyl record without causing some damage to the surface of the disc – and lead to a creative practice that drives playback tools into territory where undesired elements of media become the focus of the practice.[85]

The modifications and manipulations of the turntable is one of the first examples of cracked media practices: the playback device is used in unconventional ways, including playing the records at the wrong speed or backwards, making the turning mechanism of the platter wind down, or putting other objects than a disc on the platter. In *Cartridge Music* (1960), John Cage removed the needle from the turntable and replaced it with other objects: "pipe cleaners, wires, feathers, slinkies, matches,

[85] Caleb Kelly, *Cracked Media. The Sound of Malfunction* (Cambridge, MA: MIT Press, 2009), 4.

toothpicks, nails, twigs, cocktail parasols, and miniature American flags."[86] Milan Knížák extended the manipulations from the device to the material carriers, the vinyl discs; for instance in *Destroyed Music* (1963-1979), he composed a vinyl disc by gluing and taping together four parts of different vinyl discs. Knížák describes the process of manipulating vinyl discs:

> By playing them over (which destroyed the needle and often record players too) an entirely new music was created. Unexpected, nerve-racking, aggressive. Compositions lasting a second or almost infinitely long (as then the needle got stuck in a deep groove and played the same phrase over and over again). I developed this system further. I began sticking tapes over records, painting over them, burning them, cutting them up and gluing parts of different records back together, etc. to achieve the widest possible variety of sounds. A glued joint created a rhythmic element separating contrasting melodic phrases.[87]

Christian Marclay carried out similar work on vinyl records and turntables in the 1980s and 1990s, and his performances stressed qualities of liveness and improvisation. During these performances, he played multiple turntables at the same time, using scratched and ruined records, or played the phonograph as a guitar (*Phonoguitar*, 1982).

This type of artistic practice concerns turntables and vinyl records, stereos and audiocassettes, CDs and CD players, as well as other types of recorded media and devices. In the installation entitled *The Edison Effect* (1989-1993), Paul DeMarinis played with different technological devices (mechanical, electronic and digital) and recording carriers, making them clash together in unusual ways. For instance, DeMarinis used the laser of a CD player to play a vinyl record. There is also an Edison phonograph that plays a cylinder record, highlighting the noise inherent to the device and the carrier.

In cracked media practices, noise is a key concept since it represents sounds produced by modifying the recording carriers and the technological devices, whose materiality is often pushed to the edge of breaking. Kelley summarizes the various forms of noise in cracked media as follows:

[86] Ibid., 114.
[87] Ibid., 142.

> […] noise fills the audio output of cracked media: cracked lines, lost data, static and hiss, broken signals, chaotic production, earth hum, piercing tones, and digital glitch. All these sounds are made up of what we call noise, and many of the approaches taken toward the crack and break seem to fit into the numerous definitions of noise.[88]

The noise of cracked media practices can be inherent to the materiality of the technological device, of the recording carrier or of both.

Artistic work with cracked media involves both the subjective perception of noise by the public and the conceptual definition of noise in the frame of the music industry. Christian Marclay describes the decision to use the noises inherent to the device and carrier in these terms:

> I realized that when I listened to a record, there were all these unwanted sounds, clicks and pops, because of the deterioration of the record, the surface noise, scratches. Instead of rejecting these residuals sounds, I've tried to use them, bringing them to the foreground to make people aware they are listening to a recording and not live music.[89]

In order to increase audience awareness of these kinds of noises, Marclay released *Record Without a Cover* in 1986. It was sold in record stores without a jacket or a sleeve so that each copy would accumulate scratches, dust, and fingerprints from being handled by customers. The artist explains:

> With *Record Without a Cover* you can't ignore the medium. You can't ignore that you are listening to a recording. There is confusion between what is intentionally recorded and what is damage to the surface of the disc. There's a push-and-pull between the reality and the illusion. You have to stay alert.[90]

As Marclay suggests, the work on the noises of the device and carrier reflect critically on the myth of high fidelity and clean sound reproduction. Crack or break practices emphasize those noises (cracks, hums, hisses) that are contrasted by the recording industry: if the industry wants to erase the noise of the devices, cracked media artistic practices reveal them, questioning the myth of high fidelity and clean sound

[88] Ibid., 61.
[89] Marclay interviewed by Gross, reported in Caleb Kelly, *Cracked Media*, 171.
[90] Christian Marclay, "A Conversation between Christian Marclay and Michael Snow, New York, June 4, 2000," *Christian Marclay: Cinema*, exhibition held Dec. 9 – Feb 4, 2001, Oakville Galleries.

supported by the industry. Cracked media practices and their work on noise can be interpreted as a critique of recording technologies, questioning the paradigm of the transparency and cleanness of the technological device and the ideology of high fidelity while at the same time disputing the production system of the music industry. The crackling can be considered as a mark that emphasizes the noise of the technological devices used for the production and playback of recorded material, and therefore also as a mark of older technologies.

A more critical attitude towards the ideology of high fidelity is present not only in experimental music, but also in commercial music. In the aforementioned article on the return of music cassettes, Elisa Bray reported the thoughts of the musician M Ward on recording practices, who recently released an album on cassette as well as vinyl and CD:

> The idea that a 'perfect recording' should be absent of all extraneous noise is a myth of the digital age we are living in. Vinyl has a scratch to it and cassette has a certain hiss to it that I love. Making *Volume 3* available on cassette is definitely an experiment, but if we can inspire a few listeners to dig out their cassette players instead of listening to music on YouTube or whatever tiny computer speakers they are growing accustomed to then I'm happy.[91]

Aside from the return of physical carriers such as vinyl and audiocassettes, another form of *soundstalgia* can be detected in the recreation or evocation of the noises of recording carriers in contemporary music production. A way to recall these noises is for instance to add a filter that simulates the noise of vinyl being played on a record player. An example is Lauryn Hill's song *The Miseducation of Lauryn Hill*, which was produced in the digital domain yet sounds as though it was played on a record player: it starts with the sound of a needle put onto the record, a crackling noise is then heard, and another noise simulates the jump on a groove that also recurs in loop during the song. A final example of this *soundstalgia* attitude is provided by Quentin Tarantino, who also chose to keep the noises, cracks and pops in the sound of his latest film *Django Unchained* (2012). In the liner notes of the soundtrack CD Tarantino states (fig. 2):

> A note about the condition of the older recordings I am using on this soundtrack – A lot

[91] Elisa Bray, "Fast Forward: and Press Play Again – Cassettes are Back."

> of these came from my personal vinyl collection. Instead of having the record companies give me new digitally cleaned up versions of these recordings from the 60's and 70's, I wanted to use the vinyl I've been listening to for years – complete with all the pops and cracks. I even kept the sound of the needle being put down on the record. Basically because I wanted people's experience to be the same as mine when they hear the sound for the first time.

In conclusion, the last section investigated the concepts of noise and cracked media in the frame of artistic practices. The audiovisual technology industry followed the push to reduce the noise inherent to the technological devices and the recording carriers, while artistic practices brought out these kinds of noises by questioning the transparency of the media. Between these two poles, what is the position of the audience and users? A possible answer can be found in Kelly's words:

> Even though it [our much played favorite vinyl record] has come to be filled with the noises inherent in the media – its many ticks and pops and haze of ingrained dust - we forgive vinyl media for this flaw and even hear these noises with a sense of nostalgia, as they are marks created from listening to the record and remind us of times in the past when we played the music.[92]

The users not only accept the noises embedded in the playback device or the cracked noises of the recording carrier caused by use over time, but they seem to remember the media precisely for its noises. They recognize in these noises the sounds of their past experiences, and therefore these noises acquire a sort of emotional value, which is present in the phenomena of *retrostalgia* (*imagestalgia* and *sounstalgia*) described in the previous section. The evoked past can be real, as in the case of the adult generation who bought vinyl records in their youth, but can also be imagined, as in the case of the digital-born generation that displays *soundstalgia* towards vinyl without having ever used a record player.

Soundstalgia is closely related to the idea of technological obsolescence and commercial innovation: new technologies are regularly released in the market by the media industry, which used the motivation of improvement in quality in high fidelity, thus making older technologies obsolete as well as more difficult to produce, distribute

[92] Caleb Kelly, *Cracked Media*, 72.

and use. The old devices become rare and acquire a time patina (marked by noises and cracked elements) that can become an added value to the media and contribute to the phenomena of *retrostalgia*. Older technologies acquire a retro status and become first vintage, then cool and finally become profitable by re-entering the market and generating a market of memories. Obsolescence and its time marks (noises of the technological devices and the material carriers) are planned and programmed by the industry, exalted by artistic practices, and reclaimed by audiences who also make user-generated content through practices of *retrostalgia*.

The discussion of these subjects is productive and necessary, since film preservation and presentation are connected to these social and artistic practices. Currently, the habitual confrontation with audiovisual heritage is not a matter that concerns only archivists and professionals in the field, but also involves a broader range of audiences and users. Professionals in the field of preservation should understand these phenomena and take them into consideration in order to integrate their actions in the social sphere.

For instance, the comprehension of the phenomena of *retrostalgia* can be considered in defining the strategies of audiovisual heritage presentation and preservation. On the one hand, these *retrostalgia* phenomena set the stage for many possibilities for revitalizing archival material. On the other hand, the copious presence of audiovisual material outside film heritage institutions (mainly on the Internet) should incite the desire to give the audience and users something more than simple access to the material, as for instance a set of contextual information for better understanding the film, or a cinematic experience faithful to the film historicity. Similarly, understanding what noise means in social practices and how it can be conceived as noise that is inherent to technological devices and recording carriers can be useful in the work of preserving and restoring audiovisual heritage. These social and cultural issues represent a premise for further investigation, which in the following chapters will focus on the true object of this research: film sound in film preservation and presentation.

CHAPTER 2.

Film Sound Traces

2.1 Media Memory

> Despite our inevitable subordination to the past, we have freed ourselves at least to the extent that, eternally condemned to know only by means of its 'tracks,' we are nevertheless successful in knowing far more of the past than the past itself had thought good to tell us. Properly speaking, it is a glorious victory of mind over its material.
> — Marc Bloch[93]

In the previous chapter, I discussed the social and cultural dimensions of recorded sound in general, and of film sound in particular, and their value for individual and collective memory and experience. In this chapter, I consider the value of recorded media for individual and collective memory not in the light of contemporary social and artistic practices, but in light of theoretical interpretations within media and audiovisual studies. In particular, I focus on the interpretation of media records as traces and use the notion of *trace* as a key concept to interpret the relation between audiovisual recordings and memory in theoretical terms. I focus on the notion of trace because I believe it is hermeneutically useful in the perspective of preservation, since film preservation can be defined as the discipline involved in the conservation of film traces for present and future access.

In order to better define the dimensions of memory and trace in audiovisual media, I will first use Freud's "A Note upon the 'Mystic Writing Pad' "[94] as a model. In this text, Freud describes the function of human memory using the model of the *Wunderblock*, a writing tablet composed by a slab of resin or wax, a waxed paper cover and a transparent celluloid sheet on top of it (fig. 3). Pressing on the surface of the celluloid sheet, one can write on the wax paper and then erase the text or image by a

[93] Marc Bloch, *The Historian's Craft* (New York and London: Manchester University Press, 1992), 53.
[94] Sigmund Freud, "A Note upon the 'Mystic Writing Pad'," in Id., *General Psychological Theory: Papers on Metapsychology* (New York: Collier, 1925) Chapter XIII. Orig. "Notiz über den Wunderblock" First published in Int. Z. Psychoanal., 11 (1925).

movement of the hand: the writings are erased from the sheet, but they leave a permanent trace in the slab. What interests Freud in this writing device is that it combines "an ever-ready receptive surface and permanent traces of the notes that have been made upon it."[95] The double function of "unlimited receptive capacity and a retention of permanent traces"[96] leads to the similarity with human mind, perception, and memory, which Freud explains in these terms:

> […] the celluloid and waxed paper cover with the system Pcpt.-Cs. and its protective shield, the wax slab with the unconscious behind them, and the appearance and disappearance of the writing with the flickering-up and passing-away of consciousness in the process of perception. […] If we imagine one hand writing upon the surface of the Mystic Writing-Pad while another periodically raises its covering sheet from the wax slab, we shall have a concrete representation of the way in which I tried to picture the functioning of the perceptual apparatus of our mind.[97]

The metaphor of the mystic writing pad for human mind (perception and memory) is based on these terms. First the wax paper, which symbolizes the perception-consciousness system, has an "unlimited receptive capacity" and is protected by the celluloid sheet, "a protective shield against stimuli"[98] which diminishes the strength of excitations coming in. Second, the wax slab, like human memory or unconscious, is capable of retaining "permanent traces." The unconscious (the wax slab) is the place of storage and retrieval of the traces left by the perceptive stimuli, the *mnemic-unconscious traces*. According to Freud, the system of the psychic apparatus is composed of the interaction between the perceptual-conscious system (the wax paper) and the mnemic-unconscious system (the slab); in psychoanalytic therapy, the psychoanalyst recognizes and interprets the *mnemic-unconscious traces* that emerge in the patient's verbalization and personal narration as well as bodily expression.

The mystic writing pad model might no longer be considered a convincing model to describe the functioning of the mind, but it can aid in understanding the tracing and memorial capability of recording media.[99] Freud himself realizes the relationship

[95] Ibid., 209.
[96] Ibid., 208.
[97] Ibid., 211.
[98] Ibid., 210.
[99] Following the studies of neuroscience, the contemporary psychological conception of perception and memory has abandoned the psychoanalytic model and developed new interpretations in the light of

between the mystic writing pad model and recording media, and concludes his essay with a mention these apparatuses:

> All the forms of auxiliary apparatus which we have invented for the improvement or intensification of our sensory functions are built on the same model as the sense organs themselves or portions of them: for instance, spectacles, photographic cameras, ear-trumpets. Measured by this standard, devices to aid our memory seem particularly imperfect, since our mental apparatus accomplishes precisely what they cannot: it has an unlimited receptive capacity for new perceptions and nevertheless lays down permanent– even though not unalterable–memory-traces of them.[100]

Freud observes that the mind performs this double function of receiving and storing input better than the technical apparatuses designed on the functioning of perception human organs, such as spectacles, photographic cameras, and ear-trumpets.

Film scholar Thomas Elsaesser applies the mystic writing pad model to recording media, arguing that Freud could be considered a media theorist "because he thought of the body/mind as a storage and recording medium as well as an input/output device, where what interested him were the parameters of sensory input (sound, vision mainly) and its output, representability (vizualisation, narrativization, and linguistic representation, including slips of the tongue, the parapraxes or *Fehlleistungen*)."[101] Interpreting Freud's writing, Elsaesser observes that the affirmation of the unconscious can be interpreted as a way to combine transmission and storage functions:

> Freud is arguing that our senses, along with our brain, when taken together as the "psychic apparatus," are able to accomplish something that for technical apparatuses is apparently impossible to achieve, namely to combine the function of (sense-data) transmission and the function of (sense-data) storage. It is as if psychoanalysis had to be invented to bridge this gap and to explain – via the positing of the unconscious – how the "perception-consciousness system" receives but does not retain perceptions, while the

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behavioral psychology, cognitivism, behaviorism, and evolutionary biology. Freud's legacy on this topic in the psychological field is analyzed in John Forrester, *Dispatches from The Freud Wars: Psychoanalysis and its Passions* (Cambridge, MA: Harvard University Press, 1999), and Frederick Crews, ed., *The Memory Wars: Freud's Legacy in Dispute* (Oxford: Granata Books, 1997).

[100] Sigmund Freud, "A Note upon the 'Mystic Writing Pad'," 208.

[101] Thomas Elsaesser, "Freud and the Technical Media: The Enduring Magic of the Wunderblock," in *Media Archaeology. Approaches, Applications, and Implications*, eds. Erkki Huhtamo and Jussi Parikka, 100.

> "system of the unconscious" preserves, not perceptions, but "excitations," which become "permanent," in the form of mnemic traces.[102]

Unlike Freud, who maintains that technical apparatuses are "imperfect" compared to the human apparatus, Elsaesser puts human and technological apparatuses on the same level. He uses the mystic writing pad model "to picture the relation between input, storage, and processing"[103] in all apparatuses involved in the transmission of information: human, artificial, but also biological, like the ones that transmit DNA information. Elsaesser bases his model on the distinction between two levels, the level of the transmission of information and the level of storage of information:

> an apparatus, considered as archive or memory, needs to clearly differentiate and separate the transmission function (mirror) and the storage function (memory). Between perception (and immediate forgetting) and the unconscious (unlimited storage), Freud, as it were, comes close to specifying the machine requirements for an input/processing/output system.[104]

From this model, Elsaesser outlines a *media/memory constellation*:

> a theory of the visual and aural media that sees them more from the side of reproduction, as a problem of generation and replication, of storage and processing, which is to say as a general mode of information transmission, of which "memory" in its widest sense (including history and cultural memory) is the special human form, but which, at the limit, encompasses the transmission of all information, including biological information (and thus allows for non human forms of memory).[105]

This passage suggests a relation between different forms of memory: human forms of memory, as individual and collective memory (cultural memory), but also non human forms of memory, such as biological memory (DNA transmission) and artificial memory (the memory of technological apparatuses).

Following Elsaesser's suggestions, I will define *media memory* as the memory generated through audiovisual recording media. The recording, storing and repeating of

[102] Ibid., 99.
[103] Ibid.
[104] Ibid., 108.
[105] Ibid., 102.

experiences and events in sound and images are the fundamental activities that, producing *media mnemic traces,* ensure our individual, collective, and cultural memory. Following Elsaesser's media/memory constellation, I suggest a close relation between media memory and individual or collective memory based on the fact they all function on similar principles of transmission and storage of information. This close relation was already identified discussing *sound souvenirs* in the first chapter.

In the frame of this research, it is productive to consider the theoretical model of the mystic writing pad as a metaphor for interpreting film sound preservation and presentation. The two levels of the mystic writing pad model, transmission and storage, can in fact be productively used to decode film preservation and presentation practices: film preservation can be considered as a process of information storage, while film presentation can be regarded as a process of information transmission. This metaphor will be further developed in the theoretical elaboration of the findings of the research in chapter five.

2.2 Audiovisual Traces

In light of the suggestions concerning *media memory* and *mnemic traces* elaborated above, in this section I further explore the nature of media traces. Reflection on the concept of trace is crucial for understanding the nature of film sound and how it can be preserved and presented. In general, a trace can be defined as a sign inscribed on a carrier in the past and that remains in the future. In this research, I will attribute a double meaning to the notion of *trace* when applied to film. First, the term *physical trace* refers to the audiovisual signal recorded on a carrier, which allows the audiovisual information to be preserved for future access. The second meaning relates to the *mnemic trace*, intended as the trace that film leaves in individual and cultural memory through its reception. The *physical* and *mnemic trace* are both very relevant in film sound preservation and presentation practices, as will be discussed in the next chapters: the *physical trace* recalls the material dimension of film sound, while the *mnemic trace* pertains to what I previously defined as memorial dimensions of film sound. The investigation of the conditions for the inscription of menmic traces, which can be defined as *traceability*, offers more elements to understand how a particular form of

media trace, film sound, can be preserved and presented. This passage is therefore preparatory for the definition of film sound as trace, which will be elaborated in the next section.

Maurizio Ferraris' theory of *documentality* offers an interesting interpretation of the notion of trace. According to Ferraris, registration and inscription are the conditions of existence of the spirit – in a philosophical sense – and of human society: we live in a society of registration/recording, and this is the condition of possibility for a society of communication and information.[106] In other words, communication and information are just consequences of the possibility of registration.[107] Ferraris revises the Derridian principle "nothing exists outside the text" to "nothing *social* exists outside the text," meaning that each social role and social act is based on registration and memory.[108] He bases his theory on the axiom *Social Object = Inbscribed Act* (*Oggetto Sociale = Atto Iscritto*), according to which inscription is the condition of existence of social objects; inscription allows an object to transition from the domain of nature to that of culture.[109] Therefore, inscription can be considered as a fundamental characteristic of cultural objects' nature.

Moreover, inscription is the act through which human beings leave traces through time: this action refers to writing, but also painting, building, constructing, and other practices that produce traces with a cultural, historical or artistic value. Inscription is the act that produces *cultural traces*, which can be differentiated in *documents*, heralds of historical value, and *monuments*, heralds of artistic value,[110] even if they often share both natures in different proportions. The cultural traces of the past are interpreted within the disciplines of archeology, historiography, art history, and literature.

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[106] "There is no spirit without inscriptions, the spirit depends on traces as much as traces depend on the spirit." My translation from the original: "Non c'è spirito senza iscrizioni, lo spirito dipende dalle tracce almeno quanto le tracce dipendono dallo spirito" Maurizio Ferraris, *Documentalità. Perché è necessario lasciar tracce* (Roma: Laterza, 2009), 45.

[107] "We live in a society of registration, and this is the condition of possibility of a society of communication, and indeed of information." My translation from the original: "Siamo in una società della registrazione, e questa è la condizione di possibilità di una società della comunicazione, e ovviamente dell'informazione." Ibid., 202.

[108] See ibid., XIII.

[109] Tracing a transcendental ontology, Ferraris describes a list of the world's objects, dividing the objects into natural (*oggetti naturali*), ideal (*oggetti ideali*) and social objects (*oggetti sociali*). "The beauty of objects is that we can classify, collect, archive them; this is the most natural thing in the world, so ontology as a theory of objects expresses a spontaneous tendency towards collection and cataloguing." My translation from the original: "Il bello degli oggetti è che possiamo classificarli, collezionarli, archiviarli; è la cosa più naturale del mondo, sicché l'ontologia come teoria dell'oggetto manifesta una tendenza spontanea verso la collezione e il catalogo." Ibid., 12.

[110] See among others Jaques Le Goff, "Documento/Monumento," in Id., *Storia e Memoria* (Torino: Einaudi, 1986), 443-455.

Among all the forms of cultural traces, I focus on *audiovisual traces*, the cultural traces made by audiovisual recording media. These media can be defined as time-based media since they have the peculiarity of registering (inscribing) and replaying time as a flow of acoustic and visual data. With the invention of the gramophone and cinematograph, it became possible to record and store the flow of time. As Friedrich Kittler observes:

> What phonographs and cinematographs, whose names not coincidentally derive from writing, were able to store was time: time as a mixture of audio frequencies in the acoustic realm and as the movement of single-image sequences in the optical. Time determines the limit of all art, which first has to arrest the daily data flow in order to turn into images or signs. What is called style in art is merely the switchboard of these scannings and selections.[111]

The capacity to record and store time becomes the defining feature of old and new media, or what Siegfried Zielinski named "time media": photography, telegraphy, telephony, phonograph, motion picture camera and cinema, electromechanical television, computer and Internet.[112]

Audiovisual media record the time of events and what happens in front of them. Much more than other technological marvels, the photograph, phonograph and cinematograph changed individual and collective experience by providing the possibility to capture a person's likeness by recording images and sounds, assuring them a life after death that was very different from the one dependant on writing and printing traces.

According to Elsaesser, after the invention of the phonograph, which allowed the recording of vocal and aural data on wax cylinders and tinfoil, Edison "developed the kinetoscope originally to complement the phonograph and synchronize it with an image machine."[113] Elsaesser argues that Edison gave "priority to sound recording, understood as the laying of tracks of physiological data, than the cinematic image is the index of a sound emanation or of a physiological-somatic presence, and only secondarily the

[111] Friedrich Kittler, *Gramophone, Film, Typewriter*, 3.
[112] Time media are "all techniques for reproducing existing worlds and artificially creating new ones" Siegfried Zielinski, *Deep Time of the Media*, 31.
[113] Thomas Elsaesser, "Freud and the Technical Media: The Enduring Magic of the Wunderblock," 107.

imprint of a perception."[114] Elsaesser's interpretation stresses that audiovisual media were first intended to record the "physiological-somatic presence" of people and that the cinematic image was first intended by Edison as a complement to voice recordings.

The importance of audiovisual media for individual and collective memory was then first recognized in their ability to record and store images and sounds of people that would remain even after their death. The value of audiovisual media for preserving the memory of dead people is recalled by Elsaesser as follows:

> Once storage media can accommodate optical and acoustic data, human memory capacity is bound to dwindle. Its "liberation" is its end. […] Once memories and dreams, the dead and the ghosts, become technically reproducible, readers and writers no longer need the power of hallucination. Our realm of the dead has withdrawn from the books in which it resisted so long.[115]

From their first appearance audiovisual media were included in the social process of remembering the deceased. We remember our loved ones through the use of photos, video and audio recordings, which preserve their physiognomic appearance and protect it from oblivion. This process established a first link between audiovisual media and individual memory.

The analogy of the phonograph, the first device that produced time media traces, and human memory was already perceived during the first diffusion of audiovisual media, years before Freud's note on the *Wunderblock*. "The soul is a notebook of phonographic recordings:" this is the title of an article that Jean-Marie Guyau cites in his essay "Memory and Phonograph" (1880), as reported by Friedrich Kittler.[116] Here Guyau outlines analogies between the storing capacity of the phonograph and the brain, sustaining that the brain is "an indefinitely perfected phonograph – a conscious phonograph:"[117]

> If the phonographic disk had self-consciousness, it could point out while replaying a song that it remembers this particular song. And what appears to us as the effect of a rather simple mechanism would, quite probably, strike the disk as a miraculous ability: memory.

[114] Ibid..
[115] Ibid., 10.
[116] Friedrich Kittler, *Gramophone, Film, Typewriter*, 30.
[117] Ibid., 33.

> […] If the phonograph could hear itself, it would learn to recognize the difference between the voice that came from the outside and forced itself onto it and the voice that itself is broadcasting and which is a simple echo of the first, following an already grooved path. […] The principal difference between the brain and the phonograph is that the metal disk of Edison's still rather primitive machine remains deaf to itself; there is no transition from movement to consciousness.[118]

Commenting on this article, Kittler recognizes in the phonograph the first machine that combines writing and reading, storing and scanning, recording and replaying:

> In principle, even though Edison for practical reason later separated recording units from replaying ones, it is one and the same stylus that engraves and later traces the phonographic groove. Which is why all concepts of trace, up to including Derrida's grammatological *ur*-writing, are based on Edison's simple idea. The trace preceding all writing, the trace of pure difference still open between reading and writing, is simply a gramophone needle. Paving a way and retracting a path coincide.[119]

Kittler indicates the phonograph as the first medium capable of writing as well as reading or playing a trace; he proposes the notion of *trace* as the place where writing and reading coincide. The phonograph can be considered then as the first *tracing time media*, followed by cinematography, discography, videography, and more recent forms of digital time-based media.

The media theories described above make use of the concept of trace to understand and describe the nature of recording media. I will further elaborate on the notion of trace, applying it to the field of film preservation and presentation. Ferraris' notion of inscription and Kittler's consideration of trace as the writing and reading of a record served as inspiration for my first description of audiovisual trace in preservation. The term *audiovisual trace* refers to the *form of inscription of aural and visual information on a carrier*. In the instance of a music recording, the trace represents the way in which the song is recorded (e.g. analogue, magnetic or digital format) and stored (e.g. on a disc, a tape or a CD). In other words the trace depends on the recording format and the material carrier of the information. As far as film is concerned, the audiovisual trace represents the way in which the recorded event is transformed into

[118] Ibid., 31-32.
[119] Ibid., 33.

visual and aural information that can be reproduced, played, stored, and transmitted for future access.

From the film preservation perspective, the term trace can be productively related to the dimensions of storage and transmission described by Freud and Elsaesser. *Audiovisual trace* can be defined as *that ideal entity that should be preserved in order to ensure the transmission of the cinematic information for future access*. In this sense, it is important to understand the conditions that allow for *traceability*, intended as the possibility to inscribe, store and transmit audiovisual traces for future access. The survival of the audiovisual trace guarantees the possibility for the film to be experienced in the present and future, and therefore also its persistence in individual and collective memory. The audiovisual trace is determined mainly by the following factors: the carriers that store the information (e.g. film, magnetic tape, digital drive), the recording format (e.g. analogue, magnetic, digital), and the devices that allow for recording and replay. Therefore the traceability – the condition for recording, storing and replaying the audiovisual trace – depends on these three factors.

The first condition is the durability of the material carrier. The importance of the carrier emerges also in the dictionary's definition of trace, which designates it as a physical modification or alteration of a specific support or carrier. If the material carrier of the trace is corrupted or destructed, the transmission of the information is partially or totally affected. In other words, if the film stock is damaged, the visual and aural information recorded on it can also become mutilated.

Another condition resides in the technological device that reads and plays the trace. The audiovisual trace is also affected if it is not possible to find a suitable playback device in working condition to play it. For instance, if the audiovisual trace is stored on a U-matic recording videocassette, and it is not possible to find an U-matic reader because it has fallen into disuse, the transmission of the trace is compromised.

A third condition to ensure the survival of the audiovisual trace lies in the human work involved in the playback and handling of the trace. If the human capability to operate the device or handle the material carrier is lost, the transmission of the trace is in danger as well. In the previous example, if the U-matic cassette and the U-matic reader survive, but the human subject has lost the knowledge to use them, the trace cannot be experienced and transmitted.

These kinds of situations will be further explored in the case studies. For now, I want to stress that the conditions of survival of audiovisual traces are the field of action of film and audiovisual preservation, and the precondition for future access.

2.3 Film Sound, Preservation, and Presentation

The theoretical definition of media memory and audiovisual traces and their value in film preservation are the premises for the inquiry on the object of this research, film sound preservation and presentation. Before reaching the heart of the research through the analysis of case studies, it is necessary to clarify the terms film sound on one hand, and film preservation and presentation on the other. Regarding the definition of film sound, Rick Altman suggests:

> It has never been easy to capture in words the phenomenon of sound. While philosophers and technicians have developed concrete languages for describing images, sound has often seemed to require a more abstract terminology, drawing on the language of myth and the sacred rather than that of three-dimensional reality.[120]

This general difficulty in describing sound phenomena, related to the aforementioned "ocular permeation of language," has a repercussion in the confusion and vagueness of terminology regarding film sound in film studies, as was argued in the introduction.

Film sound is often confused with the term *soundtrack*, but it is much more than that. The term *soundtrack* is also not specific: it can indicate every type of recorded music that is synchronized to a movie, a television show, a videogame, a commercial, or every form of moving image. To be more specific, one should use the term *film soundtrack* to designate the sound of a particular film, the audio track synchronized to the images of a specific film and composed by dialogue, music, and sound effects. The film soundtrack is also often confused with the musical score of the film, which is only one component, or the commercially released soundtrack album of the music of the film (*music soundtrack*).

[120] Rick Altman, *Silent Film Sound*, 5.

I consider the film soundtrack as the physical trace of sound recording on a specific carrier, which allows the sound to be played in synchrony with the image. The soundtrack can also be referred to as *film sound trace* in order to emphasize the fact that film sound is experienced and remembered through traces. The existence of sound trace is strictly related to the material carrier. When the material carrier of film sound is film stock, the sound trace designates the physical area of the film base where sound is recorded optically (optical soundtrack) or digitally (digital soundtrack). The sound trace can also be recorded on other material carriers (disc, compact disc, magnetic tape, digital drive).

With the term *film sound* I indicate the sound played when the film is projected in a space, in most cases a movie theatre. In other words, *film sound* refers to the sound as heard and experienced by the audience; it consists of the sound waves that are diffused and amplified in the space during projection. The term film sound can also be used in a much wider sense, referring to technological, stylistic, productive, and receptive aspects of the recorded sound. As the title of this dissertation indicates, the object of this research is *film sound* rather than the soundtrack. The case studies will demonstrate that the soundtrack is to be considered just one dimension of film sound, that is, the one related to the materiality of the carrier.

I also clarify here the terminology regarding film preservation and presentation that will be used in this research. First, it should be noted that both film preservation and presentation pertain to the field of *film archiving*, which is defined by film theorist Giovanna Fossati as follows:

> Film archiving is the practice of collecting, preserving, and presenting film heritage. It is the practice of collecting and preserving the analogue past of film (120 years of film reels impressed with photographic images, as well as sounds recorded on vinyl, optical, or magnetic tracks) and the digital present of film (encoded images and sounds conveyed through ever-changing digital formats stored on ever-changing digital carriers). It is the practice of restoring films and copying them to new media (film, digital, hybrid) in a way that makes them suitable for presentation. It is, finally, also the practice of presenting films in new contexts.[121]

[121] Giovanna Fossati, "Filmmaking, Film Archiving and New Participatory Platforms," in *Found Footage: Cinema Exposed*, ed. Marente Bloemheuvel, Giovanna Fossati, and Jaap Guldemond, (Amsterdam: Amsterdam University Press, 2012), 178.

Film sound preservation and presentation will turn out to be two very interrelated and interdependent activities throughout this research. Despite this close interconnection, for analytical reasons I will consider them separately in the scope of this research. With the term *film preservation* I refer to the practices and activities aimed at the preservation of film heritage in its material and textual dimensions, in order to ensure future access to the visual and sonic film components. The main activities related to film preservation are passive preservation, active preservation, restoration, and reconstruction. For the definition of these terms I recall the words of film archivists and curators Eileen Bowser and John Kuiper:

> Preservation may be considered as having both an active and passive dimensions. Passive preservation is synonymous with 'storage,' i.e., keeping the material in an ideal environment and not subjecting it to any mechanical risk through use. Active preservation includes such practices and procedures as technical examination, technical selection, conservation, methods of storage in correct environments, housekeeping and collection control procedures (such as maintenance of technical records, surveillance, labeling, etc.), technical restoration, rejuvenation, duplication and quality control.[122]

In the processes of passive preservation (conservation, storage) and active preservation (duplication), human intervention is minimal, and it is limited to the safekeeping of the film as it was found. Instead, restoration and reconstruction, which are aimed at recreating a specific version of the film, entail a strong intervention and relevant changes in the material and textual dimensions of film. As film restorers Paul Read and Mark-Paul Meyer observe:

> The terms conservation and preservation are used in either an active way or a passive way and can therefore mean storage or even duplication without particular interventions and in principle without any loss of photographic information. The terms restoration and reconstruction are usually used when differences are created between the materials you start with and the materials you end with, through manipulating the process of duplication (restoration) or through editing sequences in a different order (reconstruction). [123]

[122] Eileen Bowser and John Kuiper, eds., *A Handbook for Film Archives* (New York: Garland, 1991), 11.
[123] Paul Read and Mark-Paul Meyer, *Restoration of Motion Picture*, 1.

Besides the activities related to film preservation, the other focus of this research is film presentation. With the term *film presentation* I refer to the exhibition activity that allows film to be accessed and experienced by the audience in a theatrical or public space.

The distinction between preservation and presentation is used in the investigation of the case studies for analytical purposes. The problems and issues related to film sound preservation are different from those related to film sound presentation, so the two activities bring out different aspects of film sound. For this reason, film sound preservation is predominantly discussed in chapter three with cases of early sound systems, while film sound presentation is examined in chapter four through the analysis of the presentation activities of a film archive.

The differentiation between preservation and presentation will also be used as a key concept for elaborating the theoretical model in chapter five; there I will argue that preservation and presentation are the two main activities that define the field of work of film heritage institutions. I will interpret the relation between preservation and presentation through the concepts of transmission and storage as elaborated in the mystic writing pad model: preservation is the activity that guarantees the storage of the audiovisual trace, while presentation deals with the transmission of the trace to a contemporary public. A complete definition of film preservation and presentation will be developed in chapter five, in the light of the analysis of case studies.

2.4 The Work of Film Heritage Institutions

In the definition of the terms film preservation and film presentation another central element of the research emerges: film heritage institutions, intended as the places where the work of film preservation and presentation is performed. The distinction between preservation and presentation can be associated with the distinction between archive and museum. In the domain of cultural heritage institutions in general, archives are institutions that have the primary mission of collecting and preserving historical documents and cultural objects related to individual and collective memory. Museums are institutions with the primary mission of presenting, exhibiting, and displaying historical documents and cultural forms to the public; yet their activities also include the collection and preservation of the materials for future presentations.

When applying these notions to the cinema field, the relationship between archive-preservation and museum-presentation became problematic. Nicola Mazzanti, Director of the Cinémathèque Royale de Belgique, defines this problem as "the never fully resolved chiasm of conservation-exhibition"[124] or, in the terms used in this work, of preservation and presentation. The contrast between preserving and presenting dates back to the first institutionalization of film archives. This was especially demonstrated by the diverging attitude of Ernst Lindgren, first curator of the BFI National Film and Television Archive, and Henri Langlois, co-founder of the Cinémathèque française. While Lindgren gave absolute priority to preservation by maintaining a policy of non-projection of original prints unless properly copied and preserved, Langlois' aim was to show as many films as possible, regardless of the uniqueness of the copy.[125] The contrast between Lindgren and Langlois has become legend in the narration of the emergence of film archives as institutions,[126] but the matter is indeed more complex than the dramatization of the opposition between the paladin of preservation and the paladin of presentation.

The two contrasting positions have both contributed to the definition of the role of film archives and museums. The FIAF (International Federation of Film Archives) code of ethics represents, in the words of film archivist and curator David Francis, "a distillation of the point of view of both Lindgren and Langlois."[127] Nevertheless, Caroline Frick observes that "unfortunately, professionals working in moving image archives continue to struggle with moving beyond their now 'traditional' binary opposition in which preservation poses an opposition to access."[128]

The predominance of the preservation or the presentation dimension is also detectible in the name of the institutions: film archives are usually focused on preservation, while film museums and cinémathèques concentrate on presentation. Nevertheless, these two activities are in practice complementary, or, in most cases, mixed. Archives also undertake presentation projects even if they do not have their own

[124] Nicola Mazzanti, "Response to Alexander Horwath," *Journal of Film Preservation*, no. 70 (2005): 11.
[125] See Penelope Houston, *Keepers of the Frame. The Film Archives* (London: British Film Institute, 1994), 49-59.
[126] See for instance the dramatized exchange of letters between the two archivists by Ruth Beale, "Lindgren and Langlois: The Archive Paradox," in The Cubitt Artists' Event Series Public Knowledge, http://www.ruthbeale.net/images/Lindgren_Langlois.pdf, accessed June 2013.
[127] David Francis, "From Parchment to Pictures to Pixels Balancing the Accounts: Ernest Lindgren and the National Film Archive, 70 Years On," *Journal of Film Preservation* 71 (2006).
[128] See Caroline Frick, *Saving Cinema. The Politics of Preservation* (New York and Oxford: Oxford University Press, 2011), 171.

theatre, and film museums and cinémathèques also collect and preserve films even if they do not have equipped vaults for this purpose. Ideally, film institutions should do both, first preserve and then show, as pointed out by Dan Nissen, former director of the Danish Film Institute:

> It is definitively right that the physical material should be preserved before it is shown in order to be able to ensure future access to the films for future generations […]. But it is also definitively true that films do not live merely by being preserved, but only in their encounter with a viewer and an interpreting consciousness. Preserving and showing are two sides of the same coin, then. Preserving without presenting is an inert activity, and showing without preserving is dangerously shortsighted.[129]

As analysis of the case studies will demonstrate, preservation and presentation are two activities closely interconnected and reciprocally influenced: the choices made during preservation influence presentation possibilities and the considered prospects for presentation influence preservation decisions.

If the term film archive recalls the preservation dimension while film museum and cinémathèque recall that of presentation, the term *film heritage institution* seems to reconcile this double nature, and refers to all of the forms of institutions: film archive, film museum, cinémathèque, and the like.[130] Film heritage institutions are the cultural heritage institutions that have the mission of preserving and presenting film heritage. I use the term institutions in the sense of cultural institutions, recalling the definition of film scholar Karen Gracy:

> Cultural institutions regulate the diffusion of knowledge, acting as a gatekeeping mechanism for access to information as it exists in tangible forms, and serving as locus points for the legitimation of knowledge systems. […] Although we are most likely to see cultural institutions as physical repositories for cultural objects, in fact such organization

[129] Dan Nissen et al., ed. *Preserve Then Show* (Copenhagen: Danish Film Institute, 2002), 9.
[130] One of the first extensive uses of the term film heritage institution (FHI) instead of film archive can be found in the professional study *Digital Agenda for European Film Heritage* commissioned by the European Commission and conducted by Nicola Mazzanti. See *Challenges of the Digital Era for Film Heritage Institutions*, 2011, http://ec.europa.eu/avpolicy/docs/library/studies/heritage/final_report_en.pdf, accessed July 2013.

> as libraries, museums, and archives are only the most discernible signifiers of what a cultural institution represents. [131]

In reference to the main concepts evoked in this research, I define *film heritage institutions* as *having the mission of preserving and safeguarding film as material object, as dispositif, and as audiovisual trace (preservation side)*. Moreover, *film heritage institutions keep the experience of the cultural object and of the memory of the audiovisual trace (presentation side) alive*. In these terms, film heritage institutions construct the space and context for the cinematic experience and preserve the different temporalities of film. This definition will be further illustrated in the theoretical elaboration in chapter five.

The above definition is based on the notion that film heritage institutions preserve and present audiovisual traces by working through the temporal dimensions of present, past, and future. Moreover, film institutions also evolve over time and are subject to similar temporal processes as to those of the objects that they preserve. Film heritage institutions are marked by *movements of transitions* and *transience*, where the first term refers to what they bring with them in the next stage or phase, and the latter to what they leave behind. The transitions of a film heritage institution are often technologically, economically, and politically driven and, thus, influence the preservation and presentation work performed in the institution. [132] This topic will be addressed with a further elaboration in chapter four.

In conclusion, I would like to stress the fact that in the debate between preservation and presentation described in this section, which was central for the definition of film archival theories, the issue of film sound is not specifically called into question or addressed. This absence is additional proof of the lack of consideration for film sound in film preservation theories, as I described in the introduction of this research.

The theoretical observations on film sound, preservation, and presentation made in this chapter are the premise of the investigation of the nature of film sound in

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[131] Karen F. Gracy, *Film Preservation: Competing Definitions of Value, Use, and Practice* (Chicago: The Society of American Archivists, 2007), 63. Gracy also maps the field of film institutions and archives, distinguishing between commercial entities (studios with film libraries and stock footage libraries) and non commercial organizations (larger non-profit film archives, specialist archives).

[132] For an elaboration of the term transition applied to the film preservation field see Giovanna Fossati, "Film archival Field in Transition," in *From Grain to Pixel*, 149-210.

preservation and presentation practices, which will be addressed in the following chapters through the analysis of specific case studies.

CHAPTER 3.
Film Sound Preservation:
Early Sound Systems

3.1 Film Sound Preservation

In the introduction I argued that the nature of film sound consists of different dimensions: the textual and material dimensions, the human and technological dimensions, the institutional, experiential and memorial dimensions. Each of these should be taken into account in preservation and presentation practices. Some of these dimensions were investigated in the first two chapters, where I outlined a set of key concepts related to recorded sound that I derived from social and artistic sound practices as well as media theories: the noise of the material carriers and technological devices, cleaned and cracked sounds, the notion of *soundscape* and high fidelity, and the concepts of media memory and audiovisual trace.

In the following chapters I will further analyze the nature of film sound and its core dimensions beginning with the analysis of film sound preservation and presentation case studies. In this chapter, I examine preservation and restoration projects of films where the issue of sound is particularly relevant, while chapter four analyzes the work of film heritage institutions with respect to film sound presentation. The case studies discussed here are prompted by the following questions: how can we preserve and restore film sound materials? What are the different approaches to film sound preservation and restoration? What are the problems and defects of different film sound carriers and apparatuses? Which kind of actions can be taken to solve those problems? How can the actions undertaken to preserve film sound be recorded and documented? How is it possible to exhibit and display film sound in present-day theatres? The answers to these questions as provided by the case studies will contribute to the definition of the nature of film sound, which will be elaborated in chapter five.

In order to understand the specific challenges posed by early film sound preservation, and the way that these practices inform a discussion of film sound in general, I will first describe the main principles behind the preservation of film sound. The term *film sound preservation* refers to different activities carried out in film heritage institutions and film laboratories. Film preservation starts with the identification and cataloguing process: the material carriers of each film are described and documented in a catalogue. Regarding film sound in particular, the catalogue information often refers to the film sound carrier (optical, magnetic, combmag, digital), the film sound formats (variable density, variable area, optical mono, optical stereo, RCA, Western Electric, Dolby A, Dolby SR, Dolby Digital, SRD, DTS, SDDS, etc.), and the number of channels (mono, stereo, 4 channels, 5.1, 6 channels, etc.).[133] Documenting the right material form of sound is crucial since this provides the right information for playing the soundtrack.

After cataloguing, the film sound carrier may be cleaned and duplicated before being stored. The duplication phase consists in the recording of the soundtrack on a new carrier for preservation or restoration purposes. In this phase it is important to perform a correct reading and playback, which means reading the soundtrack with the correct filter (Academy, Dolby A, Dolby SR, Dolby Digital) in order to record the correct range of frequencies of the sound information. If an optical soundtrack produced with an Academy filter is read, for instance, with a Dolby SR filter, the amplified sound is distorted because the Academy filter equalizes the frequencies differently than the Dolby SR filter.

The proper restoration work, usually completed at digital postproduction workstations, consists of trying to eliminate or reduce the disturbing elements, such as clicks and pops, which have formed because of time and other factors. The restoration work operates primarily in the field of noise, which in this case is conceived as unwanted sound. During the restoration process some adjustments can be made through sound equalization in order to make the restored sound resemble the "original" sound, by trying to recreate the supposed response in amplitude of theatre loudspeakers at the time when the film was first distributed.

This is only a brief description of the type of work involved in the preservation and restoration of film sound. Each case is different from another and no general rule

[133] For the identification of film sound materials, see Paul Read and Mark-Paul Meyer, *Restoration of Motion Picture Film*, 67-68.

can be applied. In preservation work, different variables determine what decisions should be made, such as the condition of the material carrier, the operator, the technologies, as well as time and funding.

In the following sections, I will describe the film sound preservation of early sound systems (chapter three) and early films (first section of chapter four). It should be noted that these cases do not represent the rule but rather the exception, since the films that I will consider were produced before the so-called "coming of sound," which is usually dated to the end of the 1920s, with the film *The Jazz Singer* (Alan Crosland, 1927) and *Lights of New York* (Bryan Foy, 1928). Analyzing exceptional cases is a useful strategy for the purpose of this dissertation: whereas in most cases the specific features of film sound may be easily overlooked, in exceptional cases, by contrast, they cannot be avoided. Moreover, the consideration of the sound component of films produced before the "coming of sound" also offer new reasons for considering early cinema as sound cinema rather than silent cinema.

3.2 Early Sound Systems

In this part, the objects of analysis are preservation projects involving some early sound systems: *Biophon*, *Chronophone*, *Phono-Cinéma-Théâtre*, and *Vitaphone*. The *Biophon-Tonbilder* project was carried out at the *Deutsche Kinemathek* in Berlin and presented in 2012; the *Chronophone* and *Phono-Cinéma-Théâtre* projects were curated by Gaumont Pathé Archives and the Cinémathèque française in France and presented in 2012; the *Vitaphone* project involved the UCLA Film Archive, the George Eastman House, the Library of Congress and the Museum of Modern Art Film Archive, and was initiated in Los Angeles in 1987.[134]

These projects, conceived and realized at different institutions, places and times, can be associated with the work carried out on a similar typology of film sound system, namely sound-on-disc systems. These systems represent the first experiments in sound films, allowing the synchronization of the image with sound recorded on disc. Sound-

[134] These projects involve the preservation and restoration of an entire corpus or collection of films rather than the preservation of a single film. This can be seen as a general tendency in the film preservation field, where the focus has shifted from the restoration of singular masterpieces to the preservation of partial or entire collections.

on-disc systems are characterized by the separation of the image and sound on two different carriers: the image is recorded on film, while the sound is recorded on gramophone discs or similar carriers. During exhibition, the film image was displayed on the screen through projection, while the sound was played by a gramophone and diffused in the theatre. These systems were produced from the 1900s until the standardization of film sound technology in the late 1920s and early 1930s, when the film industry supported the establishment of sound-on-film technologies that recorded image and sound on the same carrier, film stock. Before this standardization, film screenings were mainly accompanied by live music and performers who read the intertitles or produced sound effects.

Even if the standardization of film sound came almost thirty years after the birth of cinema, it should be noted that film pioneers experimented with methods and devices for synchronizing sound and images since the first definition of the cinematic medium. The exigency of combining image and sound recordings is expressed by one of the first pioneers, Thomas Edison: "in the year 1887 the idea occurred to me that it was possible to devise an instrument which should do for the eye what the phonograph does for the ear, and that by a combination of the two all motion and sound could be recorded and reproduced simultaneously."[135] Just a few years after the introduction of the *Kinetoscope* (1888-89), Edison coupled it with the cylinder phonograph, thus realizing the *Kinetophone* (1895), which transmitted the sound through rubber ear tubes (fig. 4). In the following years, many attempts were made in different countries to present moving images with synchronized sound, as for example the *Phono-Cinéma-Théâtre* (Lioret and Gratioulet, 1900), *Phonorama* (Berthon, Dussaud and Jaubert, 1900), *Chronophone* (Gaumont, 1902), *Biophon* (Messter, 1903), *Cameraphone* (Norton, 1903).

The preservation of sound-on-disc films can be considered an exceptional case, since these systems represent one of the very rare circumstances in which film sound is stored on discs. Nevertheless, it should be noted that the separation between image and sound on two carriers is a common practice in film preservation as well as film production. During film production, the image recording equipment and the sound recording equipment are separated, thus sound is recorded on a different carrier. Image and sound are rejoined and recorded on the same carrier during the production of

[135] Edison's letter to F.H. Richardson, 14 January 1925. See Raymond Fielding, ed., *A Technological History of Motion Pictures and Television* (Berkeley and Los Angeles: University of California Press, 1967), 21.

theatrical copies. The sound information for film preservation is often taken from another source than the positive print copy (sound negative print or magnetic tape), so rejoining the image and sound is also a problem for the preservation of films produced with sound-on-film systems.[136] In consideration of this, some issues related to the sound-on-disc systems can be referred to in the preservation of other film systems.

Analysis of the preservation practices adopted for early sound systems is very relevant and productive for the discourse on film sound: the fact that the sound and image are separated not only in the recording phase, but also in the exhibition phase raises specific challenges in their preservation. Present-day movie theatres are not equipped with sound-on-disc systems, therefore in order to preserve and present these films it is necessary to transfer them to new recording carriers, either analogue or digital, that can be displayed in theatres. The rejoining of image and sound is a particularly interesting operation, for it puts into question the nature of film sound and its relation with the image. Restorers and conservators have to decide on which carrier and at which speed to record the image and sound, while also finding a solution for synchronization that respects the original form of these films.

The *Biophon-Tonbilder* case provides interesting insight into understanding how the first sound-on-disc films were produced, how the technologies for synchronizing sound with image were developed, and how the audience responded to it. The *Chronophone*, *Phono-Cinéma-Théâtre*, and *Vitaphone* cases serve to show, first of all, that the *Biophon* was not exceptional, but that similar systems occurred in other countries. Moreover, each system raises other interesting issues about the preservation and presentation of film sound. In fact, these projects present diverse strategies and solutions for addressing the issues of rejoining image and sound as well as preserving and presenting them in contemporary contexts. These solutions will be described in this chapter in an attempt to answer the question: how is it possible to preserve film sound? The consideration of the different aspects that compose these systems and the decisions made in the work of preservation highlight some fundamental dimensions of film sound: the recording carrier, the technological device, the *dispositif* situation, the textual dimension, and the exhibition context. In the following sections I will analyze the *Biophon*, *Chronophone*, *Phono-Cinéma-Théâtre*, and *Vitaphone* systems in all these

[136] I refer here to cinematographic systems in which the image and sound are both recorded on film.

dimensions, first discussing their preservation, then their presentation in present-day theatres.

3.3 *Tonbilder* Carriers, *Dispositifs*, Texts, and Exhibition

The first case study considered is the preservation of five German *Tonbilder* films. Being involved in the project as a researcher, I gained direct insight into the preservation process, which was carried out from January 2011 to May 2012.[137] The *Tonbilder* project was part of the preservation activity of a film archive, the *Deutsche Kinemathek – Museum für Film und Fernsehen* (SDK). Moreover, it was also part of a cooperative academic research project, *The preservation and restoration of obsolete image and sound in the digital domain*, involving the *Hochschule für Technik und Wirtschaft* in Berlin and the *Università degli Studi di Udine* in Italy.[138] The binary orientation of the *Tonbilder* project, towards both archiving and research, made it possible to tackle theoretical issues during the realization of the work, giving the people involved the time to discuss and analyze the work in progress.[139]

The German term *Tonbilder*, meaning sound (*Ton*) - images (*Bilder*), designates early sound films accompanied by synchronized soundtracks that were recorded on gramophone shellac discs and produced in Germany in the 1900s and 1910s. The first system used to produce *Tonbilder* films was the *Biophon*, patented by the inventor and entrepreneur Oskar Messter in 1903 and improved in the following years. The term *Biophon* – whose etymology refers to life (bio) and sound (phon) – indicates that the

[137] The restoration of *Tonbilder* is a collaborative project between *Deutsche Kinemathek - Museum für Film und Fernsehen*; *Hochschule für Technik und Wirtschaft*; *Arri Film & TV; Università degli Studi di Udine* and its film and video restoration laboratory *La Camera Ottica*. My personal involvement in this project consisted of the observation of the main phases of the preservation process, including the decision-making part, and of performing some tasks especially in the phase of digital restoration.

[138] The collaboration between the two universities was possible thanks to the *Vigoni Program* of the *Ateneo Italo-Tedesco*, which financed the mobility of the researchers involved in the project: myself as a PhD student at the *Università degli Studi di Udine* and Dirk Förstner, a graduate student in Film Restoration at the *Hochschule für Technik und Wirtschaft* in Berlin. As an employee of the *Deutsche Kinemathek*, Förstner was involved in the project from its very beginning and carried out the research of the materials in the archive. The operational processes of the project were carried out at the *Arri Film & TV* in Munich.

[139] The moments of discussion during the reconstruction of the *Tonbilder* played an important role in defining the main issue at stake in the preservation of film sound: for these moments, I owe my thanks to all of the people involved in this work.

device was able to sync images with sound through the use of a projector and a gramophone linked together. Messter's system became so successful in Germany that other companies began to produce sound-on-disc systems similar to the *Biophon*: Alfred Duskes constructed the *Cinephon* for the *Duskes Kinematographenfabrick*, Guido Seeber developed the *Seeberophon* and the *Synchroscope*, and Karl Geyer produced the *Ton-Biograph* for the *Deutsches Mutoskop- und Biograph Gmbh*.[140]

Taking into account that *Tonbilder* films in Germany were produced and distributed on different sound-on-disc systems, I use the *Biophon* system as the device of reference in analyzing this case. *Biophon* was the first and most successful system in terms of production and reception. In fact, of the 1500 *Tonbilder* movies distributed in Germany from 1903 to 1914, around 500 were produced with the *Biophon*.[141] Moreover, the *Biophon* was also the system used most often for projecting sound-on-disc films in Germany. The *Biophon* also provides us with better documentation: many related documents regarding the *Biophon* survived, together with some exemplars of the devices, which are part of the film equipment collection that Oskar Messter donated to the Deutsche Museum in Munich. A model of the *Biophon* device is in fact displayed at the museum (fig. 5). This is not the case for other systems that lack description and documentation, and whose devices did not survive. It should be also noted that, despite some technical differences between competing devices, the principles elaborated in the description of the *Biophon* can also be applied to the other sound-on-disc systems developed in Germany.

Considering the importance of the material carrier and the technological device for the transmission of audiovisual traces as argued in chapters one and two, I have decided to separate the investigation of the *Tonbilder* case into three core aspects of film sound: the film carrier, the film *dispositif*, and the film text. First, the film carrier refers to the material object that contains the recorded information. Second, the film *dispositif* refers to the recording and playback devices, and the human actors that

[140] "The other German film producers did not stay idle in the meantime, but soon began to produce *Tonbilder* and to produce devices for the recording and playback of *Tonbilder*, which were similar to the apparatuses made by Messter and Gaumont." My translation from the original: "Die anderen deutschen Filmfabrikanten stehen indes nicht tatenlos abseits, sondern beginnen bald ebenfalls mit der Produktion von Tonbildern und mit der Herstellung von Geräten, die ähnlich wie die Apparate von Messter und Gaumont zur Aufnahme und Wiedergabe von Tonbildern geeignet sind." Martin Körber, "Filmfabrikant Oskar Messter. Stationen einer Karriere," in *100 Jahre Kino, Oskar Messter – Filmpionier der Kaiserzeit. Katalog zur Ausstellung*, ed. Martin Loiperdinger (Frankfurt am Main, Basel: Stroemfeld, Roter Stern, 1994), 52.

[141] Harald Jossé, *Die Entstehung des Tonfilms, Beitrag zu einer faktenorientierten Mediengeschichte* (Freiburg, München: Karl Alber Verlag, 1984), 101.

operate these technologies. Third, the film text is to be intended as the communicative content of the recorded information.

Far from being separate entities, these aspects are very much interconnected: the type of carrier influences how the device is used, the device chosen for production or projection can modify the carrier, and also the text and the film content can determine the use of a particular device or film stock. These three elements and their interconnectivities form an integrated system that shapes the cinematic experience of the films.

Tonbilder film carriers

The first element that the archivist approaches and experiences in the work of film preservation is the recording carrier, which is usually identified by the film stock. However, this is not always the case, as the *Tonbilder* example shows. *Tonbilder* films had the peculiarity of being recorded on two distinct carriers: one for the image (in most cases a 35 mm nitrate film base, positive or negative, fig. 6 and 7, or alternatively a 16 mm copy) and one for the sound (a gramophone shellac disc, fig. 8 and 9).

The separation of the image and sound carriers is correlated to the separation of the devices: during production, there were two recording devices: the camera that captured the image and the gramophone that recorded the sound. Similarly, during exhibition there were two playback devices: the projector to display the images on the screen and the gramophone that played the sound. The material nature of the carriers also influenced the dimension of the text: the fact that the sound was stored on gramophone discs meant that the duration of a single movie could not exceed the length of a disc, which at that time was about three to five minutes.

The duplicity of the carriers is also part of the reason why *Tonbilder* films constitute an interesting case in the field of sound preservation: the rejoining of sound and image is in fact a challenging issue in preservation practices. The storage of sound and image on two different carriers conditioned the disappearance of these films. In fact, in the early 1910s, film exhibitors actively discarded sound-on-disc systems and replaced them with projection devices that could not play gramophone discs, thus making it impossible to screen the *Tonbilder* films in a movie theatre. Since *Tonbilder* films lost their ability to be exhibited and, thus, their economic value, the image carriers

were separated from the sound carriers and ended up in different places and institutions. The gramophone discs were sold in the music market, and many of the surviving few ended up in private collectors' hands. Most of the films are lost, with only a few stored in film archives such as the Deutsche Kinemathek or the Bundesarchiv. The process of reuniting the image carriers with their corresponding sound carriers was one focal issue of this preservation project.

The *Biophon* system: technological devices and *dispositifs*

After a first consideration of the nature of material carriers, the next dimension concerns the devices that were used to produce and exhibit the *Tonbilder* films. In order to preserve these films correctly, it is in fact fundamental to take into account and understand the technological devices through which these images and sounds were displayed.

Before analyzing the *Biophon* system as a device and a technological development, we must first define the term *dispositif*. The French term *dispostif* became a notion of reference in sociology and media studies from the 1970s onwards thanks to the work of Jean-Louis Baudry and Michel Foucault, among others.[142] As Frank Kessler argues in "Notes on *dispositif*," the French term *dispositif* is only partially translated into English as apparatus or device: "'apparatus' does mainly underscore the 'mechanical side' of the term, and less the aspect of a specific 'disposition', both in the sense of 'arrangement' and 'tendency'."[143] The theoretical elaboration of the notion of *dispositif* involves many aspects that are excluded by the term apparatus, which indicates the technological device: *dispositif* is in fact used as a broad notion that ties together different dimensions of media, such as the economic, artistic and institutional dimensions. The distinction made by Jean-Louis Baudry between apparatus (*appareil de base*) and *dispositif* helps to clarify this point:

> In a general way we distinguish the *basic cinematographic apparatus* (*l'appareil de base*), which concerns the ensemble of equipment and operations necessary to the

[142] See among others Jean-Louis Baudry, *L'Effet cinéma* (Paris: Albatros, 1978); Michel Foucault, *Power/Knowledge, Selected Interviews and Other Writings 1972-1977*, ed. Colin Gordon (New York: Pantheon Books, 1980).
[143] Frank Kessler, "Notes on dispositif. Work in progress." Utrecht Media Research Seminar, November 2007 - www.let.uu.nl/~frank.e.kessler/personal/dispositifs.html, accessed May 2013.

> production of a film and its projection, from the apparatus (*le dispositif*) discussed in this article, which solely concerns projection and which includes the subject to whom the projection is addressed.[144]

Following Baudry's distinction, I differentiate between the concepts of apparatus and *dispostif*. I intend the concept of apparatus as referring to all of the technological devices (mechanical, electrical, digital) that are involved in the processes of production, distribution, exhibition, preservation and presentation of film heritage. In order to avoid the linguistic confusion between apparatus and *dispostif*, further on I use the term technological device instead of apparatus.

In line with Baudry's definition of *dipositif* I include the audience in the screening situation. However, I do not restrict the notion of *dipositif* solely to the moment of projection, since I consider the subjects involved in a *dispositif* situation to be not only the audience but also what I previously defined as other human actors, referring mainly to the technicians and operators. In this sense, human actors interact with the film devices and the film objects not only in projection, but also in other phases of film production. Moreover, this concept allows preservation practices to be included in the set of *dipositif* situations, since preservation, like projection, requires an interaction between human and technological actors. I propose then to use the term *dispositif* to describe the situation of interrelation between the technological devices and the human actors that can take place in the context of the production, distribution, reception and preservation of films.

The case of *Tonbilder*, as well as other early film sound systems, illustrates the difference between the concept of device, *dispositif*, and system. The projector and the gramophone, considered *singularly*, are devices: they are independent and can function alone. A *system* is formed when different devices are linked together and function in an integrated way. In the case under examination, the projector linked together with the gramophone constitutes the *Biophon* system, as described in Messter's patent. The same devices linked together with another type of connection compose a different system (the *Chronophone*, the *Vitaphone* systems). When the devices are linked together in a system, set up in a particular space and context, and operated by a human actor, they

[144] Jean-Louis Baudry, "The Apparatus: Metapsychological Approaches to the Impression of Reality in the Cinema," in *Narrative, Apparatus, Ideology*, ed. Philip Rosen (New York: Columbia University Press, 1986), 317.

constitute a *dispositif*. The human actor and the technique that he or she uses to operate the devices play a decisive role in defining the form that film takes in production or projection. In the *Biophon* system, the relation between human actor and technological actor guarantees the synchronization effect between image and sound, as will be further explained.

With the definitions of device, *dispositif*, and system in mind, I can now focus on the specific characteristics of the *Biophon* system. In 1903, the company of Oskar Messter, which produced film and film equipment, patented the *Biophon*[145] for the exhibition of moving images and recorded sound in synchrony. According to the patent drawing (fig. 10), the *Biophon* system used for exhibition was composed of two playback devices: the gramophone (fig. 11) placed behind the screen and the projector placed in the auditorium.[146] The projector and the gramophone were electrically linked together with an electromagnetic coil system that regulated the speed variations of the projector's and gramophone's motors, enabling the two devices to form a united playback system.

Film historian Harald Jossé identifies different recording and playback techniques in order to classify early sound-on-disc systems.[147] Jossé describes three main techniques applied in the production of sound-on-disc movies: the film shooting can precede the sound recording in the "post-synchronic sound recording" (*postsynchrone Tonaufnahme*), the sound recording can precede the film shooting in the "pre-synchronic sound recording" (*präsynchrone Tonaufnahme*), or they can be recorded simultaneously in the "simultaneous recording" (*Simultaneaufnahme*). During exhibition, the phonograph and projector can be linked in a "unity method" (*Unitätsmethode*) if they are driven by a unique motor or in a "dependence method" (*Dependenzmethod*) if the motor of one device leads the other. With the "indicator method" (*Indikatormethode*), the two speeds of the projector's and gramophone's motors were indicated in a unique measuring scale, which showed when the two speeds diverged. Jossé's distinction can be interpreted as a classification of the types of interactions between technological devices and human actors in the context of production and exhibition.

[145] The first patent is dated February 19th, 1903 (DRP Nr. 145 780). After little changes, a second patent was presented on April 9th, 1903 (DRP Nr. 154 372).
[146] See Christian Ilgner, Dietmar Linke, "Filmtechnick – Vom Maltesekreuz zum Panzerkino," in *100 Jahre Kino, Oskar Messter – Filmpionier der Kaiserzeit. Katalog zur Ausstellung*, ed. Martin Loiperdinger (Frankfurt am Main, Basel: Stroemfeld, Roter Stern, 1994), 117.
[147] Harald Jossé, *Die Entstehung des Tonfilms*, 69-70.

Following Jossé's terminology, the *Biophon* works according to the "pre-synchronic sound recording" principle during production and the "unity method" during exhibition. The shellac disc was recorded first, before the production and shooting of the film. The disc could be recorded for the purpose of the film, or alternatively, records produced for the music market were used, for instance arias or songs performed by famous opera singers like Caruso. During filming, the shellac disc was played and the actors on stage tried to follow with the lip movement and mimic the soundtrack (fig. 12). The films were shot in a single take and there was no editing afterwards. This enabled the synchronism between image and sound to be maintained.

For the screenings, the projectionist loaded the projector and put the disc on the gramophone, trying to start both of them in sync. To help him, sometimes there were specific marks on the film roll as well as on the shellac disc that indicated the starting point (fig. 13 and 14). However, matching the starting points of image and sound did not guarantee synchronization. Many technical problems could occur during the screening and cause a loss of synchronization: a jump of the gramophone needle on a groove because of a scratch, a film splice or a tear that caused parts or entire film frames to be missing, or a current fluctuation that produced a change in the transport speed of the machines. In those cases, the projectionist had to adjust the speed of the projector in order to regain synchronization during the screening. Therefore, the projectionist had a decisive role in the synchronization results of the projection. This observation demonstrates the importance of the human actor and of his or her interaction with the technological device in defining the frame of the *dispositif*.

In order to improve the efficiency of the adjustment operations, Messter implemented a warning device (*Synchrophon*) that used a flashing light to signal when the projector and gramophone speeds diverged. As reported by Jossé, this device and the technique involved followed the principle of the "indicator method," according to which the projector and the gramophone were connected to a speedometer, which used an indicator to display the speed of the two devices.[148] During the screening, the projectionist had to pay attention to whether the two speed arrows were aligned; otherwise, asynchrony would result. In this case, the projectionist needed to regulate (speed up or slow down) the projector speed until sound and image were in sync again. The speed of the gramophone was typically left unchanged since altering the speed of

[148] Ibid.

the sound is usually much more disturbing than changing the speed of the image. In this kind of device, the quality of the projection and the efficiency of the synching effect depended greatly on the capacity and attention of the projectionist.

Messter continuously improved the *Biophon* system in order to ameliorate the synchronization between image and sound, as demonstrated by the 35 patents for synchrony devices that he submitted from 1903 to 1908. In 1906, Messter released a new patent[149] for a device that was connected electrically with the gramophone and mechanically with the projector:[150] the motor of the gramophone set the speed while the projector's motor followed the speed of the gramophone. Jossé calls this synchrony technique the "dependence method" because one device, the projector, depends on the other, the gramophone. Jossé explains that the leading device is the gramophone because the inertia of the eye allows a certain freedom in the speed range of the projector, while the ear notices immediately if a record is played too slow or too fast.[151]

Even though the device used in the "dependence method" was more expensive to produce and more difficult to integrate with existing machines, Messter decided to adopt it and abandon the "indicator method." The "dependence method" allowed him to improve synchrony by making it more dependant on the technological actor – the projection device – than on the human actor – the projectionist. It is useful to interpret the development of the technologies used for *Tonbilder* films in terms of the relationship between human and technological actors in the *dispositif* situation: while in the "indicator method" the result depends mainly on the human actor, synchronicity in the "dependence method" depends more on the technology (the connecting of the two devices' motor) and less on the technique and operational capacity of the projectionist. The concept of *dispositif*, intended as the relation between human and technological actors, when used as a tool for interpretation can underline where the emphasis in a particular system lies, that is, in the actions of the human operator or of the device. Thus the conception of *dispositif* as a mere device would not take into account the role of the operator as well.

In other words, Messter's struggle for continuous improvement of the Biophon *dispositif* can be read in light of a continuous re-adjustment of the human-device relationship in the context of exhibition as well as that of production. The nature of this

[149] DRP Nr. 200 469 (29th April 1906).
[150] See Harald Jossé, *Die Entstehung des Tonfilms,* 76.
[151] Ibid., 69.

dispositif underlines the importance of performance and liveness: the overall result of *Tonbilder* exhibitions, as well as the cinematic experience connected to it, depended to a certain degree on the live performance of the projectionist, or, in other words, on the interaction between the projectionist and the technological device.

The *dispositif* also has to be adapted to the physical space of the exhibition. With this in mind, one of the main problems of *Tonbilder* systems was sound diffusion: the gramophone was placed behind the screen, but the sound could not traverse the whole auditorium, especially in the case of a large theatre. To solve this problem, Messter decided to improve the sound volume by using more gramophones linked together and adopting a bigger horn (two meters long). He placed the gramophones near one another behind the screen or in different places in the auditorium, creating a sort of multi-channel diffusion. This solution still had some problems: increasing the volume meant an intensification of the noise and crackle created by the phonograph. Additionally, if the gramophones were not started at the same point and at the same time, they could also generate an echo effect. These problems were overcome in 1910 thanks to the introduction of the *Auxetophon* patented by Deutsche Grammophon AG: this device amplified the sound through the use of compressed air so that it could be heard by everyone in the auditorium.[152]

Considering the importance of an adequate space for guaranteeing a good exhibition, Messter decided from the very beginning to open a theater in the centre of Berlin, the *Biophon-Theatre*, which had 280 seats, with an average audience of 500 people per day.[153] In this theatre Messter could set up the *Tonbilder* with the maximum amount of control over the exhibition space and the *dispositif*, i.e. the technological devices and the human operator. This fact sustains the idea that *Tonbilder* exhibition can be interpreted as a performance where contributing factors include the interrelation of technological devices and the human actor in the *dispositif* situation.

[152] Ibid., 70.

[153] See Albert Narath, "Oskar Messter and his work," in *A Technological History of Motion Pictures and Television: An Anthology from the Pages of the Journal of the Society of Motion Pictures and Television Engineers*, ed. Raymond Fielding (Berkeley, Los Angeles: University of California Press, 1967), 115. The theater was located at Unter den Linden, 21.

Tonbilder film texts

The third element that I use to describe the case of the *Tonbilder* is the film text, understood in semiotic terms as the content and narrative of the film. From the perspective of the text, *Tonbilder* films can be characterized as short films presenting brief drama or comedy scenes, most including a song. These musical numbers were adopted from musical theatre, cabaret, and variety shows; the songs could be borrowed from popular shows from Berlin's musical theatre or could be arias from operas and operettas. The musical piece was performed alone or inserted into a dialogue scene, a short sketch or a dance scene. Messter also recruited the stars of Berlin's musical and variety stage for shooting and recording the *Tonbilder* scenes and sounds.

Since the major innovation of the *Tonbilder* was synchronized sound, the frequent use of musical pieces and songs is not surprising: the main attraction for the audience consisted of the novelty of experiencing speech and musical accompaniment as an integral part of the film, hearing the actors' voices synchronized with the image of their bodies. The use of songs also derived from economic and production factors: the fact that shellac discs were utilized to record songs for the music market favored the presence of songs in the *Tonbilder* scenes.

The relation between carrier, text, and *dispositif* in the *Tonbilder* films can be interpreted as follows. The use of previously released, commercial music recorded on disc, and the consequent presence of popular songs in film, is an example of how the carriers and devices determined the form and content of *Tonbilder* texts. The real attraction of these films depended on the *dispositif* itself much more than on the films' content, which was organized in order to be adequate to display the potentialities of the *dispositif* and to hide its defects. In other words, the text was subordinated to a certain extent to the *dispositif*. Since the main potential and attraction of the *dispositif* was the possibility to display synchronous sound, the screenplays were constructed in order to bring out the songs or recorded sound.

The *dispositif* presented not only new opportunities on the level of text, but also restrictions: as already noted, the duration of the film depended on the maximum duration of the sound records (three to five minutes). In the beginning this was not considered a problem, since in 1903 the average length of movies was still around five minutes. Later on, however, with the emergence of longer feature films, it became a

limitation. This problem was partially overcome by using two alternating gramophones to play the sound; Messter employed this method to realize some longer films in the form of a series.[154]

The history of *Tonbilder* exhibition

The history of exhibition is also an important element to consider in preservation practices. First, documentation of historical exhibitions and audience reception provide useful information for preservation and presentation. Knowledge of a film's exhibition can help in locating other copies of the film. Moreover, the study of exhibition related material, such as billboards or reviews, can offer insight into understanding how a film supposedly looked and sounded to a contemporary audience.

When analyzing the ways in which *Tonbilder* films were historically presented, it is important to note that these films were not usually screened on their own, but instead as part of theatre programs, usually in the drama or comedy slot. These theatre programs also contained films without recorded sound that were instead accompanied by a piano or an orchestra, or were mixed in with actuality films, as indicated in a program's billboard (fig. 15).

The first presentation of a *Tonbilder* film, which is also considered to be the first film screening with synchronized recorded sound in Germany, took place on 29 August 1903 in the Apollo Theatre.[155] The reaction of the public and critics was enthusiastic. This is an impression of the screening as reported in 3 September 1903 edition of the Staatsbürger Zeitung:

> For that there is only one voice of admiration. Nostradamus and Cagliostro are orphans compared to Messter, and the inventor of Biophon should consider himself lucky that he is part of the modern world. In the 17th Century he would have been involved in a witch trial, or sent to a madhouse, like Mondecaus, the inventor of the steam engine.[156]

[154] An example is the five-part adaptation produced by Messter (1908) of *Ein Walzertraum*, with a running time of 15-20 minutes.
[155] Harald Jossé, *Die Entstehung des Tonfilms,* 74.
[156] My translation from the original: "Es gibt dafür nur eine Stimme der Bewunderung. Nostradamus und Cagliostro sind Weisenkinder im Vergleich zu Messter, und der Erfinder des Biophons mag sich glücklich schätzen, dass er der modernen Welt angehört. Im 17. Jahrhundert hätte man ihn in einen Hexenprozeß verwickelt, oder in ein Narrenhaus gebracht, wie Mondecaus, den Erfinder einer Dampfmaschine." Ibid., 74-75.

The films were then screened in other theatres. The *Tonbilder* attraction soon gained recognition in the short film programs in Germany and was also distributed in foreign countries, such as Austria, Hungary, Russia, the Netherlands, Denmark, and Italy.[157] Before 1914, Messter installed approximately 500 *Biophon* devices in theatres.[158] The *Tonbilder*, whose devices required a closed and stable space for sound diffusion, played a role in the evolution of exhibition spaces. Around 1905 in fact the cinema exhibition space shifted from wandering spectacle (*Wanderkinos*) to stable theatres, the *Ladenkinos* with a capacity of less than 100 people and the bigger *Kinotheatres* with a capacity of 1000 people.[159]

A *Tonbildboom*[160] happened in Germany from 1903 to 1914 and resulted in the production of around 1500 *Tonbilder* negatives, of which 500 were produced by Messter. Competing companies, such as the *Deutsche Mutoskop und Biograph* or the *Duskes Kineamtographenfabrik*, also produced films with sound-on-disc systems similar to the *Biophon*. In 1913-1914, this boom came to an end mainly because of the progressive establishment of the feature film with a length of one to two hours. With the technology of the time, it was too problematic to produce *Tonbilder* films that lasted as long, since a single disc could play only around five minutes of recorded sound. Additionally, the language of film was also changing because of new possibilities provided by production devices: camera movements, alternate shots, elaborate editing, and effects. The stable single shoot required for shooting *Tonbilder* films and the inability to make cuts in editing relegated these films to an outdated form of cinema. Another reason for the end of the *Tonbildboom* was that films with synchronized sound were no longer a novelty; also, the synchronicity with the image was often compromised because of the many problems that could occur during projection, which was perceived as disturbing by an increasingly demanding public. Finally, the onset of the First World War brought an end to *Tonbildler* production and distribution.

For all these reasons, in the second half of the 1910s the *Tonbilder* films were no longer considered commercially exploitable: the technology became obsolete, exhibitors dismissed the playback devices, and projectors lost the capacity to operate them. Sound and image carriers were separated and ended up in different places, and most of the films were lost as a result. Collectors saved some film reels from destruction and

[157] See Oskar Messter, *Mein Weg mit dem Film* (Berlin: Max Hesses Verlag, 1936), 65.
[158] See Martin Körber, "Filmfabrikant Oskar Messter – Stationen einer Karriere," 49.
[159] Harald Jossé, *Die Entstehung des Tonfilms,* 98.
[160] See ibid., 101.

possibly screened them without sound in non-theatrical settings. Some of the films were donated to archives. The shellac discs were still used privately as music records since they very often contained songs; therefore they became part of the collector market or ended up in specialized sound collections.

Examination of the end of *Tonbilder* exhibition was useful for locating the film and disc materials. Moreover, investigation into exhibition history also served to better understand the modes of display and the *dispositif* set-up. Providing information on how the sound of *Tonbilder* films was presented in the past, exhibition history also plays a role in defining how these films can be presented now, as will be clarified in the following examination of preservation practices.

3.4 The Preservation of *Tonbilder* films

Before analyzing the preservation of the sound of *Tonbilder* films, which will be described in the next section, I will first discuss the initial phases of the preservation process. Here, the issues concerning the level of the carrier come particularly to the fore.

The first step in the *Tonbilder* project consisted of finding and selecting the material objects for preservation. As previously mentioned, the image and sound carriers were separated after the end of their commercial distribution. The few *Tonbilder* films and discs that survived were located in different places and institutions, such as the Deutsche Kinemathek and the Bundesarchiv Berlin. Upon examination, the catalogue of the Deutsche Kinemathek contained twenty-five film titles corresponding to *Tonbilder* films.[161] However, when searching the same titles in the sound collection of the Kinemathek, only two items were found (a wax cylinder and a magnetic tape with four musical accompaniments recorded in the 1950s), but no shellac records. Since the archives provided no corresponding records, the search was extended to private collections, taking into consideration the films' exhibition history. In particular, the German collector Christian Zwarg, who specializes in *Tonbilder* records, carried out the

[161] See Dirk Förstner, "Die Möglichkeiten des *Digital Intermediate* Prozesses in der Filmrestaurierung am Beispiel von Tonbildern," Master Thesis, Hochschule für Technik und Wirtschaft HTW Berlin, 2012, 12.

research in the collectors' world, finding four sound records that corresponded to the film titles.

The main criterion for selection was finding the corresponding sound discs. In the end, only four films could be found that met this requirement. However, an additional film titled *Babylied* was selected for preservation, despite the inability to locate the corresponding sound disc. This decision was made because of the qualities of the film copy, which was the only one to be hand-painted, and the comic value of scene, which showed the actor Henry Bender singing a song and dancing dressed like an infant. My analysis will not consider this last film, since its restoration did not involve sound. The five *Tonbilder* films selected for this preservation project were (see table, fig. 16 and 17):

1. *Am Elterngrab* (1907)
2. *Schutzmannlied* (1908)
3. *Liebes Männchen folge mir* (Albert Kutzner, 1910)
4. *Militärische Disziplin* (1910)
5. *Babylied* (1904)

Once the film and discs had been found and selected, the project needed to be defined. Considering the characteristics of the *Tonbilder* texts, the material carriers, the technological devices and the *dispositif* as described above, the preservation of *Tonbilder* films poses the following questions: what does it mean to preserve sound-on-disc system-based films like the *Tonbilder*? How can they be reconstructed with current technologies? How can they be made accessible to the public and presented in current theatres that are not equipped with the original playback system?

The objective of the project needed to be defined with respect to preservation and presentation. For preservation, the team of preservationists decided that the aim was the production of preservation copies, since the films were not already preserved neither by this institution nor any other. In terms of presentation, it then needed to be determined whether the restored copies were going to be screened in a theatrical setting or used as access copies for other media and settings (DVD, digital copy for the web, and so on). The team decided in favor of a solution that allowed the presentation of the restored *Tonbilder* films in a contemporary movie theater.

It should be noted that is not possible to present the *Tonbilder* films in their original form, with the use of the original materials (film rolls and discs) and devices, mainly because of the obsolescence of the carriers and the *dispositif*. In the case of the carrier, the film and the discs are, in most cases, unique copies and have deteriorated over time. The nitrate film rolls, if they survived, are very fragile and most likely physically and chemically decomposed. Moreover, it is not possible to project nitrate film in today's film theatres for security reasons since it is flammable; only few theatres in the world have the license to do so on special occasions. The original shellac discs are also very fragile: each time a shellac disc is played, the stylus scratches the surface of the track, eroding sound information. On the level of the *dispositif*, it is not possible to use the original playback equipment, since theatres no longer use this technology. Only a few examples of the machines still exist, some of which are preserved in museums. Even considering the very expensive possibility of putting the device in a theatre - assuming that it still works - no projectionist nowadays has the technical knowledge required for operating the equipment needed.

The choice of theatrical exhibition for the restored versions prompted questions surrounding how these films could be displayed using present-day theatrical playback equipment. In order to show the *Tonbilder* films in a cinematic context, it is necessary to transfer them to other carriers and formats that allow them to be displayed with today's devices in the *dispositif* setting of contemporary movie theatres. Considering the need to transfer the material and the impossibility to use the same type of carrier as the original films there were two main questions at this stage: what kind of carriers (analogue or digital) should be used? Should sound and image information be combined onto a unique carrier or two separates ones? The project team considered two possible directions for answering these questions.[162]

The first direction evaluated the use of separate carriers, one for the image and one for the sound. This option, which would be more accurate with respect to the original film form, using 35mm film for the image and maintaining the speed of about 16 fps, and using a vinyl disc for the sound, since it is no longer possible to record shellac discs. However, the possibilities of exhibition in this situation would be very

[162] See Dirk Förstner, "Rekonstruktion von Tonbildern in modernen Wiedergabesystemen. Theoretische Diskussion und praktische Anwendung," Bachelor Thesis, Hochschule für Technik und Wirtschaft HTW Berlin, 2009, 36.

limited, since almost no theatres would have access to a projector with variable speed as well as a record or magnetic player, hence, this was not a viable solution.

Instead, a solution should be favored that accommodates the devices present in today's theatres. Given this consideration, the carriers could be both analogue (image on film; sound on magnetic tape), both digital (image on hard disc; sound on Compact Disc, digital magnetic tape or hard disc), or a combination of analogue and digital (image on film; sound on Compact Disc, digital magnetic tape or hard disc). It should be noted that the use of digital carriers for the sound could be problematic because is not possible for the projectionist to work the same way with digital means as with analogue ones. In fact it is not possible to put starting marks on a CD, and digital playback machines do not allow the alteration of playback speed. This leaves the combination of image on film and sound on magnetic tape as a possible solution, but only if the projection booth is equipped with a tape playback system, which is unusual.

The second direction the team investigated comprised solutions where the sound and image were stored on the same carrier, which could be analogue (a 35 mm combined film copy) or digital (a hard disk). In both cases, the synchronization would not depend on the projectionist, but on the display machine (a film projector in the first case or a digital projector in the second one), since the images and sounds would already be synchronized on the carrier. In this case, the original materiality of the film would be deprived of one of its most specific characteristics, the duplicity of its carriers. However, the film would have a greater possibility of being presented in contemporary theatres: the format and carriers would in fact be compatible with contemporary projection technologies, and special equipment or special skills of the projectionist would be not required.

The choice between the use of one or two carriers for recording the image and sound of the reconstructed *Tonbilder* films can be interpreted from my tripartite definition of preservation as featuring carrier, *dispositif*, and text. The strategy of using two different carriers could be considered more attentive to the preservation of the original *dispositif* and the materiality of the carriers, but requires extra equipment (variable speed projector, record or magnetic player) as well as a skilled projectionist, since synchronization depends on his or her precision in operating the projector and the sound playback machine. On the other hand, the recording of image and sound on the same carrier supports the reconstruction of the films on a textual level; in this case, the

requisites for contemporary presentation take precedence over the original *dispositif* and carriers.

Considering these two possibilities, the project team chose the option of using one unique carrier for image and sound. It was decided to produce both an analogue and a digital copy as output of the reconstructed *Tonbilder* films: the 35mm film combined copy with an optical soundtrack guarantees its preservation in the long term, while the DCP digital copy can easily be used for exhibition in theatres equipped with digital projectors.[163]

The decision to use one unique carrier for image and sound betrays the original materiality of the *Tonbilder* films to a certain extent. However, this "betrayal" can be put into perspective somewhat, considering that each transfer of the film entails a change in the its materiality: this change is part of the process of a film's reproduction and transmission to the future through migration in new carriers. In fact, some *Tonbilder* films had already gone through a migration when they were copied from 35 mm nitrate to 16 mm acetate film, as for instance in the case of *Liebes Männchen folge mir* and *Schutzmannlied*. In this transfer, they had already lost some characteristics of their original format: part of the 35 mm frame has been cropped to fit the 16 mm frame and the original color, which might have been done by hand, was lost when copied to black and white 16mm film stock, as shown in the case of *Babylied*. Considering the degree of material change involved in each migration, preservation work can also be intended as the ability to choose which characteristics of the film should be safeguarded and which characteristics can be modified, and to what extent.

In conclusion, the choice of the carrier in this project is an example of the delicate decision making process that is continuously being carried out by archivists and restorers, balancing historical against contemporary materials, devices, and screening practices. It also shows that preservation choices have a direct impact on presentation and that these two activities are closely connected. In fact, the decision to record image and sound on the same carrier, despite the fact that they were originally separated, is considered here to be the best solution to presenting the films in contemporary theatres. Finally, the choice of the carrier suggests that there is no absolute right or wrong solution, but each decision depends on the context, the people involved, and the technology available. Preservation practices can be interpreted using the concept of

[163] See Dirk Förstner, "Rekonstruktion von Tonbildern in modernen Wiedergabesystemen," 41.

dispositif, as I did for explaining the exhibition of *Tonbilder* films: the practice depends on the balance between human and technological actors in a particular situation. Preservation work turns out to be much more of a social practice than a merely technical or scientific one.

3.5 Synchronization, Sound Reconstruction, and Denoise

After discussing the choice of the carrier, in this section I elaborate on the process of synchronization between image and sound, which is one of the most problematic and interesting aspects of the *Tonbilder* reconstruction. As already pointed out, both the records and films of the *Tonbilder* system did not have a standardized playback speed, since the motors of the camera and gramophone lacked a fixed rotation speed. Film speed was standardized to 24 images per second (fps, frame per second) only after the adoption of the optical soundtrack system at the end of the 1920s;[164] before this time, the speed could vary from 14 to 22 frames per second.[165] Similarly, gramophone records did not have a defined speed (rpm, revolutions per minute) at first, but ranged from 60 to 130 rpm; it was standardized to 78 rpm only around 1925 with the introduction of electrical recording systems.

These two unknown factors made synchronization problematic, since there is no established and technologically standardized reference point. The first challenge of *Tonbilder* synchronization was to find a disc speed that would make the music and human voices sound natural. The second challenge was to identify a film speed that would make the movement in the images seem natural as well (not too slow and not too fast). While the final challenge was final harmony between those two speeds.

The project team decided to use the sound recording as the guideline for playback speed, since the ear is more sensible to variations in sound speed than the eye is to

[164] As explained by Read and Meyer: "Sound film was standardized at 24 frames per second. […] Twenty-four frames (equivalent to 456 mm/second) was the minimum length necessary for reproducing an optical sound track capable of recording and reproducing frequencies up to 5000 cycles per second, which was considered necessary to obtain realistic sound reproduction quality." Paul Read and Mark-Paul Meyer, *Restoration of Motion Picture Film*, 26.

[165] For a discussion on the problem of the speed of early cinema, see Kevin Brownlow, "Silent Films: What Was the Right Speed?," *Sight and Sound*, Summer, 1980.

variations in image speed. This decision is supported by this consideration of Read and Meyer:

> The characteristics of sight mean that film images shown at an incorrect speed are still intelligible, and even film run backwards is still intelligible as time running backwards. Sound cannot be heard in the same way and changes in speed mean profound changes in frequency, or tone, and a lack of perceived reality. A change in tone and harmony resulting from a change of just three frames per second in the speed of projection is unacceptable to the human ear. If the film direction is reversed the sound becomes unintelligible. [166]

An additional argument towards using sound speed as a starting point lies in the fact that the *Tonbilder* projection *dispositif* was based on the principle that the image speed followed that of the sound. This brief account of the process already shows the great degree of variability that could occur in the operational work of preservation: how can the naturalness of sound or image speed be determined if there are no other parameters? There is no objective or universal answer, but the solution to such problems often comes out of interaction between the film carriers and the human actors (the preservationists and technicians) as well as the technologies at their disposal.

The first step was to digitize sound and image in order to bring both of them into the digital domain where they could be reassembled. The digitization of the image was carried out through the use of an *Arriscan*, which scanned each frame and converted it to a DPX file[167] in 2K resolution. The images were then corrected using film restoration software, such as *Da Vinci Revival*, *Diamant* and *Shake*; the main phases consisted of stabilization, deflicking, manual and automatic retouch, and grading.[168]

Christian Zwarg, the private collector and owner of various *Tonbilder* discs who carried out a search for such materials in the collectors' world, requested to personally perform the sound digitization of the discs with his own equipment.[169] To play the

[166] Paul Read and Mark-Paul Meyer, *Restoration of Motion Picture Film*, 26.
[167] Digital Picture Exchange (DPX) is an image file format used in the workflow of Digital Intermediate (DI), postproduction and visual effects.
[168] For more information about the restoration and reconstruction of the images, see Dirk Förstner, "Rekonstruktion von Tonbildern in modernen Wiedergabesystemen," 22.
[169] Since Zwarg performed the sound digitization at his own studio, it was not possible to document this process through personal observation. The following information about the apparatuses and techniques used for the digitization of the *Tonbilder* sound thus derives from Dirk Fröstner's interview with Zwarg, see Dirk Förstner, "Rekonstruktion von Tonbildern in modernen Wiedergabesystemen," 57.

records, Zwarg used a modern variable speed turntable with a special needle produced by the London-based company *Expert Stylus*; he did not use an original gramophone steel stylus because its weight (100-200 grams) would have worn the grooves of the disc.

The most important parameter to determine in sound digitization is the rotational speed, since early gramophone discs did not have a standardized speed and there were no indications on the discs. According to Zwarg, *Tonbilder* records usually have a speed of 75 revolutions per minute. The digitization of the sound information is obtained by connecting the record player to a computer with an acquisition software; the sound files were delivered as AIFF[170] with a bit rate of 16 Bit and a frequency of 44,1 kHz. The record was digitized in stereo format with a stereo pickup cartridge, even if the gramophone track should be played as mono: this trick provides two equal tracks, so that the better quality track can be used. Moreover, it is possible to take a sample from the other track in the event of any damage. The frequency response[171] of recorded sound on shellac discs is approximately between 100 and 4000/5000 Hz, which is very limited if compared to the sensitivity of the human ear (approximately 20 to 20000 Hz): this is why the sound recorded on early shellac discs, which lacks low and high frequencies and has a lot of noise, result as strange to contemporary ears, used to the improved sound quality of current recordings.

Sound and image were first reunited in *Avid Digital Suite* (*Avid DS*), a platform capable of ingesting DPX files in 2K resolution and processing them in real time. With *Avid DS*, it is possible to change the speed of the image files and sound files through the *Retiming* function. The retiming of sound and image presented two issues. The first concerned the acquisition of the image files: the software, which was developed for new productions, can work only with an image frequency of 24 fps or higher, in accordance with contemporary standards. In order to work with early films, which have a speed of between 14 and 22 fps, it is then necessary to simulate the speed of 24 fps: this can be achieved with a plug-in that uses an algorithm to automatically double each image.

The next problem related to the presence of splices in the scanned copies: in many cases, the presence of splices marked the fact that frames were missing, causing a break in the synchronization between sound and image. To facilitate the synchronization

[170] Audio Interchange File Format (AIFF) is an audio file format for digital postproduction and storage.
[171] The frequency response in sound acoustic represents the measure of frequency range that is covered by the device output, in comparison to the sound input.

process, it was decided to try to establish, at least approximately, the number of missing frames in the different splices. This operation could be attempted since the *Tonbilder* films do not have editing cuts: they were filmed as a sequence shot and not edited in postproduction so that the duration of the shot and of the recorded sound would remain the same, and therefore synchronization could be maintained in projection. In order to determine the number of frames missing, the project team made use of the *Avid* software's function that places a virtual grid on top of the frames. The grid helps to determine how many frames are missing by considering the steps and jumps in the movement of actors or objects. This method is not entirely accurate, but allows for an estimation of the number of missing frames. If the number was very low (one or two frames), no changes were needed; but when the number was high and the jump was discernible and disruptive, it was decided that a number of black frames correspondent to the number of supposed missing frames would be inserted.

Once the image timeline was adjusted by inserting the black frames, it was put in relation to the sound timeline (fig. 18). From this comparison, it was decided which frame speed should be attributed to the image files: 15 fps for *Schutzmannlied*, 16 fps for *Liebes Männchen folge mir*, 18 fps for *Militärische Disziplin*, and 20 fps for *Am Elterngrab*. After having determined the image speed rate, the sound was compared to the image again: it was much more synchronized, but still a bit off. Therefore, the sound files were slightly accelerated (between 101% and 123%) in order to create a better sync with the image. The decision to accelerate the sound speed was made also due to the fact that some soundtracks, particularly the one of *Am Elterngrab*, sounded too slow with regard to both music and human voice.

The description of the synchronization process shows the challenges of detecting a balanced speed of image and sound. The ideal combination of image and sound speed was found when the movement in the image flowed, the sound seemed natural, and the sync was acceptable without any disruptions. No principle or rule was determined; instead, human perception was the final judge. The resulting synchronization is not perfectly simultaneous, meaning that lip movement does not fully coincide with the sound. The loss of sync was only corrected if it resulted as very disturbing to the ear; again, the judgment was based on human perception. The analysis of this process shows the importance of the human actor, the restorer or the operator, in the process of preservation: in many phases his or her judgment, based on perception as well as

expertise and historical knowledge, determines how a film's form is changed in the process.

The synchronization process, as interpreted in the analytical frame that I propose, demonstrates the importance of understanding the original *dispositif* situation in which the film was shown. The loose synchronization in the restored films is justified by the fact that the films were never perfectly synchronized in the first place, since synchronization depended on the capacity of the projectionist as well as technical factors. This loose synchronization is a characteristic of the original films that is allowed to be maintained in the reconstruction; a perfect sync would in fact deprive the public of a trace of the original separation of the image and sound carriers and the live sync performed by the projectionist. The reconstruction of synchronization took into account the performance aspect of *Tonbilder* exhibitions: similar to the *Tonbilder*'s projectionist, the preservationists and restorers used the technological means at their disposal to find the best possible accordance between image and sound in an attempt to remain faithful to how the film was displayed. The performance dimension of the exhibition phase is safeguarded to a certain extent by the preservation work; this dimension is also displaced from the presentation to the preservation phase.

As previously noted, it is not possible to keep the original form in its integrity; in the process of reconstruction there are basic changes on the level of the image (doubling of image, setting of a frame rate) and of the sound (changing the speed). These changes are nevertheless necessary to achieve the aim of the project, that is, the presentation of *Tonbilder* films in cinema theatres and to the contemporary public.

After finding a suitable sound speed for synchronization with *Avid DS*, the sound files were imported into the *ProTools HD7* sound suite, so that they could be processed in a sound studio with an appropriate calibration of the amplification. Digital audio software allows an extensive processing of sound information through the control of many parameters and the use of multiple tools.

In the *Tonbilder* project, there were two main actions undertaken in the digital processing of sound. The first process was the retiming of the sound, an operation for changing the speed and length of the track, which was obtained through the use of the *Pitch'n Time Pro* plug-in. The second process consisted of denoising, which is the action taken to reduce noise. The *iZotope RX Denoise* plug-in was used for this task. It is important to note that both plug-ins have an effect on the overall sound signal and can generate so-called audio artifacts, which are unwanted distortions caused by the

malfunction of sound hardware or software. Therefore, different attempts were carried out to decide the parameters of the plug-ins, and which plug-in should be used first.[172] Upon hearing the results, it was concluded that the use of denoise, along with the least invasive parameters, changed the tone of the voices and music, sometimes creating a "pump" effect,[173] and thus the reduction of noise was damaging the signal with artifacts. Therefore, it was decided to only work on the retiming and not intervene in the noise.

The analysis of the *Tonbilder* case thus points to the treatment of noise, which I already individuated as a fundamental issue in sound preservation. As noted in chapter one, early sound recordings contain a lot of noise, especially for ears used to modern high fidelity: these noises can be inherent to the carriers or to the devices that play them, or can be caused by the aging action of time or other factors. In the *Tonbilder* case, a certain amount of noise is inherent to the shellac disc carriers as well as the gramophone recording and playback devices. Digital software can substantially reduce the noise, but extensive action would corrupt the original recording and result as unnatural. Moreover, it would affect the sound trace to be recorded and stored for future access, canceling the noises that people associate with early sound recordings.

The treatment of noise in restoration practices can be interpreted in the light of the social and cultural dimensions of the noise associated with recording media, as described in chapter one. Following the considerations made on this topic, a principle for carrying out noise treatment in sound restoration can be formulated in this way: the noise inherent to the material carrier and the noise inherent to record and playback devices can be maintained and preserved, since they were already present in the initial exhibitions of the film. The noise produced due to time and use of the carrier can be reduced as much as possible.[174] It is very difficult to distinguish between these two kinds of noise, and even more difficult to treat them separately, since the frequencies of noises and recorded sound are all mixed together in the sound signal. Determining the quantity and quality of noise to be reduced therefore cannot be settled by a general rule or a formula, but, as with other preservation practices, mainly must depend on the judgment of the restorer or the technical operator and the possibilities offered by the technological devices involved in the process. The exchange between human and

[172] See Dirk Förstner, "Rekonstruktion von Tonbildern in modernen Wiedergabesystemen," 66.
[173] "Pumping" is an effect caused by a particular use of audio compressors that changes the levels making the signal sound unnatural.
[174] For a discussion on the ethics of sound restoration in musical documents, see Sergio Canazza and Mauro Casadei Turroni Monti, eds., *Ri-mediazione dei documenti sonori* (Udine: Forum, 2006), 44. See also Angelo Orcalli, "Orientamenti ai documenti sonori," in *Ri-mediazione dei documenti sonori*, 4-60.

technological actors plays a decisive role in determining how the noise will be treated, and reveals once more to be a determining factor in the result of preservation work.

An experiment in synchronization was conducted on the film *Militärische Disziplin*. The disc track almost matched up to the film, but not perfectly: in fact, the disc was recorded by Messter in 1903 with the title *Lustiges auf dem Kasernenhof*, while the film was produced by *Deutsche Bioscop GmbH* in 1910. This circumstance is not surprising; the investigation of the history of production and exhibition of these films showed that it was common practice for competing *Tonbilder* companies to use very similar sketches and remake the most successful ones. Since most of the dialogue of the disc seemed to fit to the image, it was decided to make an experimental reconstruction: the part of the dialogue that corresponded to the mimic of the character was synchronized, while the rest was left silent. This operation is considered questionable from a preservation perspective, because it matches sound and images that most likely belonged to two different films. Thus it does not preserve the original film text, but creates a completely new text. This kind of experimental operation is allowed in preservation under the condition of publicly documenting, declaring, and justifying the changes to the original film. The main justification for this experiment was that it allowed contemporary audiences to get an idea of the sketch, which would be incomprehensible without the sound. In the framework of my analysis, it can be stated that this forced synchronization betrays the fidelity to the text in order to show the potentialities of the historical *dispositif*. This experiment can be considered unacceptable according to the principles of the philology of the text: here a new film text is created, a text that has never existed in this form before. Yet if the preservation practice is guided by other principles than the philology of the text, such as the recovery of the *dispositif*, this experiment can be justified.

The presentation of *Tonbilder* films

I conclude the analysis of the *Tonbilder* project with a description of the presentation of this project to the public. Even if film preservation can exist also without presentation, as exemplified by the preservation work carried out by private collectors like Christian Zwarg, I consider that preservation and presentation are two activities necessarily interconnected and complementary in the work of film heritage institutions. The

mission of a public film heritage institution includes in fact making preserved material accessible to the public.[175] The moments of presentation and exhibition are important factors to take into consideration when analyzing a film preservation project, because they measure the exposure of the project and the response of present-day audiences.

There are mainly two kinds of presentation of preservation projects. The first is the theatrical presentation for a general public, which can be accompanied by digital access and distribution. The second is the presentation for a professional audience, as for instance during conferences, symposia, or festivals dedicated to film archiving. In these situations the people that work in the field of film preservation interact, share their knowledge and expertise, discuss their experiences and results, and define their position in the field. These occasions play an important role in shaping the practices of preservation and also help to legitimize preservation work. Theatrical presentations for the general public and presentations for the professional public can also happen in contiguous situations, as for instance in dedicated festivals or conferences.

Considering the presentation to the professional public, the *Tonbilder* project was first presented at the Music and the Moving Image Conference (New York University, June 2012), with a presentation titled *Tonbilder: Sound-On-Disc, Song-On-Film*. A more technical event titled "The Possibilities of Digital Intermediate Process in Film Restoration" was held at the *Third Arri Workshop* (June 2012) and at the *AMIA* conference (Seattle, November 2012) for the archive public. These moments offered an occasion to share the considerations and practical issues concerning the *Tonbilder* film restoration with other professionals of the field.

The theatrical presentation of the five *Tonbilder* films to the general public occurred at the *Il Cinema Ritrovato* film festival in Bologna on the June 25, 2012, in the section *Un secolo di clip musicali* (fig. 19). Before the screening, a page with the translated texts of the films was distributed to help audience members understand the lyrics, and a brief presentation described the historical context and the reconstruction of the films. The introduction provided the public with information regarding the original form of *Tonbilder* films and their original exhibition as well as explained how preservationists worked on them. Thus the introduction offered contextual information that served for a better understanding of the films. The films were then presented to the German public at the Arsenal Kino during the Word Day for Audiovisual Heritage (27

[175] See Dan Nissen et al., eds., *Preserve Then Show*.

October 2012) and then at the *Toute la mémoire du monde* festival in Paris (28 November 2012).

3.6 The *Phono-Cinéma-Théâtre* and the *Chronophone* Systems

The *Toute la mémoire du monde* festival, held at the Cinémathèque Française in November 2012, presented a program titled *The beginnings of sound - "You ain't heard nothing yet!"* which showed different early sound systems. This program exhibited, besides the restored *Tonbilder* films, other early sound films, which were produced with the *Phono-Cinéma-Théâtre*, the *Chronophone* and the *Vitaphone* systems. What these preservation projects have in common is their work on early sound systems in which sound and images are separated onto two carriers. For the analytical purpose of describing film sound preservation practices, it is relevant to briefly describe these other projects, since they allow for comparisons to be made regarding solutions for similar preservation problems. Moreover, the realization of these projects in the last few years at different institutions seems to suggest a new interest in and attention to early sound film forms in the international archive field. As the title of the festival program - *"You ain't heard nothing yet!"*- suggests, the presentation of these projects can be interpreted as indicative of a tendency to rethink the beginning of film sound, which film history generally placed in the late 1920s, in the light of the initial sound systems of early 1900s.

In this section I describe the project of the reconstruction of the *Phono-Cinéma-Théâtre* repertoire and some *Chronophone* films, curated by Gaumont Pathé Archives and the Cinémathèque française. Following the analytical method of the *Tonbilder* case, I first illustrate the *dispositif*, carrier, and text dimensions of the two systems, as well as their exhibition history. Then I give some insights into the restoration, reconstruction, and presentation of the films.

Conceived by Clément Maurice Gratioulet and Henri Lioret in the end of 1890s, the *Phono-Cinéma-Théâtre* system can be considered the first film sound system. The first presentation of the *Phono-Cinéma-Théâtre*, on 28 April at L'exposition universelle de 1900 in Paris, is regarded as the first public presentation of film with synchronized

sound. It was presented as a "talking picture" attraction in the pavilion organized by the engineer Paul Decauvrille and the actress Marguerite Vrignault. The auditorium was located on Rue de Paris near the Pont des Invalides and was designed by the architect Dulong, who used the 1751 "Fresh Pavillon" as his model. After the Exposition, the attraction traveled throughout Switzerland, Germany, Austria, Sweden, Spain, England, and Italy. The *Phono-Cinéma-Théâtre* company ended in November 1901.

The *Phono-Cinéma-Théâtre* system is characterized for having the sound recorded on phonographic cylinders. This is the main difference in relation to other systems, which used discs as recording media. As for the carriers, the images were stored on nitrate 35 mm film prints with central and two lateral perforations (fig. 20), and many of the frames were also hand colored. The sound was recorded on phonographic cylinders (fig. 21 and 22) that measured 13 cm in diameter and 22 cm height and had a running time of about four minutes. Similar to the *Tonbilder*, the short scenes of the *Phono-Cinéma-Théâtre* films consisted of excerpts from stage plays and comedies as well as songs and dances from operas and music halls. The *Phono-Cinéma-Théâtre* program presented in fact the most famous artists, actors, musicians, dancers, and comedians of the Parisian theatres, from the *Comédie Française* to the vaudeville and boulevard theatres (fig. 23).

The production of the films followed the "playback method:" first, the sound was recorded through an *Idéal* phonograph on cylinders and the scene was then captured with an *Ambroise-François Parnaland* 35 mm camera while the actors tried to mimic the dialogue or song, or perform a dance to the music.[176] During exhibition, the projectionist achieved synchronicity by manually accelerating or slowing down the speed of the projector, trying to remain in sync with the phonograph. This practice recalls the exhibition of *Tonbilder* films, in which the performance of the projectionist was fundamental in guaranteeing the synchronization effect.

The preservation project provided for the reconstruction of 30 out of the 35 shorts of the first *Phono-Cinéma-Théâtre* program. Of these films, only one cylinder disc survived and could be synchronized with the images. The other films were presented with live music accompaniment. Two aspects are particularly noteworthy in the preservation and presentation of the *Phono-Cinéma-Théâtre* films.

[176] See Laurent Mannoni, "Le répertoire reconstitué du Phono-Cinéma-Théâtre," in the catalog of the *Toute la mémoire du monde* festival, November 2012, 52.

First, as in the case of the *Tonbilder* project, the digitization of the sound recorded on the cylinder disc was carried out by a private collector, Henry Chamoux. In 1998 Chamoux invented the *Archéophone*, a device that can digitize the sound information of all formats of phonographic cylinders in wax or celluloid produced between 1888 and 1929.[177] The phonographic cylinders are installed through holders of different dimensions attached to the device, and a pick up head reads the trace of the sound signal and digitize it. Since the phonographic cylinders have a variable rotation speed, the motor has a speed range from 44 to 238 rpm that can be adjusted in relation to the recording. The digitization of phonographic cylinders is very difficult because the carriers are very fragile and can break under the pressure of the stylus; it is therefore important in this process to choose the right stylus and accurately center the cylinder in the device in order to recover the sound information. As in the *Tonbilder* case, the preservation practice is determined by the interrelation of human and technological actors.

The second interesting aspect of this project is that the presentation of the *Phono-Cinéma-Théâtre* program, held at the Cinémathèque française on 30 November 2012, aimed to simulate or evoke the experience of the first exhibition. In particular, a small orchestra composed of a piano (John Sweeney), an accordion (Romano Tedesco), and percussion (Frank Bockius), performed live music to accompany the majority of the films whose cylinders were not recovered. For the reconstruction of the music, the original scores of the musical pieces used in the cylinder recordings were sought after: in cases where the original scores were not found, the musicians tried to reconstruct a score as suitable as possible, especially for the dance numbers. Sometimes the percussionist provided a few sound effects for the action in the scene. Furthermore, the orchestra also played the music together with the sounds recorded on cylinder disc, creating an evocative mix of early sounds recorded on phonograph and live music. This happened in some shorts where the actor in the scene sang a popular song, and the singing voice was recorded on the cylinder without music. It is believed that the live orchestra accompanied the singers' voice recordings also during the first exhibitions of the *Phono-Cinéma-Théâtre* in 1900; this element of film exhibition's history contributes to defining presentation practices. The presentation of the *Phono-Cinéma-Théâtre* program illustrates not only the material and technological dimensions of film sound but

[177] See http://www.archeophone.org/, accessed December 2012.

its performance dimension as well. The combination of the cylinder disc's sound with the live performance during presentation can be interpreted as an attempt to reconstruct not only the soundtrack but also the original *soundscape* of exhibition.

The second part of this preservation project involved the *Chronophone* films, which Gaumont Pathé Archives aims to preserve in their entirety in the following years in collaboration with the Conservatoire des techniques of the Cinémathèque française, the Archives françaises du film, and the Fondation Jérôme Seydoux-Pathé. By November 2012, they had already digitized four hundred titles out of eight hundred, of which forty have been previously synchronized.

The *Chronophone* was the main competitor of Messter's *Biophon*: they were the two main systems for exhibiting sound-on-disc films in Europe in the first decade of nineteenth century. Léon Gauomont was interested in pairing sound and image very early on, as demonstrated by this note made by him in 1881 and referenced by Laurent Mannoni: "If it were possible to photograph a play with an entire army of shots, for every second, it would be possible to have an entire series of the performers' movements, which one could see at home while the phonograph or the telephone plays back the voice."[178]

The *Chronophone* device was composed of a cinematograph combined with a gramophone (fig. 24). The motors of the cinematograph and gramophone were linked electrically, with the motor of the phonograph driving the speed. The image carrier was 35 mm film with lateral perforations, while sound was recorded on gramophone discs (fig. 25). Gaumont patented the *Chronophone* in 1902, but it was publicly presented and commercialized only years later, in 1906. The main problem that Gaumont aimed to resolve before public screenings was amplification, since it was difficult for the public to hear the sound when far from the horn. Therefore, Gaumont perfected the system in 1905 and released the *Chronomégaphone*, which was an amplified phonograph that strengthened the sound volume in the theatre with the help of compressed air. The main exhibition space was Gaumont-Palace in Paris, where Gaumont was able to have control of the exhibition performance. The necessity to control the space and the performance recalls Messter's decision to build his own theatre in Berlin.

[178] My translation from the original: "Si l'on pouvait photographier avec tout un bataillon de clichés une pièce de théâtre, dans chaque seconde, on arriverait à avoir toute une série des mouvements des acteurs, que l'on pourrait voir chez soi même temps que le phonographe ou le téléphone qui en reproduirait la voix." Maurice Gianati and Laurent Mannoni, eds., *Alice Guy, Léon Gaumont et les débuts du film sonore* (New Barnet: John Libbey Publishing, 2012), 53.

The *Chronophone* films are divided in two categories, interestingly enough, according to the use of the *dispositif* during production: the *phonoscènes*, where the artists performed the number in playback in front of the camera and tried to follow the pre-recorded disc, and the *filmparlant*, where sound and images were recorded synchronously using a microphone connected to the phonograph (fig. 26 and 27). The two forms were only different at the production level, since both could be screened with the same *Chronophone* equipment.

During the first period of the *phonoscènes*, Gaumont did not possess the technology and techniques to record sound with sufficient quality, so he used previously-recorded discs or discs that had been commercially released by music labels. Around 1907, when his troupe succeeded in recording sound together with the image, Gaumont began producing the *filmparlant*. As with the *Tonbilder* case, the relation between the technological devices and their human operators was fundamental in the development of the film form.

In the preservation of *Chronophone* films, it is interesting to note that a different transfer strategy was pursued, compared to the one chosen for the *Tonbilder* films. In the *Tonbilder* case the images were duplicated in order to be screened together with the sound using modern devices. In the *Chronophone* case, the films were scanned, and then the DCP digital copy was produced without duplicating or inserting images. The DCP file was then projected through a 3D digital projector, using "double or triple flashing:" the projector shows 24 frames per second, but each frame is flashed two or three times. This procedure, invented for showing 3D digital films, has been adapted for screening digitized versions of early films, which have a film speed slower than 24 fps; this is because present-day digital projectors cannot show films at rate slower than 24 fps. The trick consists of showing the DCP of a film recorded, for example, at 18 fps with a double or triple flashing, obtaining a final speed of 16 or 20 fps. The simulation of the original form of sound-on-disc films is obtained in the *Chronophone* case by working on the level of the device (the projector) and the *dispositif* (the way it is operated, and, in particular here, the use of a tool for a purpose different from its original function).

The *Tonbilder* and the *Chronophone* cases presented two different strategies for adapting the original form of early sound films to contemporary playback devices. The difference between these two procedures can be interpreted as follows, using the analytical concepts proposed. In the *Tonbilder* project, the duplication of images in the

recording phase affected the level of the carrier: the images were in fact recorded twice in the physical copy. In the *Chronophone* case, the speed of the images was changed using a projection technique, by intervening at the level of the device and *dispositif*. These two different procedures changed the original form of the film, to some extent, and how these films will be preserved and presented in the future. In the *Tonbilder* example, the fact that some images were duplicated on the carrier should be documented, so that if in the future a successive preservation is made, this element can be taken into account when choosing the copy to work on. In the *Chronophone* case, the way in which the restored films are to be projected is important in case of future exhibition. If the projection devices will be different from the ones used now, another projection strategy must be found in order to present the film at the right speed. These examples show once again that a record of the procedures and techniques adopted in preservation and presentation is important to document which aspects of the film form are changed in the process, and how the film trace survives for future access.

3.7 The *Vitaphone* System

To conclude this overview of sound-on-disc preservation projects, I will look at the preservation of *Vitaphone* films. The first reason for the analysis of this case is a temporal one: the project is older than the other two, beginning in the late 1980s. The analysis of the *Vitaphone* preservation project shows how the problems concerning sound and its synchronization in early films were solved twenty years before the *Tonbilder* and the *Chronophone* cases. I will highlight similarities and differences in preservation practices that treat similar materials but with different technologies and techniques. The second reason why it is interesting to include this case in the analysis lies in the development of the project: it started within an institutional framework that involved the UCLA Film Archive, the George Eastman House, the Library of Congress and the Museum of Modern Art Film Archive. However, it later developed outside the institution over the course of many years and was revitalized by the work of collectors, film experts, and film enthusiasts. This circumstance emphasizes the possible forms of participation of the public and the users in the cultural process of the preservation of

film heritage, and thus demonstrates to what extent the social and cultural context influences choices in film sound preservation.

The *Vitaphone* is a sound-on-disc system: the image is stored in 35 mm film, the sound in sixteen-inch electrical disc (fig. 28, 29 and 30). The *Vitaphone* projection system incorporates the film reproduction unit and the gramophone unit into a single device (fig. 31 and 32). The playback system is composed of a projector and a sound amplifier placed in the projection booth, horns situated behind the screen, and wires connecting the horns and the amplifier (fig. 33). The main difference with regards to the other two early sound systems concerns the carrier: in this case the sound is recorded on electrical disc, which means that the rotation speed is defined, while in the systems discussed above it was variable. Another difference is found in the playback device: instead of having two different devices linked together, in this case the playback of image and sound are integrated in a single device.

The *Vitaphone* system was developed by the *Vitaphone* Corporation, which was a subsidiary corporation of Warner Bros Picture Inc. and Western Electric, created on May 27th 1925 to produce and experiment with sound-on-disc films. Although the *Vitaphone* was conceived more than twenty years after the first film sound experiments, it is generally recognized in film histories as the first system that produced sound films.[179] This assumption is inaccurate, considering the earlier commercialization of sound-on-disc systems such as the *Biophon* and *Chronophone* in Europe twenty years before.

It is, however, true that the *Vitaphone* brought sound to Hollywood productions by proving to be commercially exploitable in the US market, unlike previous systems. One reason for this success was that this system was conceived and launched by a studio and not by a private inventor or a commercial laboratory: Warner Bros. foresaw the possibility to emerge, expand, and enter the world of Hollywood majors through the production and distribution of sound films. Moreover, the choice of sound as a way to establish themselves within Hollywood was both aesthetically and economically motivated: the Warner brothers were planning to buy theatres for distributing their productions, and sound-on-disc was perceived as a solution to save on exhibition expenses for live music and orchestras. Additional economic conditions caused other Hollywood studios to convert to sound; among these, the most important was the

[179] See for instance David Bordwell and Kristin Thompson, *Film History: An Introduction* (New York: McGraw-Hill, 1994).

involvement of the American Telephone and Telegraph Company and its two units, Western Electric Company and the Bell Telephone Laboratories.[180]

Warner Bros. as well as Metro Goldwin Mayer and First National produced many *Vitaphone* films between 1926 and 1939. Similar to the *Chronophone* and *Tonbilder* films, the *Vitaphone* film narratives consisted of scenes from musical theatre, opera, and Broadway, as well as from comedy and vaudeville shows. These movies were a great success until the beginning of the 1930s when the definitive adoption of sound-on-film for production and distribution by the major studios resulted in the slow disappearance of the equipment for *Vitaphone* projection from theatres.[181] No longer commercially exploitable, the films and discs were stored in different places and forgotten, mirroring what transpired with the *Biophon* and the *Chronophone* systems.

The discovery of the discs in the Warner Bros. Archive and their subsequent donation to the UCLA Film and Television Archive led to the beginning of the *Dawn of Sound* restoration project in 1987. Robert Gitt, the Preservation Officer of the UCLA archive at the time, provided a public description of the restoration,[182] making it possible to learn about the practices they used even today.

According to Gitt's report, synchronization was relatively unproblematic. This depended mainly on the fact that the speed parameters of image and sound playback were defined in this system: the 35 mm film was projected at 24 fps, while the sixteen inch records were played at 33 1/3 rpm. For synchronization, the sound of the disc was recorded on magnetic-striped 35 mm film. This intermediate soundtrack was lined up with a workprint copy of the picture on a Steenbeck flatbed. Discrepancies due to loss of frame were adjusted here, and disturbing clicks and pops were eliminated manually by scraping off portions of the magnetic oxide. The magnetic track was then recorded as optical soundtrack and printed together with the image in a combined print. In order to keep the original "full frame" and make space for the optical soundtrack, the frame was printed in a smaller format through the use of optical-reduction printing. Following this process, the images and sounds of the *Vitaphone* films were reassembled in the analogue domain.

[180] See Sheldon Hochheiser, "AT&T and the Development of Sound-Motion Picture Technology," in *The Dawn of Sound*, ed. Mary Lea Bandy (New York: The Museum of Modern Art, 1989).
[181] See Jean-Pierre Verscheure, "Les premiers systèmes Vitaphone, Movietone et Photophone," in *Alice Guy, Léon Gaumont et les débuts du film sonore-*
[182] Robert Gitt, "Restoring Vitaphone Films," in *The Dawn of Sound*, 11-13.

This process can be described within the analytical framework described above, as I previously did for the *Chronophone* and *Tonbilder* projects. In this case synchronization is obtained operating on the level of the carrier: images and sounds are in fact physically worked on the analogue copy in order to obtain the synchronization. In contrast to the other cases, however, here there was no important intervention in the speed of images or sounds.

The records made by Gitt can be read in light of the influence of changing technologies on preservation work. The *Vitaphone* project was conducted in analogue workflow, which has limited possibilities to manipulate the audiovisual information in comparison to the possibilities of the digital workflow used in the *Tonbilder* and *Chronophone* projects. The different technological devices and techniques at the disposal of the preservationist necessarily influence the preservation practices. In general terms, it can be stated that in the analogue domain preservation practices regarded mainly the work on the material carrier, on the physical copy: the copy was physically cleaned and copied, and the intervention were made on the carrier. In the digital domain, preservation work concerns primarily the technological device and the *dispositif*: once the film images and sounds have been digitized, they can be worked on and manipulated using digital software, before eventually recording them back onto film or onto a digital carrier.

Gitt's documentation can be used not only to highlight the differences in the use of technologies, but also to individuate the similarities. This report can in fact be read as supporting the idea that the guiding principle of preservation can remain the same, regardless of technological development. Considering the treatment of noise for instance, Gitt explains:

> We agreed with Richard [Dayton, working at YCM Laboratories] that it would be best to reproduce the sound in a simple, straightforward manner, without excessive filtering or extensive electronic processing. Unless used with restraint, modern noise-reduction techniques can drain the life of early recordings, and we wanted as much as possible to maintain the natural sound quality as recorded originally by the Vitaphone process.[183]

This principle is also demonstrated by the *Tonbilder* and *Chronophone* projects, where the noise of the original recordings was preserved as well.

[183] Ibid., 12.

The relevance of Gitt's documentation highlights once again the importance of documenting and publishing material on preservation practices. It is important to record descriptions of the preservation practices used to demonstrate the changes and modifications on the level of the text so that the restoration can be reversible in the future. Additionally, descriptions are necessary for documenting which devices were used and in which way, since operational techniques can disappear as fast as the technologies. Moreover, a description of preservation practices also provides insight into which agencies and social actors influenced the process.

The *Vitaphone* project concluded with the restoration of the most famous or important *Vitaphone* features, some shorts, and the first *Vitaphone* program presented at the Warner Theatre in New York on 6 August 1926, moreover believed to be the first synchronized sound film public screening in the United States.[184] These films were presented together with an exhibit that opened at the Museum of Modern Art in New York in October 1989,[185] which was produced by the MoMA and the AT&T Archives. The small exhibition, including screenings of the restored films, was constructed to travel and be installed in theatres or auditorium lobbies around the country.

Once the archival project came to an end, a public interest in *Vitaphone* films emerged, which was probably prompted by the traveling exhibition. A group of five private disc collectors (David Goldenberg, John Newton, Sherwin Dunner, Ron Hutchinson, and Vince Giordano) started the *Vitaphone Project* in 1991.[186] The *Vitaphone Project* is an informal organization with the goal to set up a collective catalogue of their resources, 16-inch soundtrack recordings for *Vitaphone* movies, and find archives that hold the corresponding 35mm negatives. The major US film archives became interested and involved in the project, which led to collaboration between collectors and archives, including the UCLA Film Archive, the Library of Congress film archive, the George Eastman House, and the Warner Bros. Archive. The project's website also became a networking opportunity for archive, museum, and studio professionals as well as collectors. The connections formed led to the development of joint restoration projects.

[184] For a list of the restored movies, see http://www.moma.org/docs/press_archives/6739/releases/MOMA_1989_0106_115.pdf?2010, accessed December 2012.
[185] See Edward Jay Pershey, "'American Moviemakers: The Dawn of Sound' at the Museum of Modern Art," *Technology and Culture*, vol. 32, no. 1 (Jan, 1991).
[186] See http://www.vitaphoneproject.com/, accessed December 2012.

The archives decided to restore some of the films year by year with the sound provided by the collectors, produce theatrical copies, and release them in DVD. In more than twenty years of activity of the *Vitaphone Project*, 3,500 discs have been found, nearly 150 *Vitaphone* shorts have been restored, over 200 shorts were released on DVD, and nearly half a million dollars in funding was raised. The Warner Bros. Archive, which is the major rights owner of *Vitaphone* films, undertook fifty-three restorations between 2009 and 2010, releasing four DVDs afterwards. The restored *Vitaphone* films were presented in theatres at various film festivals (Capitolfest in Rome NY, Film Forum in New York, Cinefest in Syracuse NY, UCLA Festival of Preservation in Los Angeles), as well as in theatres across the USA. The *Vitaphone Project* also provided a number of items for the 2006 exhibition "From Horns To Hard Drives: The History of Sound Technology,"[187] including discs, programs, stills, needles, a record duster, posters, lobby cards, and even an original 1928 Western Electric Projectionists manual.

The fact that the *Vitaphone* preservation project was animated not only by film heritage institutions but also by collectors, film experts, and film enthusiasts is particularly relevant: film preservation can in fact become an activity that involves more and more individual and social actors not necessarily belonging to the institutional field.

As a final example of the contribution of collectors to film preservation, I would like to mention the case of Jean-Pierre Verscheure since it is particularly relevant with regard to sound. Professor at the *Institut National Supérieur des Arts du Spectacle* in Brussels, Verscheure collected film sound devices, moved by the conviction that each film should be seen and heard in the *dispositif* for which it was intended. He started to collect equipment and devices in order to demonstrate the changes in the cinema spectacle, and in twenty years of research, he collected 750 devices and 700,000 pages of documentation, containing information about the techniques for using the devices. He also put the devices back into use whenever possible. Interestingly, Verscheure is a film collector who is not only interested in collecting film objects, but also engaged in rescuing the *dispositifs* and documenting how to operate the *dispositifs* in order to reproduce an original cinematic experience.

[187] The exhibition opened in early September 2006 in the United Gallery F-2 North Connector in the San Francisco International Airport, and was organized by *The San Francisco Airport Museum* in conjunction with Dolby Laboratories.

Verscheure's collection gained public acknowledgment: some devices were on public displayed in the *Des frères Lumière aux frères Dardenne* exhibition at the Mundaneum Museum in Mons, Belgium, in 2009. The collection was recently donated to the Cinémathèque française and an exhibition is planned for 2015. This last example reveals once again, as already noted in the previous cases, the great value of collaborations between institutional social actors, the public and private film archives or laboratories, and social actors external to institutions, such as private collectors and film experts, in the process of preserving audiovisual heritage.

3.8 Conclusion: Preserving Film Sound Traces

Until recent years, early sound systems have been neglected or underrepresented, both in film historiography and in film preservation. The recent preservation and presentation of early sound systems discussed in this chapter – the *Chronophone*, *Phono-Cinéma-Théâtre*, and *Vitaphone* – offer a chance to show early sound films to the general public, and also to rethink the historiography and categories of early cinema.

The rediscovery of early sound systems, some of which have been described in this chapter, can contribute to the process of rethinking and redefining the assumptions made about the historiography of early cinema. The fact that many pioneers, such as Edison, Gaumont, and Messter, tried to find solutions to synchronizing sound and images contradicts the assumption that cinema is a purely visual medium. Moreover, public appreciation of early sound films in contemporary presentations demonstrates the accomplishment of the combination of sound and images on a textual level. The achievement of synchronization already in the 1900s supports the idea that the introduction of synchronous sound in film exhibition only in the late 1920s was determined more by economic reasons than by technical constraints.[188] The evolution of film technology is not just scientific, but also social and cultural: it depends on the economic and industrial conditions of production, distribution and exhibition, and on

[188] For example, Jean-Pierre Verscheure interestingly traces the role of banks and telephone companies in the establishment of a standardized sound system in the Unites States of America. See Jean-Pierre Verscheure, "Les premiers systèmes Vitaphone, Movietone et Photophone."

the expectations of the public, much more than on patents and the invention of devices.[189]

The dating of the arrival of sound in film in the late 1920s, as well as the consideration of the previous period as characterized by silent cinema, is therefore questionable. In recent years film heritage institutions and scholars have made efforts to rediscover the sounds of early cinema in providing original music scores for live orchestras as well as reviving the function of the narrator and the stage rumorist. Starting from the assertion that cinema has never been silent, the category of "silent" cinema is slowly replaced by "early" cinema.

Considering the possible impact on the reconsideration of film historiography, early sound systems are indeed a relevant example of film sound traces. Nevertheless, forms of film sound have been varied throughout the history of cinema. Most have been underestimated and not taken much into account in the work of preservation. Also, in presentation, the sound of old films is often incorrectly played back in theatres; for example, playing a mono track as stereo or not applying the Academy filter to an Academy soundtrack.

The analysis of preservation practices in fact highlighted some crucial dimensions of film sound: the material carriers, the technological devices and human actors, the *dispositif* situation, the film text, the screening performance, and the history of exhibition. The consideration of these elements in early sound systems is beneficial to understanding how sound became a fundamental part of the cinematic experience through its synchronization with the film image. Moreover, the preservation practices applied to early sound systems can provide useful considerations for interpreting and preserving other types of film sound. These highlighted dimensions can in fact serve for describing film sound in general, as it will be further investigated in the following chapters.

[189] See John Belton, "Technology and aesthetics of Film Sound," in *Film sound theory and practice*, 63.

CHAPTER 4.
Film Sound Presentation:
Space and Institutional Context

4.1 Film Sound Presentation

In the previous chapter I examined the preservation of early sound systems, namely the *Biophon*, *Chronophone*, *Phono-Cinéma-Théâtre*, and Vitaphone systems. In the analysis of preservation practices, I highlighted the importance of relevant elements of film sound: the material carriers, the technological devices and human actors, the *dispositif* situation, the film text, the screening performance, and the history of exhibition. These elements of preservation practices contribute to understanding and defining what film sound is and how it relates to film image. The analysis of the preservation of these early sound systems further demonstrated how preservation and presentation are two highly interconnected activities. As the shown by the example of the *Tonbidler*, the choice of a certain carrier in the preservation process is often incited by the context of presentation. As I will now argue in this chapter, decisions about the presentation of film sound similarly depend on decisions made during preservation.

Preservation and presentation practices, intended as the core activities of film heritage institutions, point to a number of factors important in defining film sound and its core dimensions. The preservation practices examined in the cases of early sound systems highlighted in particular the three dimensions of film that I defined as carrier, *dispositif*, and text. The presentation practices that will be analyzed in this chapter will bring attention to other dimensions of film sound, namely the spatial and institutional dimensions, which are less evident in preservation practices. Film presentation concerns the screening situation, where the *dispositif* and the audience are central. Additionally, the presentation of archival film depends on the film heritage institution where it is performed; through presentation, institutions create the space and context for the cinematic experience of film heritage. The space and institutional context of

presentation will turn out to be important factors in understanding the nature of film sound.

In presentation practices, film sound is primarily considered in the screening of early films. The question of how to deal with sound is more evident in the case of early "silent" films, for which a sound accompaniment has to be found in order to present them. It is in fact very rare that an early film is presented without any live or recorded sound, probably because it is believed that the public would not accept the silence during the screening. In early "silent" films either there is no sound available or the sound can be reconstructed by contextual information, such as scores and reviews of historical performances, which need to be interpreted.

In the past decade, film sound has gained attention in screening practices of archival films. The live musical accompaniment of early "silent" films was enhanced with the recovery of original scores or the composition of new scores, mainly in occasion of film festivals or special events, such as the following: Il Cinema Ritrovato in Bologna, Le Giornate del Cinema Muto in Pordenone and the San Francisco Silent Film Festival. Many people are involved in this rediscovery, by promoting or conducting the rediscovery of original musical accompaniment or the composition of new scores: music composers and conductors such as Carl Davis; film historians and documentarians such as Kevin Brownlow and David Gill; conductors and musicologists such as Gillian Anderson, Berndt Heller and Donald Hunsberger; musicologists such as Theo van Houten and Lothar Prox; as well as orchestras and music groups that are actively involved in performance of film music. The topic of the musical accompaniment of early cinema has been investigated by academic literature, which mainly analyzes the original scores or the newly composed scores in musicological terms.[190]

In the frame of this research, musical accompaniment is considered as only one aspect of the presentation of early films. Since musical accompaniment has already received broad academic attention, I will focus on the other, still largely neglected core elements of film sound, such as the *dispositif*, the space, and the institutional context of

[190] See among others Gillian B. Anderson, *Music for Silent Film. 1894 – 1929: A Guide* (Washington: Library of Congress, 1988); Gillian B. Anderson, "Preserving our Film Heritage or Making Mongrels? The Presentation of Early (Not Silent) Films," *Journal of Film Preservation* 57 (1998); Martin Miller Marks, *Music and the Silent Film. Contexts & Case Studies 1895-1924* (New York and Oxford: Oxford University Press, 1997); Rick Altman, *Silent Film Sound*.

presentation. For this purpose, I refer to the definition of museum presentation as outlined by cultural heritage scholar Julia Noordegraaf:

> The presentation comprises all elements that mediate between the museum and its audience, such as the location, architecture and layout of the building, the order and arrangement of the object in display, the various display techniques and different means of communication and visitor guidance.[191]

This observation prompts me to include in my analysis aspects that are usually not considered pertinent in film presentation, namely architecture, the configuration of the spaces, and the display modes. These aspects indeed play a role in how an audience experiences film sound.

In order to examine the spatial and institutional context of presentation, I will take as an example the activity of a specific film heritage institution: the EYE Film Institute Netherlands, the former Nederlands Filmmuseum.[192] The Filmmuseum-EYE is an instrumental case to study with regard to film sound presentation, since this institution has a rich history and prominent reputation concerning experimentation with different forms of film sound presentation. Moreover, the recent institutional reorganization and geographical relocation of this institution provides a unique perspective for analyzing the institutional and spatial dimensions that define film sound.

To link the topic of preservation analyzed in the previous chapter and the subject of presentation, I start the analysis in this chapter by discussing the reconstruction of two "silent" films, *Zeemansvrouwen* and *Beyond the Rocks*, which were restored by the Filmmuseum. These examples show how it is possible to experiment with film sound through preservation and presentation practices, offering a first example of the experimental tradition of the Filmmuseum-EYE and its particular attention to the issue of sound. Moreover, their activities will once again show how preservation and presentation practices are two activities that are closely intertwined.

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[191] Julia Noordegraaf, *Strategies of Display. Museum Presentation in Nineteenth- and Twentieth-Century Visual Culture* (Rotterdam: Museum Boijmans Van Beuningen, Nai Publishers, 2004), 13.

[192] I use the term Filmmuseum-EYE when a condition or situation involves the institution both before and after the reorganization of the institution. Otherwise, I refer to Nederlands Filmmuseum (abbreviated into Filmmuseum) to indicate the institution's previous incarnation, while EYE Film Institute Netherlands (abbreviated into EYE) to designate the new institution.

4.2 Sound in Early Films: Experiments between Preservation and Presentation

Zeemansvrouwen (*Sailor's wives*, Henk Kleinman, 1931) was restored by the Nederlands Filmmuseum and presented in 2003 at the Filmmuseum Biennale. The restoration is elaborately described by Giovanna Fossati, former curator of the Nederlands Filmmuseum and currently head curator of the EYE Film Institute, in her book *From Grain to Pixel*.[193] My analysis will concentrate specifically on the issues related to the sound aspects of this preservation and is largely based on Fossati's description of the case. From the perspective of sound, *Zeemansvrouwen* offers peculiarities relevant to this analysis: the new musical score composed specifically for the restoration was recorded on film presentation copies, and most importantly the dialogues and sound effects were also recorded together with the musical score. The intent was to create a *soundscape* of the movie, not just with extradiegetic music but also with intradiegetic voices and sound effects. This is striking because usually the recreated *soundscape* of early silent films is composed only of live music accompainment, and not of recorded voices or effects.

Zeemansvrouwen depicts the life of Leen, a female fish merchant who is forced to choose between a relationship with the father of her children, who is a petty criminal, and the love for an honest young sailor. The drama also documents working-class life in Amsterdam in the late 1920s: many scenes were shot in real locations, with non-professional actors, such as the initial scene at the open air market.

The importance of *Zeemansvrouwen* for Dutch film heritage lies not just in the documentation of the realities of Dutch life, but also in the fact that this film was originally conceived to be the first Dutch sound film. Problems with production, however, ended up making it the last Dutch silent film. Director Kleinman cast two professional singers in the leading parts because he wanted to do a part-talking *soundie*: the majority of the film would have been silent with intertitles, but in some scenes there would have been songs with synchronized sound. [194] The sound was meant to be recorded on gramophone records, probably using one of the sound-on-disc systems

[193] See Giovanna Fossati, *From Grain to Pixel*, 231-235.
[194] See the Filmmuseum website, http://lisa.filmmuseum.nl/biennale03/html/index-234.html, accessed December 2012.

available by the end of the 1920s, such as the Vitaphone system discussed in chapter three. The difficulties in managing the sound recording and the synchronization led the production to abandon the idea of making a sound film. This demonstrates once again how the relation between human and technological actors is fundamental in film production, in determining a film's form and text. The last considerations recall some aspects of the *Tonbilder* case, such as the importance of the *dispositif* in the frame of preservation; the restoration process of these two projects have in fact some analogies, in particular regarding the issue of synchronization.

As Fossati describes, during the restoration process the restorers decided that the reconstructed version of the film would contain a new soundtrack with musical accompaniment, composed by Dutch musician and composer Henny Vrienten. The practice of adding a newly composed score is very common in the contemporary presentation of silent films. What is notable in this case is that the soundtrack not only included music, but also sound effects and dialogue. The dialogue, which was recorded by contemporary Dutch actors Jeroen Krabbé and Nelly Frijda, was not always synchronous with the filmed actors' lip movements. Nevertheless, the final result of the new voices joined with the old images is not disruptive.

The practice of adding voices and effects to early silent films was new in the archival field. The Filmmuseum partially justified this decision by referring to the fact that the film was originally meant to have sound. The Dutch writer Lodewijk de Boer wrote the dialogue based on the namesake theatrical play by Herman Bouber. The writing also involved the work of a professional lip-reader for deciphering the words pronounced by the actors during filming; this helped align the voice actors' dialogue to what the characters in the film were saying.[195]

The decision to add a recorded soundtrack with music as well as dialogue and effects shows that the sound component of the film experience was used by the Filmmusuem as a field for experimentation in the restoration process. This was not the first experiment of its kind: in 1995, the Filmmuseum produced *Cinéma Perdu* under the direction of Peter Deleput. This TV series, coproduced by the Dutch television station VPRO, involved presenting early silent films from the Filmmuseum's collection to the television public with recreated sound scores. Frank Roumen, the Filmmuseum's producer who supervised the *Cinéma Perdu* series, was also involved as a producer in

[195] See Giovanna Fossati, *From Grain to Pixel*, 232.

the *Zeemansvrouwen* project. The *Cinéma Perdu* series served as a role model when deciding whether to recreate a sound score in the case of *Zeemansvrouwen*.

The addition of the recorded soundtrack to *Zeemansvrouwen* led to a migration practice that was similar to the one used in the sound-on-disc systems analyzed in the previous chapter: in fact, in this case as well, the film image and the soundtrack ran at two different speeds, so a way to synchronize the two would have to be found. In this case, however, the running speed of image and sound were not variable, as in the case of the *Tonbilder* films, but fixed: the film had a speed of 22 frames per second, while the soundtrack was recorded at 24 frames per seconds, the standard speed for sound projectors. In order to synchronize image and sound, the film's length had to be stretched to cover the length of the sound. First, Vrienten composed and recorded the soundtrack using a VHS video reference of the film; the recorded sound was then synchronized to the image. The procedures of stretching and synchronizing are described in a report by Paul Read, who supervised the digital restoration process at the Digital Film Lab in Copenhagen:

> The VHS image was cut into several approx. 5,000 frames sections, and each section of the new data was matched with the offline. From this, it was possible to calculate the additional time, and therefore the number of frames, required. The Inferno calculated the frame repetitions needed (for example one section needed a new frame every seven alternating with every eight), and carried out the addition. As a final check, the new data was played out to Digi Beta (PAL resolution) and the playout and offline were run in parallel through a vision mixer to create a split screen image and recorded this on another videotape. Each section matched at beginning and end perfectly but due to some omitted frames there was a maximum drift of three frames at one point.[196]

Once the sound and images of *Zeemansvrouwen* were matched, they were recorded together on film negative and then printed on a positive projection print.

Read's report is a valuable record not only for the documentation of the *Zeemansvrouwen* restoration project, but also for the documentation of a method for obtaining synchronization between sound and image according to the technology of 2002. Comparing this practice to the one applied to the Vitaphone films in 1987 or the

[196] Internal report by Paul Read to the Nederlands Filmmusuem (April 2003), reported in Giovanna Fossati, *From Grain to Pixel*, 234.

one used for the *Tonbilder* films in 2012, it is possible to trace the changes in technology and technique in sound preservation. In the Vitaphone case, synchronization was obtained through analog processes by copying the sound first onto magnetic tape and then onto film together with the image. In the case of the *Zeemansvrouwen*, the first digital technologies were applied, but in order to match image and sound, multiple passages were required to line up the analogue image with the digital sound. In the *Tonbilder* case image and sound could be worked together in the digital domain and with a great degree of manipulation: the speeds of image and sound could be changed in real time with only one click, so different solutions for synchronization could be tested. This flexibility would not have been possible in the analogue domain. The comparison of these three different synchronization practices is possible thanks to the survival and accessibility of the reports and documentation related to the restoration process. The documentation of preservation practices provides an invaluable source for understanding the way film sound is shaped through these practices, how film sound changes over time and how it is possible to preserve it.

Zeemansvrouwen premiered at the Filmmusuem Biennale in April 2003, and a year later it was presented at the Samuel Goldwyn Theatre in Los Angeles as well as in other theatres in the USA and Canada. Regarding the reception of the restored version, Fossati observes:

> While some fellow film archivists raised the question of whether a film archive should be the promoter of such an experiment, most reactions were not against the creation of an alternative version of *Zeemansvrouwen*. I must admit that, at the time, I was expecting many more critical, and even negative, reactions. But there should be no misunderstanding: this was a new version and not a restoration. Probably, since *Zeemansvrouwen* was an unknown title to most before the sound version was made, few people felt like objecting to the initiative of the Nederlands Filmmuseum. In the end it was also a way to present the film to a larger audience. In the case of a well-known title, the reactions might have been different.[197]

The last consideration is very interesting, especially in relation to the restoration, supervised and documented by Fossati, of *Beyond the Rocks* (Sam Wood, 1922) which

[197] Giovanna Fossati, *From Grain to Pixel*, 234.

was carried out at the Nederlands Filmmuseum in 2005. [198] This restoration spurred in fact much more discussion in the archival field, even though the level of experimentation was lower compared to *Zeemansvrouwen*.

In *Beyond the Rocks* the two Hollywood stars Gloria Swanson and Rudolph Valentino act out the drama of an impossible love between the young and beautiful Theodora, forced by her family into an arranged marriage, and the charming Lord Brancondale. The film was believed to have been lost for decades before being found and restored by the Filmmuseum and subsequently presented at the second edition of the Biennale in 2005. The original material, a nitrate print with Dutch title cards, was found reel by reel in unlabeled cans within the institution as part of the collection of the Haarlem-based collector Joop van Liempd. The film was almost complete and only a few frames were missing.

Besides the restoration of the silent version of the film, it was also decided that a new sound version with a new soundtrack would be created, again composed and performed by Henny Vrienten. Coming from the experience of *Zeemansvrouwen*, Vrienten decided to elaborate on a fairly experimental soundtrack, adding sound effects.

The policy of the Filmmuseum in the *Beyond the Rocks* case was to preserve the film in its original form but also to distribute it in new experimental restored versions for contemporary audiences. The restoration project produced different versions, including two restored silent versions (one with the original Dutch titles, one with newly added English titles), two sound versions for distribution (one with musical accompaniment, one with music and sound effects), one digital sound version for distribution, and two DVD versions with two soundtrack options. The film was presented with the newly recorded soundtrack at the Filmmuseum Biennale in Amsterdam in April 2005, in the Cannes Classic section in May 2005 and at the Il Cinema Ritrovato festival in July 2005. At the Le Giornate del Cinema Muto silent film festival in October 2005 the film was presented in the recorded sound version but also in the silent version with live musical accompaniment; the decision to present the silent version on this occasion was taken in consideration of the very specialized public of this festival.

Even though this soundtrack was less "experimental" compared to the one made for *Zeemansvrouwen* since no dialogue was added, the reception of the *Beyond the*

[198] Ibid., 235-252.

Rocks restoration by the professional public was much more critical. Fossati attributes this difference to the fact that *Zeemansvrouwen* was an unknown Dutch film, while *Beyond the Rocks* was a well-known, popular film:

> Indeed, although the score was widely appreciated, the sound effects (such as opening doors, barking dogs, and such) became the main point of criticism from colleague archivists and scholars. […] it is quite interesting to notice that what was considered acceptable for an unknown title such as *Zeemansvrouwen*, became the topic of fiery discussions within the film archival field in the case of a much more popular title like *Beyond the Rocks*. Mainly for this reason, the Nederlands Filmmuseum decided to add an alternative sound option to the DVD edition where sound effects are reduced and well integrated in the score.[199]

In other words, experimentation in film sound presentation seems to be much more tolerated in an unknown film rather than in a classic film. It is interesting to note that this film was considered a classic not for having a long and successful history of favorable reception, since the film had always been considered lost and nobody could have seen it before its restoration. It is most likely the presence of Swanson and Valentino in the starring roles that led this film to be considered a classic, and therefore less suitable for experimentation as compared to an unknown film. This observation recalls the concept of traceability described in chapter two: it shows in fact how a film can become an object of cultural memory without actually being experienced. The criticism of the professional audience also indicates that the sound reconstructed in the restoration was not correspondent to the imagined or supposed trace of the film, which would not include sound effects.

Using some of concepts examined in this research, it can be argued that adding sound effects is to a certain extent faithful to the original, if we consider the original as not just the material object carrying the film content, but as including the *dipositif* situation and the related cinematic experience: silent film screenings were often accompanied by live sound effects performed by musicians or rumorists. According to Fossati, although it received criticism from the professional archival field, the score with added effects was well accepted by the general public.[200] All things considered, it

[199] Ibid., 241.
[200] Ibid.

was decided to produce a restored version eliminating the sound effects and keeping the music, in order to please a more traditional expert public. This decision is also indicative of certain dynamics in the film archival field and shows the social dimension of film preservation: some decisions in restoration projects are influenced by the reception and response of the general and professional public.

The question of if the preservation of *Zeemansvrouwen* and *Beyond the Rocks* can be defined as a restoration, a reconstruction, a reinterpreted version or a fake version is debatable in the theoretical field. The production of a preservation copy of the film as it was found, before the restoration process, guaranteed that the "original" version was preserved, making it safe to experiment and produce different restored versions. Experimentation in preservation is allowed on the condition of following the principles of documentation and reversibility.[201] These principles are even more important if the interventions are invasive or experimental. Once one copy of the material in its original state for preservation purposes has been produced and the reversibility of the restoration has been guaranteed, the definition of the experiments as restoration, reconstruction, reinterpreted version or fake version becomes a nominal matter. More important is to understand *why* these experiments were carried out. Fossati explains that the Filmmuseum "opted for a creative addition to the original artifact on the one hand to make it more accessible for a larger audience, on the other hand to reinterpret it."[202]

The proliferation of restored versions can be interpreted as a vindication of the multiple natures of film against the supposed uniqueness of the original. The decision to produce multiple sound versions can be interpreted as a demonstration of the idea that film preservation can account for the variability of film in exhibition, instead of just sustaining the idea of an original object that should only be recovered in its original state. Moreover, the production of different versions is also facilitated by the use of digital technologies. For instance, in the DVD version of *Beyond the Rocks*, it is possible to play the film with a soundtrack consisting of music and limited sound effects, one containing full sound effects, or one even with the wire recordings of the voice of Gloria Swanson.[203]

These two cases also demonstrate that preservation and presentation are two activities closely interconnected and reciprocally influenced: the choices made during

[201] For the principle of restoration in fine arts, see Cesare Brandi, *Theory of Restoration*, 57.
[202] Ibid., 173.
[203] Sam Wood, *Beyond the Rocks* [DVD], Leerdam: Art-S Home Entertainment, 2006.

preservation influence the possibility of presentation, and the prospects considered for presentation influence decisions made during preservation. For instance, the choice during preservation to record a soundtrack onto the film carrier instead of creating a silent film to be accompanied by live music is also a way of addressing a limitation in presentation. The Nederlands Filmmuseum venue in Vondelpark could not have hosted a concert orchestra for accompanying film presentations since the two cinemas were too small, so the recording of the musical performance on the film copy allowed the film to be screened in environments where live music could not be performed. On the other hand, some choices for presentation also influenced the film's restoration, as for instance in the issue of synchronization of the added soundtrack with the image. The analysis of these practices demonstrates how preservation and presentation activities and outcomes are closely intertwined. It is sometimes difficult to say whether a choice or decision pertains to one domain or the other.

Preservation and presentation practices highlight different dimensions that define the nature of film sound, such as the carrier, *dispositif*, the space, and institutional context. Upon examination of preservation projects involving early sound systems the dimensions of film sound carriers and *dispositifs* in particular became apparent. The presentation practices that will be analyzed in this chapter highlight the spatial and institutional dimensions. Film presentation activities depend on the space and setting where they are performed, which in this case indicates film heritage institutions. The institutional dimension plays a very important role in presentation activity: through presentation, institutions create the space and context for the cinematic experience of film heritage.

4.3 The Case of the EYE Film Institute Netherlands

In order to describe the activity of film sound presentation performed by a film heritage institution, I use the EYE Film Institute Netherlands, the former Nederlands Filmmuseum, as a case study. There are two reasons why I chose this institution. First, EYE has a long tradition of experimenting with new ways of presenting film sound; the evaluation of these experimentations provides an ideal context for the analysis of film sound in presentation practices. Second, this institution has recently come to the

conclusion of a ten-year transformation that involved rethinking its role and activity as a film heritage institution. This process consisted of a technological transition that involved the digitization of a consistent part of its analogue film collection, as well as an institutional transition beginning in 2010 with a merger with other Dutch film institutions. This culminated in 2012 with the opening of EYE's new building, which offers a new space and context for the presentation of film sound. As previously noted, space influences how film sound is perceived and experienced, so the analysis of the relation between space and film sound offers further considerations in the definition of film sound itself.

Even if these technological and institutional transitions were originally conceived independently, in my consideration it is possible to detect, in retrospect, an interrelation between them. The digitization of a large part of the film collection was originally planned mainly for online access. In the same years theatrical projection was converting to digital projection, through a process that started in 2011 and which was almost complete within about a year.[204] The digitization of the EYE film collection was adapted to the digital standard so that the film heritage could still be distributed in cinemas around the country. Moreover, EYE also needed to expand its theatrical space, since according to the situation at the time of writing it will soon be the only public theatre in the Netherlands that has the ability to screen analogue films through analogue projection. The Filmmuseum's previous venue was no longer suitable since its theatres contained only a limited amount of seats.

In this frame, I want to highlight the concept, already expressed within Noordegraaf's definition of museum presentation quoted above, that the presentation and exhibition activity of a cultural heritage institution is closely related to the physical space where it is performed: the space where a work of art or a cultural form is placed and its modes of display greatly influence the public's experience of that object, and, as a consequence, affect the way that object enters individual and collective memory. The physical space of a cultural heritage institution assumes the function of a symbolic space in the experience and memory of the public.

In the case of the EYE Film Institute Netherlands, the value of physical space is particularly relevant since the new building was specifically designed and built for the

[204] See http://www.screendaily.com/dutch-cinemas-complete-digital-rollout/5047167.article, and http://www.cinemadigitaal.nl/, accessed December 2013. Cinema transition to digital exhibition is investigated by David Bordwell, *Pandora's Digital Box: Films, Files, and the Future of Movies* (Madison, WI: Irvington Way Institue Press, 2012).

purpose of hosting this institution. It is common for the venues of cultural heritage institutions to be adapted from existing buildings, as in the case of the former venue of the Filmmuseum-EYE in Amsterdam's Vondelpark. Since the new venue of EYE was built specifically for the institution's activities, it is relevant to consider how a state-of-the-art film heritage institution, with the ability to influence the construction of its new venue, configured this space for its presentation activities.

From this premise, the new space of the EYE Film Institute will be analyzed specifically in relation to sound presentation and with the propose of further understanding the nature of film sound. This particular aspect will lead to more general considerations regarding the policy or idea of presentation that this institution carried out before and after the realization of the new space. For this purpose, I outline in the following section the history of film presentation of the Filmmuseum-EYE, which I define as an "experimental tradition," especially with regard to sound.

The history of a film heritage institution influences the preservation and presentation work performed by that institution. As noted in the second chapter, film heritage institutions are subject to *movements of transition and transience* similar to their objects of preservation. In order to understand a particular moment in the history of a cultural institution, its previous periods should also be considered. Consequently, when analyzing the latest moment of transition, which covered a period of almost ten years and concluded in 2012 with the opening of the new building, I will briefly reference the previous phases of the institution's history and the process that led to the construction of this building. I take as reference the account made by Giovanna Fossati, who distinguishes three phases in the history of the Filmmmuseum-EYE.[205] In resuming the history of the institution, I focus on the presentation practices adopted, the role of sound in such practices, and the effect of the spatial and institutional contexts of presentation on those practices.

[205] See Giovanna Fossati, *From Grain to Pixel*, 171-178.

4.4 An Experimental Tradition in Film Sound Presentation

The first phase of the history of the Filmmmuseum-EYE covers the first thirty years of its existence, during which the Filmmuseum established itself as an institution. This initial moment began with the foundation of the Dutch Historic Film Archive in 1946 as part of the Stedelijk Museum in Amsterdam. From this, the Nederlands Filmmuseum was created as a non-profit foundation in 1952: it received money from the state without being a state institution. Under the direction of Jan de Vaal, the Filmmuseum acquired its core film collections (the Uitkijk and Desmet collections). The institution did not have its own venue at that time and instead rented facilities to store and screen its film collection.

In 1975, the Filmmuseum opened an exhibition space in the Vondelpark Pavilion, located in the main central park of Amsterdam's Vondelpark. The Vondelpark Pavilion, built in Italian Renaissance style by architect Willem Hamer, was used since its opening in 1881 as an exhibition space for the fine arts, becoming also a meeting point for modern artists (fig. 34). The Pavilion was adapted for the Nederlands Filmmuseum when it was chosen as the venue to house this institution in 1975. Two screening rooms were built from the existing spaces of the Pavilion: the rooms were small and narrow, and the number of seats was limited (eighty in one room and sixty in the other). In addition to the two theatres, there was a cinema book shop at the entrance and a café in the vault. The opening of the Filmmuseum in the Vondelpark Pavilion considerably increased the presentation activity of the institution, which previously had to rent presentation spaces in other cinemas or venues.

The second phase of this institution's history covers the 1980s and 1990s and witnessed the direction of Hoos Blotkamp. At this time, the Filmmuseum was very active in both the restoration and presentation of its collection. While other institutions positioned themselves either more on the side of preservation or of presentation,[206] the Nederlands Filmmuseum found a balance between the two pursuits and established an experimental tradition in the restoration and presentation of archival films.

[206] See Penelope Houston, *Keepers of the Frame. The Film Archives*, 60-77.

Since 1980, the Ministry of Culture had guaranteed regular funding for the Filmmuseum, so resources were available for restoration projects. This allowed the Filmmuseum to increasingly engage in film restoration and not only concentrate on the recovery of masterpieces of film history, but also of early non-fiction and little known silent films.

Along with restoration, the presentation of the films from the collection was considered a primary mission of the institution. When presenting films, the Filmmuseum paid particular attention to the sound component, especially when screening silent films. For this purpose, the Filmmuseum hired musician and composer Martin de Ruiter, currently head of the music department at EYE, to curate the musical accompaniment program in 1999. This decision demonstrates the attention that this institution has given to sound presentation: hiring someone specifically to curate the sound presentation is exceptional in film heritage institutions. Another sign of this attention is the opening of the Cinema Concerts series, a monthly event where silent films were presented with an orchestra performing a score especially composed for the occasion. Since the Pavilion screening rooms were too small to host an orchestra, the Cinema Concerts were held at the Tuschinski theatre at Rembrandtplein, which is equipped with an organ for special music accompaniments, or in other venues in the city, such as the music hall (Muziekgebouw) and the city theatre (Stadsschouwburg).

The Filmmuseum's approach to the practice of presentation can also be detected in the remodeling of the larger auditorium in the Pavilion: in 1991, the original 1924 Art Deco interiors of the Cinema Parisien were installed. The Cinema Parisien was an historic cinema in Central Amsterdam that opened in 1910 and was designed by architect Jos Hegener. The inside was decorated in Art Deco style by the Dutch film pioneer Jean Desmet, who was the Director of the cinema from 1910 until 1956. When the Cinema Parisien was about to be demolished, its Art Deco interiors were saved from destruction and mounted in the Pavilion's cinema. This installation allowed the preservation of a historic artifact of cinema and its presentation to a contemporary public, thus sustaining the idea that the setting of the film experience has a historical value that is worthy of preserving if possible. The historical value of these panels is linked to cinematic collective memory and experience: the installation of the wood panels enriched with beautiful Art Deco decorations gave the Pavilion auditorium the atmosphere of an old cinema theatre and made it a more authentic setting for screening silent films.

The presentation activity of the Filmmuseum was not meant to only involve screenings of classical masterpieces: an experimental attitude towards the content and modality of film presentation developed thanks to the work of director Hoos Blotkamp (1987-2000) and deputy-directors Eric de Kuyper (1988-1992) and Peter Delpeut (1992-1995). De Kuyper, an art critic and experimental film director, and Delpeut, a found footage filmmaker, brought new attention to unconsidered material held in the archives and to experimental ways of presenting this content. As Fossati observes, "the focus of the Netherlands Filmmuseum shifted from the celebrated centerpieces of official film history to its margins."[207]

In 1990, for example, De Kuyper and Delpeut started the *Bits & Pieces* project to shed light on unidentified film fragments found in the vaults. Short and unidentified film fragments were usually not considered, or even catalogued, in normal preservation practices. In order to reevaluate such fragments, De Kuyper and Delpeut created twenty minute long found footage compilations with this material and presented them to the public. With *Bits & Pieces*, a project still active today in which one compilation is still produced each year, the Filmmuseum anticipated a tendency that has since been very successful: the recovery and restoration of marginal cinematography and orphans works.[208]

In this second phase, the Filmmuseum also "started experimenting with a new exhibition practice in which silent films were presented in unexpected settings with contemporary musical accompaniment."[209] The use of contemporary musical accompaniment, such as rock or electronic music, was in opposition to the use of classical piano or orchestral music popular at the time. The choice of unexpected settings also depended on the spatial limitations of the screening rooms in the Pavilion. The first screenings of early films with an experimental approach, which often involved the choice of the space and the sound accompaniment, received positive feedback from the local public. This positive outcome, along with a strong vocation towards presentation, led the institution to organize its own film festival, the Filmmuseum Biennale, which started in 2003 under the direction of Mark-Paul Meyer, senior curator of EYE, and Martin de Ruiter, musician and silent film programmer at EYE.

[207] Giovanna Fossati, *From Grain to Pixel*, 172.
[208] See Christian Olesen, "Found footage photogénie: An interview with Elif Rongen-Kaynakçi and Mark-Paul Meyer," *NECSUS European Journal of Media Studies* 4 (Autumn 2013), available at http://www.necsus-ejms.org/found-footage-photogenie-an-interview-with-elif-rongen-kaynakci-and-mark-paul-meyer/, accessed December 2013.
[209] Giovanna Fossati, *From Grain to Pixel*, 172.

The festival presented recently restored movies often accompanied by newly composed scores performed live. In the first edition of the festival in 2003, the films were presented in different venues in the city: not only film theatres (like the Filmmuseum Cinerama and the Pathé Tuschinski), but also other spaces, such as the Concertgebouw concert hall and the Paradiso music club. This music club, a symbol of the underground music scene in Amsterdam, served as a stage for the screening of experimental films, such as Walter Ruttmann's *Opus II, III, IV* (1921-1925), which were presented with scores by Dutch composer Louis Andriessen. In the following editions of the festival, other venues were used, such as the Stadsschouwburg theatre in Leidseplein, the previous home of the Dutch National Ballet and opera. In 2009 this building hosted the premiere of the restored version of *J'Accuse* (Abel Gance, 1919) with a new musical score by Gary Lucas and Reza Namavar performed live by the Ensemble Caméléon.

The first Biennale was notably titled *See the sound, hear the image*, which emphasized the importance of the sound accompanying the image, but also the value of the cinematic experience as an event comprising both image and sound. In her account of the history of the Nederlands Filmmuseum, Bregt Lameris observes that the intention behind this attitude towards presentation was to:

> […] create a situation similar to the one experienced by the film audience in the past. The Filmmuseum tried in this way to (re)create the fascination of a silent film program. The intention was not to recreate authentic programs, but mainly to simulate a feeling in the audience similar to the one felt by early cinema audiences. […] The Filmmuseum allowed itself room for free interpretation for the musical accompaniment of silent films, by inviting well known musicians such as Henny Vrienten, Joost Belinfante and others, and giving them carte blanche. This resulted in experimental programs, which place such film presentations in the domain of experimental arts.[210]

This account testifies to the institution's consistent plan to experiment with film presentation. It also highlights the increased role that sound played in the Filmmuseum's screenings: as the years progressed, what was once an experimental practice became a well-established tradition. Another element emerges from Lameris'

[210] Bregt Lameris, "Opnieuw belicht. De *pas de deux* tussen de filmmuseale praktijk en filmhistorische debatten" (PhD diss., Utrecht University, 2007) 143-144. Translation in Giovanna Fossati, *From Grain to Pixel,* 173.

statement: the intent to simulate the "feeling," the original cinematic experience, rather than trying to be faithful to a supposed original text. The Filmmuseum's experimental tradition in film presentation expresses a focus on cinema as an event and performance, and on the experience of the audience, rather than on the film as text. The focus on the dimensions of the event and performance were intended to bring a particular attention to the spatial and institutional context of film presentation.

Zeemansvrouwen was presented as the main event of the first Biennale, while *Beyond the Rocks* was the main event of the second Biennale: this was yet another sign of the establishment of an experimental tradition in presentation. Other restoration projects demonstrate the Filmmuseum's experimental tradition in film sound presentation. For example, *Regen* (*Rain*, Joris Ivens, 1929), which was presented at the 2005 Biennale, was reconstructed with the musical score composed for this film in 1941 by Hans Eisler. The score and the image did not match perfectly when they were combined, so it was deduced that some parts of the film roll were missing. Some black frames were used to fill the missing parts in order to safeguard the integrity of Eisler's musical score and keep the original synchronism between the music cues and the images. In other words, the sound component of the film was given priority over the image component.

Another example is the presentation of the restored version of *Man with a movie camera* (*Chelovek s kino apparatom*, Dziga Vertov, 1929) during the 2010 Biennale. A score composed by music composer Michael Nyman was produced especially for this restoration, and the Michael Nyman Band performed it live. The screening took place in one of the Muziekgebouw aan't IJ's concert halls instead of a movie theatre in order to provide the best acoustics possible for the musical performance. However, the aspect ratio was incorrect since the concert hall was not specifically equipped for film screenings, resulting in part of the image being cut off. There was also too much light coming from the orchestra that reflected onto the bottom of the screen: this similarly shows how preference was given to sound presentation over image quality.

The examples of *Regen* and *Man with a movie camera*, where sound presentation was favored above image presentation, are very rare: in screening situations, the image is usually prioritized over the sound. This is also because the audience tends to recognize and complain more about errors or mistakes on the screen rather than ones concerning sound. If the presentation practice of giving priority to the image can be read

as a manifestation of the hegemony of the visual, these last examples can be interpreted as an exception to this assumption.

Regarding the case of *Man with a movie camera*, it is interesting to note that presenting a film in an institutional space devoted to a media other than film, in this case music, also has consequences on the presentation quality. The space of a music hall entails different purposes, different technologies, and different audience expectations than a film theatrical space. In a music hall in fact the space is designed according to characteristics of music acoustics, the *dispositif* concerns music performance, and the audience expects to hear well rather than see well. This example shows how much film presentation is conditioned by the *dispositif*, the space, and the institutional context where it is performed. Each presentation can therefore be considered, to a certain extent, a performance. With this in mind, the following sections will analyze, using the Filmmuseum-EYE case as an example, the role of the physical space and the institutional context in film sound presentation.

4.5 A New Space for Presentation

Before analyzing in the next section the presentation of film sound in the new venue, I summarize here the main events that led to the opening of the new building. The first decade of the twenty-first century, defined by Fossati as the third phase of the Filmmuseum-EYE, is characterized by two transitions of the institution: a technological transition consisting of the digitization of its collection, and an institutional transition that led to its relocation and the inauguration of the new site. This phase began in the late 1990s with the first use of digital technologies for restoration and access purposes. During these same years, the Filmmuseum started the search for a new location in order to bring together its different departments which were scattered among various venues throughout Amsterdam. Director Hoos Blotkamp proposed a move to Rotterdam, but the Filmmuseum's board refused, and, thus, the Filmmuseum stayed in Amsterdam.

This phase of the Filmmuseum coincides with an attempt to rethink and reorganize cultural institutions founded by the Dutch government, which was looking for new funding models in order to reduce public investment in culture institutions and

encouraging public-private partnerships.[211] In 2005, the Ministry decided to consolidate the film public sector by merging three institutions: Holland Film, the Filmbank, and the Netherlands Institute for Film Education that worked in production, distribution and education, respectively. However, this merger was stalled for some years.

In 2005, the director and board evaluated the feasibility of a relocation of the Filmmuseum and considered the new urban plan of the municipality of Amsterdam that was trying to relocate cultural centers outside the restricted area of the city centre to less-attractive areas in order to make them more livable. The part of the city designated for the new Filmmuseum was Amsterdam Noord, the Northern part of the city. Delugan Meissl Associated Architects won the public competition for the architectural design of the new building with an ambitious building plan and innovative design, which was one of the main selling points for finding private founders (fig. 35). In fact, the elevated cost of the project called for a public-private partnership.

Parallel to the relocation of this institution, the Dutch government supported the project titled *Images for the Future*, which was envisioned in 2005, approved in 2006, and initiated in 2007. The project aim was "the broad availability of audiovisual material for everybody,"[212] and this objective was facilitated through the digitization of the audiovisual collections of the main Dutch audiovisual archives: the Nederlands Filmmuseum (with mainly film collections), the Netherlands Institute for Sound and Vision (holding broadcasting materials), and the National Archive (with a large collection of still photographs). This consortium of audiovisual institutions and archives came together to digitize, preserve, and allow access to the Netherlands' audiovisual heritage. By June 2012, the total number of hours of digitized material was as follows: 15,007 hours of film (at the Filmmuseum-EYE and Beeld en Geluid), 85,006 hours of video and 81,000 hours of audio (at Beeld en Geluid), and 2,000 photos (at the National Archive).[213]

The *Images for the Future* project had a budget of 154 million euros and was backed by the Ministry of Economics with funds for significant infrastructural works.

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[211] Information regarding the beginning of the new EYE institution derived from Ramesh Kumar, "EYEing the Netherlands: Why the Filmmuseum became a new institution." Paper presented at the conference *Beyond the Screen*, London, December 2012, unpublished.

[212] *Images for the Future Project Plan*, 5., http://imagesforthefuture.com/sites/default/files/imagesforthefuture_projectplan_2006.pdf, accessed December 2012.

[213] This data were presented at the Economies of the Commons 3 Conference, Amsterdam October 2012, see the presentation by Paul Keller, http://ecommons.eu/day-1-session-1-after-images-for-the-future-what-images-for-the-future-has-delivered/, accessed June 2013.

To date, it is the largest and most expansive publicly financed audiovisual digitization project. Thanks to this project, the Filmmuseum-EYE was granted a budget of about 35 million euros for preserving, digitizing, and providing access to a large part of their film collection. As Fossati reports "*Images for the Future* is probably the most challenging project in the Filmmuseum's history, enabling to assess, preserve, restore, digitize, describe, and making accessible its own collection in the period 2008-2015."[214] By June 2012, the Filmmuseum-EYE has preserved 1,300 hours of film in 35 mm; digitized 3,800 hours in 2K DPX; encoded 4,200 hours in JPEG 2000, HD and SD; contextualized 5,500 hours of material (of which 500 are for education purpose). In terms of titles, the Filmmuseum-EYE has digitized 6,000 titles out of the 40,000 collected in the archive. The institution was also active in the copyright clearance of the collection, hiring three lawyers full time. The project is still active, even though funding has presently been reduced.

With this project, the Dutch government guaranteed the long-term safekeeping of the Filmmuseum's collection and its status as an independent national museum, meaning that the continuing management of the collection is subsidized by state money. In return, the Filmmuseum was obligated to adhere to the Ministry's plan for a unified public film sector. Therefore, in 2010, the previously planned merging of the three film institutions (Holland Film, the Filmbank, and the Netherlands Institute for Film Education), with the addition of the Filmmuseum, took effect. Throughout this process, the Filmmuseum-EYE was placed under the direction of Sandra den Hamer, who was appointed in 2007 and previously served as the director of the Rotterdam Film Festival.

The Wieden and Kennedy advertising agency was hired to create a new brand for this institution. They were asked to come up with a new name, which had to be different from those of the constituent institutions, and a new logo. A name change is very significant for the positioning of an institution in the social sphere.[215] In this case, after reviewing the proposals of the advertising agency and consulting the boards of the constituting institutions, the name EYE Film Institute Netherlands was finally chosen. EYE also evokes the name of the IJ (pronounced "aye" in Dutch), which is a large body of water between Amsterdam and North Amsterdam that the new building overlooks.

[214] Giovanna Fossati, *From Grain to Pixel*, 174.

[215] For a better understanding of the identity construction of a film heritage institution, see Ray Edmondson, *National Film and Sound Archive: The Quest for Identity. Factors Shaping the Uneven Development of a Cultural Institution* (Canberra: University of Canberra, 2011), particularly the section 2.6 "Marketing, Positioning and Branding."

EYE further refers to the form of the building, which recalls the form of a human eye, and the logo, which is an outline of an eye. The explicative 'Film Institute Netherlands' was added to the EYE name.

This name also heralded the change in the physical space of the institution: on April 5, 2012, the new EYE building was inaugurated with a big ceremony (fig. 36). The building cost forty million euros and was financed by ING Real Estate, the city of Amsterdam, the Ministry of Culture, and the Ymere housing association. It was purchased by ING after completion and is leased to EYE for a period of twenty-five years. The original plan also contained a building to house the collections and the library near the new presentation building. This so-called Collection Center is still planned and should be completed within a few years.[216]

The position of the site of the institution in the geographical and urban space, as well as the architecture and configuration of the physical space, are very relevant in defining the symbolic value of the institution for the user community. Considering the position within the city, the location changed from the very frequented and lively Vondelpark to the decentralized and developing area of Overhoeks in Amsterdam Noord. In terms of architecture, the relocation is characterized by the passage from a nineteenth century pavilion to a twenty-first century futuristic building. Both these aspects contributed a change in how this institution is perceived by the regular public and occasional visitors. The new building represents a turning point, nevertheless some continuity in the activity of the institution can be detected, as for instance in the presentation of film sound following the experimental tradition of the Filmmusuem.

4.6 Film Sound Presentation: Sounds in Spaces

In this section, I describe EYE Film Institute's new building in relation to sound presentation. The configuration of the physical space constitutes an important variable in sound presentation. This is predominantly because the physics of sound diffusion and its perception by the human ear are greatly influenced by the configuration of the space.

[216] http://www.eyefilm.nl/nieuws/eye-tekent-huurovereenkomst-voor-collectiecentrum, accessed June 2013.

To clarify this point, I recall here the definition of sound by Read and Meyer reported in the first chapter:

> The total amount of energy in movement, the surface area covered, and the type of vibrating movement involved (depending on the material and its shape) determine the properties of these waves. When the waves strike and penetrate different mediums, their properties vary and change through the process of reflection, refraction or diffraction.[217]

The architectural structure of the space, the construction materials, and the interior design influence the reflection, refraction, and diffraction of sound waves in the space, and consequently how it is perceived. In other words, the same sound signal resonates differently depending not only on the *dispositif* which plays it (playback and amplification system) but also on the space where it is played. For instance, the sound rendition of a film in a small cinema is qualitatively different from when it is projected in a larger theatre hall.

In order to describe film sound presentation in the new building, I use Schafer's concept of *soundscape*, intended as the acoustic field of study and introduced in chapter one. In applying this concept to film sound presentation, a first distinction has to be made between *filmic* and *cinematic soundscape*. With the term *filmic soundscape* I indicate the soundscape of a particular film as it is recorded on the film carrier. The *cinematic soundscape* refers to the actual sound of the film perceived by the audience in a particular screening situation: this is composed by how the *filmic soundscape* resonates in a specific space and thanks to a specific *dispositif* situation (technological device and human actors), and also by the sound coming from the public.

Considering this distinction, I will analyze the different *soundscapes* of the new building. As Schafer observes, it is very difficult to analyze and describe *soundscapes*:

> We can isolate an acoustic environment as a field of study just as we can study the characteristics of a given landscape. However, it is less easy to formulate an exact impression of a soundscape than of a landscape. There is nothing in sonography corresponding to the instantaneous impression which photography can create. With a camera it is possible to catch the salient features of a visual panorama to create an impression that is immediately evident. The microphone does not operate this way. It

[217] Paul Read and Mark-Paul Meyer, *Restoration of Motion Picture Film*, 9.

> samples details. It gives the close-up but nothing corresponding to aerial photography. […] To give a totally convincing image of a soundscape would involve extraordinary skills and patience: thousands of recordings have to be made; tens of thousands of measurements would have to be taken; and a new means of description would have to be devised.[218]

On this basis, I will not pursue a complex analysis of the *soundscapes* with technological means to obtain a description of sound, but rather consider sound perception in the different spaces from the point of view of the audience experience, considering my own auditory experience as representative for that of an "ideal listener." In this way I could personally test and evaluate the hermeneutic categories used in the following analysis of the *soundscapes*.

In particular, I recognized the usefulness of some perceptual categories expressed in the article "Listening from Within," which reports the results of a psychological study conducted by Claire Petitmengin and others academics.[219] The study describes the auditory experience from a psychological and perceptive point of view, on the base of interviews: after listening to different kind of sounds, the subjects interviewed were asked to describe their personal auditory experiences. Upon comparison of the answers, the study argues that the auditory experience is based on three modes of listening: "source of the sound," "object sound" and "bodily felt sound." In these categories I found some tools that could help trace the auditory experience in a cinematic setting in general, and then specifically in the new EYE building. These categories allow for an analysis of the perceptual dimensions of film sound in space, or, as defined above, the *cinematic soundscape*.

The first mode, *source of the sound*, regards the identification of the object or procedure used to produce the sound. As the study reports:

> If I am asked to describe my experience of the sound, what I ordinarily immediately describe is the physical event which is at the source of the sound. […] The sound provides me with information about the characteristics of the object which have produced

[218] Richard Murray Schafer, *The Soundscape*, 7.
[219] Claire Petitmengin, et al., "Listening from Within," *Journal of Consciousness Studies* 16, no. 10-12 (2009).

> it: their direction, their distance, their speed, the matter of which they are made, their density, their solidity or hollowness, and the consistency of the surface.[220]

The process of identifying the *source of sound* is usually pre-reflective, meaning that it is not conscious but "usually hidden by the absorption of attention in the object or content of the experience."[221] The source can be identified in a verbal, visual, or non-symbolic form: "the subject pronounces the name of the source in an inner voice and/or sees an image or a visual scene representing the source."[222] The identification can also happen when a memory is evoked. The subject's attentional disposition is focused on the source of the sound, and the experiential space seems to extend in the direction of the source: "The imagination of the source extends lived space far beyond the space which is visually perceived,"[223] while the sound and the subject's body seem to become transparent. This point was elaborated by a participant of the study as follows: "Instantaneously my lived space is extended, changing itself to go and touch the source of the sound in geographic space."[224]

If we apply this category to the cinematic experience, an interesting situation occurs. There are two possible sources of sound: the sounds coming from the fictional reality of the film and the sounds coming from the physical reality of the theatre. The *cinematic soundscape*, as previously defined, is composed of both these sources of sound: it comprehends the sounds coming from the film reality (the *filmic soundscape*) but also the sounds coming from the reality of the physical screening space. The attention of the subject is focused on the sound coming from the mediated reality and being diffused in the theatre through amplification devices. The filmgoer is usually bothered by sounds from the theatre unrelated to the film, which he or she perceives as disturbing noise. Usually the viewer-listener tries to ignore or minimize the sounds coming from the unmediated reality and focus his or her attention on the sound coming from the film.

A cinematic situation can also present *bizarre sounds*, which are described in Petitmengin's study as sounds of which the source is not immediately recognizable.[225] For instance, the noise and crackles of an old movie soundtrack can be considered as

[220] Ibid., 260.
[221] Ibid., 256.
[222] Ibid., 261.
[223] Ibid., 263.
[224] Ibid.
[225] Ibid., 254.

bizarre sounds, because the subject usually cannot identify the source of such sounds neither in the unmediated nor in the mediated reality.

The second listening mode individuated in the study of Petitmengin et al. is *object sound*, which is characterized by the perception of pure auditory qualities of the sound without a clear identification of the source: "The sound is not considered as a clue, a sign, a means giving me information about something else, but it is perceived immediately for itself."[226] The sound is perceived independently from the object or event that produced it: the source is obliterated, while the atttentional disposition of the subject is focused on the sound qualities (volume, pitch, timbre, persistence), which are often associated with vision or touch. For instance, one interviewee, quoted in the study, states: "As soon as the sound starts I have the impression of something sharp, aggressive, grating."[227]

In a cinematic setting, the *object sound* can be experienced, for instance, during the screening of experimental films, where the viewer might appreciate the quality of sound without actually being able to identify what caused that sound. This is because the source of sounds in experimental films is often not detectable in the images. A particular case of object sound is *spatial sound*, which occurs when the sound completely fills the space of the auditorium.[228] This situation is made possible in present-day theatres thanks to multiple loudspeakers surrounding the public. It is common for contemporary film sound design, by enhancing the surround effect of sound amplification, to create spatial sound experiences.

The third listening mode, *bodily felt sound*, occurs when the sound resonates in the body, thereby involving different senses. As Petitmengin et al. indicate:

> This resonance is sometimes easily perceptible, like that of the bass in a rock concert or a nightclub, or that of a pneumatic drill. But a certain amount of practice makes it possible to become aware of more subtle resonances, such as that of the voice (whether someone else's voice or my own voice), of music, of the sounds of nature, or of any other sound.[229]

The bodily felt listening mode is activated, for instance, when we hear music that triggers the body to dance, and we start tapping our foot on the floor or moving other

[226] Ibid., 264.
[227] Ibid., 265.
[228] Ibid., 278.
[229] Ibid., 268.

parts of our body to the rhythm of the music. The felt sound involves "a transformation of the texture of the lived space, associated with a synchronization between interior space and exterior space, which makes the frontier of the two spaces more permeable."[230] In the cinematic experience, a similar situation can happen when the viewer is captivated by a film's music (e.g. with famous pop songs or pieces of classical music), or when the use of sound effects creates a resonance in the body (as in the use of bass for sound effects in a battle).

In the following section, I will use these categories regarding auditory modes as well as the concept of the *soundscape* to describe the EYE Film Institute's new space. These auditory modes can be applied in a cinematic setting in general, as explained in the previous paragraphs, but they are also appropriate to describe the auditory experience in a specific space and situation. Therefore, these auditory modes can help in describing the cinematic soundscape of the current EYE space.

To assist with this analysis, I divide the new building in four areas that correspond to four kinds of *soundscapes*: the theatrical space (the four cinemas), the exhibition space (the museum), the access space (the *Panorama* and *Pods* in the Basement), and the public space (the *Arena*). Each of these areas has a particular *soundscape* and presents film sound in a different way. To describe the auditory experience in these spaces, I use the preceding concepts of auditory modes distinguished by Petitmengin et al.: the *source of sound* (what is this sound), the *object sound* (what this sound is like), and the *bodily felt sound* (what the experience of this sound is like). In this description I will highlight which modes are prevalent in the different spaces, acknowledging that the modes often overlap in auditory situations and one mode does not necessary exclude the others.

In addition to the division into four areas, I assemble the spaces into two groups according to their purpose: for presentation and for access. The notions of presentation and access differ with regards to the role of the public: in presentation, the institution chooses the cultural object to exhibit or display to the public, while in access, it is the user who selects the material he or she wants to consult from the archival collections.

[230] Ibid., 274.

4.7 Spaces for Presentation: Cinemas and Exhibition

I begin my analysis from the traditional presentation spaces of a film heritage institution—the theatrical space and the exhibition space—and focus on how the sound is presented and perceived by viewers in the different places. The theatrical space in the new EYE building is composed of four cinemas: each of them has a specific structure and design and a specific presentation purpose. In terms of presentation equipment and possibilities, all four cinemas can project both analogue and digital films in the following formats: 35 mm, 16 mm, 70 mm, 2 K, 4 K. Cinemas 1 and 3 can also project 3D digital films.

Cinema 1 is the biggest theatre with 315 fixed seats, and it is therefore used for premieres and films that draw larger audiences (fig. 37). Regarding sound presentation, this cinema is characterized by the presence of a historic built-in organ (fig. 38). The organ, dated 1929, came from the Passagebioscoop cinema in The Hague, where it was used for the live accompaniment of silent films: characteristically, it cannot only play music, but also some sound effects, including the sound of a siren, a bird or castanets, which were used in historic screenings to replace the rumorist.[231] Fallen into disuse for decades, the organ was later restored and then installed adjacent to the left wall near the screen. The restoration of the organ is an interesting example of how a film heritage institution can preserve not only film objects but also devices and *dispositifs* in order to safeguard a certain film experience. The organ is played on special occasions for live music performances. With this new structure, EYE finally gained the ability to present in-house silent films with live musical accompaniment performed by an orchestra.

The organ was used for the first time during the main event of the building's inauguration: the screening of the *The Spanish Dancer* (Herbert Brenon, 1923), starring Pola Negri (fig. 39). The film was previously restored at the EYE Film Institute, and it was presented with a new soundtrack composed by Martin de Ruiter. This soundtrack was performed by musicians playing the organ, piano, violin, and guitar, as well as a soprano singer. The musicians performed on stage in front of the screen, and were

[231] Confirming the well-established use of sound effects in early film presentation, the presence of the sound effect function in the organ reveals another element to justify the use of sound effects in *Beyond the Rocks*.

therefore visible to the audience. Having attended the screening, it was particularly noticeable the way the sounds produced by the organ completely filled the space. I could not detect a specific point from which the sound originated, rather it seemed as though it was coming from the surfaces of the walls. Therefore, I associate the organ performing in this cinema to the *spatial sound* listening mode, in which the subject perceives the sound as filling the space. The music coming from the piano, violin, guitar, and the singing were associated to the instrument and musician visible on stage, and therefore activated the *source of sound* listening mode.

Cinema 2 has 130 seats and it differs from the other cinemas in that its rows of seats can completely retract so that the hall can become an open space, and, if necessary, be filled with other elements that do not usually pertain to a film theatre. This cinema is used for events that include film installations and film-related performances. During the inauguration, this space hosted an installation titled *Circo Togni Home Movies*[232] (fig. 40 and 41). This installation was composed of a cube with four-screens hanging from the ceiling in the middle of the room. Each screen projected images of home movies recorded and collected by the Togni circus family from the 1940s to the 1970s. During the projection, the band Available Jelly improvised a live jazz performance. The performers were situated beside the cube, while the audience moved around the space to see the screens from different angles and perspectives and hear the music from different places. This situation recalls the *bodily felt sound* listening mode: the audience listens to the music, which is played among the people in the auditorium. The body, not forced to remain seated but free to move in the space, becomes even more permeable to the resonance of the music. Aside from film-related installations, this room can also be used as a ballroom or for music concerts; these functions once again recall the concept of *bodily felt sound*. In general, during live musical performances that accompany film screenings, the *object sound* listening mode is activated: the audience, concentrated on following the story, and reading the intertitles if present, perceives the musical accompaniment in its pure auditory qualities without a clear identification of the source.

[232] The *Circo Togni Home Movies* installation and performance was realized by the Associazione Home Movies – Archivio Nazionale de Film di Famiglia (Bologna, Italy), in collaboration with La Camera Ottica – Film and Video Restoration (Gorizia, Università degli Studi di Udine, Italy). It was first presented in the Filmforum Spring School in Gradisca in 2008, and at the Courtisan Festival in Ghent in 2009.

Cinema 3, with 130 fixed seats, was designed following experimental filmmaker Peter Kubelka's concept of Invisible Cinema: the hall is completely black so that there are no elements that could distract the audience from the film experience. Albie Thoms describes Invisible Cinema, which was realized under the supervision of Kubelka at Anthology Film Archives in 1970:

> It is something of a space capsule, and when one enters it one is plunged into a sort of sensory deprivation chamber in which all one sees is the film on the screen and its sound (if it has any) is all one hears. Everything inside the cylindrical cinema is black, except for the screen, and the seats have hoods and blinkers so that one only looks at the screen. The cinema is tiered so that the seats of the row in front cut across the bottom of the screen just below head-height. All visual and aural impressions extraneous to the film are eliminated.[233]

The intention to eliminate "extraneous" aural impressions relates to the *source of sound* listening mode: the sounds within the cinema should be reduced as much as possible, and the sounds of the film should be the only ones that fill the cinema. In other words, the *cinematic soundscape* should coincide with the *filmic soundscape*. Cinema 3, however, does not completely follow Kubelka's project, which contained separators between the seats so that the audience would not be disturbed by the presence of the other people (fig. 42); the separators are absent in Cinema 3. Nevertheless, the idea to provide a pure cinematic experience, and to make the *cinematic soundscape* coincide with the *filmic soundscape*, is found in the design of Cinema 3, in which the listening mode of the *source of sound* prevails.

Cinema 4 has 75 seats and is decorated in Art Deco style. The original plan was to install the panels of the Cinema Parisien that were previously mounted in the Pavilion's auditorium. However, their installation was not possible, since the panels would have had to been modified and, as part of the Desmet Collection (declared part of UNESCO World Heritage in 2011), they could not be altered and placed in the new cinema. Since the original panels could not be installed, it was decided that a similar Art Deco decoration would be produced with new panels, so that the old style setting would be recreated. Moreover, in order to create a particular atmosphere in the theatre, a LED lighting system was especially designed by light artist Rob Looman. The idea of an old-

[233] Albie Thoms, "Films of Change," *Lumière* 32 (1974), 33.

style atmosphere for this cinema was also applied to the cinema's program: this cinema is used for screening silent films, classics, and educational programs. The decision to build a link between the physical space and the type of films shown further reinforces the idea that the space influences the cinematic experience. Since this theatre is dedicated to the presentation of silent and early films with live music accompaniment, it can be associated to *object sound*, because live performances directs the attention of the audience towards the pure auditory quality of sound.

Regarding sound presentation in the theatrical space, an acoustic problem must be noted: the acoustics of each of the four theatres do not allow live music to be performed without amplification because of the sound reverberation in these spaces. In other words, live musical performances must always be amplified. In general, music played without electronic amplification has a different effect and texture compared to when it is amplified. The possibility to play without amplification also depends on the instruments played and the musical genre. This kind of concern mainly regards the acoustics of the music halls. It is usually not a concern in modern cinemas, since the soundtrack is recorded and then diffused in the theatre through amplification systems. However, since this institution specifically hosts live musical performances as well, this aspect was considered, but ultimately left unresolved in the acoustic design of the cinema spaces.

If the four theatres present this lack in acoustic design, an analysis of the exhibition space reveals a great attention to the acoustic issue. The exhibition space consists of an area of approximately 1,200 m^2, and is composed of one large room that can be divided in smaller sections with wall panels (fig. 43). The versatility of this space is very important, since it hosts four temporary exhibitions each year rather than one permanent exhibition. The exhibitions already realized at the time of writing are: *Found Footage: Cinema Exposed* (April-June 2012, fig. 44), *Stanley Kubrick: The Exhibition* (June-September 2012), *Expanded Cinema: Isaac Julien, Fiona Tan, Yang Fudong* (September-December 2012, fig. 45), *Oskar Fischinger – Experiments in Cinematic Abstraction 1900-1967* (December 2012- March 2013), *Johan van der Keuken / Up to the light* (March-June 2013), and *Fellini – The Exhibition* (June-September 2013).

The configuration of the space as a single room creates some issues with regard to sound. This is particularly relevant because various types of audiovisual material are featured within these large-scale exhibitions: the sounds of different screened materials could in fact interfere with one another when they are displayed within the same section. For this reason, this space was soundproofed with a very expensive sound

absorbing ceiling. The use of such a system demonstrates how the combination of the building materials and the configuration of the space influence how sounds are diffused and perceived. Without this system, the exhibition area would be much noisier due to echoes. This soundproofing system enables this space to be isolated from external sounds coming from not only the theatres or the Arena, but also the smaller exhibition areas. These sections are acoustically isolated since the wall panels are also made of soundproofing material. This way, the sounds of small areas do not interfere with the ones nearby. For each exhibition, it is necessary to find the right reconfiguration of the space through the use of the panels to accommodate the quantity and type of audiovisual material that will be displayed. The acoustic isolation system in the exhibition area recalls the *source of sound* listening mode: the aim of this system is to contain the sounds of each section inside its physical boundaries, so that the public is not disturbed by sound coming from other sections.

For instance, the exhibition dedicated to Oskar Fischinger contained multiple sound projections. The exhibition was composed of four sections with simultaneous projections on big screens as well as video material displayed on TV monitors, while glass cases displayed hand painted works and other documents (fig. 46 and 47). In the first three sections, the curators and designers decided to project the films in sequence, the following one starting only after the previous one had ended, so that the sound of one projection would not interfere with the others. This particular decision to not superimpose different soundtracks in the same space also underlines the importance of the sound element in Fischinger's work, which is significantly called *visual music*. In these films Fischinger experiments with the relation between music and abstract visual art. In the bigger, final section (fig. 48), the visual parts of the projections were simultaneous, while the audio came from one clip at a time. In such situations, the listening mode activated is the *source of sound*: the subject is guided through the room by the sound sources, and he or she is attracted by and compelled to pay attention to the screen in the room that is accompanied by the sound.

4.8 Spaces for Access: *Panorama*, *Pods*, *Arena* and the Web

If the four cinemas and the exhibition space refer to the traditional presentation activity of a film heritage institution, the *Panorama* and the *Pods*, two areas in the building's Basement exhibition area, are dedicated to access. These installations allow users to browse and view film materials from EYE's collections. The Basement is in fact characterized by the attempt to engage visitors interactively with its audiovisual collection. All spaces in the Basement are free to the public.

The *Panorama* is a 360-degree interactive immersive installation (fig. 49 and 50).[234] In a dark room, four digital wide angle projectors project sixteen running strips of moving images on all four walls and seven projectors present film clips as they were photographed one frame at a time (fig. 51). There are seven consoles dedicated to a specific theme (i.e. Film Stars, Colour, Magic, Slapstick, Exploration, Battle, The Netherlands) that contain twelve film clips related to each theme (fig. 52). The preview window shows all the clips related to a specific theme. The users can choose which clips they want to see through the touchscreens installed within the consoles, which also serve for offering some contextual information about the clips (fig. 53). Users can also play the selected film backwards or forwards, using a lever. Each control panel is connected to a digital projector that displays the selected clips on one of the walls.[235]

The *Panorama* space can be considered as a bridge between exhibition and access: the installation of the running film strips on the wall addresses the exhibition and presentation aspect, while the consoles, which must be activated by the user, relate to access and interaction. Access to EYE's collection is limited to the clips loaded in each station, but the selection of clips nevertheless allows a form of access to the collection, even if in the context of exhibition. Fossati explains that "[t]he EYE Panorama is an example of how a film collection can be shown to an audience in a more

[234] The installation was produced as a collaboration between EYE, the Submarine production studio and the Beamsystems equipment provider.
[235] The idea to present short film scenes that have a common theme or motif recalls the assembling of film fragments in the *Bits and Pieces* programs; this is an example of how the approaches related to the experimental tradition in film presentation are still present in the new building.

flexible fashion than that of the traditional cinema setting (or dispositif) where the films shown are decided solely by the programmer or curator."[236]

The concept behind the *Panorama* is mainly visual: film images running in strips around the walls of a dark room. As the name declares, this installation is inspired by earlier eighteenth and nineteenth century panoramic *dispositifs*. However, the sound component plays a role in this installation as well. The *Panorama* was designed not only as a visual but also as a sound installation: each control panel is equipped with a *sound tile*, a sophisticated version of a sound shower, composed by a square loudspeaker mounted on the ceiling right above the console, so that it is possible to hear the sound of the selected clip. When the user plays the clip forward or backwards with the lever, the sound also goes forward and backwards and produces an impaired noise, which can be related to what I defined as the noise of the device in chapter one.

The challenge of the *Panorama* installation with respect to sound was to isolate sound diffusion areas without using physical barriers, so that the person who is using the console hears only the sound of the clip he or she chooses and not the sound of other stations. Moreover, a solution needed to be found for limiting the amount of disruptive noise in a situation where all seven consoles would be used simultaneously. This goal was achieved, since the *soundscape* of the *Panorama* is not disruptive or distracting, and the sounds of the clips are audible only in the area below the sound tile.

When considering how the viewer perceives the film, it is interesting to note that the sound associated to the film clips comes from the ceiling: this is an unusual position for the *source of sound* since film sound usually comes from either behind the screen or from the walls surrounding the cinema theatre. Walking into the space while many consoles are showing clips creates an interesting listening experience, making it possible to cross film sound bubbles and pass from the sound of one film to another. Such an experiment shows the difference between the *filmic soundscape*, which is the sound of each sound bubble, and the *cinematic soundscape*, intended as the sound of the whole space in which film is screened.

Outside the *Panorama*, there are five *Pods*, viewing cabins where the visitors can watch parts or complete films from EYE's collection and also play a film quiz (fig. 54 and 55). In these cabins, the sound is diffused through built-in loudspeakers. Even if the cabins have two open accesses, the sound is contained in the cabin space through the

[236] Giovanna Fossati, "Filmmaking, Film Archiving and New Participatory Platforms," 182.

loudspeaker system. The sound is audible only to the people in the cabin, thus here the *spatial sound* listening mode can be detected. The sound amplification of the *Pods* initially experienced some problems, since the volume of some of the clips was low and could not be clearly heard from inside the stations; later on the volume of the clips was calibrated and the problem was solved. Similar to the *Panorama*, the *Pods* can also be considered as a renewed form of an archaeological media device, recalling early forms of experiencing moving images, such as Edison's Kinetoscope.

Besides the *Panorama* and *Pods*, the Basement also hosts the *Playground*, a space with interactive installations that intend to engage visitors in a playful way; this space is in fact primarily designed for families. Here sound can be associated to the *object* and *spatial sound*: the sound of the installation, if any, is mixed with the sound of the people interacting with them, especially the lively clamor of the children involved in the discovery of the media attractions.

This analysis of the physical spaces of the new building concludes with the *Arena*, which is an open public space (fig. 56, 57 and 58) with a café, restaurant, and a panoramic view of the IJ and Amsterdam. The same sound absorbing ceiling system as in the exhibition space was utilized in this area because of its large size and because it is commonly used as a meeting and event space. This sound absorption system helps to reduce noise when the area is overcrowded. This *soundscape* has a prevalent mode of *object sound* listening: the murmur of people talking in the café or on the stairs helps to perceive the quality of sound itself rather than the source of sound. During special events, live music or DJ performances are held in this space and are sometimes accompanied by visual projections of film clips, often containing material from the *Bits & Pieces* collection, onto the walls and the large window of the building (fig. 59). On these occasions the *bodily felt sound* is also activated, since the musical sound can engage the body in a more or less explicit dance.

EYE's website can be considered as a virtual space for accessing film heritage materials. It is nowadays an important access point to film heritage and film sound and should thus also be analyzed as a film sound space. The following remark by Nicola Mazzanti regarding the role of digital access on demand with respect to traditional presentation outlines how these two aspects are complementary in the new role of film archive as institution:

> I see [the library function – "access on demand" – and the museum function] not only as

> two facets of the role archives should play, but as two aspects which are so inherently interrelated and interdependent that one could not exist without the other. I am deeply convinced that the film archives' system as a whole – if not each individual archive – should be able to fulfill both these functions, and that it would be a serious mistake to prioritize or undermine one against the other.[237]

EYE has initiated different web projects in order to provide online access to the digitized material in the collection.[238] For example, the *Film in Nederland*[239] portal provides access to the collection and allows users to view clips and films that are related to the Netherlands for free. Another instance of web access is the *Instant Cinema*[240] platform, where it is possible to view experimental and art films from EYE's collection.

Besides the website that allows access to film material in general, there are also platforms that allow users to reuse and remix film material that is in public domain and therefore does not require copyright clearance. A large amount of EYE's digitized material will be soon available on *Open Beelden*, an open media platform that permits the downloading of the digitized material and its reuse using a creative commons license.[241] The *Scene Machine*[242] is an online application that mixes clips (around one thousand) from the film collection using keywords. This platform allows users to browse the collection, compose their own compilations, and share it on social networks. *Celluloid Remix*,[243] a related project, is an online contest that invites professional and amateur filmmakers to remix film fragments from the collection and make found footage videos with the option of also adding a new soundtrack.

Regarding the sound presentation in these virtual spaces, it should be noted that in the case of websites and online platforms it is not the institutions but the users that decide in which space and through which *dispositif* the film or segment is perceived. As a projectionist, the user can control the playback of the film, start and stop it at any moment, browse forward or backwards, control the volume of the sound or decide to mute it. This situation can be related to the *source of sound* listening mode, in the sense that the user is focused on the source of sound that he or she can control through the

[237] Nicola Mazzanti, "Response to Alexander Horwath," 13.
[238] http://www.eyefilm.nl/en/watchfilmsonline, accessed June 2013.
[239] http://www.filminnederland.nl/, accessed June 2013.
[240] http://preview.instantcinema.org/, accessed June 2013.
[241] http://eye.openbeelden.nl/; see also http://www.eyefilm.nl/en/news/eye-releases-more-than-150-films-on-openbeeldennl, accessed January 2013.
[242] http://scenemachine.nl/; accessed June 2013.
[243] http://celluloidremix.openbeelden.nl/; accessed June 2013.

dispositif. The user's control over the sound is even more accentuated in the cases of the reuse and remixing of film. In these cases in fact the user can manipulate the sound acting as a postproduction technician, he or she can change or add a new soundtrack, controlling the *source of sound* at the source.

4.9 Conclusion: Presenting Film Sound in Space and Institutional Context

In this chapter, I illustrated EYE's activities with regards to film sound presentation. I highlighted how the presentation practices of a film heritage institution, together with the physical space and the institutional context, contribute to creating a specific cinematic experience. In particular, the Filmmuseum-EYE is distinguished for its creative and experimental use of devices, *dispositifs*, spaces, and carriers in the creation of cinematic events and experiences. Therefore, I defined the activity of this institution as an "experimental tradition" in film presentation. Moreover, EYE recently went through a transition with a technological dimension (the digitization of the collection) and an institutional dimension (the move to the new building).

The relocation of this institution can also be interpreted as a symbolic change in values: relocating from a nineteenth century pavilion to a twenty-first century futuristic structure symbolizes the passage from the old "chaperone model" of archiving to an "open and direct model," following the process of "audience" becoming "users."[244] The symbolic value of this institution and its new location is also influenced by evolving technology and the new media context: it could be argued that EYE wants to offer a new public space for commonly sharing visual and aural experiences at a time when personal portable devices allow users to listen and view media content in every context and moment.

The decision to build four unique cinemas that differ from one another in style, design, and concept demonstrates a great attention to the configuration of physical space by influencing a viewer's perception and experience of a film. The attempt to install the original Art Deco panels of the Cinema Parisien in the new building also indicates the

[244] Giovanna Fossati, *From Grain to Pixel*, 175.

dedication of the Filmmuseum-EYE to preserving cinema theatres as the space and context of the film experience. Moreover, the restoration and installation of an historic cinema organ reveals the preservation of cinema *dispositifs*.

The principle and practices of presentation that define these theatrical spaces are based on the idea that in this innovative complex it should be possible to show all kinds of films, and each film should be presented in an appropriate setting. Therefore, the choices of programming also take into account the screening space as well as any required musical accompaniment. It is very different to see a silent film in Cinema 1 accompanied by an orchestra and the organ, in Cinema 4 with piano accompaniment, or in Cinema 3 with the improvisations of jazz band or an electronic DJ set. Considering these elements, it could be argued that *the presentation practices of this institution emphasizes an idea of film sound as performance and event, where the physical space and the institutional context are not neutral, but play an active role in the viewer's experience and memory of a film*.

In this chapter, I delineated the experimental tradition of the Filmmuseum-EYE regarding film preservation and presentation in general and film sound presentation in particular. From the 1980s onward, this institution stressed the importance of the role of musical accompaniment in the presentation of film heritage by experimenting with live music during performances but also in restoration practices. This experimental tradition in sound presentation can be also explained as a consequence of the spatial limitations of the previous building. The two cinemas in the old venue in Vondelpark Pavilion were small and not suitable for live music concerts during the screening of silent films; therefore, the Filmmuseum had to rent other theatres and event locations for showing films with a live music performance. This reiterates how film presentation is influenced to a certain degree by a physical space.

The limitations of the physical space of the old venue can also be interpreted as a reason for certain preservation choices. When the Filmmusuem-EYE engaged in the restoration of two important silent films, *Zeemansvrouwen* and *Beyond the Rocks*, it was decided that new musical accompaniment would be commissioned and that the soundtrack would be recorded on projection copies. One motivation for this decision was to allow the possibility to screen the movie with the new score also in cinemas that cannot accommodate live music performances, like the venue in Vondelpark. The composition of this new sound for the films was also experimental with regards to the addition of sound effects and voices. In other words, the experimental practices in film

sound presentation were sustained by experimental practices in film sound preservation and vice versa. These practices created a tradition inside the institution and also instilled regular audiences with new habits of perception.

The new building can be considered as a new receptacle and context for old practices of presentation that belong to the experimental tradition of the Filmmuseum-EYE. It is interesting to individuate the elements of this tradition that persisted also into the latest phase of the institution's history. Considering film sound presentation, a persisting practice is the attention and consideration given to live performances and musical accompaniment for screenings of either early or experimental films. The practice of film sound presentation at EYE is a legacy of the former Filmmuseum, one that is still pursued and adapted to the new building. Moreover, there is a proliferation of live musical accompaniment with two fixed monthly events: a Cinema Concert every second Sunday of the month and a jazz film concert every fourth Sunday of the month. The Cinema Concerts represent an element of continuity in the tradition of film sound presentation: in contrast to the past, there is no need to use other venues because the concerts are held within the institution's new venue. Another element of continuity is the Biennale film festival in which sound presentation plays an important role given the consistent programming of early films. For the festival as well there is no longer the need of other venues; the upcoming 2014 edition, which is named Celebrate Cinema and will become an annual event, will take place in the new building.[245]

The presentation of film sound heritage in the new building has been described using the notion of *soundscape* on one hand, and the listening modes of auditory experience (*source of sound, object sound, spatial sound, bodily felt sound*) on the other. In this frame, *I consider film sound presentation as the related* cinematic soundscape *shaped by different factors: the sound signal played by the playback device or produced live during the performance, the playback and amplification system through which the sound is diffused, the configuration of the space and its acoustics, and the sounds produced by the audience*.

Considering the new structure from the point of view of the "hegemony of the visual," it should be noted that there are some aspects that reinforce the idea of this hegemony: the choice of the name and the logo, which refer explicitly to the eye; the visual impact of the building design that recalls the shape of an eye, and the visual

[245] See http://www.eyefilm.nl/en/news/celebrate-cinema-at-eye, accessed January 2014.

impact from the inside, where the big glass wall embracing the Arena offers a panoramic, "filmic" view of the IJ and the Amsterdam Central Station. However, there are also elements that indicate a particular attention to the sound factor, such as the restored organ, the soundproofing system of the exhibition space, the sound showers in the Panorama and the live performances. Above all, this active and experimental practice of film sound presentation is a sign that the sound factor is not underestimated or forgotten by this institution.

To conclude, the analysis of presentation practices highlighted crucial dimensions of film sound: the *dispositif*, which already emerged in preservation practices, but also some additional elements, such as the space, the institutional context, the performance characteristics of sound in presentation. The brief analysis of the different auditory modes that can be activated in film presentation demonstrate in fact the role of the physical configuration of the space as well as the institutional context in which film sound is perceived and experienced by the audience. The institutional context can be defined as the context created by the activities and decisions of the people working in the institution, as curators and programmers.

The institutional and experiential dimensions of film sound are overlooked by film theories, which are usually focused only on the textual dimension, the recorded soundtrack of the film. The consideration of these dimensions serves as a contrast to the definition of film sound as a static and fixed text composed of music and dialogues. The spatial, institutional, and experiential dimensions suggest describing film sound as a dynamic event, a performance that changes according to the space and institutional context where it is performed. In the next and final chapter, I will consider all the elements and dimensions of preservation and presentation practices in the elaboration of a multifaceted definition of film sound.

CHAPTER 5.
Film Sound in Theory, Preservation, and Presentation

5.1 A Biaxial Model

The aim of this dissertation is to find, define, and conceptualize film sound in preservation and presentation. The core questions of the research concern the nature of film sound: what is film sound? How can it be conceptually defined? What does it consist of? What are its core dimensions? In order to formulate an answer to these questions, I explored in chapters one and two the value of recorded sound for individual and collective memory. In chapters three and four I described practices of film sound preservation (the sound-on-disc systems) and film sound presentation (the activity of the EYE Film Institute Netherlands). This last chapter aims at resuming the main considerations and findings of this research, and combining them in a coherent model.

In this chapter, I first use the analysis of the case studies examined in this dissertation to develop a model for the definition and conceptualization of film sound, showing how film sound preservation and presentation practices bring to the fore the core characteristics of film sound. This discussion serves to demonstrate how a study of preservation and presentation practices can contribute a much needed definition of film sound to the field of film theory in general. Then, I will discuss how the proposed theoretical model can promote the reformulation and interpretation of film sound preservation and presentation theories and practices. Although based on real practices, it is a theoretical model. In fact, this model aims to provide some key concepts to understanding and interpreting the decisions and choices related to preservation and presentation practices, however it does not explicitly suggest or describe new solutions, methodologies, or procedures.

As the case studies demonstrated, preservation and presentation practices highlight a number of crucial aspects and dimensions that contribute to the definition of

the nature of film sound. The preservation of early sound systems focused on the importance of taking into consideration not just the material carrier, but also the technological devices and the human actor's techniques, which I defined as the film *dispositif*. On the other hand, the presentation practices adopted by the Filmmuseum-EYE demonstrated how the devices, the *dispositifs*, and the spaces necessary for presentation can be used in an experimental way to create cinematic events and experiences.

In order to describe the nature of film sound, I interpret the dimensions that have emerged from my analysis of film sound presentation and preservation practices – carrier, device, *dispositif*, text, physical space, and institutional context – using three key concepts: *trace*, *material form*, and *performance*. These key concepts are borrowed from different film and media theories, as well as the fields of film preservation and fine art conservation. The notion of *trace*, discussed in chapter two and further elaborated here, is derived from media theories, in particular from theories developed by Thomas Elsaesser, Friedrich Kittler, and Maurizio Ferraris. The concept of *material form* is taken from art historian and restorer Cesare Brandi and applied to film sound and film preservation. With the help of more recent film preservation theories, such as the ones developed by film scholars and historians Giovanna Fossati, Vinzenz Hediger, and Barbara Flückiger, I formulated certain considerations regarding the conceptual, material, and performative nature of film, as well as reflections on the different histories of film, such as those of a film's production, reception, material object, and *performance*. According to Hediger, consideration of film's material and performance histories is an example of how film archival theory can contribute to film theory:

> A theory of archival practices […] redefines film as an art form in terms of a historical object with a material history, but also with a performance history. The film's material and performance histories are without doubt crucial to the film object as defined by the archivist, but they are not accounted for in current and classical approaches to film theory.[246]

The contribution of this dissertation to previous theories is twofold. First, the theoretical model that I propose originates from and is centered on *film sound*, a

[246] Vinzenz Hediger, "Original, Work, Performance: Film Theory as Archive Theory," in *Quel che brucia (non) ritorna - What Burns (Never) Returns: Lost and Found Films*, ed. Giulio Bursi and Simone Venturini (Udine: Campanotto Editore, 2011), 48.

component that in the conceptualizations of film, even from an archival perspective, is still largely neglected or treated selectively, focusing mainly on the soundtrack or the musical accompaniment. Second, my intent is to discuss the key notions as *interrelated concepts in an integrated model*. Instead of simply making distinctions between different concepts, such as between the material object and the conceptual object, the textual and the performative dimensions, the material form and the audiovisual trace, I attempt to outline their interconnections.

These links between different concepts emerged from examination of the selected case studies. In the analysis of early sound systems I described possible relations between material object, *dispositif*, text, and exhibition. The EYE case highlighted some connections between the *performance*, the space, and the institutional context. In this chapter I intend to further investigate these interconnections, and integrate them in a united model that can effectively illustrate the dynamic nature of film sound as an object of preservation and presentation. The dynamic nature of film sound can be described considering all the different dimensions that were identified in the introduction and over the course of this research: the material, technological, human, institutional, experiential and memorial dimensions.

In order to describe the integration and interrelation of these different concepts in the context of film preservation and presentation, I use a double axis Cartesian system. *In this double axis model, the x-axis is related to the dimensions of space and experience and to the notions of film sound as material form and performance. The y-axis refers to the dimensions of time and memory, and to the concept of film sound as trace. This double axis can be considered as representing the field of action of film heritage institutions: film preservation acts mainly on the y-axis, while film presentation acts on the x-axis.*

The theoretical elaboration of this chapter is concentrated primarily on film sound, yet in the final sections the discussion will be extended to film in general, as it is composed of both image and sound. The separation of image and sound can be useful for analytical purposes, but it should be kept in mind that film as a cultural form comprises both images and sounds as its main constituents. Beginning with the underrepresentation of film sound in film theory as argued in the introduction of this research, I asserted the specificity of film sound with respect to the predominant dimension of the image, and I sustained the need to investigate the nature of film sound. As previously stated in chapter three, from the start film has been conceived as a

medium that comprises moving images (a representation of live events) and sound (performed live or recorded on carriers, either separate or together with the image). The image and sound components together create film as a cultural form; thus the cinematic experience is based on a combination of visual and auditory perception. Sound and image can exist on separate carriers, as in early sound systems, but only when they are displayed together can film be fully experienced as a form of culture.

As I will argue in this chapter, even if image and sound are treated separately during preservation, with different tools and by different operators, they have to be considered as a united body. Some observations made about film sound and its preservation and presentation can be effectively translated to film in general. Moreover, reflection on film sound can emphasize some features of film that are not considered in image-centric film theories, such as the importance of the space and performance dimensions of a cinematic event. Thus the key concepts that define film sound (*material form*, *trace*, and *performance*) will be used in the final section of this chapter to interpret the preservation and presentation of film intended as a united body composed by image and sound.

5.2 Film Sound as Trace

> 4.014 The gramophone record, the musical thought, the score, the waves of sound, all stand to one another in that pictorial internal relation, which holds between language and the world. To all of them the logical structure is common.
> — Ludwig Wittgenstein[247]

In this section I take into account film sound preservation practices, in order to highlight some features and elements that contribute to the theoretical definition of film sound. Film sound preservation and restoration deals with the dimension of *trace*, as I defined it in the second chapter, in its two meanings: first, the *physical trace* intended as the form of inscription of aural information on a carrier, namely how the sound signal is recorded on the material carriers and how the sound information is transmitted to the

[247] Ludwig Wittgenstein, *Tractatus logico-philosophicus* (London: Ruteledge & Kegan Paul, 1960), 65 [Originally published in 1921].

future through the trace inscription, and second, the *mnemic trace*, which is the trace that film leaves in individual and cultural memory through its reception.

The *physical trace* represents the entity that should be preserved in order to ensure the transmission of cinematic information for future access. Thus, *film sound preservation* concerns the storage, copying, migration, and restoration of the film sound *physical trace*. Storage involves maintaining the appropriate space and climatic conditions for film sound carriers, including masters or preservation copies (e.g. sound negatives, sound positives, magnetic tapes, or digital carriers). These elements can be copied in order to ensure the transmission of the information for future access. The copying process can be completed in the same media domain, as in the case of making a film sound negative from a film sound positive. When the media carrier or format changes, there is a migration process: this is the case when a film sound magnetic tape is first digitized and then recorded on a film positive copy. The most common migration activity as of present is digitization. In this phase, it is important to apply the right filters required of the original production and playback devices.

Film sound restoration implies, at present, digitizing the sound information of the *physical trace* and elaborating of the sound signal in the digital domain. The film sound carrier, like an archaeological artifact, presents signs incurred by the passage of time, due to the decomposition of the carrier, but also caused by the devices that produced and played it. As Altman observes "Recorded sound thus always carries some record of the recording process, superimposed on the sound event itself."[248] Altman recognizes the value of these marks as a source for film sound history and analysis:

> [T]he variables introduced by sound's material heterogeneity, along with the system constituted to record it, lie at the very heart of film sound. Though they may constitute distortions for the sound engineer, the marks of the sound narratives and the recording process that appear as part of any sound record constitute the very text of the sound analyst, the fundamental signs of the sound semiotician, the basic facts of the sound historian.[249]

I would add that these marks have an important value also for the preservationist and restorer. The marks in film sound caused by the device and the recording process

[248] Rick Altman, "The Material Heterogeneity of Recorded Sound," in Id. ed., *Sound Theory, Sound Practice* (New York: Routledge, 1992), 26.
[249] Ibid., 30.

assume the form of noise, intended as unwanted sound.

Film sound as *physical trace* is determined in fact not only by the recorded signal, but also by the unwanted noises, which I divided into the following types: the *noises inherent to the carrier* (e.g. pops and crackles), the *noises inherent to the device* (e.g. hiss, hum), the *noises derived from the dispositif* (e.g. noise occurring during film exhibition originating from the playback device or the human actor, as for instance the clicks caused by cuts in the film copy), and the *noises caused by the passage of time* (derived from the physical decay of the carrier).

As I have argued in chapter three in analyzing the *Tonbilder* case, film sound restoration deals primarily with the treatment of noise. The key issue in film sound restoration is which noises belong to the film sound and which do not. Those belonging to film sound deserve to be preserved, while those that do not can be erased or attenuated. This discernment implies the presence of a human actor, the film preservationist, restorer, or operator, who decides according to a judgment of value. The judgment on which noises should be preserved, attenuated, or eliminated reveals a particular conception of the nature of film sound. If for instance the preservationist decides to cancel out all noises, the ones inherent to the carrier and the device as well as the ones caused by the passage of time, the film sound is conceived as only the text composed by music, dialogue, and effects. If, instead, the preservationist decides to maintain the noises inherent to the carrier and device, these dimensions are recognized as part of film sound. When the noises produced during film exhibition (as a click caused by a cut) and incurred by the passage of time are also preserved, film sound is considered as an historical object; the marks and signs left on the object by time and use testify to its history and are acknowledged as part of the nature of film sound.

Therefore, in preservation work it is important to be aware of film tradition, which refers to how films have come to presently exist in collections (*physical trace*) and how they have come to impact individual and collective memory through exhibition and reception (*mnemic trace*). I consider film tradition as being composed of an internal history, which regards film as a material object, and an external history, which relates to film presentation. This distinction relates to Hediger's consideration of three forms of temporalities: "Film […] in the terms of a theory of archive practice, is both a material and temporal object, where the temporality is actually threefold: The temporality of the material object, the temporality of the film's performance and the temporality of the

history of its performance."[250] The temporality of the material object refers to what I define as internal history, while the history of film performance recalls external history. I will now discuss internal history, which can be related to the dimension of the material object; then I will describe external history, referring to the concept of occurrence.

Internal history concerns film sound as *physical trace*, and it depends on the material object, the physical carrier: over time, some alterations and decay can affect the materiality of the carrier and the recording trace, as for instance the appearance of physical or chemical decomposition of the film stock or the presence of dust and mold. These alterations can modify the recorded signal to different degrees and compromise the ability of the carrier to be played. Understanding the internal history of film sound carriers is fundamental to preservation and restoration activities: it helps to distinguish between the noises and marks inherent to the devices and carriers and the ones that occurred through use and aging of the carrier.

External history refers to the history of film sound exhibition and presentation as well as public reception and also relates to how the film trace entered individual and collective memory. Thus external history is related to film sound as *mnemic trace*. As pointed out in the *Tonbilder* case, the knowledge of the history of a film's exhibition is a crucial element in the preservation process. This information provides insights into understanding a film's reception by the public and how it was exhibited, and, thus, how it inscribed itself as a trace in cultural memory. Moreover, this information can also assist with locating other copies of the film in the frame of reconstruction.

Reflection on the musical accompaniments of early "silent" films offers another method to comprehending a film's external history. The history of film exhibition can be interpreted with the help of musicology. Cinema shares what Stephen Davies calls, in reference to music, "multi-instantiability," that is, the possibility to be performed in multiple moments.[251] In the domain of cinema, I define the different moments of exhibition as occurrences. I recall here the idea of textual occurrences (*occorrenze testuali*) applied to film by Simone Venturini, referring to "the object and the modality of material, semiotic and aesthetic perception of the final product, that is, the pragmatic

[250] Vinzenz Hediger, "Original, Work, Performance," 48.
[251] See Stephen Davies, *Musical Works and Performances* (Oxford: Oxford University Press, 2001), 13.

affirmation, the actualization of the text in collaboration with the public in the moment of the theatrical presentation."[252]

The external history, interpreted as a succession of occurrences, can be simplified as follows: a movie usually has a first distribution (occurrence A), the moment that inaugurates its public entrance into the social domain. After that initial moment, a film can be screened a number of times (occurrences X, Y, Z) in the following years. The life span of a film can cover more than a century, as demonstrated by the present-day screenings of early movies, for instance at dedicated festivals like *Le Giornate del Cinema Muto* festival in Pordenone, the *San Francisco Silent Film Festival*, or the Filmmusuem-EYE's *Biennale*. Notably, the projection of films produced as early as the end of 19th century is made possible by the characteristics of the material object and the *dispostif*. The history of the exhibition occurrences depends on the preservation of the material object and the *dispostif* set up.

The history of film exhibition and presentation (occurrences A→Z) is not just a chronology of events; it helps shape the identity of film sound as a cultural object and historic document. Through this history the film leaves traces in individual and cultural memory. The understanding of how film sound becomes a *mnemic trace* and how it enters individual and cultural memory provides useful information in the frame of preservation.

Understanding the transformation of film sound into a *mnemic trace* can be understood with support from some concepts elaborated by Cesare Brandi. Theorizing fine art restoration, Brandi explores the dimension of time in a work of art and its relation with the subject, and distinguishes three types of time. First there is the duration, the time in which a work of art is produced by the artist. Then there is the interval between the end of the creative process and the moment of reception. Finally, there is the instant "when the work of art strikes consciousness like a bolt of lightning."[253] If we translate this consideration on temporality from works of art to film sound, we can recognize these three temporalities in film sound as well: the duration of production (which involves human intervention as well as technological devices); the

[252] My translation from the original: "[L'] oggetto e le modalità di percezione materiale, semiotica ed estetica del prodotto finale, ovvero l'affermazione pragmatica, l'attualizzazione del testo in collaborazione con il pubblico nel momento della riproduzione in sala." Simone Venturini, "Tecnologie, tecniche, testi. Problematiche teoriche e metodologiche di restauro del film sonoro italiano dei primi anni Trenta," in *Svolte tecnologiche nel cinema italiano*, ed. Sandro Bernardi (Roma: Carocci, 2006), 52.
[253] Cesare Brandi, *Theory of Restoration*, 61.

interval between production and reception (which is the moment when film sound becomes a historical trace, but also when time leaves its traces on the film object), the moments of reception (what I have previously named occurrences A, X, Y, Z). I would add to these three a fourth temporality: the mnemic temporality, which comprises the time when film sound, after being experienced by the audience through its occurrences, enters the individual and cultural memory, becoming a *mnemic trace*.

These forms of temporality permeate the film carrier leaving traces; at the same time, the object itself becomes a trace entering the individual and cultural memory. Film sound, as well as film image, is not static but very dynamic: film changes continuously depending on temporalities, movements, and forces by which it is touched and penetrated. A similar consideration is made by art historian Georges Didi-Huberman in relation to the movements of the image in the domain of visual arts:

> An image, each image, is the result of movements tentatively deposited or crystallized in its interior. These movements pass through the image completely, each with its own trajectory – historical, anthropological, psychological – which leaves from afar and goes on beyond the image. These movements compel us to think of the image as an energetic and dynamic moment, yet specific in its structure.[254]

The conceptualization of *film sound as trace* allows for the description of its inherently dynamic nature, much better than a static model of film sound based on only the textual dimension would. The film carrier can thus be considered as a base for the inscription of *physical traces*, which change over time because of different factors. The different traces and marks on a film can be interpreted as signs of different histories. Flückiger observes that film as a material object is the product of several histories: the history of its production, the history of its processing, and the history of its projection. She argues that:

> Most often, these histories collapse into an individual film object, even when we consider anything else than the original camera negative. These histories have overlapping traces,

[254] My translation from the original: "Un'immagine, ogni immagine, è il risultato di movimenti provvisoriamente sedimentati o cristallizzati al suo interno. Questi movimenti la attraversano completamente, hanno ciascuno una traiettoria – storica, antropologica, psicologica – partendo da lontano e proseguendo di là di essa. E ci obbligano a pensarla come un *momento* energico o dinamico, per quanto specifico nella sua struttura." Georges Didi-Huberman, *L'immagine insepolta. Aby Warburg, la memoria dei fantasmi e la storia dell'arte* (Torino: Bollati Boringhieri, 2006), 40.

> they interfere with and mask each other. When we acquire such a filmic object at a certain time, a broad knowledge is necessary to identify the different strands of influences present in it.[255]

The knowledge of the internal and external histories of film sound, i.e. the histories of the *physical trace* and the *mnemic trace* constitute a fundamental activity in preservation work.

This section focused on how the analysis of film sound preservation practices, described in the case studies, brings forth the theoretical consideration of *film sound as physical* and *mnemic trace*, as well as the related internal and external film histories. Similarly, in the next section, I use film sound presentation practices to elaborate the theoretical concept of *film sound as performance*.

5.3 Film Sound as Performance

> […] I insist that the film text be read in the architectural context of its reception rather than as an autonomous aesthetic product.
> — Anne Friedberg[256]

Film sound presentation is the activity aimed at presenting the sound of archival films in theatres to contemporary audiences. Film sound presentation does not only involve live musical accompaniment for early films, but also the presentation of films that have a recorded soundtrack. Since sound is made by waves that are diffused in a specific space, it cannot be reduced to a physical object, the sound trace recorded on a carrier: the specific characteristics of the exhibition space, as well as the playback and amplification systems influence the way the sound waves reach our ears and thus should be included in this analysis. The *cinematic soundscape*, which I defined in chapter four as the sound perceived and experienced by the audience in a particular screening situation, is determined by how the sound trace resonates in a specific space thanks to a specific *dispositif* as well as by the sound coming from the public.

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[255] See Barbara Flückiger, "Material Properties of Historical Film in the Digital Age," *Necusu European Journal of Media Studies* 2 (2012), available at http://www.necsus-ejms.org/material-properties-of-historical-film-in-the-digital-age/, accessed June 2012.

[256] Anne Friedberg *Window Shopping: Cinema and the Postmodern* (Berkeley and Los Angeles: University of California Press, 1993), 6.

In light of these considerations, film sound presentation accentuates the variable elements of the cinematic spectacle. As Rick Altman observes,

> the sound system plays the record of the story of an event. At every point in the chain, new variables enter, new elements of uncertainty. Sound heads, amplifiers, leads, loudspeakers, and theater acoustics all force new auditory data on the audience, just as the recording process in itself had earlier introduced an implicit viewpoint.[257]

The *dispositif* and the acoustic space of reception determine the variables that change the *cinematic soundscape*. Because of these variables, the same film copy screened in two different theatres, by two different projectionists, through two different devices, yields two different film sound events. With this in mind, it is now necessary to understand how the cinematic situation influences film sound. In this regard, I refer to the analysis of the presentation activity of the Filmmuseum-EYE carried out in chapter four.

In the analysis of the Filmmuseum-EYE case I stressed the importance of the physical space and the institutional context, which is defined by the activities and decisions of the people working in the institution, as curators and programmers. In examination of the case study I underlined the influence of different aspects of the institutional context in film presentation: the limitations of the presentation space in the Vondelpark venue, the decision to hire a music programmer to curate the films' live musical accompaniment, the recovery of marginal cinematography and orphans works, the experimentation on the sound of "silent" films. All these institutional factors contribute to define film sound presentation. Moreover, the physical space is also taken into account as a contributing factor in presentation. In the new building, film sound is displayed differently according to the type of space: the four cinemas, the exhibition area, the Panorama, the Pods, the Arena, and the internet. The decision of where a particular film should be programmed also requires the consideration of the spatial characteristics of the different theatres.

These considerations bring me to add another dimension to film sound, in addition to the trace: the *performance*. The performative nature of film sound emerges in film presentation. Film presentation intended as a cinematic event, is characterized by the following elements: the film *physical trace* recorded on the carrier, the technological

[257] Rick Altman, "The Material Heterogeneity of Recorded Sound," 28.

device and human actor (i.e. the *dipositif*) that allow the film to be displayed, the audience, the space, and the institutional context.

The performance element is particularly relevant if we consider early cinema presentation.[258] In the *Tonbilder* case, I used the term *performance* to describe historical exhibitions, where the ability of the projectionist was fundamental to ensure the synchronization of image and sound. The performative aspect of film presentation relates in fact to the interaction between human and technological actors. Film presentation in early cinema can be considered a *performance*: each screening was a unique event, depending on an exhibitor's choices in the accompaniment, live music, programs, theatrical décor, and stage attractions. Film historian Leonardo Quaresima notices that early film's text does not coincide with the film object: it is made up of the film object and the spectacle in which the film is included.[259]

If in early cinema the *cinematic soundscape* was mainly composed of sounds produced in the physical space of the auditorium by musicians and the audience, after the introduction of synchronized sound, the *cinematic soundscape* came to coincide with the recorded soundtrack. As a result of sound-on-film standardization, the performative nature of film sound and film presentation became less visible and perceptible to the public, for the musicians and performers that used to accompany the screenings disappeared from the stage. Hediger observes that:

> With the introduction of sound the film screenings become the performance, and the producer produces not only the pre-text for the performance, but the substance of the performance itself, that is the film print with its soundtrack which henceforth occupies the key place in the theatrical performance, unencumbered by other elements.[260]

The importance of the performance dimension of exhibition is further discussed by Hediger, who refers to the concept of performance in music philosophy to clarify the relationship between text and performance in film. In music, the performance depends on a text, the musical score, as well as on the work of the musicians that interpret the text. Similarly, in film exhibition there is a text, the film work, which serves as a score

[258] See the section "Film sound before the conversion: live performance" in Leo Enticknap, *Moving Image Technology: From Zoetrope to Digital*, 102-104.
[259] See Leonardo Quaresima, "Effetto Diorama. Sulla nozione di testo nel cinema delle origini. Una nota," in *Il restauro cinematografico: Principi, teorie, metodi*, ed. Simone Venturini (Udine: Campanotto Editore, 2006).
[260] Vinzenz Hediger, "Original, Work, Performance: Film Theory as Archive Theory," 52.

in film exhibition: "the relationship between work and performance is essential and thus can help to conceptualize the film object regardless of whether the performance aspect is an obvious constituent of the film-as-work, as in the case of early cinema or film installations, or not, as in the case of mainstream feature films."[261]

Hediger's observations on the role of performance can be further elaborated considering film sound in particular. As I have noted in the analysis of the case studies, film sound reveals the performance aspects of film presentation: this is very clear for live music or sound performances, as in the case of early cinema exhibition. The performance aspects are also present when the film sound is recorded as a trace on a carrier: the *cinematic soundscape* of that film will be different for each screening and audience. The analysis of film sound presentation in the new EYE building demonstrated that the diverse spatial configurations of the four theatres have an influence on film reception, in that they activate different auditory modes. Using the concepts of *source of sound*, *object sound*, and *bodily felt sound* as auditory modes, I described how film sound was perceived in different ways in the four cinemas, but also in other spaces of the new building.

The analysis of film sound presentation highlighted the importance of the following elements for the definition of *cinematic soundscape*: the acoustic signal recorded on the carrier, the playback and amplification devices, the physical configuration of the space and its acoustics, the institutional context. These elements contribute to define how film sound is perceived and experienced by the public. Film sound presentation can thus be productively interpreted in terms of *performance* for two reasons. First, the concept of *performance* stresses the singularity and non-reproducibility of the cinematic event, which depends on the variables of the *dispositif*, the space, and the institutional context. Second, the concept of *performance* also highlights the importance of the interrelation between human and technological actors in film presentation.

[261] Ibid., 53.

5.4 Film Sound as Material Form

> Material: "If memory and perception were the *Material* of things? The thought gives us the idea of a completely new form of reality: it is composed of perception and memory together."
> — Friedrich Nietzsche[262]

> Form: "And every thing, as long as it lasts, carries with it the pain of its form, the pain of being like that and of not being able to be any different […] We are very superficial, you and I. We don't delve deeply into the joke, which is more profound and rooted, my dear friends. And it consists of this: the being acts necessarily through forms, the appearances he creates for himself, to which we give the value of reality. A value that changes, naturally, according to how the being appears to us, in that form, in that act."
> — Luigi Pirandello[263]

In the previous sections I defined the nature of film sound using the concepts of *trace* and *performance*. The material, technological, and human dimensions of film sound still requires further investigation, which will be carried out in this section with the help of the concept of *material form*. Other core dimensions of film sound, specifically the carrier, *dispositif*, and text, the importance of which was argued in the analysis of preservation and presentation practices, can be described from a coherent perspective by using the concept of *material form*.

My intent in employing the concept of *material form* is to bring together these two aspects (matter and form) in the definition of film sound. I take this concept from Cesare Brandi's theory of restoration regarding a work of art. The coexistence and interconnection of material and form in cultural and artistic objects is one of the fundamental assumptions in many aesthetic theories. What is notable about Brandi's theory is that he considers the issue of material and form in a work of art from a preservation and restoration perspective and not just from a theoretical, historical, or

[262] My translation from the original: "Wenn Gedächtnis und Empfindung das *Material* der Dinge wären? […] Der Gedanke gibt uns den Begriff einer ganz neuen Form der Realität: er ist aus Empfindung und Gedächtnis zusammengesetzt." Friedrich Nietzsche, *Gesammelte Werke 1872-1875* (München: Musarion Verlag, 1922), 39.

[263] My translation from the original: "E ogni cosa, finché dura, porta con sé la pena della sua forma, la pena d'esser così e di non poter più essere altrimenti. […] Siamo molto superficiali, io e voi. Non andiamo ben addentro allo scherzo, che è più profondo e radicale, cari miei. E consiste in questo; che l'essere agisce necessariamente per forme, che sono le apparenze ch'esso si crea, e a cui diamo valore di realtà. Un valore che cangia, naturalmente, secondo l'essere in quella forma e in quell'atto ci appare." Luigi Pirandello, *Uno, nessuno e centomila* (Milano: Oscar Mondadori, 1972), 88 [originally published in 1926].

aesthetic point of view. This perspective can add significant elements to the pure theoretical, historical, or aesthetic approaches. In particular, the preservation perspective highlights the interconnections between the material, human, technological and social dimensions of film sound, while other approaches consider them separately.

Brandi's work has already been referenced in the first theories on film restoration made by Italian film preservationists and historians during the 1990s.[264] These professionals and scholars applied Brandi's principles by considering film restoration as a work of art. Here, instead, my intent is to use Brandi's concept of material form to define film sound in theoretical terms. Therefore, I expand the application of Brandi's concepts to the issue of film sound, which was not discussed in the 1990s because film restoration at that time was centered on early "silent" films. I also read Brandi's writings in light of new developments within film preservation theory, which are less-focused on the restoration of a single film as a work of art and more engaged in issues of mass digitization, broad access, and open archive.

According to Brandi, the experience of a work of art depends on the dialectic between form and material: the form (*forma*) is the image, while the material (*materia*) is the epiphany (*epifania*) of the image. The form is manifested through the material, the physical medium. In other words, the form represents the way in which the work of art's materiality is perceived and interpreted by the human subject.

Brandi considers the form and the material as both equally important in the perception and transmission of a work of art.[265] Moreover, in a work of art, there is no definite separation between material and form, but a close interconnection: the material—the physical means through which the image manifests itself—is coextensive to the form:

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[264] See among others Canosa, Michele, "La tradizione del film. Testo, filologia, restauro"; Gianluca Farinelli and Nicola Mazzanti, *Il cinema ritrovato. Teoria e metodologia del restauro cinematografico*; Michele Canosa, "Per una teoria del restauro cinematografico," in *Storia del cinema mondiale*, vol. 5, ed. Gian Piero Brunetta (Torino, Italy: Einaudi, 2001).

[265] Brandi recognizes two kinds of errors in giving priority to the form or to the material: "The error is concealed in the view – dear to the positivism of Semper and Taine – that material generates or determines style. This sophistry stems from paying insufficient attention to the distinction between structure and appearance, and from assimilating the material, as the vehicle of the image, into the image itself. In effect, the appearance taken on by material in a work of art is being considered as a function of the structure. At the opposite extreme, the role of the material in the image may be neglected (as occurs in formal aesthetic theory). This arises when material's importance as structure is not recognized. Thus the same result is reached: the assimilation of the material's appearance into form, dissolving the material's structural aspect." Cesare Brandi, *Theory of Restoration*, 52.

> But the physical medium to which the transmission of the image is entrusted does not merely accompany it; on the contrary, the medium and the image coexist. It is not a question of material on the one hand and image on the other. Nonetheless, despite the material's coexistence with image, it is not completely subsumed within the image. Some of the physical structure will be acting as supports for the parts that are actually transmitting the message, though the reasons these are needed and the image's maintenance are closely linked. Examples would be the foundations of a building, the panel or canvas of a painting, and so on.[266]

If we apply Brandi's theory to cinema, the form is the image and the material is the film carrier. However, if the form is the image, where does the sound fit in? Even though Brandi focuses only on visual arts, he does not forget the dimension of sound; in the following passage, he recounts the importance of materiality, intended as "the *physicality* that is needed for the image to arrive at one's consciousness,"[267] also in the sound dimension, referring in particular to sound in poetry and music:

> This *physicality* may be minimal, yet it is always there, even when it virtually disappears. For example, the objection could be made that a poem, if read silently, only with the eyes, needs no physical vehicle, in that writing is merely a conventional tool for indicating certain sounds. In theory, one could even create a poem with a series of symbols, knowing only what they mean but not how they are pronounced. This is a mere quibble. Not knowing the sound that corresponds to the symbol does not imply that the *sound* is unnecessary to the substance of the poetic image. The image would be as diminished in its figurativeness as the famous compositions of ancient paintings for which there is no image, only a description. The need for sound exists, and even if the sound is not supplied, it lives in the totality if the language's image, which every speaker possesses fully, and gradually activates internally.[268]

Brandi concludes that there is a physical materiality in music, and that this materiality influences the form that music takes during a performance.

> And so, time still goes by, even for such works of art as poetry, that seem more immune to it. Here, too, time has the same effect as it does on a painting's colours, or on the hues

[266] Ibid., 49.
[267] Ibid., 62.
[268] Ibid.

> of marble. Music is equally affected, for ancient instruments have been so greatly modified – for tone as well as pitch – that nothing is more approximate than the way Bach sounds on a present-day church organ, or even Corelli and Paganini on a violin of their period, fitted with metal strings.[269]

This last consideration establishes a possible link between music and film sound preservation. The material form of music changes over time according to the type of instruments used, the musicians' performance, and their techniques. In other words, the same music score assumes a different material form depending on these factors, but also on the configuration of the space. Similarly, the same film sound trace played by different projectionists, in different spaces, and through different devices, results in different film sound *forms*.

Film sound as material form is defined by the interrelation of the following three factors: the *sound carrier* as a material object in its different forms (optical, magnetic, digital, vinyl, and others); the *sound dispositif*, which refers to the recording, postproduction, and playback technologies and to the techniques adopted by the operator; and the *sound text* as conceptual object, which consists of the music score, dialogue, and effects.

The three dimensions of film sound as material form are interconnected and dependent on one another. This relationship means that a specific sound carrier (e.g. optical soundtrack) requires a specific device to be read (e.g. a sound head in the projector and an amplification system) and a specific technique (e.g. the Academy filter) to be adopted by the human actor (the projectionist). All of these elements influence the material form of film sound, how film sound is presented to the listener's ears and how it is experienced by the audience in a particular cinematic event.

The analysis of the *Tonbilder* case study in chapter three is helpful for conceptualizing film sound as a material form. The description of *Tonbilder* films, which I made from the perspective of preservation, was based on three dimensions. First, I considered the dimension of the carrier: the peculiarity of these movies is the distinction between the image carrier, the 35 mm film stock, and the sound carrier, the shellac discs. I then described the *dispositif*, which refers to the relationship between human actors and technological devices in production and reception. The conception of *dispositif* not just as an apparatus but as the interrelation between a human actor and

[269] Ibid., 63.

technological devices derives from the analysis of this case, in particular from the consideration of the importance of the projectionist's performance for synchronization during screenings. In this frame, I interpreted Messter's repeated technological improvements as continuous re-adjustment of the interrelation between human and technological actors. During production, the camera and gramophone devices were used by the technical and creative crew in different ways in order to create the synchronization of sound and image. During exhibition, the technological devices included a 35 mm projector that was linked to a gramophone and the related amplification system. The human actor, the projectionist, and the techniques that he or she adopted during projection played an important role in the resulting synchronization of the films. The third factor is the film's textual dimension, namely, short comic scenes and musical numbers. In the description of this case, I underlined how much these three dimensions are interconnected not only in terms of production and reception, but also for preservation purposes.

All these dimensions put together define the material form of film sound. The carrier relates to the material dimension of film sound, which is how the sound trace and signal is recorded. The *dispositif* refers to the human and technological dimensions, which is how the sound trace is played back by the reading and amplification devices and through the work of the projectionist. The textual dimensions concern the content and meaning assigned to film sound through reception.

If one of the aims of film preservation is to preserve film sound as integrally as possible, all these dimensions should be taken into account. These dimensions are therefore crucially important for the work of film preservation and presentation. The carrier guarantees the survival of the recording trace in the future, and therefore has to be preserved. The *dispositif* is necessary to display the film to the public; moreover, the knowledge of the historical *dispositif* gives information on how to preserve and present archival films properly. The integrity of the text favors the reception and understanding of the film by the contemporary public.

These considerations regarding the preservation of the *Tonbilder* films prompt me to identify the elements of *film sound as material form*, but at the same time reveal that these elements do not only pertain to film sound but also describe film as a whole. Film sound can be separated from the image for analytical purposes, but on a theoretical level it should be considered together with the image, as a whole body. The consideration of film sound as an independent entity risks a promotion of the hegemony of the sound

instead of the hegemony of the image. The cinematic experience contradicts a rigid separation of the two: the reception of film always includes visual and sound perceptions together. In consideration of this, film theory and film preservation should consider image and sound together. A valuable definition of film sound, therefore, takes into account the image as well. For this reason, then, I now move from the definition of *film sound as material form* to a more general definition of *film as material form,* which includes the image and accommodates the specific nature of film sound.

Film as material form can also be separated into our three dimensions: the film carrier, the film *dispositif*, and the film text. In the definition of the dimensions of material form, I was inspired by Barbara Flückiger's suggestion that "we should make a distinction between the film as a text (i.e. as a conceptual object), the film as a token (i.e. as a material object), and the film as a performative instance in projection."[270]

The first dimension regards the film carriers, the material objects that convey the cinematic information. In the analogue domain, the materiality of the carrier concerns the physical, chemical, and mechanical characteristics of the physical base: the filmstrip. The structural elements of the film carrier include the film format (8 mm, super 8 mm, 9.5 mm; 16 mm; 17.5 mm; 35 mm; 70 mm), perforation type (KS, BH, etc.), edge codes, aspect ratio (1.37:1; 1.66:1; 1.85:1, 2.20:1, 2.40:1), film base (nitrate, acetate, polyester), film emulsion (black-and-white, color, negative, positive, reversal, dupe), sound carriers (optical, magnetic, digital), and sound type (variable density, variable area, optical mono, optical stereo, Dolby A, Dolby SR, Dolby Digital SR.D, DTS, SDDS).[271] In the digital domain, the structure refers to the carrier that stores digital cinematic information and also to the format and encoding characteristics of the digital files that contain the audiovisual information.

From a preservation perspective, it is advantageous to enrich the dimension of film carriers with the notion of "film body," as defined by Barbara Flückiger.[272] With the term "film body" I refer to the film in its entirety, as the entity composed of the different carriers that store different parts of information related to an individual film title. In the case of the *Tonbilder* films, for instance, the cinematic information is stored on two material objects: a 35 mm film for the image and a shellac disc for the sound.

[270] Barbara Flückiger, "Material Properties of Historical Film in the Digital Age."
[271] For a definition of the technical terminology, see Paul Read and Mark-Paul Meyer, *Restoration of Motion Picture Film*.
[272] The notion of a film's body is discussed by Barbara Flückiger, "Material Properties of Historical Film in the Digital Age."

Different carriers exist and are played as single entities, but the film in its entirety, as a whole body, is complete only when all the carriers containing different parts of the cinematic information related to a title are gathered together. This observation also refers to the recording of a film on multiple film rolls: if a roll is lost, the other rolls can still be screened, but the film as a body is incomplete.

The second dimension relates to the *film dispositif*, which refers not only to the technological devices (technological actors) used to produce and display the film but also the technicians (human actors) and the techniques adopted in employing the machines and devices. In this sense, film is considered as the product of a specific industrial and technological system: some particular technologies enable the media object to be produced and distributed for release as well as to be transferred to a different media format for future access. The film *dispositif* depends on the interrelation of technological devices and human actors: the technological devices exist also when not in use, but it is only when the machines are triggered by a human actor in a certain spatial and temporal context that the *dispositif* dimension is set in motion. The techniques used by the human actors influence the resulting projection.[273] Through the *dispositif*, the film gains its appearance and is experienced by the audience. Without the *dispositif*, the film remains a potential form imprisoned in its body.

The third dimension, the *film text*, refers to a film's content and meaning as it is perceived, experienced, and interpreted by human subjects. This dimension concerns what Brandi calls *form*, which is the image as perceived by a person viewing a work of art, and is related to the spectator's perception, conceptualization, and interpretation.

After describing the distinctions between these three dimensions, the carrier, the *dispositif*, and the text, I would now like to once again highlight their interconnections. These three dimensions of *film as material form* are in fact interrelated ("coextensive" in Brandi's terms): the material identity of film is defined by the interrelationship of these three factors. Therefore, the material form is not a stable object, since it changes

[273] A definition of the distinction between film technologies and techniques is given by Simone Venturini: technology is "the entirety of apparatuses and elements of the applied technological research at disposal during film production," while techniques are "the modes and processes of technical and cultural production of the film, where production should be intended in the etymological sense: to extract, reveal, give meaning to, that is, to produce a complete and coherent audiovisual text." My translation from the original: "a) le *tecnologie*, nel nostro caso e limitatamente al sonoro, il complesso di attrezzature ed elementi della ricerca tecnologica applicata a disposizione del gruppo produttore durante il periodo di genesi del film; b) le *tecniche*, i modi e i processi di produzione tecnica e culturale del film, dove produzione è da intendersi in senso etimologico: estrarre, rivelare, dare senso, ovvero produrre un testo audiovisivo compiuto e coerente." Simone Venturini, "Tecnologie, tecniche, testi. Problematiche teoriche e metodologiche di restauro del film sonoro italiano dei primi anni Trenta," 52.

continuously as different subjects experience the film in all its dimensions (carrier, *dispositif* and text) in different places and times and through different media.

The material form and the trace represent two aspects of the nature of film sound in particular, and of film in general. Film (sound) as material form *is related to the form that the material object takes when displayed in a specific dispositif and in a specific space; it represents how film (sound) is experienced by the audience in a particular cinematic occurrence*. Film (sound) as trace *concerns the passage of film (sound) throughout the dimensions of time, history, and memory, and refers to the internal history of the* physical trace *and the external history of the* mnemic trace, *how film enters individual and cultural memory*. The film material object that is closed in the archive or forgotten in a cellar can be considered a *trace* that is subject to time. Film reveals its *material form* when it is experienced and perceived by an audience in a specific cinematic event, which can be defined as performance. Whereas film (sound) as material form regards the cinematic experience, film (sound) as trace is linked to film's cultural memory.

There is a symbiotic relation between *material form* and *trace*: the material form influences the historical trajectory of the trace and vice versa. The *Tonbilder* case demonstrates this relationship: the material form of the *Tonbilder* films, which is characterized by the separation of the image and sound carriers, influenced the tradition of *Tonbilder* traces, which refer to the internal history of the films (how time affected the physical trace recorded on carriers) as well as the external history (considering that the presentation of *Tonbilder* films stopped when the material form could not be displayed in theatres because of a change in projection devices). Similarly, the internal and external histories of *Tonbilder* films as traces impacted the material form: for instance, the damage to the film and discs that occurred through time or use modifies to a certain extent how the film was perceived by the public during a specific cinematic event. For instance, the splices made by the projectionists during the exhibition of *Tonbilder* films caused the loss of frames: this compromised the synchronization of the image and sound for future screenings, and thus also the audience's reception.

Evidence of this relation between material form and trace can be found also in the EYE case study. Experimentation in film preservation and presentation influenced the tradition and history of film traces. For instance, the experimentation with the sound of the silent films *Zeemansvrouwen* and *Beyond the Rocks* changed those films at the level of the material form, how the films were experienced by the audience in the screening

of the restored versions. But those screenings became part of the external history of the films, so the experimentation also changed the film as trace, how the films entered individual and cultural memory and how they will be transmitted to the future.

In the next section I will interpret film preservation and presentation in the frame of this symbiotic relation between film as material form and film as trace, between the space of the experience and the time of memory.

5.5 Preservation and Presentation of Film Sound: Between Experience and Memory

> Experience is indeed a matter of tradition, in collective existence as well as private life. It is the product less of facts firmly anchored in memory [*Erinnerung*] than of accumulated and frequently unconscious data that flow together in memory [*Gedächtins*].
> — Walter Benjamin[274]

In the previous sections, I outlined a definition of film sound as *trace*, *performance*, and *material form* originating from the observations on film sound preservation and presentation practices described in the case studies, which highlighted the material, technological, human, institutional, social, and cultural dimension of film sound. The concepts of *material form*, *trace*, and *performance*, elaborated from the practices, can be constructively applied to film preservation and presentation theorization. Thus, in this last section I widen the discourse from film sound to film in general, intended as a body composed of images and sounds, and from film sound to film preservation and presentation in general, conceived as the work of film heritage institutions. This work can be interpreted using the concepts of trace, material form, and performance, as I suggested in the beginning of this chapter. The work of film heritage institutions acts in a double axis, where film sound as *material form* and *performance* refers to the space and experience axis, while film sound as *trace* relates to the time and memory axis.

Film preservation theories deal primarily with the question: how can film heritage be preserved, restored, and presented? The varied answers to this question highlight

[274] Walter Benjamin, *On Some Motifs in Baudelaire* (Cambridge and London: Harvard University Press, 2006), 172 [Originally pubished in 1939].

different approaches to film preservation.[275] I use the concepts from the theoretical model that I previously described to individuate different approaches with regard to film restoration.

The first approach concerns the restoration of "film as original text," which is the film as originally produced and distributed and what can be defined as *Urfilmtext*.[276] The idea of trying to recover the original text often entails the attempted elimination of the traces of time, negating the history of the material object. With regard to this approach, Paolo Cherchi Usai references the "model image," which lacks a history:

> The main aim of each project of preservation of the moving image is therefore, *strictu sensu*, an impossible attempt to stabilise a thing that is inherently subject to endless mutation and irreversible destruction. Trying to impose a reversal of this process (a goal incoherent in itself, as no reconstruction of the moving image can be accomplished without trying to imagine what the Model Image looked like, thus separating it still further from a previous character which itself is unknown to the preservationist) is tantamount to a denial that the moving image has a history.[277]

Another approach is aimed at the restoration of "film as occurrence," which implies preserving a particular version of the film; for example, the version screened during the first public projection or the one licensed by the director. A third approach regards the restoration of "film as material object, as physical copy, as carrier," which involves restoring the physical copy without adding materials from other copies. All of these approaches are focused only on one aspect and risk neglecting the other elements that define film as material form and trace, and cinema as event and occurrence. It is therefore productive to elaborate on the definition of film preservation to include the different elements of the model that I have described.

Film preservation work primarily addresses film as material object and its material characteristics. Film preservation work regards the dimension of time: it acts in the present, on material objects of the past, with the goal of transmitting the film trace and form to the future. This work deals with the continuous passage and transition of

[275] A first classification of approaches to film preservation is made by Fossati, who individuates four frameworks: "film as original," "film as art," "film as *dispositif*," and "film as state of the art." Giovanna Fossati, *From Grain to Pixel*, 158.
[276] Urtext is used to indicate the original text in human sciences. It is formed by adding the prefix Ur, used in German language to indicate the origin or the primordial state of something, to the word "text."
[277] Paolo Cherchi Usai, *The Death of Cinema. History, Cultural Memory and the Digital Dark Age* (London: British Film Institute, 2001), 67.

film forms through different dimensions of time, and aims at preserving the traces of time, possibly avoiding the eradication of time from audiovisual traces and vice versa.

Observations made regarding film sound can help clarify how to add the notion of trace to film preservation theory. As discussed in the second section of this chapter, film sound preservation and restoration can be considered as a practice that acts in the field of noise: noise, intended as unwanted sound, is the gray area where time and other factors change the materiality of film sound. I distinguished between the noises inherent to the carrier and the device, which were already present when the film was first exhibited, and the noises caused by the *dispositif* and by the passage of time.

These considerations can be applied to film preservation and restoration in general, including also the image component. The film object, like an archaeological artifact, displays marks left by different temporal occurrences. If noise can be a trace of time in the sound dimension, other types of time marks pertain to the visual dimension (e.g. dust, scratches, color fading). *Preservation practices can be interpreted as a process of identification and discernment between the marks and signs inherent to the technological device, the ones inherent to the carrier, the ones caused during film exhibition, and ones generated by the passage of time*. The marks caused during film exhibition by the *dispositif* are signs left by the devices that played the film (e.g. the scratches and tears provoked by the projection device) and by the human actor who handled it (e.g. cuts and splices in the copy, punch holes to sign the reel change, written annotations). The marks caused by the passage of time include the modifications due to physical and chemical processes of decomposition of the carrier. Dust, humidity, heat, fungi, bacteria, and other agents can affect the physical carrier as well as the image and sound traces recorded on it. The discernment between these different marks can be useful for arriving at and justifying the decisions regarding which marks should to be preserved and which should be erased.

Along this line of reasoning, film can be interpreted as having a field of variability (the elements of the film form that change over time) and a field of invariability (the elements that persist). The presence of variable and invariable elements is underlined by film historian Alberto Farassino:

> In the film text as a whole, there are components created to last and ensure transmissibility (namely, film carriers, in different stages: negative, positive, lavender, etc.) and then there are other components that are renewable but always different, and are

> made to maybe wear down during a single projection. [...] Cinema is the medium of continuous retextualization: each screening of a film establishes, even because of small variations, a new text for the next projection.[278]

This consideration suggests that film as material object is reproducible, but cinema as spectacle is not. The field of invariables is linked to the notion of film as a material carrier capable of preserving recorded information, while the field of variables pertains to the dimensions of cinema as an event and involves the *dispositif*, the space, and the institutional context.

Nevertheless, this demarcation is nuanced, since there are some variables that affect the material object, such as the marks caused by the passage of time and the decay of the physical copy. There are also invariables in the film exhibition context that involve the technological standards established over time (e.g. the film projection speed of 24 frames per second as well as film sound standards, such as the Academy Curve or the Dolby noise reduction filters). This last consideration in particular influences film preservation: even if the material objects, the carriers of cinematic information, are preserved in the best way possible from aging and decomposition so that the invariable characteristics of the film are safeguarded, the material form of the film will necessarily change when it is presented. This is because the *dispositifs* through which the carriers are displayed change over time, as well as the space and the institutional context of presentation. Along these lines, Fossati observes that the continuous evolution of the *dispositif* makes presentation of archival films a re-interpretation:

> Film archival practice is traditionally intended as the practice that preserves, restores, and presents film heritage so that it is true to the original, both as a historical and aesthetical artifact. However, no matter how true to the original a film archivist tries to be, the restoration and presentation of film heritage always implies a re-contextualization. Indeed, a film made and projected in another era has not only been presented through a different technological apparatus, but has also been experienced by an audience with a very different relation to the medium. In other words, the whole film dispositif changes

[278] My translation from the original: "Nel testo filmico globalmente inteso esistono delle componenti pensate per durare e assicurare la trasmissibilità (sono appunto i supporti, nei loro vari stadi: negativo, positivo, lavander, ecc.) ed esistono poi altre componenti rinnovabili ma sempre diverse, fatte per esaurirsi nel corso di una proiezione. […] Il cinema è il medium della continua ritestualizzazione, ogni proiezione di un film stabilisce, anche solo per piccolissime varianti, un nuovo testo per la proiezione successiva." Alberto Farassino, "Un cinema corrotto," in *Il restauro cinematografico: Principi, teorie, metodi*, 69.

with time and any (re)presentation of archival films is by necessity a re-interpretation.[279]

In order to be presented and experienced in the present and future, *film as material form* is subject to a continuous process of migration (the adaptation of the material object to the presentational *dispositifs*) and re-contextualization (the presentation of film in a particular space and context of exhibition).

Following these considerations, *film preservation and presentation can be described as the work aimed at the preservation of the audiovisual trace through managing the variables and invariables involved in the processes of migration and re-contextualization*. In other words, preservation and presentation decisions are aimed at mediating the temporal dimensions by dealing with the fact that part of the material form survives over time, and part of it only emerges in the *performance*.

As I have noted in the analysis of the *Tonbilder* preservation project, when *film as material form* is subjected to migration, some elements of the material form change, others disappear, and the rest remain. The choices made in preservation work are often determined by what elements should be preserved and what elements will consequently change in the process. In the *Tonbilder* case, for instance, it was decided that the loose synchrony between image and sound was a characteristic of the material form that should be maintained in the reconstruction: attempting to obtain a perfect sync would have hidden a trace of the separation of the image and sound carriers as well as a trace of the exhibition practice in which synchronization was obtained through the projectionist's performance. This decision demonstrates an approach to film preservation that is not only focused on the material carrier, but also takes into account other dimensions, such as the *dispositif*, the space, and the *performance*.

These dimensions can and should be considered not only in film preservation activity, but also in film presentation, as I have explained in chapter four through analysis of the presentation activity of the EYE Film Institute Netherlands. I observed that the form of sound in auditory perception and experience depends on the playback and amplification system (*dispositif*) as well as on the configuration of the space (diffusion and reverberation of sound waves) and the institutional context (the activities and decisions of the people working in the institution).

[279] Giovanna Fossati, "Filmmaking, Film archiving and New Participatory Platforms," 178.

These observations led me to the formulation of a possible answer to the initial question of this section, regarding what and how can film be preserved, restored, and presented through the work of film heritage institutions. Film preservation work can be aimed at preserving, restoring, and presenting *film as audiovisual trace* and *film as material form* in all of its dimensions (the film carrier, the film *dispositif,* and the film text). The work of film heritage institutions can preserve film as material form and audiovisual trace, but also the experience of the former and the memory of the latter. The intent of this work can be described as the attempt to set up the space (context) and preserve the time (different temporalities) of film.

Film heritage institutions act on this double axis. The x-axis, which represents the dimension of space and experience, is related to the concept of film as material form and performance. The y-axis, corresponding to the dimension of time and memory, refers to the concept of film as audiovisual trace. In particular, the preservation activity regards the y-axis, being aimed at the storage and tradition of the audiovisual trace for future access. The presentation activity involves the x-axis, cinema as event, meaning the transmission of the material form to the public.

This double axis model can also be interpreted using as metaphor Elsaesser's conception of the Mystic Writing Pad model, which was described in chapter two as based on two levels: the storage and the transmission of information. The x-axis, defined by film material form and experience, can be interpreted as similar to the transmission level. The y-axis, characterized by film trace and memory, recalls the storage function of the Mystic Writing Pad model. *The double axis model is constructed by the relation between the tradition of the audiovisual trace and the transmission of the material form.*

The double axis model illustrates the relationship between preservation and presentation: preservation and presentation are two interconnected and symbiotic activities. This interconnection has been highlighted on many occasions throughout this research. In theoretical terms, preservation is a precondition for presentation, while presentation is the main justification for preservation. In more practical terms, the decisions undertaken when preserving a film not only influence the outcomes of presentation, but they are also influenced in turn by the presentation setting. Along these lines, Cherchi Usai argues for an integrated approach in preservation and presentation:

> the way you present a moving image is dependent on the way you preserve it, and it is dependent, in turn, on the way you decide to acquire a given work. I think one of the imperatives of our profession now is to demonstrate, in a persuasive manner, the importance of an integrated approach to archiving and curating, which incorporates the acquisition process, the preservation process and the presentation process.[280]

Throughout my research, I have discussed not only the interconnections between preservation and presentation, but also the interrelation between the different concepts and dimensions that I used to define film sound. In chapter three I investigated the relation between the dimensions of the carrier, *dispositif*, and text, in film sound preservation practices. In chapter four I described the relation between *dispositif*, space, and institutional context in film sound presentation practices. These relations are summarized in this chapter through the elaboration of three concepts to define film sound: *trace*, *material from*, and *performance*. These concepts are considered in an integrated biaxial model that can be used for the analysis of film sound, as well as for the interpretation of film preservation and presentation.

Taking the different elements of the model into account does not mean that all of them have the same importance: in preservation practices, the decisions undertaken often tend to privilege one aspect of the model (e.g. the material object, the *dispositif*, the presentation setting, or the original text). An example of the implications of recognizing different elements in the model can be found in the treatment of noise in film sound restoration practices. The consideration of the different dimensions of film sound permits the identification of noises inherent to the carrier and the device, and the noises derived from the *dispositif* and caused by the passage of time. This discernment can help in deciding which noises are to be preserved, attenuated, or erased. By including all these different dimensions, the model can serve as a tool in the decision making process, and also in the interpretation of this decision after the fact.

The decision making process is also influenced by the *institutional context* of film preservation and presentation. As I have observed in the introduction, preservation and presentation are not just practical activities, but social activities of interpretation that involve public actors (film heritage institutions, laboratories, manufacturers of film and film equipment), human actors (film archivists, restorers and preservationists, curators,

[280] Paolo Cherchi Usai, David Francis, Alexander Horwath, and Michael Loebenstein, eds., *Film Curatorship. Archives, Museums, and the Digital Marketplace* (Vienna: Synema Publikationen, 2008), 13.

lab technicians), and technological actors (the technological devices and equipment). The practices and choices depend on the institutional context, and on the interaction of the individual, social and technological actors involved in film preservation.

Additionally, film heritage institutions are involved in a larger network that includes social actors that are involved in film production (e.g. filmmakers, film production companies), distribution (e.g. film distribution companies, rights holders), preservation (e.g. film heritage institutions, film and digital laboratories), and reception (e.g. audiences and users). Film preservation and presentation deal with all these different contexts. For instance, when discussing noise, I underlined that film archivists and preservationists should also take into account the social phenomena surrounding them, such as the *soundstalgia* phenomena or the use of noise in sound art practices, in order to integrate their actions in the social sphere. In other words, the practice of preservation is a social activity of interpretation that depends both on the actors involved and the context in which it is performed.

Being part of the work of film heritage institutions, film sound preservation and presentation is affected by all the different elements and dimensions that emerged in the theoretical model of this final chapter. The consideration of the key concepts of this model (*material form*, *audiovisual trace*, *performance*), both in film theory and preservation practices, can help in the acknowledgment and valorization of the different dimensions of film sound, that I traced in the introduction: the material, technological, human, institutional, experiential and memorial dimensions.

Conclusion

The initial assumption of the present research was the consideration of sound as a component of film that has been *lost in transience*. Film sound has been underestimated and underrepresented in film studies as well as in film preservation studies. Film has in fact been considered, especially in the past, as an image-oriented medium. The sound component of film has become a subject of interest only in a more recent phase of film studies. Moreover, film studies mainly considered film sound as a text composed by music, dialogue, and sound effects, where the musical score had precedence. In this dissertation, the underrepresentation of film sound is interpreted as related to two phenomena: the *hegemony of the visual*, which alludes to the predominance of vision and image in contemporary Western cultures and societies, and the *transience of sound*. This concept relates to the transitory nature of sound: sound is a fleeting and elusive event that is difficult to catch, define, and analyze through words.

Despite its underrepresentation, film sound, in combination with the image, is a fundamental component of film as a cultural form. In this research, the importance of film sound as part of our cinematic experience has been investigated through the concept of *cinematic soundscapes*, while the relevance of film sound to our cinematic memories has been elaborated with the idea of *film sound souvenirs*. Since film sound is fundamental in our cinematic experiences and memories, it is relevant to first investigate and then preserve its nature properly: with this aim I conducted the research of this dissertation.

In order to study the nature of film sound, I researched film preservation and presentation practices: from the analysis of case studies concerning these practices I derived the definition of film sound as *material form*, *trace*, and *performance*. The *material form* of film sound is characterized by the film carrier, *dispositif* and text. Film sound as *trace* is defined by the internal history of the material object (*physical trace*) and the external history of film exhibition and presentation (*mnemic trace*). Film sound as *performance* relates to the variable elements of film presentation (*dispositif*, space and institutional context). The *material form* and the *performance* determine how film sound is perceived and experienced by the audience in a particular presentation

occurrence (i.e. the *cinematic soundscape*), while the *trace* relates to how film sound enters the individual and cultural memory (i.e. *film sound souvenirs*).

The definition of *film sound as material form, trace,* and *performance* has a wider relevance for the field of film studies. This elaboration encourages the consideration of film sound in its multiple dimensions, not only as a text composed of a musical score and dialogue, giving relevance to the different dimensions of film sound: the material dimension (carrier, *physical trace*), the human and technological dimensions (*dispositif*), the textual dimension (text), the institutional dimension (physical space, institutional context), the performative dimension (*performance*), the experiential dimension (*cinematic soundscape*) and memorial dimensions (*film sound souvenirs*, *mnemic trace*).

Additionally, the consideration of *film sound as material form, trace,* and *performance* can lead to a redefinition of the historiographic reading of film sound. The fact that the coming of sound is generally dated only to the late 1920s entails that sound film is intended as the film having a synchronized soundtrack recorded on the film carrier; in this perspective, film sound is reduced to the soundtrack. If, as I have argued in this dissertation, film sound is instead considered as a complex of different dimensions, the beginning of sound film should be dated back to the beginning of cinema as spectacle. The sound of early cinema, according to the model proposed in this research, should thus be considered as part of the history of film sound. This possible rethinking of the historiography of film sound is also supported by the consideration of early sound systems, as they were described in the case studies.

In addition, the definition of *film sound as material form, trace*, and *performance* also has a wider relevance for the field of film preservation and presentation. I formulated a theoretical model that, starting from the definition of film sound, could be used for understanding and interpreting the preservation and presentation of film, understood as both sound and image. The theoretical model is based on the concepts of *material form, trace,* and *performance*, which can help in individuating the interplay between variables and invariables of film in preservation practices and theories.

The way in which film sound is affected by the passage of time, its variables and invariables, can be interpreted examining the domain of noise. Film sound preservation can in fact be considered as the activity that operates in the field of noise: first, through a distinction between the noises inherent to the recording carrier, those inherent to the technological device, those caused by the *dispositif*, and those acquired through the

passage of time or other factors, then, by deciding which noises should be preserved and which should be erased in the film trace preserved for future use, and finally, by presenting film sound in new spaces and institutional contexts. The *cinematic soundscape* can in fact be shaped and characterized by working on the *dispositif*, the space, and the institutional context.

Along the same lines, the work of film preservation and presentation can be interpreted as the practices acting in the field of variables and invariables of film. The variables and invariables are determined by the movements of transition and transience occurring throughout time, which change *film as material form*, *trace*, and *performance*. With the passage of time, some elements of film as material form and trace get changed, others are kept, and the rest disappear. What changes or remains the same are tied to transition, while the features that disappear pertain to transience. Preservation and presentation practices intervene in the interplay between the variables and invariables, and address the marks and noises of the past in film.

The theoretical elaboration and findings of this dissertation offer possible ideas and inspirations for further research in the domain of film theory and film preservation. The definition of film sound and the theoretical model proposed can contribute to the discussion of other crucial issues, for instance, problems that have emerged with the digital transition. The digital debate in fact made its way into film theory and film preservation theory only once digitization started to involve the image dimension of film, in the late 1990s and 2000s,[281] even if the digitization of sound in the cinematic field appeared many years before, in the mid 1980s.[282] Significantly, the main

[281] The digital transition in film theories was discussed starting from the late 1990s. See among others Thomas Elsaesser and Kay Hoffman, *Cinema Futures: Cain, Abel or Cable. The Screen Arts in the Digital Age* (Amsterdam: Amsterdam University Press, 1998); Henry Jenkins, "Digital Cinema, Media Convergence, and Participatory Culture," in *Rethinking Media Change: The Aesthetics of Transition*, eds. David Thorburn and Henry Jenkins (Cambridge, Mass: MIT Press, 2003), 282-312; David N. Rodowick, *The Virtual Life of Film* (Cambridge, MA, and London: Harvard University Press, 2007); Frank Kessler, "What You Get Is What You See: Digital Images and the Claim on the Real," in *Digital Material: Tracing New Media In Everyday Life and Technology*, eds. Marinane Van Den Boomen et al. (Amsterdam: Amsterdam University Press, 2009); David Bordwell, *Pandora's Digital Box: Films, Files, and the Future of Movies*. In film preservation theory the digital turn was explored in the 2000s. See among others Paolo Cherchi Usai, *The Death of Cinema*; Howard Besser, "Digital Preservation of Moving Image Material?," *The Moving Image 2* (2001); Paul Read, "Digital Image Restoration – Black Art or White Magic?," in *Preserve Then Show*; Paolo Cherchi Usai, et al. eds., *Film Curatorship*; Giovanna Fossati, *From Grain to Pixel*.

[282] The digitization of sound first involved sound recording during film production, with the introduction of the Digital Audio Tape (1987) as sound recording carrier, and digital recording devices such as the Nagra-D (1994). It then involved sound in postproduction, with the launch of digital workstations and software such as Sound Designer (1984) and Pro Tools (1991). Finally, digital spread into sound distribution, in the form of recording formats such as Dolby Stereo Digital (1991), and carriers, for

arguments in the analogue-digital debate were related to the visual aspect of film: the quality of the analogue image based on film emulsion and grain was compared to the quality of the digital image based on pixel and resolution. The questions of how the essential qualities of film sound changed in the passage from analogue to digital recording and display formats have still not been investigated in film theory. The fact that the digital debate was primarily driven by and concerned the image can be interpreted in the light of the hegemony of the visual and the idea of the transience of sound. The recognition of this lack opens the field to potential research in the future: it could be interesting to reinterpret the issue of digitization considering the nature of film sound together with the nature of the image. Some questions and topics on this subject could be: what would change in the theoretical conception of digital cinema if the nature of sound is considered together with the image? How can digital cinema be read in the frame of the definition of film sound as material form and trace? Does the transition to digital offer an occasion to overcome the hegemony of the visual?

Besides the questions on whether the consideration of film sound can help to rethink the digital turn, other questions can be posed. An example could be the use of multimedia texts for film sound analysis. In the past, film histories, film analysis and film criticisms could describe the visual aspects of a film using the support of still photos, which show different features of the film such as the lighting, set construction, and also the editing through the use of picture sequences. In the analysis of film sound it was not possible to refer to samples in the text. This obstacle may be overcome in the future with the aid of multimedia texts published in academic publications, which allow sound files to be linked to written texts. This would create the possibility of referring to samples and examples in the analysis of film sound, thus contributing to a reduction of the hegemony of visual in film analysis.

Another topic that can be further investigated, in the light of the findings and considerations of this dissertation, concerns the activity of film heritage institutions in the digital world. In the present context of continuous and simultaneous access to the widest archive of human knowledge, the Internet, film heritage institutions are forced to reshape their role and activity. If film as text and content is copiously and easily accessible through the Internet, digital distribution (DVD, film on demand, internet and digital TV) and portable mobile devices, what tasks are left to the film archives? It is

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instance in the Digital Disc Playback system for IMAX theatres (1988) and the Digital Theatre System (1993).

possible to find some answers considering the concepts of *film as material form*, *trace*, and *performance*. The model suggests in fact an approach to preservation and presentation that is not only focused on film as text but also on other elements: the technological devices, the human techniques and practices, the space of exhibition can also become, to a certain extent, objects of preservation and presentation.

Film heritage institutions will soon be the only institutional repositories of original carriers (analogue film copies) and traditional theatrical *dispositifs* (analogue projection systems). With the rapid digitization of theatrical projection, film heritage institutions will very soon become the only place where it will be possible to experience analogue film in its original form: as analogue film stock projected by an analogue projector. The focus on the creation of cinematic events would support a reevaluation of the communal and social aspects of film presentations, aspects that risk becoming lost in an era of individual consumption of media content through mobile devices. The characteristics of performances and events can in fact be considered as the elements that keep the audience going to the theater rather than watching a movie at home, on a DVD player, or on the Internet. The role of film heritage institutions in the digital world can therefore be rethought through a creative use of *dispositifs*, spaces, and institutional contexts for creating cinematic experiences. In this frame of possible solutions, film sound can play an important role. Live musical accompaniments constitute a valuable factor in the creation of cinematic experiences. However, possible experimentations in the use of playback *dispositifs* can also contribute to this goal: for instance, recreating the *cinematic soundscape* of silent films with historical gramophone discs and record players instead of with live musical accompaniment could be an interesting offering for the audience.

Along this line of reasoning, I conclude with a final note on the role of the human actors involved in preservation and presentation work: film archivists, curators, restorers, programmers, technicians, etc. The field of work of archivists and curators can be interpreted as characterized by the interaction of transition and transience, variability and invariability, permanence and obsolescence, memory and oblivion. Considering this dialectic, the role of the archivist and curator can be described as a translator (*traduttore*) and traitor (*traditore*) of film forms and traces. They translate and transfer the film forms and traces of the past into the present and future (transition). At the same time, they betray those same film forms, since in each translation something of the form can become lost forever (transience). The acceptance of this loss and the

awareness of the continuous movement of transition and transience that inevitably changes the film forms and traces are a moral challenge for the archivist and curator. The recent digital turn prompts us to rethink the ways in which archivists and curators work with film transition and transience. In this context, the attention to film sound can contribute to new solutions for preservation and presentation practices. Furthermore, the definition of film sound as *material form*, *trace*, and *performance*, and the consideration of its different dimensions that have been investigated throughout this dissertation, can be productive for revisiting film history, film theory, and film preservation theories.

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Figures

Fig. 1: Lee De Forest's *Audion* advertisement (1929)

Fig. 2: *Django Unchained* soundtrack, Tarantino's liner notes

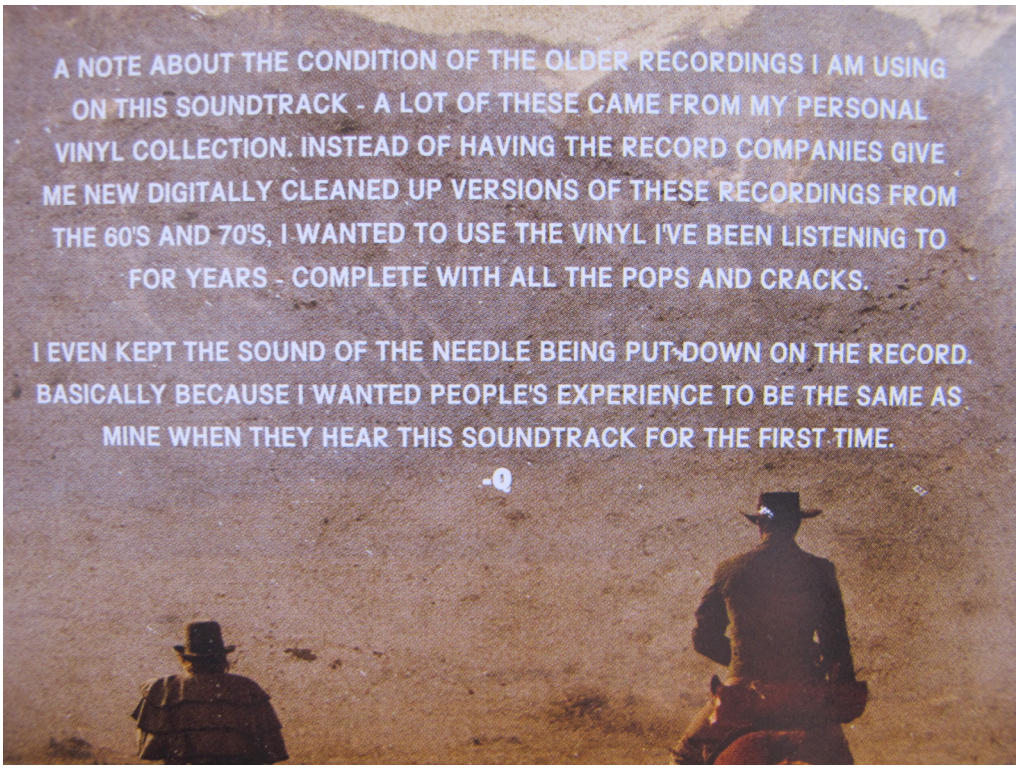


Fig. 3: A model of the Mystic Writing Pad (UK, 1950s)

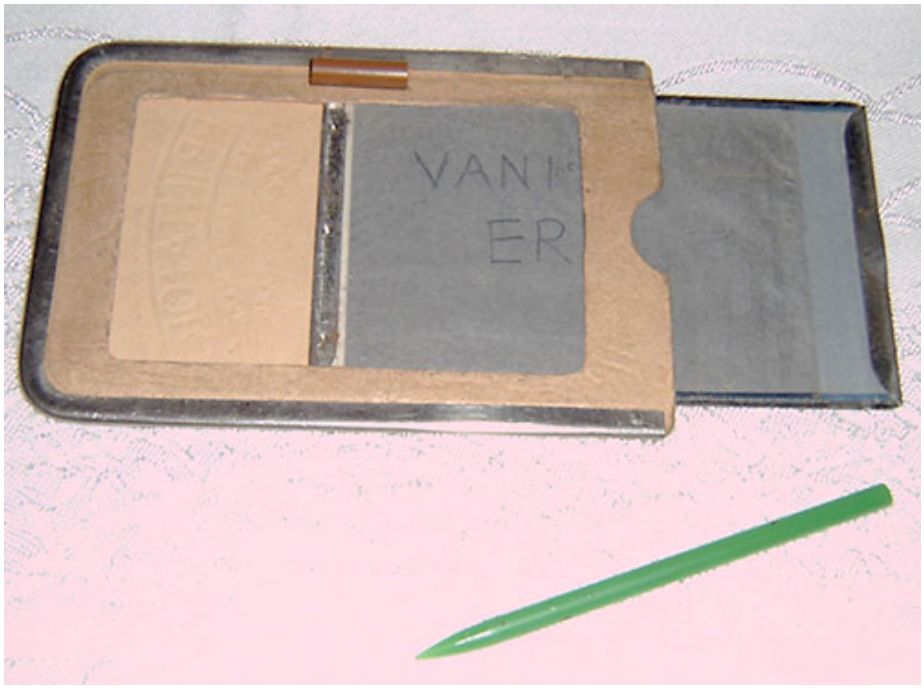


Fig. 4: Edison's *Kinetophone* (1895)

Fig. 5: The *Biophon* projection device [Deutsches Museum, Munich]

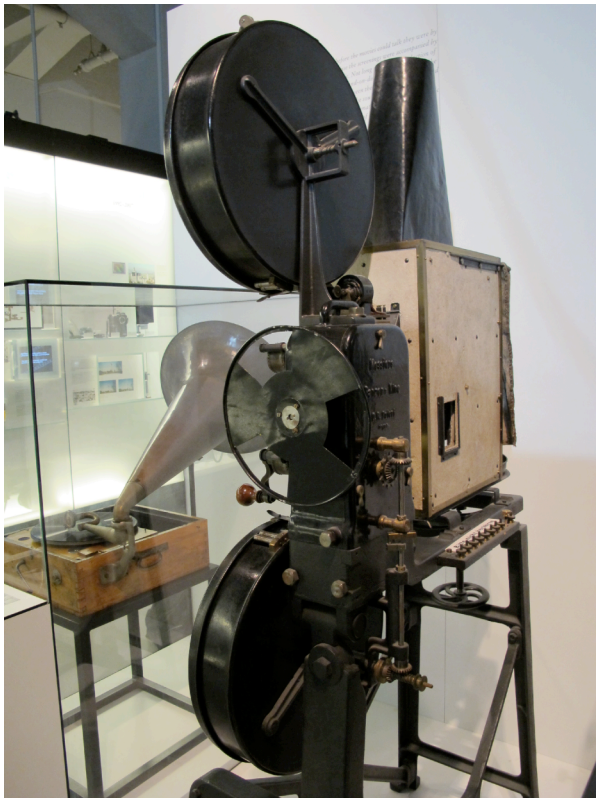


Fig. 6 and 7: *Tonbilder* film image carrier (35 mm film)

Fig. 8 and 9: *Tonbilder* film sound carrier: *Biophon* shellac disc
[*Pavillon-Duett*, 1907, private collection Stephan Puille Berlin;
Rauschlied aus "Künstlerblut", 1910, Österreichische Mediathek Wien]

Fig. 10: Patent drawing for the *Biophon* system (Oskar Messter, 1903):
Projector (a), screen (b), gramophone (c), motors (d, e), coil system (f), brushes (g), voltage sources (h).

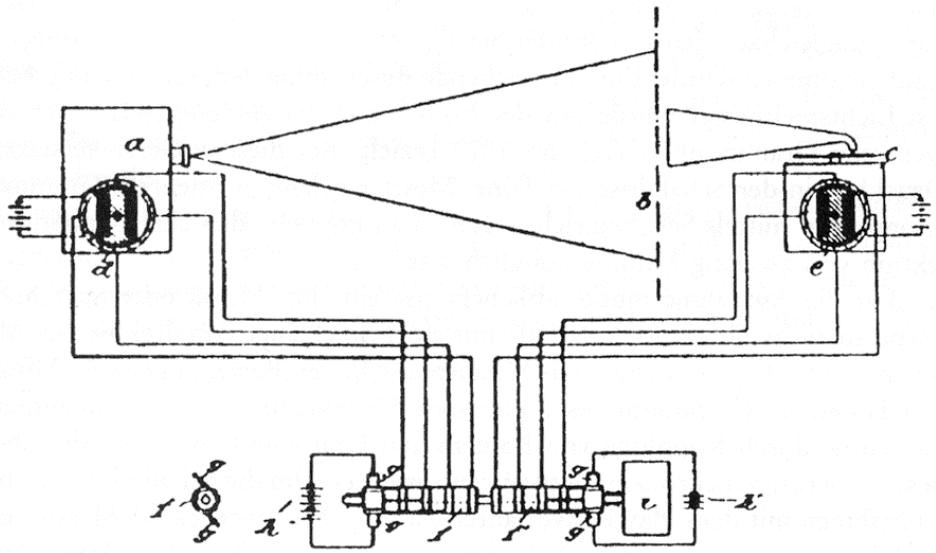


Fig. 11: The *Biophon* gramophone, 1910

Fig. 12: *Tonbilder* film shooting: "Pre-synchronic" image-sound recording, Messter-Studio Berlin, 1910

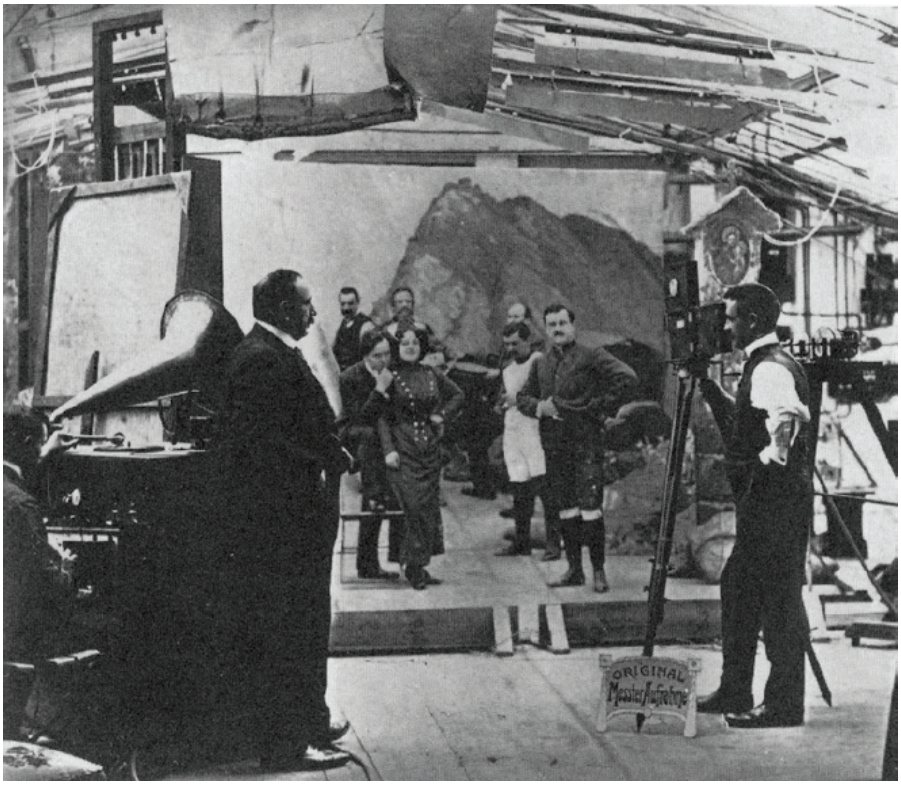


Fig. 13: Starting mark in a *Tonbilder* film

Fig. 14: Starting mark in a *Tonbilder* shellac disc [Private collection Stephan Puille]

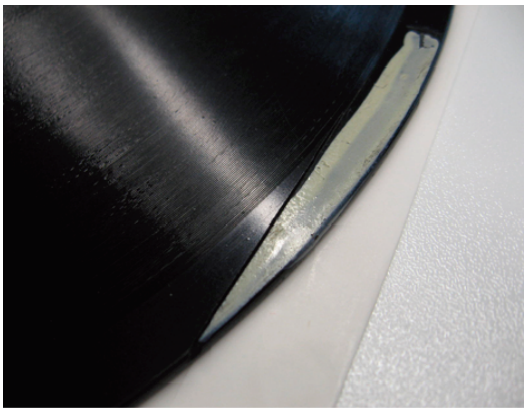
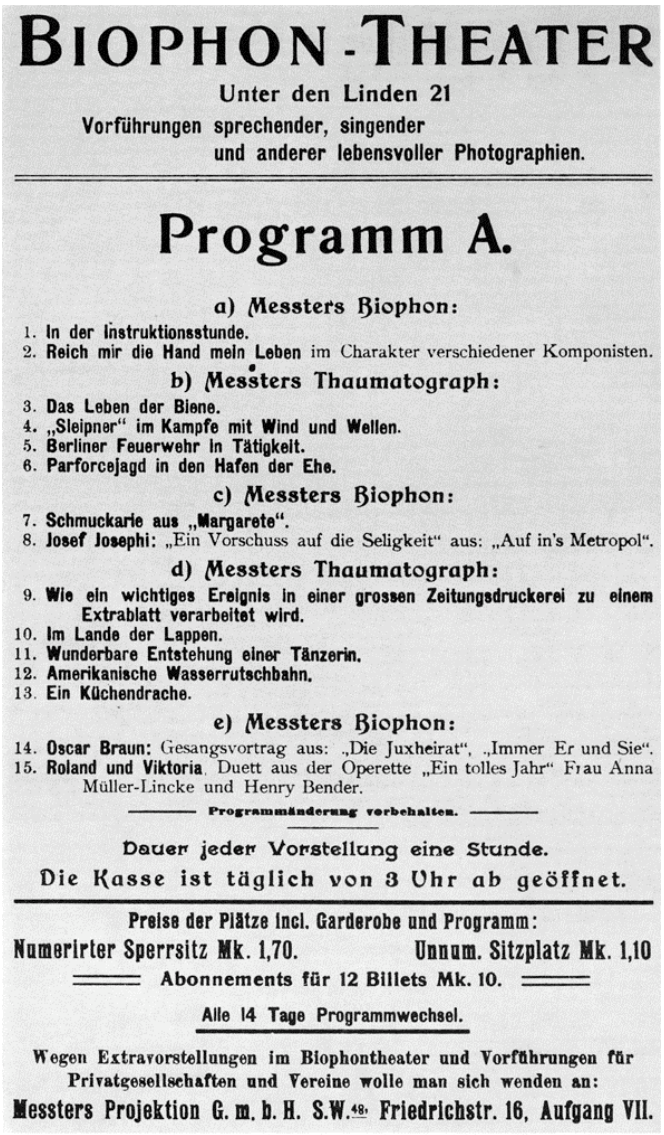


Fig. 15: A *Biophon-Theater* Program



BIOPHON-THEATER

Unter den Linden 21

Vorführungen sprechender, singender und anderer lebensvoller Photographien.

Programm A.

a) Messters Biophon:

1. **In der Instruktionsstunde.**
2. **Reich mir die Hand mein Leben** im Charakter verschiedener Komponisten.

b) Messters Thaumatograph:

3. **Das Leben der Biene.**
4. **„Sleipner" im Kampfe mit Wind und Wellen.**
5. **Berliner Feuerwehr in Tätigkeit.**
6. **Parforcejagd in den Hafen der Ehe.**

c) Messters Biophon:

7. **Schmuckarie aus „Margarete".**
8. **Josef Josephi:** „Ein Vorschuss auf die Seligkeit" aus: „Auf in's Metropol".

d) Messters Thaumatograph:

9. **Wie ein wichtiges Ereignis in einer grossen Zeitungsdruckerei zu einem Extrablatt verarbeitet wird.**
10. **Im Lande der Lappen.**
11. **Wunderbare Entstehung einer Tänzerin.**
12. **Amerikanische Wasserrutschbahn.**
13. **Ein Küchendrache.**

e) Messters Biophon:

14. **Oscar Braun:** Gesangsvortrag aus: „Die Juxheirat", „Immer Er und Sie".
15. **Roland und Viktoria**, Duett aus der Operette „Ein tolles Jahr" Frau Anna Müller-Lincke und Henry Bender.

Programmänderung vorbehalten.

Dauer jeder Vorstellung eine Stunde.

Die Kasse ist täglich von 3 Uhr ab geöffnet.

Preise der Plätze incl. Garderobe und Programm:

Numerirter Sperrsitz Mk. 1,70. **Unnum. Sitzplatz Mk. 1,10**

Abonnements für 12 Billets Mk. 10.

Alle 14 Tage Programmwechsel.

Wegen Extravorstellungen im Biophontheater und Vorführungen für Privatgesellschaften und Vereine wolle man sich wenden an:

Messters Projektion G. m. b. H. S.W.48 Friedrichstr. 16, Aufgang VII.

Fig. 16: List of the reconstructed *Tonbilder* films

	Film Title	Production, Year	Credits	Film Material	Archive Nr.
1	*Am Elterngrab*	Internationale Kinematograph- und Lichtbildgesellschaft, 1907		35 mm nitrate, dupe negative of the Thirties	SDK 02126-N
2	*Schutzmannlied* (from "Donnerwetter - tadellos")	Deutsche Mutoskop- und Biograph GmbH, 1908	Actor: Henry Bender	16 mm acetate reversal copy	SDK 03951-K
3	*Liebes Männchen folge mir* (from "Zigeunerliebe")	Duskes Kinematographen und Film-Fabriken GmbH, 1910,	director: Albert Kutzner	16 mm acetate reversal copy	SDK 03670-K
4	*Militärische Disziplin*	Deutsche Bioscop GmbH Berlin, 1910	Operator: Guido Seeber	35 mm nitrate positiv	SDK 00097-N
5	*Babylied*	Messter's Projektion GmbH, 1904		35 mm nitrate positive, hand-painted	SDK 01490-N

Fig. 17: List of the *Tonbilder* shellac discs

	Shellac Disc Title	Production, Year	Interpreters	Author, Composer	Matrix
1	*Am Elterngrab*	Gramophone 2-42799 Berlin, April 1904	Karl Ottemar (Tenor) Grammophone Orchestra, cond. Bruno Seidler-Winker	Emil Winter-Tymian op. 202	2093 1/2 h
2	*Schutzmannlied* (from the 1905 theatre revue of the Metropol-Theater "Donnerwetter, tadellos!")	Zonophone X-22892 Berlin, August 1908	Schutzmann Knautschke: Henry Bender (actor in the film as well) Gramophone-Orchestra, cond. Bruno Seidler-Winker	Paul Lince, Julius Freund	13613-u
3	*Liebes Männchen, folge mir* (from "Der Zigeunerbaron")	Jumbo A 97132 Wien, Frühjahr 1910	Jolan: Mizzi Jezel Kajétan: Karl Schöpfer	Franz Léhar, Alfred M. Willner, Robert Bodanzky	Vo 858
4	*Lustiges auf dem Kasernenhof* (sound for Militärische Disziplin)	Messter's / M.P.510 Berlin, August/ September 1903	Gustav Schönwald	Gustav Schönwald	1791 x

Fig. 18: Comparison between image and sound timeline in Avid DS

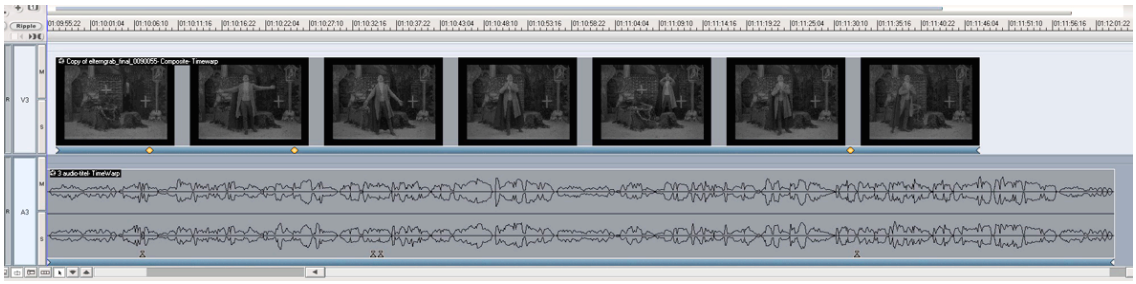


Fig. 19: The presentation of the *Tonbilder* films at the *Il Cinema Ritrovato* festival, Bologna 2012.

Fig. 20: *Phono-Cinéma-Théâtre* film image carrier (35 mm film with 3 central perforations)

Fig. 21 and 22: *Phono-Cinéma-Théâtre* films sound carrier (phonographic cylinders)

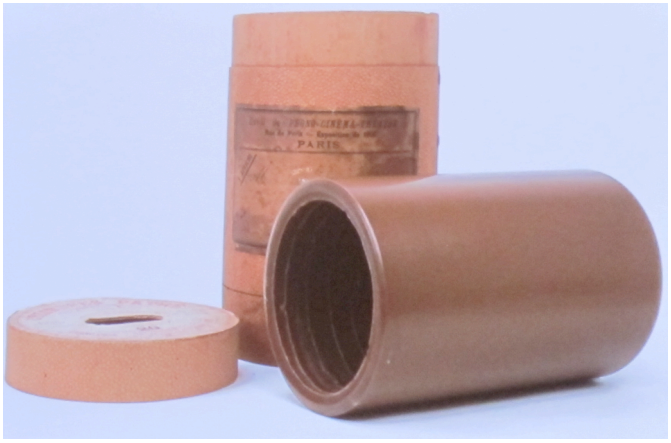


Fig. 23: The *Phono-Cinéma-Théâtre* poster by François Flameng

Fig. 24: The *Chronophone* system (Gaumont)

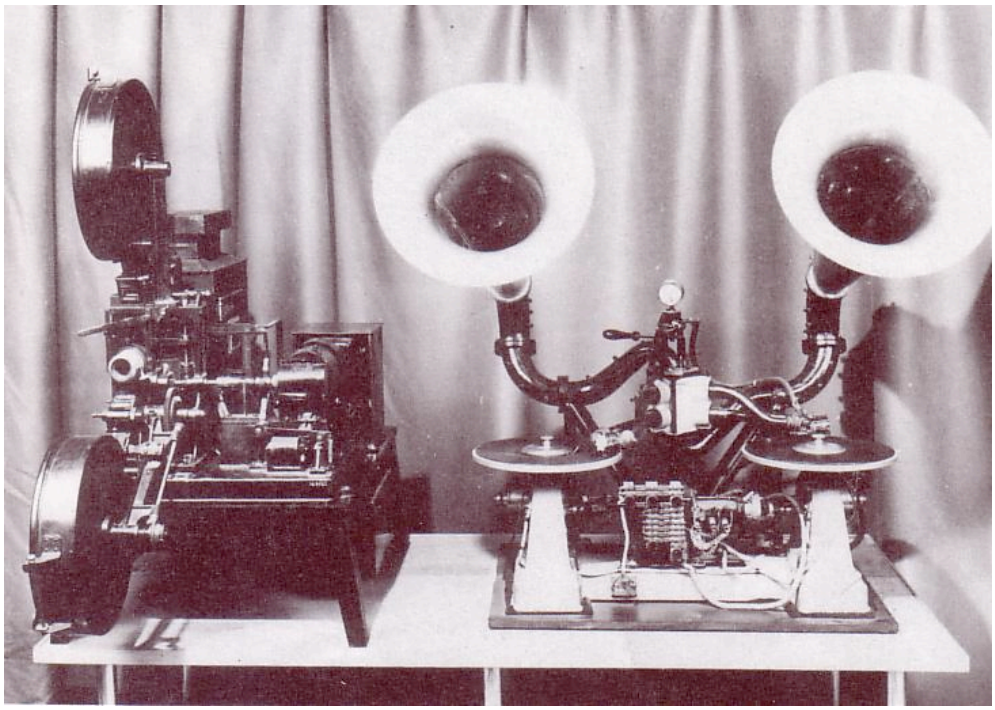


Fig. 25: *Chronophone* film image and sound carriers, details
(35 mm film with starting mark, gramophone disc)

Fig. 26 and 27: *Filmparlant* shooting: image and sound synchronous recording

Fig. 28 and 29: Vitaphone film image and sound carriers
(35 mm film, sixteen-inch electrical disc)

Fig. 30: Vitaphone engineer George Groves at a 1925 electrical disc-cutting lathe for sound movies [The Granger Collection, NYC]

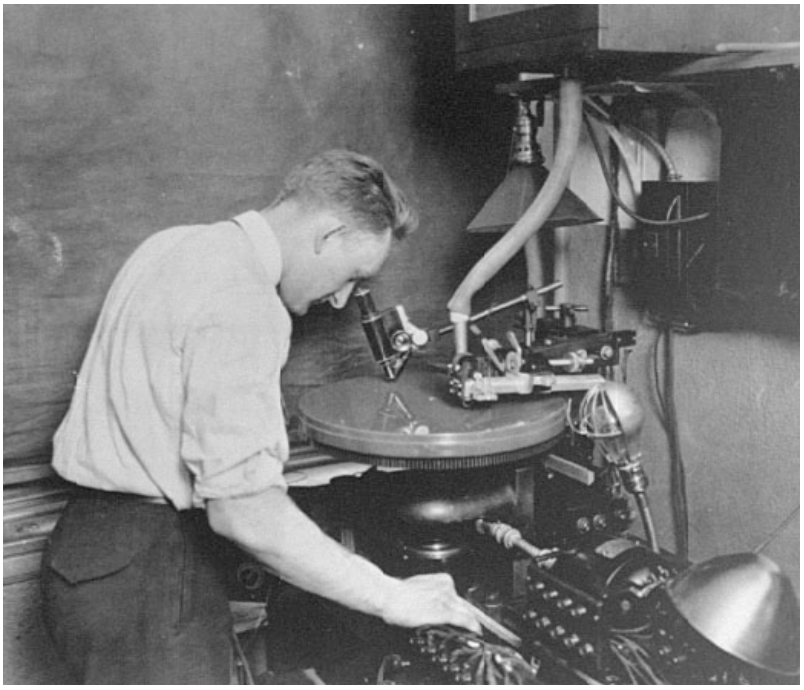


Fig. 31: Craft demonstrating the Vitaphone system
[Collection AT&T Archives, Warren, New Jersey]

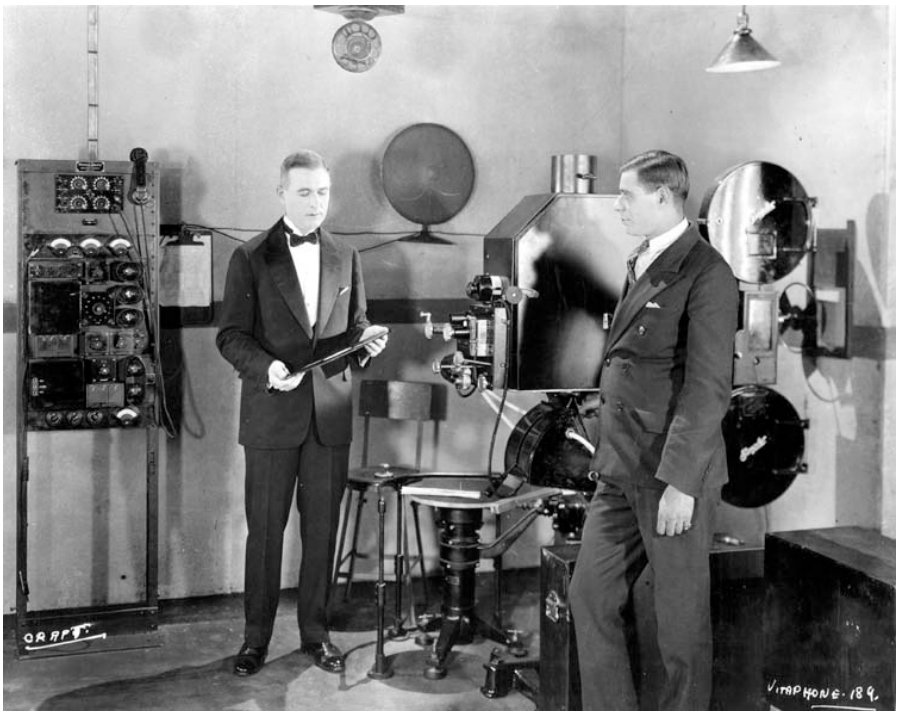


Fig. 32: ERPI projector device for sound-on-disc films [The Granger Collection, NYC]

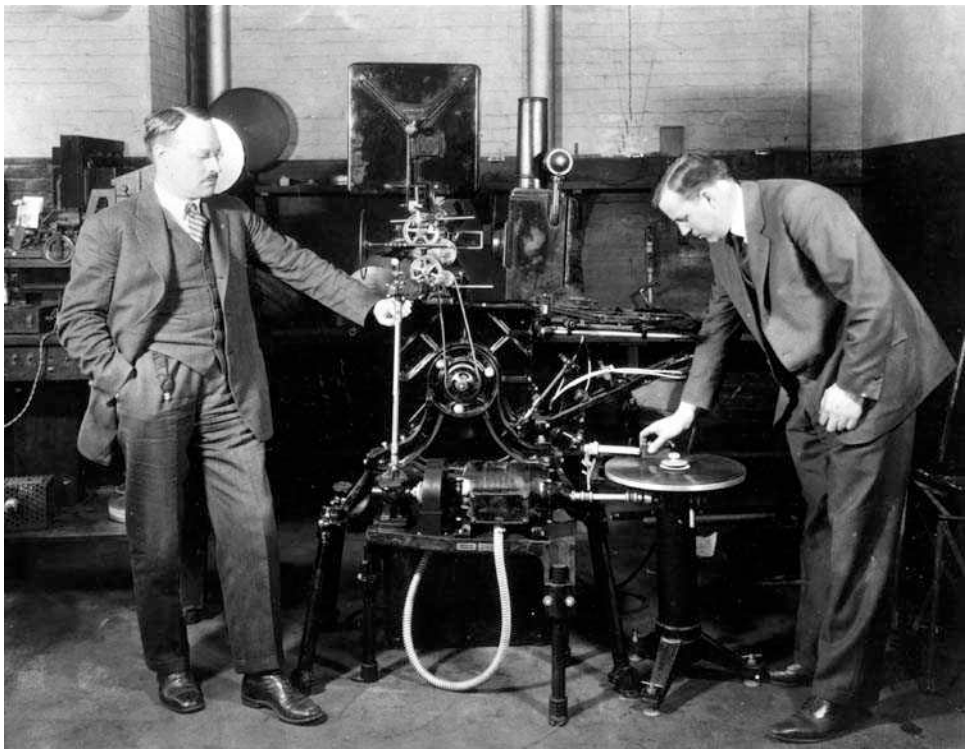


Fig. 33: The Vitaphone *dispositif*, advertisement by Electrical Research Products Inc. printed in 1929 in The New Yorker and Saturday Evening Post
[Collection AT&T Archives, Warren, New Jersey]

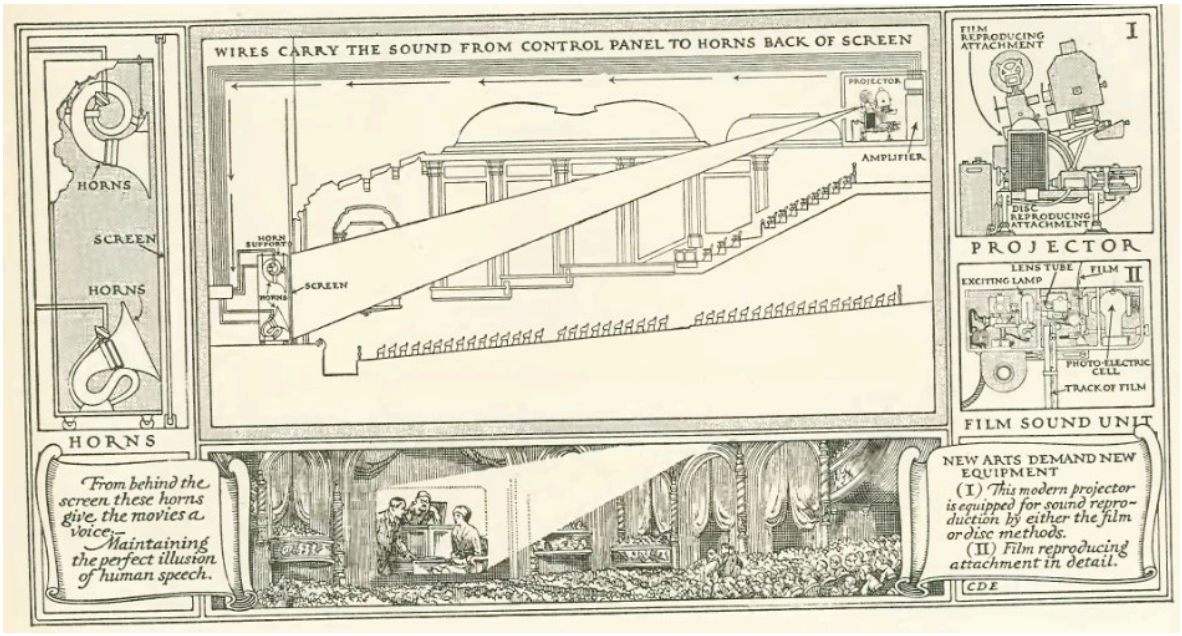


Fig. 34: Nederlands Filmmuseum venue in Vondelparkpavilijoen

Fig. 35: The new building of the Eye Film Institute Netherlands

Fig. 36: Opening of the new building of the Eye Film Institute Netherlands

Fig. 37: Cinema 1

Fig. 38: Cinema 1, built-in historic organ near the cinema screen

Fig. 39: The presentation of *The Spanish Dancer*
with live musical accompaniment

Fig. 40: Cinema 2 with the grandstand seating retracted
on occasion of the installation and performance of the *Circo Togni Home Movies*

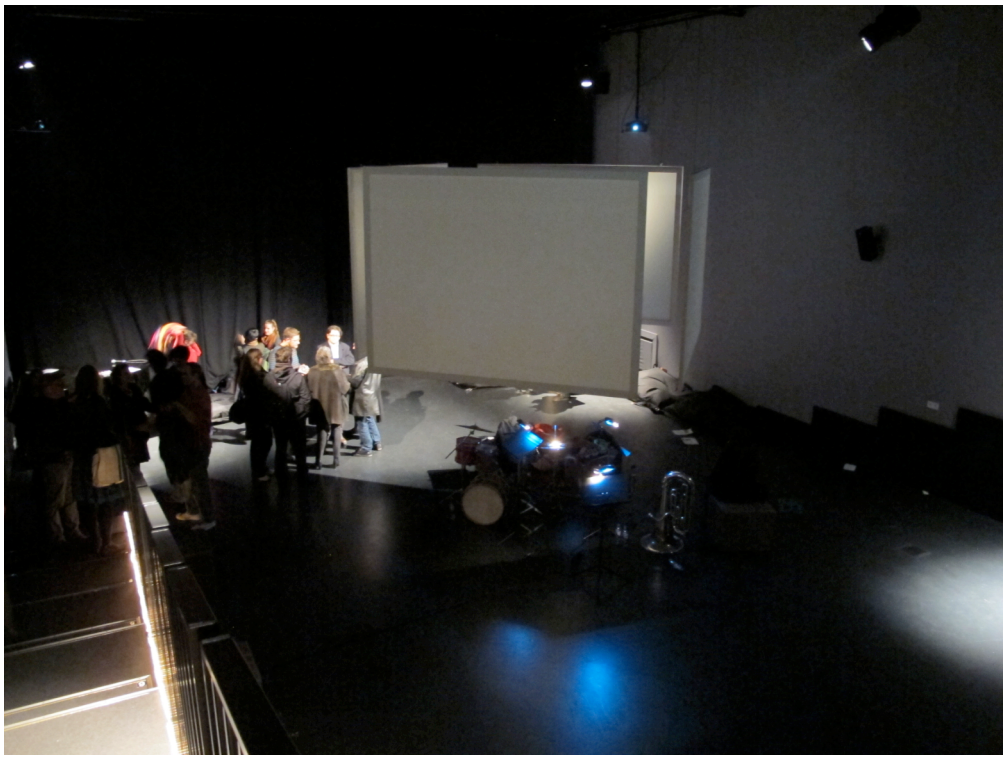


Fig. 41: Cinema 2 during the performance of the *Circo Togni Home Movies*

Fig. 42: Peter Kubelka's Invisible Cinema

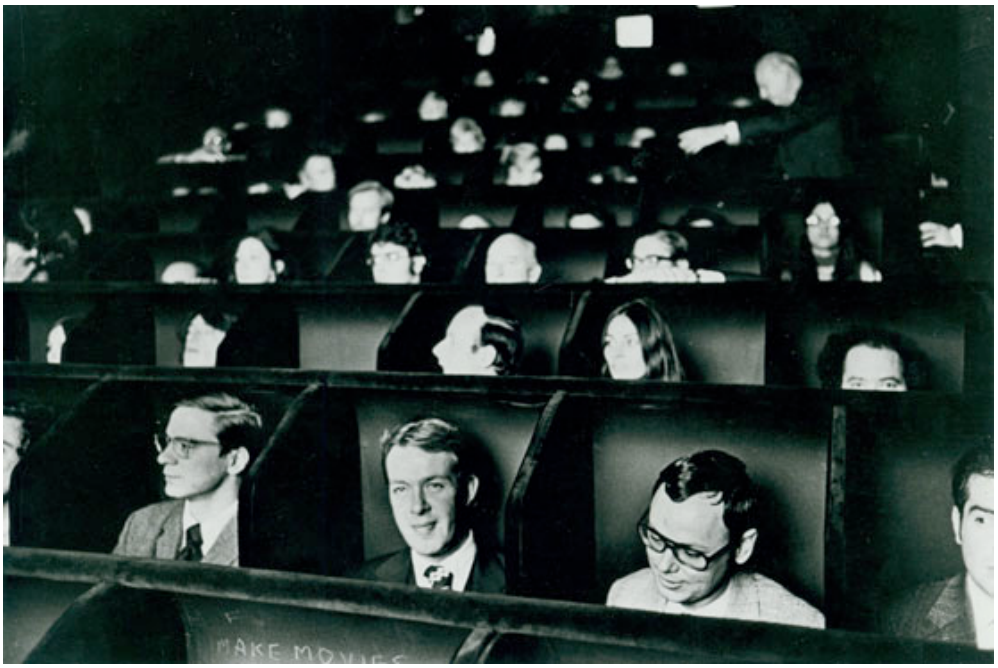


Fig. 43: The Exhibition Space

Fig. 44: The Exhibition Space, *Found Footage: Cinema Exposed* exhibition

Fig. 45: The Exhibition Space, set up for the *Expanded Cinema: Isaac Julien, Fiona Tan, Yang Fudong* exhibition

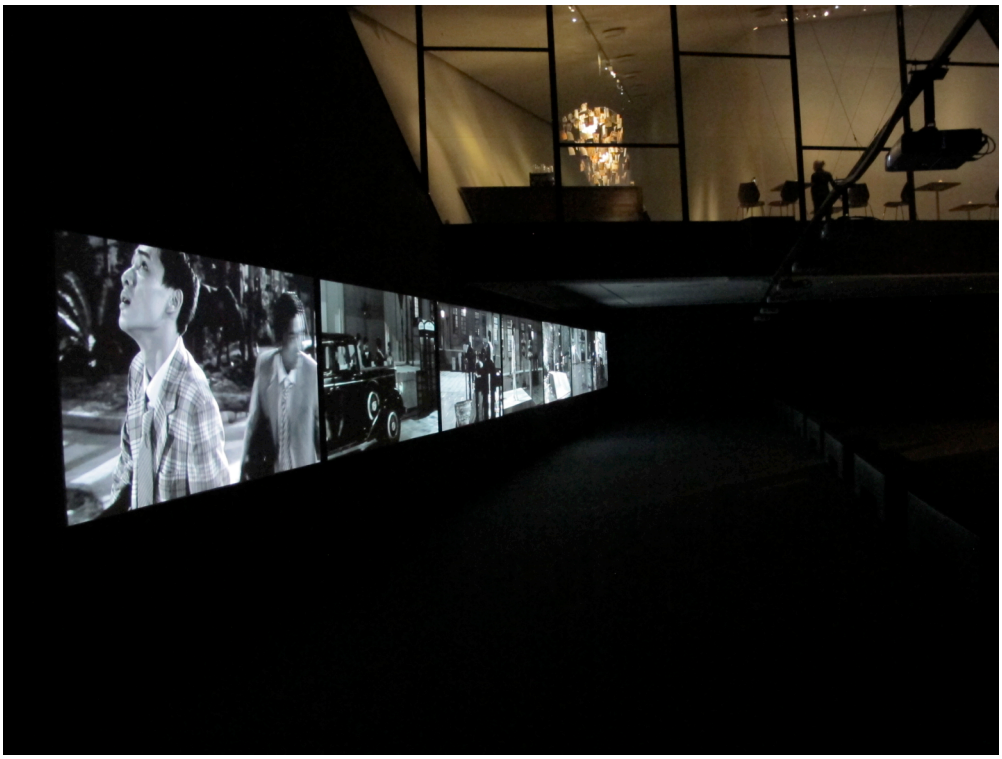


Fig. 46: The Exhibition Space, set up for the *Oskar Fishinger – Experiments in Cinematic Abstraction 1900-1967* exhibition

Fig. 47: The Exhibition Space, set up for the *Oskar Fishinger – Experiments in Cinematic Abstraction 1900-1967* exhibition

Fig. 48: The Exhibition Space, set up for the *Oskar Fishinger – Experiments in Cinematic Abstraction 1900-1967* exhibition

Fig. 49: The Basement, *Panorama*

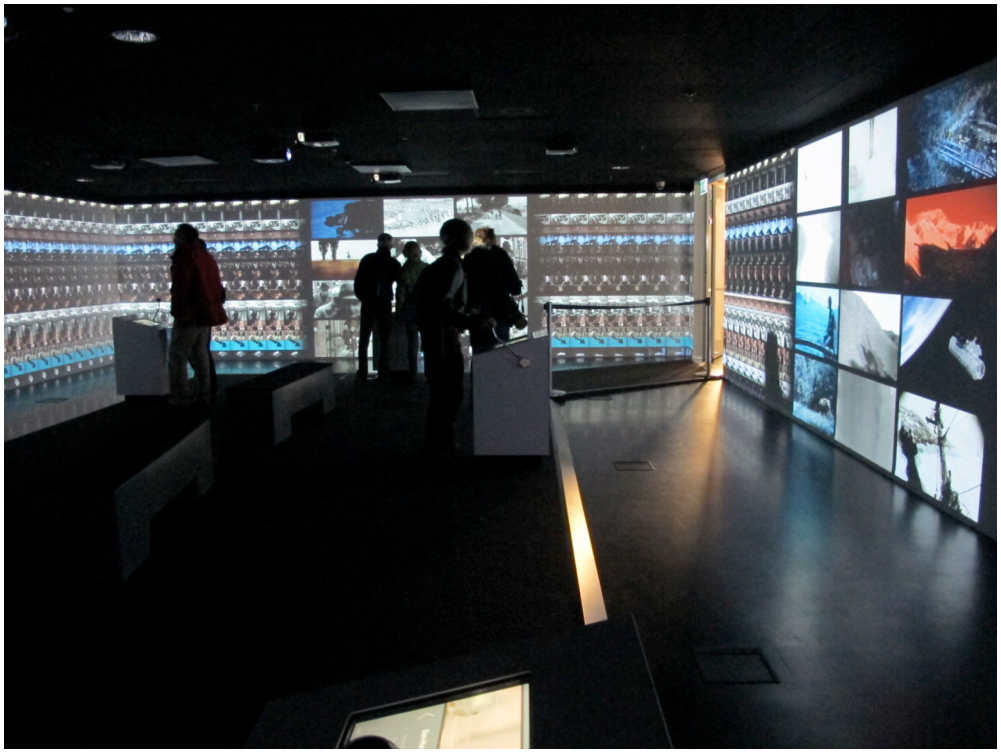


Fig. 50: The Basement, *Panorama*

Fig. 51: The Basement, *Panorama*

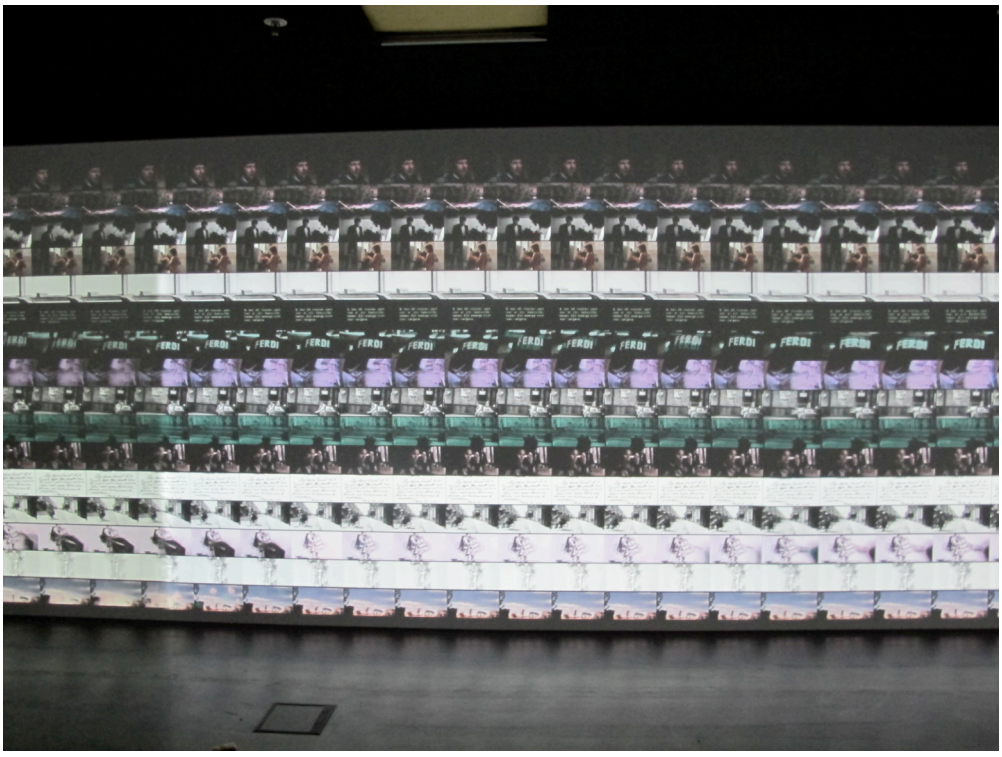


Fig. 52: The Basement, *Panorama*, consoles

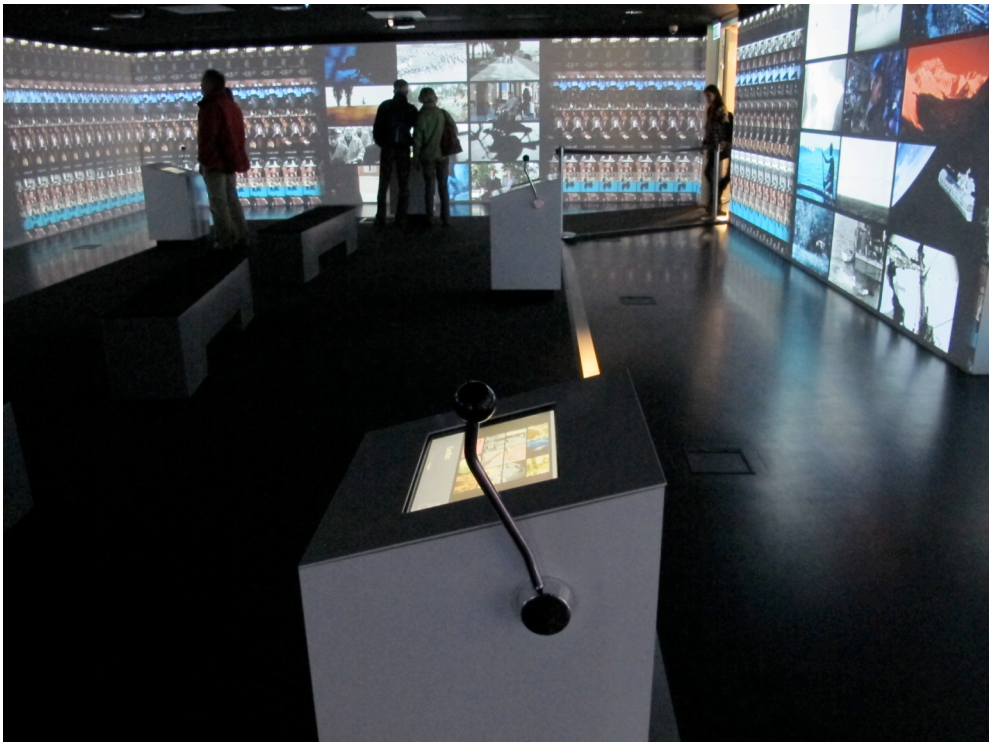


Fig. 53: The Basement, *Panorama*, console touchscreen

Fig. 54: The Basement, *Pods*

Fig. 55: The Basement, *Pods*

Fig. 56: The *Arena*

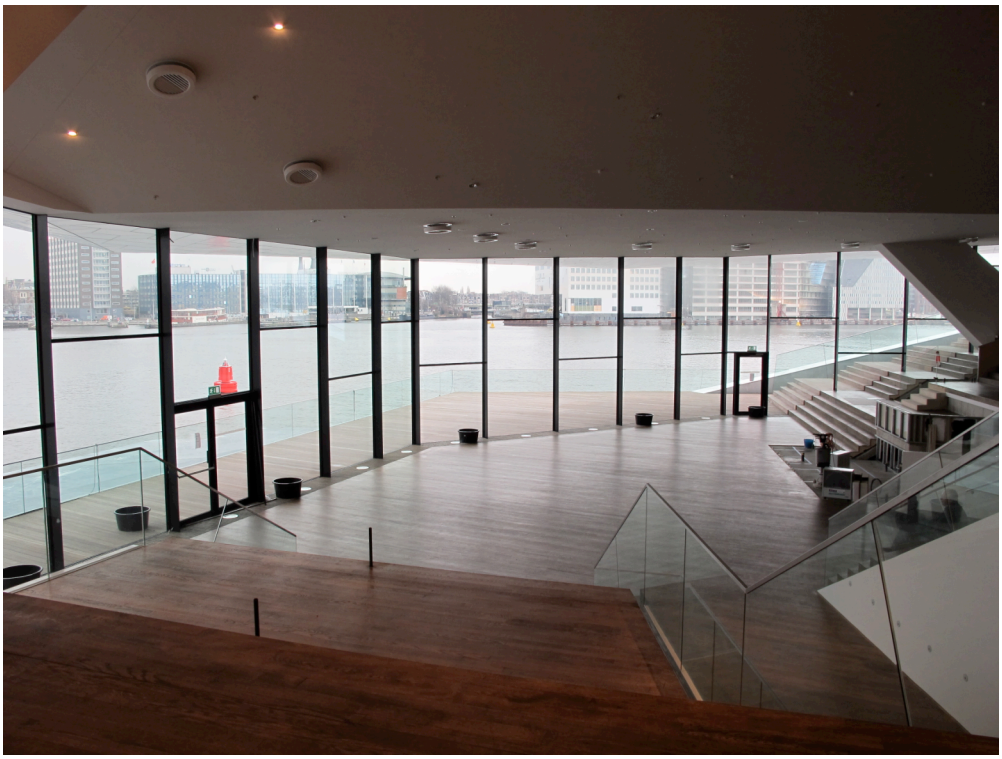


Fig. 57: The *Arena*

Fig. 58: The *Arena*

Fig. 59: The *Arena*, projections on the walls

List of Figures

Fig. 1: Lee De Forest's *Audion* advertisement (1929)
[source: http://www.nps.gov/features/safr/feat0001/virtualships/vrmovies/muvr2hs11.htm, accessed January 2014]
Fig. 2: *Django Unchained* soundtrack, Tarantino's liner notes
[photographed by author from the booklet]
Fig. 3: A model of the Mystic Writing Pad
[source: http://www.vanishederas.com/vintage-printator-magic-notepad-c1950s-sold-7647-p.asp, accessed January 2014]
Fig. 4: Edison's *Kinetophone* (1895)
[source: http://dumuetauparlant.wordpress.com/une-evolution-des-techniques-du-son/, accessed January 2014]
Fig. 5: The *Biophon* projection device
[photographed by author at the Deutsches Museum, Munich]
Fig. 6: *Tonbilder* film image carrier
[from: Dirk Förstner, "Die Möglichkeiten des *Digital Intermediate* Prozesses in der Filmrestaurierung am Beispiel von Tonbildern," 18]
Fig. 7: *Tonbilder* film image carrier
[from: Dirk Förstner, "Rekonstruktion von Tonbildern in modernen Wiedergabesystemen," 8]
Fig. 8 and 9: *Tonbilder* film sound carrier: *Biophon* shellac disc (*Pavillon-Duett*, 1907, private collection Stephan Puille Berlin; Rauschlied aus "Künstlerblut," 1910, Österreichische Mediathek Wien)
[from: Dirk Förstner, "Rekonstruktion von Tonbildern in modernen Wiedergabesystemen," 7 and 10]
Fig. 10: Patent drawing for the *Biophon* system (Oskar Messter, 1903)
[from: Christian Illgner and Dietmar Linke, "Filmtechnick – Vom Maltesekreuz zum Panzerkino," 117]
Fig. 11: The *Biophon* gramophone, 1910
[from: Harald Jossé, *Die Entstehung des Tonfilms, Beitrag zu einer faktenorientierten Mediengeschichte*, 90]

Fig. 12: *Tonbilder* film shooting

[from: Harald Jossé, *Die Entstehung des Tonfilms, Beitrag zu einer faktenorientierten Mediengeschichte*, 89]

Fig. 13 and 14: Starting mark in a *Tonbilder* film and shellac disc

[from: Dirk Förstner, "Rekonstruktion von Tonbildern in modernen Wiedergabesystemen," 23]

Fig. 15: A *Biophon-Theater* Program

[from: Albert Narath, *Oskar Messter. Der Begründer der deutschen Kino- und Filmindustrie*, 34]

Fig. 16: List of the reconstructed *Tonbilder* films

Fig. 17: List of the *Tonbilder* shellac discs

Fig. 18: Comparison between image and sound timeline in Avid DS

[computer screenshot from the restoration process at Arri Film & TV]

Fig. 19: The presentation of the *Tonbilder* films

[photographed by author at the *Il Cinema Ritrovato* festival, Bologna 2012]

Fig. 20: *Phono-Cinéma-Théâtre* film image carrier

[source: http://www.cinematheque.fr/fr/musee-collections/actualite-collections/restauration-numerisatio/repertoire-reconstitue-p.html, accessed January 2014]

Fig. 21 and 22: *Phono-Cinéma-Théâtre* films sound carrier

[photographed by author at the lecture "Restoration of sound films" by the Conservatoire des Techniques at the *Toute la mémoire du monde* festival in Paris, November 2012]

Fig. 23: The *Phono-Cinéma-Théâtre* poster by François Flameng

[source: http://www.cinematheque.fr/fr/musee-collections/actualite-collections/restauration-numerisatio/repertoire-reconstitue-p.html, accessed January 2014]

Fig. 24: The *Chronophone* system

[source: http://dumuetauparlant.wordpress.com/une-evolution-des-techniques-du-son/, accessed January 2014]

Fig. 25: *Chronophone* film image and sound carriers

[from: Maurice Gianati and Laurent Mannoni, ed. *Alice Guy, Léon Gaumont et les débuts du film sonore*, 167]

Fig. 26 and 27: *Filmparlant* shooting

[from: Maurice Gianati and Laurent Mannoni, ed. *Alice Guy, Léon Gaumont et les débuts du film sonore*, 184 and 173]

Fig. 28 and 29: Vitaphone film image and sound carriers

[photographed by author at the lecture "Restoration of sound films" by the Conservatoire des Techniques at the *Toute la mémoire du monde* festival in Paris, November 2012]

Fig. 30: Vitaphone engineer George Groves at a 1925 electrical disc-cutting lathe for sound movies

[The Granger Collection, NYC; source: http://www.granger.com/results.asp?image=0174673&inline=true&itemx=3&wwwflag=4&screenwidth=1159, accessed January 2014]

Fig. 31: Craft demonstrating the Vitaphone system

[Collection AT&T Archives, Warren, New Jersey; source: http://commons.wikimedia.org/wiki/File:VitaphoneDemo.jpg, accessed January 2014]

Fig. 32: ERPI projector device for sound-on-disc films

[The Granger Collection, NYC; source: http://www.granger.com/results.asp?image=0174689&inline=true&itemx=31&wwwflag=4&screenwidth=1159, accessed January 2014]

Fig. 33: The Vitaphone *dispositif*, advertisement by Electrical Research Products Inc. printed in 1929 in The New Yorker and Saturday Evening Post

[Collection AT&T Archives, Warren, New Jersey]

Fig. 34: Nederlands Filmmuseum venue in Vondelparkpavilijoen

[source: http://commons.wikimedia.org/wiki/File:Nederlands_Filmmuseum.jpg, accessed January 2014]

Fig. 35: The new building of the EYE Film Institute Netherlands

[photographed by author at the EYE Film Institute Netherlands]

Fig. 36: Opening of the new building of the EYE Film Institute Netherlands

[photographed by author at the EYE Film Institute Netherlands]

Fig. 37: Cinema 1

[photographed by author at the EYE Film Institute Netherlands]

Fig. 38: Cinema 1, built-in historic organ near the cinema screen

[photographed by author at the EYE Film Institute Netherlands]

Fig. 39: The presentation of *The Spanish Dancer*

[photographed by author at the EYE Film Institute Netherlands]

Fig. 40: Cinema 2 with the grandstand seating retracted

[photographed by author at the EYE Film Institute Netherlands]

Fig. 41: Cinema 2 during the performance of the *Circo Togni Home Movies*

[photographed by author at the EYE Film Institute Netherlands]

Fig. 42: Peter Kubelka's Invisible Cinema

[source: http://severinsays.files.wordpress.com/2010/12/olsen.jpg, accessed January 2014]

Fig. 43: The Exhibition Space

[photographed by author at the EYE Film Institute Netherlands]

Fig. 44: The Exhibition Space, *Found Footage: Cinema Exposed* exhibition

[photographed by author at the EYE Film Institute Netherlands]

Fig. 45: The Exhibition Space, set up for the *Expanded Cinema: Isaac Julien, Fiona Tan, Yang Fudong* exhibition

[photographed by author at the EYE Film Institute Netherlands]

Fig. 46, 47 and 48: The Exhibition Space, set up for the *Oskar Fishinger – Experiments in Cinematic Abstraction 1900-1967* exhibition

[photographed by author at the EYE Film Institute Netherlands]

Fig. 49, 50, 51, 52, and 53: The Basement, *Panorama*

[photographed by author at the EYE Film Institute Netherlands]

Fig. 54 and 55: The Basement, *Pods*

[photographed by author at the EYE Film Institute Netherlands]

Fig. 56, 57, 58 and 59: The *Arena*

[photographed by author at the EYE Film Institute Netherlands]

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Curriculum Vitae

Sonia Campanini received her BA degree (cum laude) in Audiovisual and Performing Arts Studies at the Università Cattolica di Brescia in 2004, and her MA degree (cum laude) in Film, Television, and Media Studies at the Università degli Studi di Bologna in 2009. In 2010 she began a joint doctorate in Film and Media Studies at the Università degli Studi di Udine and Universiteit van Amsterdam. Her research interests are concentrated in the field of film and audiovisual heritage and in particular focus on: film preservation, restoration and presentation; the material, technological and memorial dimensions of audiovisual heritage; media archaeology; audiovisual perception and experience; the sound component of film and audiovisual media. She gained hand-on experience in film preservation and restoration in different film laboratories, such as Chace Audio in Los Angeles, Technicolor in Rome, Haghefilm in Amsterdam, Arri Film & TV in Munich, and La Camera Ottica in Gorizia. Her publications include essays and articles for the journal *Cinergie*, papers for international journals such as *Music and the Moving Image*, and she served as co-editor for the publication *L'archivio / The Archive* (Udine: Forum, 2012).

Film Sound in Preservation and Presentation

Summary

In the dissertation "Film Sound in Preservation and Presentation" the nature of film sound is investigated through the perspective of film preservation and presentation, i.e. the cultural and social practices aimed at the preservation, restoration, presentation of, and access to film heritage.

The point of departure of the research is the consideration of the hegemony of the visual in Western cultures and societies. The hegemony of the visual can in fact be detected in film studies as well: film, since its inception, has been defined as a fundamentally image-oriented medium, in which the image and visual component have predominance over the sound component. Furthermore, sound can be considered as being *lost in transience*: the transitory and ephemeral nature of sound, the difficulty to define it easily through language, and the impossibility to duplicate it as an event are the main reasons for which sound has been underestimated in film and film preservation studies. The examination of the hegemony of the visual and the transience of sound prompts the argument that the nature of film sound has yet to be investigated in all its core dimensions and components by film theory and film preservation theory.

Given this premise, the dissertation aims to investigate the different dimensions of film sound that can be identified through the study of preservation and presentation practices, recurring to some key concepts: the material dimension (carrier, *physical trace*), the human and technological dimensions (*dispositif*), the textual dimension (text), the institutional dimension (physical space, institutional context), the performative dimension (*performance*), the experiential dimension (*cinematic soundscape*), and the memorial dimensions (*film sound souvenirs*, *mnemic trace*).

The first chapter traces the memorial dimension of film sound, elaborating on the concept of *film sound souvenirs* in relation to individual and cultural memory. In discussion of this topic special attention is given to social and artistic practices in which the concept of noise emerges as a mark of the recorded sounds of the past (*soundstalgia*, *cracked sounds*).

The observation of social and artistic practices in relation to recorded sound of the past leads to the second chapter, where the memorial dimension of film sound is analyzed on a theoretical level. In order to conceptualize how recorded sound relates to our individual and cultural memory, the notion of *media memory* is elaborated, recalling Sigmund Freud's famous *mystic writing pad* model and its interpretation by film historian Thomas Elsaesser. Closely linked to the concept of media memory is the notion of *audiovisual trace*, which contributes to the understanding, on a theoretical level, of how film as trace can become part of cultural memory. The concept of trace is examined its two facets: the *physical trace*, which is the inscription of visual and aural data on a carrier, and a *mnemic trace*, intended as the trace that a film leaves in cultural memory.

The following two chapters are dedicated to the analysis of case studies that involve film sound preservation and presentation practices. Chapter three presents the case of the preservation of early sound systems, focusing on the *Biophon*, *Chronophone*, *Phono-Cinéma-Théâtre*, and *Vitaphone* systems. These early sound systems are characterized by the separation of image and sound on two different carriers: the image is recorded on film while sound is recorded on disc or cylinder. The separation of image and sound raises relevant issues for film preservation and presentation, which can help to define certain dimensions of film sound, such as the carrier, *dispositif* and text. The consideration of these systems is also significant with regards to film historiography: the fact that these systems date from before the so-called "coming of sound" of the late 1920s incites the question of why these systems were not considered as part of the sound period, and what is the consequent conception of sound sustained by film historiography.

Chapter four focuses on film sound presentation practices through the analysis of the case of the EYE Film Institute Netherlands, whose activities demonstrate an experimental tradition in film sound presentation. Particular attention is given to the institutional dimension of film sound, which refers to the space and context of presentation, and to the experiential dimension, that is, how film sound is perceived and experienced by the audience in a particular cinematic event. Using the concept of *soundscape*, this section explores how film sound is perceived and experienced in the new EYE venue 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 defining 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 these 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.

Based on the considerations of the case studies analysis, the theoretical definition of film sound is constructed on three conceptual nucleuses: film sound as *material form*, *trace*, and *performance*. These three concepts, considered as interrelated, can in fact offer a model for describing and understanding all the different dimensions of film sound that emerged from the preservation and presentation practices analyzed in the case studies: the material, human, technological, institutional, experiential, and memorial dimensions.

Filmgeluid in conservering en presentatie Samenvatting

In het proefschrift Filmgeluid in conservering en presentatie wordt de aard van filmgeluid onderzocht vanuit het perspectief van filmconservering en filmpresentatie, met andere woorden, vanuit de culturele en sociale praktijken die gericht zijn op de conservering, de restauratie, de presentatie en het ontsluiten van cinematografisch erfgoed.

Het uitgangspunt van het onderzoek is de hegemonie van het visuele in westerse culturen en samenlevingen. De hegemonie van het visuele doet zich ook voor in de filmwetenschap: vanaf het ontstaan is film primair gedefinieerd als een beeldgeoriënteerd medium, waarin de visuele component overwicht heeft op de geluidscomponent. Bovendien kan het geluid worden beschouwd als 'verloren in vergankelijkheid': de kortstondige en vergankelijke aard van geluid, de moeilijkheid om het te definiëren met behulp van taal, en de onmogelijkheid om het te herhalen als een gebeurtenis zijn de belangrijkste redenen voor de onderwaardering van geluid in filmwetenschap en filmconserveringsonderzoek. De hegemonie van het visuele en de vergankelijkheid van het geluid nodigt er toe uit de aard van filmgeluid in al haar kerndimensies en componenten te onderzoeken vanuit de film- en conserveringstheorie.

Dit proefschrift heeft tot doel de verschillende dimensies van filmgeluid die naar voren komen uit filmconserverings- en presentatiepraktijken te onderzoeken via een aantal belangrijke concepten: de materiële dimensie (drager: *carrier*, fysiek spoor: *physical trace*), de menselijke en technologische dimensies (*dispositif*), de tekstuele dimensie (tekst: *text*), de institutionele dimensie (fysieke ruimte: *physical space*, institutionele context: *institutional context*), de performatieve dimensie (*performance*), de experiëntiële dimensie (filmische 'geluidslandschap': *cinematic soundscape*), en de herinneringsdimensies (filmgeluidsouvenirs: *film sound souvenirs*, herinneringsspoor: *mnemic trace*).

Het eerste hoofdstuk schetst de herinneringsdimensies van filmgeluid, voortbordurend op het concept van *film sound souvenirs* in relatie tot individueel en cultureel geheugen. Bijzondere aandacht wordt besteed aan sociale en artistieke

praktijken waarin het concept van 'noise' naar voren wordt gebracht als een kenmerk van opgenomen geluid van het verleden (*soundstalgia*, *cracked sounds*).

De aandacht voor sociale en artistieke praktijken in verband met historisch opgenomen geluid leidt tot het tweede hoofdstuk, waarin de herinneringsdimensies van filmgeluid worden geanalyseerd op een theoretisch niveau. Om te conceptualiseren hoe opgenomen geluid betrekking heeft op ons individuele en culturele geheugen, wordt het begrip media memory uitgewerkt, met het beroemde *mystic writing pad*-model van Sigmund Freud en de interpretatie ervan door filmhistoricus Thomas Elsaesser. Niet alleen diens concept *media memory*, maar ook het concept *audiovisual trace* draagt bij aan het op een theoretisch niveau begrijpen van film als spoor van het culturele geheugen. Het concept *trace* (spoor) wordt op twee manieren opgevat: als een fysiek concept - de inscriptie van visuele en auditieve gegevens op een drager - maar ook als een herinneringsconcept - het spoor dat een film achterlaat in het culturele geheugen.

De volgende twee hoofdstukken zijn gewijd aan de analyse van case studies die betrekking hebben op conserverings- en presentatiepraktijken van filmgeluid. Hoofdstuk drie presenteert de conservering van vroege geluidssystemen, met name de Biophon, Chronophone, Phono-Cinéma-Théâtre en Vitaphone systemen. Deze vroege geluidssystemen worden gekenmerkt door de scheiding van beeld en geluid op twee verschillende dragers: het beeld wordt opgenomen op film terwijl geluid wordt opgenomen op een disc of cilinder. De scheiding van beeld en geluid brengt relevante vragen naar voren voor filmconservering en filmpresentatie, die kunnen helpen om een aantal dimensies van filmgeluid, zoals *carrier*, *dispositif* en *text*, te definiëren. De overweging van deze systemen is ook belangrijk met betrekking tot filmgeschiedschrijving: het feit dat deze systemen dateren van voor de komst van de geluidsfilm eind jaren 1920 roept de vraag op waarom deze systemen niet werden beschouwd als onderdeel van de geluidsperiode, en wat de daaruit voortvloeiende opvatting van geluid in de filmgeschiedschrijving is.

Hoofdstuk vier richt zich op presentatiepraktijken van filmgeluid toegespitst op EYE Film Instituut Nederland, een instituut met een experimentele traditie in de presentatie van filmgeluid. Bijzondere aandacht gaat uit aan de institutionele dimensie van filmgeluid, die verwijst naar de ruimte en de context van de presentatie, alsmede de beleving: de auditieve waarneming en ervaring van het filmgeluid. Met behulp van het concept *soundscape* wordt hier onderzocht hoe filmgeluid wordt waargenomen en ervaren op de nieuwe locatie van EYE, en hoe de ruimte en institutionele context de

filmgeluidservaring beinvloeden.

In het licht van de sociaal-culturele en theoretische overwegingen van filmgeluid in de eerste twee hoofdstukken en van de case studies in het derde en vierde, wordt in hoofdstuk vijf een theoretisch model voor het definiëren van filmgeluid gepresenteerd. Aan de ene kant draagt dit model bij aan filmtheorie, omdat het helpt om het dynamische en vergankelijke karakter an filmgeluid, evenals de verschillende dimensies ervan en hun onderlinge relaties, te definieren. Aan de andere kant kan het model dienen als een potentieel instrument voor het nemen en verantwoorden van beslissingen in conserverings- en presentatiepraktijken, omdat het model de relevante aspecten van filmgeluid die moeten worden overwogen in de conservering en ontsluiting van cinematografisch erfgoed identificeert.

De hier ontwikkelde theoretische definitie van filmgeluid wordt gebaseerd op drie concepten: filmgeluid als *material form*, als *trace*, en als *performance*. Deze drie concepten in samenhang bieden een model voor het beschrijven en begrijpen van alle verschillende dimensies van filmgeluid die zijn voortgekomen uit conserverings- en presentatiepraktijken in de geanalyseerde case studies: zowel de materiële, als de menselijke, de technologische, de institutionele, de ervaringsgerichte en de herinneringsdimensies.