

Sonorous materiality of analogue film

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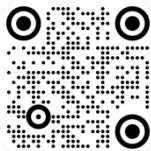
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Abstract

In this article, I represent film materiality's sensory and ecological aspects through the sounds I recorded during my ethnographic fieldwork on contemporary analogue film practices. By re-listening to the recorded sounds without visual references, I explore the multisensory and aesthetic relationships that human actors have with the film material, and what nonhuman actors have to say about their material causality in these soundscapes. By shifting the focus from the visibility of the film to the sonic qualities of the film material, I explore the potential of sonically observing the media materiality.

Keywords: sound studies, photochemical film soundscapes, field recordings, sensory aesthetics, ethnography



Please keep on your headphones while reading this essay and scan the QR code for the print version to listen to the soundworks.

Introduction

In this text, I visit the sensory aesthetic and environmental dimensions of the film materiality through the audio documentation I recorded during two years of participant observation in artist-run film labs[1] in Vienna and Berlin, also repair, photography, and telecine[2] shops in Istanbul.[3] Analogue film's small gauges of 16mm and Super-8mm find a niche artistic use today as experimental cinema formats, especially in Europe.[4] The human and

nonhuman sounds that emerge during film production constitute a rich resource for understanding and representing the practices of shooting, developing, and screening analogue[5] film beyond text and anthropocentrism. The sonorous materiality of film and its apparatuses that resonate throughout their practice can provide a reservoir for reconnecting film materiality's sensory aesthetics to its ecological dimensions. An acousmatic mode of listening to these recorded sounds allows for interpreting various moments in their specific cultural and historical contexts without privileging the vision and the human actors. I take sounds as a contact point to relate the sensory experience with analogue film and the aesthetics they produce to the ontological conditions of film manufacture and their ecological footprint. This re-association can help us to imagine media technological futures where sustainability is a central concern without ignoring the importance of material agency in aesthetic processes. Thus, I explore the following question: How can sounds be used to establish the material relationship between sensory aesthetics and environmental sustainability that can help us rethink cinema histories and reshape ecologically-oriented cinematic futures?

Materiality has been a central topic for a wide range of recent theoretical research, from cultural and media studies to anthropology.[6] The concept of agency, traditionally attributed to the human agent acting as a subject, has been challenged by new materialist theories. Philosopher Rosi Braidotti, with her concept of the posthuman, shifts the universalist position of humanist thought, centred on the human subject, into the symbiotic coexistence of the human and the nonhuman.[7] Eschewing the traditional binary distinctions between nature and culture, object and subject, human and nonhuman, physicist and feminist theorist Karen Barad's agential realism approaches the matter as 'an ongoing historicity'[8] from an epistemological, ontological, and ethical perspective while exploring the intra-activity between the material and the discursive. Although discussions on nonhuman agency vary, theories drawing on materiality largely follow a visual and logocentric path to make their cases. The hint of the sonic sometimes appears as a metaphor, as in the work of political theorist Jane Bennett, where she draws attention to the

political agency of things in shaping the human world. Tracing the vitality of the nonhuman and the non-living, Bennett asserts that '[w]e need [...] regimes of perception that enable us to consult nonhumans more closely, or to listen and respond more carefully to their outbreaks, objections, testimonies, and propositions'.[9] Bennett's invitation to listen to the nonhuman realm, although not conceptualised around a sonic thought in her book *Vibrant Matter* (2010), may prove crucial for philosophical thought that reconsiders agency between the human and the nonhuman.

While discussing the space of the sonic in a wide range of historical theories from Marxism to phenomenology, scholars James A. Steintrager and Rey Chow remind us of the etymological kinship of theory with 'viewing' and note that '[t]he recent return to aesthetics, affects, and the senses has likewise oscillated between image and text, showing scant interest in the topic of sound as such'.[10] Similarly, sound scholar and sonic artist Salomé Voegelin emphasises that theory, 'even of the sonic, promotes a visual and mute thinking of the world'.[11] Voegelin searches for sonic methodologies rather than theories to attain the realm of 'interaction and interbeing' and concludes that telling sonic stories 'yields the insight of unseen lands as unknown lands that once heard can become part of our present'.[12] Through sonic participation, a lived moment's 'contingent interactivity'[13] and once visible elements that participate in the happening of that moment invisibly resound. The sonic realm, then, resonates as the domain of intra-action and symbiotic becoming. Sonic methodologies or sonic stories can broaden human-, eye- and logo-centric interpretations of the world and underline the connected and interrelated co-creation of traditionally separated categories of nature and culture, humans and nonhumans, living and non-living beings.

Observing sensory aesthetics of film materiality

Art historian Petra Lange-Berndt discusses the role of materiality in contemporary artistic practices, emphasising the scarcity of a theoretical focus on materials beyond an anthropocentric interest in things. Lange-Berndt asks what it 'mean[s] to give agency to the material, to follow the material and to act with the material'.[14] Concerning analogue filmmaking, filmmakers engage in an artistic practice that focuses on the material articulations of photochemical film. However, in

line with Lange-Berndt's formulation of giving agency, this division of material agency seems anthropocentric. Filmmakers share their agency with the media objects and transform their accidental operations into aesthetics, but the knowledge and mastery of the artist prevail.

During a Super-8mm film development workshop at filmkoop in Vienna, filmmaker and workshop organiser Steffanie Weberhofer explained to participants that 'film is not only about seeing but [also about] hearing and feeling'. [15] Analogue filmmakers working with an experimental, do-it-yourself approach on Super-8mm and 16mm formats today praise their medium not only because of the grains and vibrant colours that mark the viscosity of this practice but also because of the multisensory processes afforded by a filmstrip's physicality. Touch is central to this practice. [16] Tactility is the key sensation in a spectrum of sensory discourses in which more intimate bodily interactions are translated into visual aesthetics, such as leaving a fingerprint on recorded images, the kinetic attraction between wet film and dust, or filmmakers inscribing bodily elements such as saliva, blood, and skin on the celluloid. [17] Touch also allows feeling the water temperatures and the textures of various surfaces, such as metal and plastic, during the film bath. While preparing chemical baths to develop their films, filmmakers experience olfactory perceptions too. A filmmaker told me she required a chemical-free year because of the carcinogens she was exposed to when developing film by hand. Film offers even a gustatory experience as 'every artist who has developed their films or has loaded a camera had to kiss the film in the dark at least once in their life' [18] to find the side that has the emulsion on it. These proximate senses build the intimate relationship between the filmmaker and the film materiality. These sensory experiences, however, often work hand in hand with visual perception. Someone holding a filmstrip might seek the light to see the indexical images on it. Ultimately, this multisensory experience is reduced to the visual aesthetics of the final product, the film.

While analogue filmmaking emerges as a multisensory distinction, the ontological conditions of film materiality often remain secondary to what artists can do with it. Materialist film theory, focusing on physical experiments with film, remains within the scope of medium specificity, which rather points to the exceptional

characteristics of the medium. Media scholar Gregory Zinman asserts that ‘the contextual industrial and ideological aspects of [film’s] use and manufacture’ are often neglected in the ‘handmade and materialist filmmaking’s unexamined commodity fetishism that focuses on the physical properties of the analog medium’.[19] Even if today’s analogue filmmakers are better aware than their digital counterparts of the raw materials, if not the conditions of production, that make up their medium, the visual spectacle created by these materials continues to dominate over how these materials are produced. Zinman explains that

film stock is made of plastics and its emulsion is made with gelatin, which is derived from animal by-products. The ‘grain’ of the film is silver salts, which are converted to metallic silver following exposure to a light source. The emulsion consists of silver halide grains suspended in a gelatin colloid – a synthesis of mineral and animal by-products. [...] Contemporary polyester film stock is a relatively stable form, capable of lasting hundreds of years. This makes it both an ideal preservation medium for moving images and a guarantor of its continuing material presence in other landfills in those cases where trims, scraps, and entire prints deemed unworthy of care and preservation are discarded.[20]

Therefore, there is an ontological distinction between the medium that is cared for and given agency and the material components that constitute this medium. Material existence persists long after the medium ceases to be a medium. In the shift from medium to materiality, the interaction of environmentally conscious artists with film is exemplary. Chemist-artists who not only recognise the layers of the film material but also have the chemical knowledge to manipulate it stand out. The project ‘Vegan Analogue Film’ (2019), in which filmmakers Josephine Ahnelt and Ester Urlus produced a gelatine-free film emulsion and achieved a successful result in terms of experimental film aesthetics, is an exciting endeavour.[21] Super-8mm filmmaker Dagie Brundert produces her ecologically sustainable film developers from rosemary, beer, potato juice, seaweed, and many other non-toxic ingredients.[22]

In this context, as Lange-Berndt notes, ‘those who have been listening to [...] materials, have not predominantly been academics but artists, designers, architects, conservators or technicians’.[23] Thus, filmmakers who listen to their materials contribute to the emergence of ecologically sustainable media futures, in contrast to the conventional use of industrial media technologies. The commodity fetishism

around analogue film may therefore be more a problem of observation than practice. Film theories rely heavily on the image for understandable reasons, such as the appeal of the final product to the eye. Academic studies on photochemical film and its apparatuses[24] focus on the exceptional physical possibilities that give rise to visual aesthetics, often ignoring the contexts that produce this medium. The predominance of visual observation may be one of the reasons for this neglect.

In a more general sense, however, media studies increasingly engages with the socio-ecological footprint of material components of media technologies.[25] Nevertheless, as author Nadia Bozak notes, '[t]he image – cinematic, photographic, digital, or analog – is not only materially and economically inseparable from the biophysical environment, it is the environmental movement's primary pedagogical and propagandistic tool'.[26] Visual technologies that are part of ecological conflicts retain their status as tools that convey the message of nonhuman labour while their material status becomes invisible. Sounds, with their recordable and replayable character, break the dependence on the image as a means of documentation, observation, and representation, making materials audible. In doing so, they take up less space than their visual relatives, such as the mov. and mp4. Beyond simply listening to sounds, hearing as 'a way of touching at a distance'[27] emphasises the synesthetic experience of perception when the visual dominance is removed. Listening to the sonic realm without visual references can liberate materials from their anthropocentric status as commodities, objects, mediums, devices, or things. In this sense, analogue filmmaking contains much more vivid material soundscapes than its digital counterparts. Moreover, as I will sonically demonstrate later, the film process offers moments in the darkroom freed from the hegemony of the eye.

Sonorous materiality

While literature on materiality rarely addresses the sonic, there is a growing interest in materiality from a sonic perspective. Writer and sound artist Andy Birtwistle considers (historical) sound emerging from the material constellations of (obsolete) technology as a source that mobilises the generalised passivity of non-humans. Birtwistle notes that '[h]istorically these sounds have been treated as a problem, and successive waves of technological innovation have been directed at

repressing the sound of technology',[28] which may explain the increasingly muffled soundscape of digital technologies. The attempt to eliminate the noise generated by technologies in use, such as electrical or mechanical noises, points to the progressive linear logic of media technologies that considers the markers of media materiality as problematic.

Writer and curator Caleb Kelly's concept of 'materials of sound' brings a sonic perspective to current artistic, theoretical, and philosophical debates on materiality in a world of ecological crisis, exploring the intersections of materiality and sound from an aesthetic and ecological perspective. Considering the sound arts, Kelly notes that

In the shift of our attention to the sound itself or the sound in itself, it may be that we have forgotten the material origins of that sound. While we listen closely to all manner of sounds in nature and culture, the things that created the sounds have receded to the background. Even speakers are things. They may play digital audio, but they are made out of cardboard, wooden casing, copper wire, and magnets. They are things, and their materials have a history.[29]

Kelly then moves from reduced listening while making a sonic shift from media objects to their material components. Composer and acoustician Pierre Schaeffer introduced the term '*musique concrète*' and the practice of reduced listening to the formal properties like rhythm, timbre, and tone of non-instrumental sounds such as steam engines and trains.[30] Reduced listening, as much as it is innovative in the sound arts and expands modes of perception, also carries the risk of abandoning the field of knowledge to the visual. In this regime of perception, the sonic remains a psycho-acoustic experience rather than a mode of knowledge. Kelly presents examples of contemporary artworks that access material information through sound, opening a sonic dimension to ways of understanding materiality dominated by visibility and touch.

The music of sonorous materiality of analogue film can also convey semantic information. By sonorous materiality, in line with Birtwistle and Kelly's concepts, I mean the sound that technologies make when used as assembled mediums of sensory aesthetic experience. The resonant matter, noises, signals, and vibrations can restore the uneven margin of agency between the human and the nonhuman while

recalling the interwoven web of nonhuman energies that contribute to artistic practices and sensory aesthetics. I argue that empirically observing an artistic practice, in my case contemporary analogue filmmaking, through a mode of acousmatic listening that omits visual references and focuses on the materiality of sound can grasp the entanglement of materiality in a radically different way than visual observation. Sounds are, beyond an anthropocentric stance, the performance of materiality in process.

Sonic observation and acousmatic listening

As an observer, it is difficult to access information beyond the voices and narratives of filmmakers who intimately engage with the material. Particularly in visually participatory moments, the indexical images visible on the film before projection and the agency of the people who create them are dominant. When watching the process of working with a film apparatus, it is more likely to see the human hand as the main subject and agent. After all, handmade film is another common term used to describe photochemical filmmaking. Having multisensory experiences with a medium is the result of years of practice. This knowledge, which artists and technicians with this expertise take the time to present, leads to human beings at the centre of the lived moment. Therefore, ocularcentrism, which prioritises vision, can reinforce anthropocentrism.

Sound theorist Brandon LaBelle asserts that ‘sound is a medium enabling animate contact that, in oscillating and vibrating over and through all types of bodies and things, produces complex ecologies of matter and energy, subjects and objects’.[31] Thus, sounds and listening practices open up new ways of knowing, confusing the traditionally coded roles of object and subject. In cultural contexts where animate and inanimate matter appears as opposing categories, sounds, especially those that are listened to without seeing their source, can break anthropocentrism.

Here, empirical methods centred on participant observation can offer practical approaches to and with the sonic. With the ‘sensory turn’ in ethnographic research and the proliferation of sound recording and editing, there has been a move away

from exclusively text-based and logocentric work towards using sensory perception to comprehend and represent research fields in an interdisciplinary way. While visual ethnography is still the dominant form of non-textual observation, empirical engagement with listening to cultures is increasingly gaining traction.[32] Sound recordings can challenge visual observation by allowing us to listen to what LaBelle calls 'sonic agency' to address our time's critical ecological, social, and economic issues. Engaging with the politics and ethics of the public sphere through the sonic and listening, LaBelle argues that 'invisibility may extend precisely what or who counts, within the space of appearance, by widening the sphere of the uncountable and the inexistent as bodies that matter'.[33] One approach LaBelle proposes to overcome the 'logic of visual capture'[34] is acousmatic listening.

Listening to sounds by separating them from their visual sources while focusing on the bioethics of the invisible can also connect the causality between sensory aesthetics and the ecological dimensions of artistic practices. If the gaze reinforces anthropocentrism by placing artists at the centre, perhaps the causality of the non-human energies transformed into sensory aesthetics, from raw materials to multispecies labour, can be attained through acousmatic listening practices. When the visual spectacle is removed, sounds can allow us to listen to the interplay of multiple actors rather than one person mobilising or distributing agency to passive nonhuman participants. Eliminating the visual layer can make room for a broader imagination that understands the world not as a playground for humans but as a complex performance of living and non-living beings. While separating sounds from their visual sources can be done by closing the eyes, the recordable character of sounds (up to a point) makes the sonic realm both a documentable research subject and a representation method. Therefore, when sounds are transformed into sound objects that can be replayed through a schizophonic[35] practice, there is a space to listen more carefully to nonhuman participants.

In the darkroom

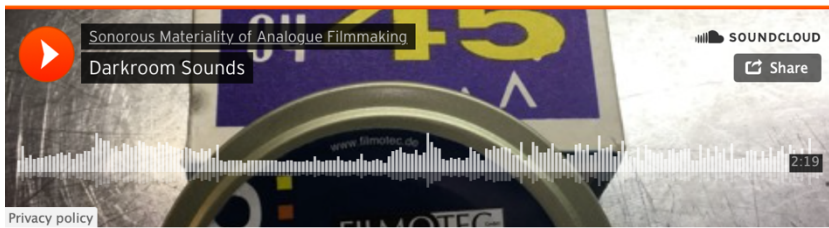


Fig 1: Sound Clip: 'Darkroom Sounds'. Loading an expired 16mm film from USSR in the darkroom, finding her way through the beats and bumps of metallic and plastic bodies clashing with each other, filmmaker Masha Godovannaya describes her experience working in the pitch dark as a 'concentrated silence'.

<https://soundcloud.com/sonorousmaaterialities/darkroom-sounds>

In handmade filmmaking, as the filmmaker develops the film in the darkroom, there is a moment of visual interruption guided by touch and surrounded by the vivid sounds of materiality (Fig. 1). In these moments of acousmatic listening, in which I find myself as a silent observer in a secluded corner, unlike the filmmakers who produce plastic-metallic sounds by touching the developing tanks and reels on the cold steel workbench, the material grounds I rely on are sounds. In this highly light-sensitive environment, even the red circles that indicate that the audio recorder is recording are hidden under the light-proof molleton cloth. The darkness manifests itself through the muffled tones in this clip. When the hegemony of the eye is interrupted, the eye omitted from light cannot follow the filmmaker who is skilfully and busily moving around the space. The sensory realm of analogue film practice can be attained through the tempo of the sounds. Stripped of visible references, these moments manifested as inspirations to listen to the material beyond the human. In these acousmatic moments, the rewinding of an expired Soviet film to a 16mm Krasnogorsk film camera transformed from medium-specificity into the vitality of plastic and metal. Instead of remaining in the background, the sound of dripping water on a metal sink, essential for the film's multiple baths, simultaneously echoes their fluid materiality and the infrastructure that sustains this materiality. Through acousmatic listening, it is perhaps impossible to define the exact character of the materials: is the metal aluminium or steel? However, they manifest their materiality by leaving their objecthood or tool positions. In the dark, sounds become a source of knowledge of nonhuman agency that enables one

to listen not only to their psychoacoustical tones, rhythms, and timbres but also to their materiality. Although the sounds alone cannot tell us all the complex stories of materiality, such as the afterlife of the water contaminated by the film developers brought to the municipal garbage centre by the filmmakers, they draw attention to the vitality of this subject through the animacy of their sound and arouse curiosity for further questions.

In this clip, one can hear the subjectivity of the listening experience through the human voices. While the practitioner Masha Godovannaya explains her time in the darkroom as ‘concentrated silence’ and that she rarely prefers to listen to music while working, for me, the observer, it is a sonorous moment which is a fundamentally different ‘feeling’ from thinking about the research matter in front of a computer. Practices of listening and interpreting what one listens to are deeply connected to who listens to what, where, and for what purpose.[36] Therefore, the position, cultural background, and perspective of the person practising listening are significant in indicating the subjective readings through which the transmitted information is interpreted.

Polyphony of film apparatuses



Fig 2: Sound composition ‘Polyphony of Film Apparatuses’. Rhythms of analogue filmmaking while filmmaker Maja Milic working on a Crass animation stand in LaborBerlin; sounds of a 16mm Bolex camera; filmmaker Deborah S. Philipps demonstrating the sounds of the Steenbeck editing table in the Media Centre at the Kunstquartier Bethanien in Berlin; film technician Erdogan Bidav digitalises half a century old Super 8 film in his Telecine shop in Istanbul, a Super-8mm Eumig camera films various frames per second.

<https://soundcloud.com/sonorousmaterialities/sounds-of-filmic-intermediaries-1>

The sound composition ‘Polyphony of Film Apparatuses’ (Fig. 2) consists of sounds recorded in various contexts and geographies. Some of the sounds in this clip I collected during a day of observation, such as Maja Milic’s work session at

LaborBerlin and Erdoğan Bidav's transfer of a historical amateur Super-8mm film to USB as a digital file at the Telecine workshop in Istanbul. Others, such as Deborah S. Philipps' demonstration of how the Steenbeck editing table works in the media centre of Berlin's art quarter Bethanien and the sound of a 16mm Bolex during a workshop at filmkoop Vienna, were kindly demonstrated to me so that I could hear and record them. Finally, during my experiments with a borrowed camera, I recorded the sounds of the Eumig Super-8mm camera recording images at different speeds while sonically materialising the temporal characteristics of moving images. Listening to the sounds of these instruments that filled the space and enlivened it with their loud rhythms sometimes extended to a period close to meditation. Sometimes the experience was limited to a brief moment of eavesdropping. Apart from these temporal and spatial differences, trying to understand how these apparatuses I often saw worked for the first time was a quest that I followed with my eyes. During these endeavours of comprehension, the source of most of my information was the human voice, which stands at the top of the sound hierarchy to convey meaning. Therefore, my eyes mostly followed people as subjects who generously shared their knowledge with me.

When I played this composition to my students without informing them about the content beforehand and asked them what they had heard, I received some precise or close guesses such as 'old cinema', 'old movie cameras', 'cassette players', and 'analogue clocks', as well as arbitrary answers like 'microwave', 'train', 'stamping', 'old car engine', 'swing', and 'a day in an office'. When I asked them to evaluate these sounds from an aesthetic point of view, i.e. reduced listening to sounds with a culturally shaped ear, almost all of them found them disturbing. Only during one presentation a techno music lover related them to the industrial roots of techno and found them musically interesting. Beyond aesthetically interpersonal and intercultural readings, one could semantically say that these sounds are the sounds of an industrial society. For someone who does not know the context, these sounds could be coming from any industrial factory. Metallic drilling rhythms recall the intertwined histories of film technology and extractive industrialism.

As film theorist and composer Michel Chion noted, 'a sound often has not just one source but at least two, three, even more'.^[37] Thus, the sounds of analogue film

practices in this clip reverberate the symbiotic vitality of static things through the liveliness of the metallic-plastic rhythms of assembled media objects, apparatuses, and mediums. The sonic dimension of the filmmaking process encompasses the spatiotemporality of all these culturally diverse moments. Human chatters point to the sociality of the space, while the rhythms of the various frames per second at the beginning and end of this composition materialise time and the illusion of moving images by a continuous act of recording frame after frame.

Searching after one common source that marks all the sonic instances in this clip, one arrives to listen to the keynote sound of the electrical signal. Composer and sound environmentalist R. Murray Schafer asserts that keynote sounds ‘are heard by a particular society continuously or frequently enough to form a background against which other sounds are perceived’.[38] According to Schafer, the keynote sounds indicate the characteristics of the people exposed to them.[39] Attuning the analogue film processes from a sonic perspective materialises the electrical signal as a fundamental element. Schafer notes that the keynote sound ‘is the anchor or fundamental tone and although the material may modulate around it, often obscuring its importance, it is in reference to this point that everything else takes on its special meaning’.[40] Electricity moves forward in this analogue soundscape with a switch of sonic attention from the mechanical figures that take on its meaning to electrical grounds. Electricity, as an actor so pervasive in everyday life of the Global North, seems to function so smoothly that its very existence is underheard. Electrical noises vivify inanimate and mundane objects and shape cultural techniques.

Perhaps one reason that my ears become more sensitive to the background signals of electricity is that during my fieldwork in Istanbul in February 2022, news of constant power cuts from Anatolia and high price increases across the country shook the accepted nature of the everyday use of electricity. Hanging electricity bills in the windows of shops on the verge of bankruptcy soon turned into an act of protest. In Erdoğan Bidav’s workshop, where I found the sounds of analogue film apparatuses in use after a long search, all technical questions turned into answers overwhelmed by economic conditions. Sensory aesthetic experiences can-

not develop as a tradition unless economic opportunities create cultural infrastructures. Currently, rising prices of raw materials in Europe are closely affecting alternative art spaces held together by limited collective efforts, such as filmkoop Vienna, of which I am a member. A 'volatile mix of coal, sweat, electromagnetic fields, computer programs, electron streams, profit motives, heat, lifestyles, nuclear fuel, plastic, fantasies of mastery, static, legislation, water, economic theory, wire, and wood',[41] an electrical grid becomes a more fragile assemblage as the resources it depends on diminish. Electricity, derived from this complex combination of raw materials, is one materiality to be listened to when reconnecting multisensory aesthetics with environmental resources.

During analogue filmmaking, there are sonic moments where the continuous key-note quality of the electrical signal is interrupted. The faint sounds of the 16mm film camera in this composition (0:09-0:32), losing tempo and fading out, are the emission of a different kind of energy. As some of my students have surmised, they resemble the sound of an old clock waiting to be wound. The kinetic energy provided by a crown attached to the camera needs intervals before it buzzes again. This sound adds a self-contained dimension to the concept of handmade film. Winding the handle to load the spring-wound motor, the operator transfers energy to the camera body. This apparatus, which receives kinetic energy from the filmmaker's arm, has the capacity to add an ecological dimension to the design of media technologies. Thus, electricity as 'a medium' supposedly 'without a message'[42] echoes an environmental message in an age of ecoanxiety[43] fraught with scenarios of scarcity and blackouts.[44] Through contextual interrogation, the soundtracks thus relate human-centred sensory aesthetics to the environmental footprint of film technologies.

Soundscape of an analogue film screening



Fig 3: Sound Clip 'Projector Does Not Want to Work'. Filmmaker-projectionist Karel Doing tries to convince a moody projector to work during a screening in filmkoop Vienna. In the end, the projector decides to work.
<https://soundcloud.com/sonorousmaaterialities/projector-does-not-want-to-work>

The former cold microcinema of the artist-run film lab filmkoop Vienna is filled with the intermittent buzz of a 16mm projector (Fig. 3). The projector forces itself to work or feels compelled to work amidst the sounds of metal and plastic. A monotonous electrical signal fills the silence in the moments when its voice is muffled. Filmmaker-projectionist Karel Doing, trying to negotiate with the projector to show his films, wishes it would behave better. The vibrations reverberate through the bodies of about ten people who fill the small room, sitting on different sofas and old cinema seats. The audience sits in silence, knowing that when one part of the experimental analogue screenings is to experience the films' vivid colours, the other part is to surrender to the agency of the film and its apparatuses. A few other elderly projectors wait for their turn. Karel Doing intervenes with gentle touches in the inner world of the projector that does not want to work. Together we wait for the images to be projected on the white cloth stretched on the wall. In the meantime, I ask myself: Who and what participates in this mechanical polyphony? Is it the moody analogue projector making these noises? Is it the projectionist's hands that tend to the projector like a surgeon or the celluloid film forcing its plastic body to pass through the projector? Are the electric cables coming from beyond the walls and connected to a multinational power grid the source of all this? Is it the bright bulb of the projector or the texture of light-sensitive silver halide particles suspended in the gelatine-based film emulsion that causes these noises?

Like Kelly's statement that sounds 'call on us to think about where these materials have come from and where they will end up',^[45] the sound clip 'Projector Doesn't

Want to Work' resonates the soundmark of a changing cinematic soundscape. Schafer defines a soundmark as 'refer[ing] to a community sound which is unique or possesses qualities which make it specially regarded or noticed by the people in that community'.[46] As a 'memorable or vital acoustic experience',[47] mechanical projection sounds made their mark on cinema before they were considered unwanted noise or radically altered by digital technologies. They still define a nostalgic tone of a certain cinematic soundscape. Curator and academic Kim Knowles considers 'the rhythmic chatter of 16mm projectors' as 'a mechanical soundtrack to this vibrant celebration of film technology'.[48] In this sound clip, however, this chatter is interrupted by the projector's refusal to work, as if to illustrate the discontinuity between cinema technologies symbolically. The keynote sound of the electrical signal alone does not provide the necessary infrastructure for the moody projector to work again. It is then a question of working with the projector, understanding its materiality and constantly trying to convince them to co-create this micro-cinematic moment. In this sense, this clip echoes the language of care and maintenance.

Knowles, discussing contemporary practices with photochemical film in the context of technological shifts and materiality, views the appropriation of film and its apparatuses as 'a culture of recuperation, recycling and repurposing'.[49] As long as audio-visual media tools are produced according to a linear logic of technological progress, all the human and nonhuman labour forming them is transformed into devices that will supposedly soon become obsolete and contribute 'their share to the gigantic rubbish heaps that cover the face of our planet or to the mobile junk that zips through outer space'.[50] Therefore, from an anthropocentric perspective, the collective efforts of filmkoop, which adopted the unwanted analogue machinery and maintains film projection infrastructures, and filmmaker Karel Doing, who travels to Vienna to project his films, initiate these sound waves that reverberate through the bodies of the audience waiting to watch experimental analogue films in this cold cellar dedicated to alternative film practices. Thus, the tired projector in the screening room is transformed from an outdated object into an agent that reminds us of its presence with loud sounds that are as central to the multi-sensory film experience as the films projected on the screen. Yet, a film projector

that has lost its anticipated function echoes the components that make up its integrity as a medium. The plastic-metal sonority of the obsolete film projector may challenge the linearity of new technologies driven by capitalist concerns as long as it works. A non-working projector, like many other old devices, will be reduced from a media object to its material components and sent for scrap.

In this soundscape of collective maintenance echoed through an analogue film screening not all melodies of the participants come from discontinued materials. When the projector's mechanical sound fades, the film's plastic sound – waving in the air because it cannot find the gate to enter and be shown – can be heard.

Materiality of analogue film

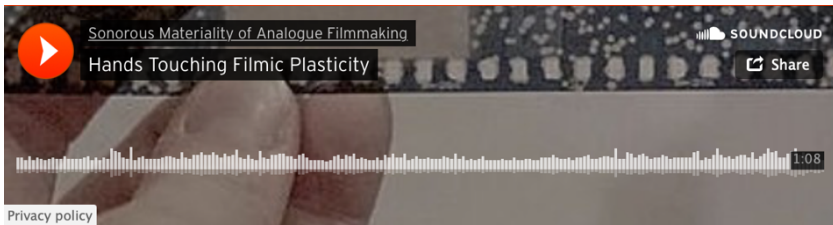


Fig 4: Sound clip 'Hands Touching Filmic Plasticity'. A multispecies touch echoing deeply entangled voices of animal, mineral, vegetal, human resources, synthetic chemistry, (sun)light, water, electricity, and much more in its many layers embedded on the film base.

<https://soundcloud.com/sonorousmaaterialities/hands-touching-filmic-plasticity>

Photochemical motion picture film, used as a motion picture format for most of the 20th century, has lost its importance in the cinema industry in the face of 'technological shifts that have been taking place since the 1990s'.^[51] With the rise of digital technologies, which are relatively cheaper, faster, and easier to use, it has been widely regarded as obsolete. However, this once dominant moving image material finds a niche now. Contemporary practices with film stock centre around the artistic interpretations of its physical distinctions. The supposed immateriality of digital technologies,^[52] the relatively limited tactile possibilities they offer users compared to film, and the constant software and hardware updates make analogue film a viable alternative to a variety of artists. Moreover, some filmmakers who have learned to make films on film do not want to give up their instrument to which they have become accustomed.

Film material is a complex assemblage of elements, earthly labour, animal exploitation, mining, and the oil industry, and mechanical, optical, and chemical know-how. From the late nineteenth century until now, photochemical images have been engraved in the different supports. Although celluloid is still used metonymously to describe photochemical film, film stock consists of two supports of polyester and cellulose acetate bases today. One can hear their differences from the sounds they make: acetate film breaks whereas polyester bends without being torn apart. Polyester film is mostly used as print film and projection copy due to its durability. In contrast, acetate film is used to shoot on film without damaging the camera due to its flexibility.

Physicality, which allows for a variety of direct interventions on the film surface, is used by scholars and practitioners as one of the central discourses to emphasise the tactile qualities of film. Visually observing a filmmaker working with film evokes anthropocentric notions of handcraft, artisanship, and mastery. But what does the touch of film sound like without visual references? Listening to the sound clip 'Hands Touching Filmic Plasticity' (Fig. 4) reveals the materiality of film rather than its medium quality. The randomly swirling sounds, which emphasise the difficulty of controlling this material, remind us that although plastic is flexible, it is a stubborn material. Without visual references, the touch of celluloid links its status as a medium to the petroleum that is the product of a wide range of deep-time labour. The maverick noise becomes a clamour of the multifaceted components, industrialism, and artistic lineages that realise this moment. Thus, one interpretation of this sonorous materiality where I touch Kodak's ESTAR polyester film base is the sound of petrochemistry.

In her book *Plastic Matter*, culture and media scholar Heather Davis analyses racialised pasts and possible queer futurities through plastic and argues that

the process of naming plastic as a medium [...] brings the material forward for critical analysis, allowing us to ask how it circulates and what infrastructures and legacies are being built with it, what material presents and futures we have created, what have been foreclosed, and for whom.[53]

Acousmatic listening to film stock can help us to call photochemical film petrochemical. Listening without seeing the indexical images etched on the film connects different time scales, while sound works as a speculative mediator between the deep-time fossilisations of dead plants and animals, water, air, coal, capitalist progressivism, and the material-discursive desires of people projected towards an idea of a future provided by a niche cultural-material image. Plastics exist to transcend temporality on a human scale at the expense of racialised geopolitics and multinational land exploitation.[54] Semantically, listening to these sounds evokes notions of permanence in film materiality. While human actors argue around the promise of archiving the enduring materiality of analogue film for nearly 100 years, the nonhuman sounds of plastic remind us of the specific infrastructural energies required for this preservation. In a world full of ecological crises, the notion of permanence, which must be translated between media technologies that frequently change formats, becomes a growing energy problem. Suppose we could eliminate the premise of permanence in audio-visual arts. In this case, the analogue film might take on different timbres, even if it contradicts the preconditions of the current capitalist art and culture industries. Alternative analogue tonalities can therefore be imagined, such as mycelium murmurs,[55] which do not guarantee permanence but hold promise for sustainability-centred media futures.

Challenges of sonic methodologies

So far, I have explored the possibilities of using sounds to reconnect the sensory aesthetic and environmental aspects of analogue film materiality. Sounds without sight can echo the vibrant nonhuman labour in this particular media practice. However, embarking on a material enquiry with recorded sound comes with specific challenges. For example, using sounds as a source is speculative when the materials cannot be heard distinctly. Furthermore, in cases of hearing impairment, sounds beyond vibrations will not make sense as a research object. For me, however, the digital sound recorders I used to relate the sensory aesthetic to nonhuman labour and the computer I used both to edit these sounds and to write these lines constitute a paradox for this research. Digital tools have carbon footprints

and environmental issues, too, as they depend on extracted materials like coltan, cobalt, tin, silver, and palladium.[56]

Conclusion

Sounds emerge as a distinctive method for empirical research on media materiality as they are ‘thoroughly material’[57] with capturable vibrations. Listening to the sonorous media materials, peeling the mediums within mediums could be an accessible method for routine inspections towards ‘green(ing) the media’[58] and how we understand the world around us. Sounds hold the capacity within them to blur the subject-object divisions when one only listens to the world without depending on the scaled hierarchies of the eye, putting the human actors in the centre of the actions. Sounds we may ignore while looking, perhaps impressed by the artist’s knowledge, reveal the inseparable relationship between plastic and metal as mediums together with electricity and water. Even though ‘we rarely recognise a unique source exclusively on the basis of sound we hear out of context’,[59] by rehearsing purposeful listening and asking specific questions on causality, the sounds can be one way to attain the biophysical ontology of a material. Potentially, a sonic observation could reveal information about cinema’s destructive industrial roots and eco-centric media futures. Thus, rather than being a conclusion, sounds are only one of many tools to consider the presence of nonhumans when asking questions about environmentally friendly cinema technologies and film practices.

As film practices move from permanence to sustainability, from authentic artworks to ephemeral processual relationships, film materiality can help us imagine the futurity of ecological media practices. In a muffled digital soundscape, where the sounds of media technologies are increasingly muted, filmic sonority can emphasise the sensory aesthetics defended by analogue practitioners and the emphasis on process rather than the product. Industrial materials do not necessarily have to be used to experience these processes. It is impossible for artists operating in capitalist art markets and living precarious lives to change standardised materials independently. Nevertheless, they bring a material sensibility through processes that aesthetically guide us which directions to move. In an age of ecological crisis, sounds of media practices echo the destructive industrial endeavours resonating through the physicality of audio-visual technologies. Yet they also resound

the possibilities of transformation towards more eco-centric cine-materiality, if we find nuanced ways to listen to the voices of all these human and nonhuman actors of vibrant media materiality.

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Notes

- [1] Technical collectives where filmmakers keep the analogue film infrastructures alive and work with photochemical film with a 'metacinematic reflection' . (See Catanese & Parikka 2018, p. 51)
- [2] The process of transferring film to other formats such as tape or digital files.
- [3] My ethnographic PhD at the Department of European Ethnology at the University of Vienna explores the senses made with photochemical film in different cultural contexts today, considering the sensory aesthetics, economic, and environmental conditions of the medium. A peer-reviewed experimental documentary film, based on my audio-visual documentation and re-enactments of interviews made with filmmakers and maintainers, will be published in March in the journal TRAJECTORIA.
- [4] According to the world artist-run film-labs map (<https://www.filmlabs.org>, accessed on 15 August 2022), of the 61 laboratories worldwide, 41 are located in Europe.
- [5] I use the term 'analogue' as it is widely used by the filmmakers I interviewed in German and English languages. In Turkish, the maintainers and photographic film sellers used the terms 'film' and 'mechanical' more often than 'analogue' whereas 'argentique' is the notion used in the French context.
- [6] See Boscagli 2014; Miller 2005.
- [7] Braidotti 2013.
- [8] Barad 2007, p. 151
- [9] Bennett 2010, p. 108.
- [10] Steintrager & Chow 2019, p. 2.
- [11] Voegelin 2021, p. 270.
- [12] Ibid., p. 275.

- [13] Ibid.
- [14] Lange-Berndt 2015, p. 13 (emphasis in original).
- [15] As a member of the artist-run film lab filmkoop Vienna, I approach the subject from an auto-ethnographic point of view. So, in this article I adopt a narrative that also emphasises my personal experiences.
- [16] See Lameris & Flueckiger 2019.
- [17] Knowles 2013.
- [18] Lefrant 2019, p. 35.
- [19] Zinman, pp. 116-117.
- [20] Ibid, p. 117.
- [21] <https://super8.nl/en/nieuws/vegan-analogue-film-2/> (accessed on 15 November 2022).
- [22] <https://www.dagiebrundert.de/ECaffenol.html> (accessed on 15 November 2022).
- [23] Lange-Berndt 2015, p. 16.
- [24] See MacKenzie & Marchessault 2019; Lissel & Edgar et al. 2019.
- [25] See Parikka 2015 for the material conditions of digital technologies; see Coleman & James 2021 or Levin & Ruelfs et. al. 2022 for the history of photography’ s extractive dimensions.
- [26] Bozak 2011, p. 3.
- [27] Schafer 1994, p. 11.
- [28] Birtwistle 2017, p. 42.
- [29] Kelly 2018, para. 3.
- [30] Schaeffer 2017.
- [31] LaBelle 2018, p. 7.
- [32] Boudreault-Fournier 2021.
- [33] Ibid., p. 32.
- [34] Ibid., p. 17.
- [35] Schafer 1994, p. 90.
- [36] Sterne 2012, pp. 3-4.
- [37] Chion 2012, p. 49.
- [38] Schafer 1994, p. 272.
- [39] Ibid., p. 9.
- [40] Ibid.
- [41] Bennett 2010, p. 25.
- [42] As media theorist Marshall McLuhan claimed about electric light (McLuhan 1964, p. 15).
- [43] Ecoanxiety as a result of ‘negative psychoterratic impacts of climate change’ is “re-lated to a changing and uncertain environment” (Albrecht 2019, p. 76).
- [44] <https://www.bloomberg.com/news/articles/2021-01-27/green-shift-brings-blackout-risk-to-world-s-biggest-power-grid#:~:text=As%20bitting%20cold%20caused%20power,to%20keep%20the%20same%20frequency.> (accessed on 15 November 2022).
- [45] Kelly 2018, para. 6.
- [46] Schafer 1994, p. 10.
- [47] Ibid., p. 152.
- [48] Knowles 2020, p. 13.
- [49] Ibid., p. 138.
- [50] Zielinski 2006, p. 2.
- [51] Knowles 2020, p. 1.
- [52] See Parikka 2015.

- [53] Davis 2022, p. 71.
- [54] <https://www.bbc.com/news/uk-57139474> (accessed on 15 November 2022).
- [55] See Sheldrake 2020.
- [56] See Parikka 2015.
- [57] Schulze 2012, p. 198.
- [58] Keilbach & Pabiś-Orzeszyna 2021.
- [59] Chion 2012, p. 48.