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Listen: a litho-phonic encounter

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Workshop manuals on lithography tend to be written with art students in mind and the information they contain largely focuses on technical aspects of the process. It is, however, difficult to put into words the nuances of this printmaking practice, and consequently, handbooks rarely refer to sensory information and phenomenological experience. In light of this issue, my intention in Listen is to test the potential and limitations of written language as a means through which to describe the tacit and embodied knowledge of a lithographer. To aid this task, I created a two-minute video recording of myself preparing a lithography stone and this video features as a central element in the text. Prompted by a process of transcribing its sound, this video became the protagonist of a transdisciplinary encounter between lithographic sound and words. Structured as an intertextual narrative, Listen couples the transcription of the video with a historic, geological and cultural survey of sonorous stones. Punctuating the dialogue, are quotations from lithography handbooks that tether this serendipitous exchange to its intention: that being to speak about the perceptual realms of lithographic practice. At the core of Listen, is the subject of graining limestone—a process that requires both careful attention, to ensure that the surface is even and free from unwanted marks, and a tolerant sensitivity to the abrasive noise of graining stone. These two aspects, attention and noise, are entwined in the content, critical interests, and metaphorical dimensions of Listen. As a piece of written material from ongoing practice-led research that explores the intersection between lithography and language, Listen knowingly tests the protocols of academic language. My intention through this unconventional approach, is not to present the results of an enquiry, but to offer the reader a scriptural space for contemplative reflection. Somewhat akin to the practices of stone lithography, I suggest that the act of engagement that Listen proposes is rewarded by intimate attention and sensitivity to the presence of noise.

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Introduction

Sonorous correspondence. In *Listen*, I explore the musical worlds of stone through a serendipitous polyphony of lithographic and litho-phonic worlds. As an intertextual narrative, one strand describes a video documenting the preparation of a lithography stone. Coupled with this intimate observation of the noisy process of graining limestone, is a historic, geological and cultural overview of the world's sonorous stones. Whilst many shared themes arise, it is the acoustic properties of stone that primarily connects these two disparate fields. Interjecting this dialogue, are quotations from lithography handbooks that tether this piece of creative non-fiction to both its context, and its aim: that being to explore ways to put into written language the tacit and embodied knowledge of a lithographer. As such, two modes of inscription are represented here: lithography and writing.

A lithographer's knowledge. Invented by Bavarian playwright Aloys Senefelder in 1796, lithography transformed the speed of printed communications at the time. And, by chance, also helped to advance contemporary theories of evolution—the fossilised feather of *Archeopteryx lithographica* having been discovered in 1860 by quarriers mining for lithography stone. Still in print today, Senefelder's *Complete Course on Lithography* was first published in 1819, although generally, as with other artisan skills, lithographic knowledge is more effectively shared from person to person by apprenticeship, rather than through written instructions. The nuances of this knowledge can be challenging to communicate through words, for the complex process of lithography depends not on adherence to protocols, but on patient handling of the metastable chemistry of oil and water. The aspect of lithography that I consider here is the preparation of the limestone matrix: a laborious task that demands meticulous care to ensure that the ground stone has a smooth, level, paper-like surface and that the drawn information is free from extraneous marks. My intention is to reflect on the sensory and phenomenological experiences of a lithographer, in particular, their simultaneous experience of attention and noise.

Attention to disparity. As a preliminary aid for *Listen*, I video-recorded myself preparing and drawing a lithography stone. The text started as a description of the video, and as the writing progressed, this 2-min edited recording, entitled 'figure/ground' and available to view here: <https://www.youtube.com/watch?v=HDwF60xWZPs>, became a central feature. Methodologically, the task of transcribing demanded focused attention that has much in kind with that needed for stone lithography. This method also required a sensitivity to the contingency of relationships between disparate elements—in this case, not oil and water, but sounds and words. From this slow practice, of listening, remembering, and writing, the text emerged as a correspondence, between the virtuality of a re-imagined past, the phenomenological present, and the process of language making.

As well as being the prompt for a descriptive narrative, the video also became the tangible protagonist and enigmatic subject of a poetic journey. One that reflects on a state of attention that willingly dwells in ambiguous and contradictory environments: such as the chemical antipathy of oil and water, diverse elements of an interdisciplinary narrative, and the presence of sound as words. Illuminating my thoughts on the nature of the attention that I consider here, are the thoughts of the early 20th-century philosopher, activist, and mystic, Simone Weil (1909–1943). I found Weil's reverence for a contemplative mode of attention rooted in manual work, to be resonant with the practices of stone lithography. Particularly relevant to the ideas I explore, is Andrea Nye's (1994) reflection on Weil's thoughts:

'... the key to thought is not assertion, or the logical connections between assertions, but "attention": the patient holding in the mind of seemingly incompatible truths (...) the tolerance of uncertainty (Nye, p 60).'

Exploring the heterogeneous language of lithography. The novelty that led to the ubiquity of lithography for commercial printing was the potential for a limestone matrix to economically reproduce autographic images alongside text. Through rhetorical devices and an unconventional format, *Listen* reflects the legacy of this novelty. Structurally this is manifested in the interdisciplinary play between lithographic and litho-phonic worlds, and linguistically through the lyrical voice of a third-person narrator. As a work of creative writing, these strategies align this paper to a field of fine art practice that employs language as material and medium (e.g. Lomax, 2000; Rendell, 2010). Whilst this approach lies outside the scientific custom, my intention is not to position this material beyond the rigours of review. But rather, to implicitly test the potential of written methods of communication, and to create a language that is authentic to the perceptual and imaginary realms of which I speak.

Within the context of practice-led research in the arts, my approach is informed by the transdisciplinary writer on visual culture Irit Rogoff, who recently asked, 'How do the methods by which we approach something actually emulate the kind of affective texture of the thing itself?' (Rogoff, 2019). In light of her words, the 'affective texture' that I 'emulate' are the conditions of stone lithography: its paradoxical chemistry, attentive labour, sensory environment, and dynamic relationship with language. The written work of contemporary artist and academic Salome Voegelin has also been instructive in shaping my thoughts. Describing writing about sound as 'a signifying practice of invisible rhythms that make accessible what is in excess of and falls out of the frame of conventional language' (Voegelin, 2016, p 66) Voegelin both acknowledges the limitations of language and suggests that to speak about such intangible phenomena as sound is to reach beyond modes of translatable clarity. Shaped by a feminist methodology that shares knowledge through storytelling (e.g. Boon et al., 2018), the language I use to speak about the sounds of lithography likewise 'falls out of the frame' of academic conventions.

Embracing a breadth of interpretation, the term 'language' I take in its broadest sense: as tacit, spoken, and written communication. And as the materialising gestures of a virtual and corporeal cosmos that signifies in sounds, marks, signals, wavelengths, vibrations, and the lyrical rhythms of poetic cadence. Germane to the heterogeneity of this language, is Elizabeth Grosz's interest in the incorporeality of what lies beyond semantic function and outside translatable phenomena (Grosz and Mercier, 2021). In *Listen*, a plurality inherent in communication is embedded in the voice of a narrator who slips between sonic, scriptural, and imaginary realms, and in my multiple subjectivities: as the author, as the self-same lithographer and 'listener' who is both observed viewing and describing the video, and as the lithographer recorded in the video. In the sections that provide information about the musical sounds of stone, in contrast to the intimate streams of thought, I am the disembodied voice that shares information about rock gongs, lithophones and music notation. It is through these voices that the languages born from stone emerge: as visceral vibrations that arise between bodies and the world; as the serendipitous play with matter to hand; as the craft and measure of syntax and finely tuned instruments of communication; and as printed notation and recorded sound. In the final paragraph, these disparate modes of lithographic and litho-phonic language are drawn

together by a Chinese paperweight. Held in the hand of the narrator, and simultaneously featured in the video and its transcription, this oblong piece of slate is both inscribed with written characters and has the properties of a sonorous stone.

The noise of lithographic language. Running through the fabric and deviations of Listen is a sonic excess initiated by the sound of preparing lithography stone. In the print workshop, alongside this sound of limestone graining, noise is also silently present from reverberating events long past. In the veins and patination of each stone matrix, is a residue of detritus laid down in the Jurassic sedimentation. When these deposits reappear as unwanted marks on the printed paper, this stray matter of geological noise becomes the unintended perturbation of technological noise. As an analogue medium, together with a lithography stone's potential to capture the continuous tone of an autographic line, is its susceptibility to the random interference of noise. It is as such that noise in its rich duplicity features in Listen: as the sound of graining limestone, and analogously as the 'stray matter' of sonorous stones that infiltrates the primary information. Metaphorically, noise is also present in the text as a lyrical ambiguity that interferes with the clarity of a reader's comprehension.

Foregrounding the role that noise plays in Listen, is the work of the transdisciplinary writer, philosopher, and academic Cecile Malaspina, whose 2018 publication, *An Epistemology of Noise*, was formative to my nascent ideas. The development of the written material was subsequently nourished by the College International de Philosophie 'Aesthetics of Noise' series of online seminars, hosted by King's College London and led by Malaspina (October 2020 to June 2021).

For Malaspina, noise in its dynamic serendipity, reveals a contingency implicit in all knowledge-making. Just as the unidentifiable noise of stray feathers in lithography stone was later understood by Darwin to be useful information, the 'epistemological noise' that Malaspina celebrates is the novelty of knowledge born from fields of chance. In such speculative environments, she suggests, the boundary between useful information, and superfluous noise, is ambiguous. And that this distinction, between noise and information, is not one regulated by orthodox protocols, but by a contingent gesture of selection (Malaspina, p 117). I draw on this notion, and welcome Malaspina's call for fruitful entwinements of alterity, her regard for the critical use of metaphor (ibid. p 8), and the fertile territory she identifies in the 'gaps' that disrupt the seamless flow of a unified narrative (ibid. p 115). It is by way of such moves, that Listen enfolds the disparate and nurtures a generative ambiguity between lithographic noise and litho-phonetic information. And, through a speculative gesture that underlies my critical interests, brings Cecile Malaspina's delight in the contradictory and indeterminate, into touch, with Simone Weil's 'patient holding in the mind of seemingly incompatible truths' and 'tolerance of uncertainty' (Nye, p 60).

In this Introduction, I hope to have provided a brief overview of my method, structure, and context. The material that follows, however, does not offer an attentive reader didactic clarity, but a scriptural space of reflection that is open to wide interdisciplinary interpretation. And, in its endeavour to describe indescribable realms of perceptual experience, embodies the apophatic folly of this ambition

Soundtrack

The attention of a transcribing lithographer: listening, remembering, writing.

'As in every other aspect of lithography, careful attention to detail during graining, the first step in the process, will help

eliminate many problems later. To produce excellent impressions, stones must be properly prepared so that they are perfectly level and do not have any scratches (Devon, 2008, p 126).'

The title words of the video, 'figure/ground', fade out, and a mute screen waits some moments before blinking open to a discordant scouring noise. Too slow and persistent to be the circling edge of a figure skater's blade, and too polyphonous to be a scribing hand on a chalkboard. Almost mechanical, it is a pulsing that swells and recedes, steady, repetitive. Perhaps more akin to the spade of gravel thrown into a tumbling cement mixer at the end of the day. Coupled with and produced by this sound, is a listener in the process of writing a description of this audio-visual encounter. And in turn, generated by this process of language making and its materialisation as written text, is a reader.

Replaying the same few seconds, again and again, she tracks the frames moment by moment, listening for perceptible changes in pitch, tempo and volume, as she dwells in the unnameable dissonance. In this task, the listener is strained. Caught in the contradictory pursuit of catching spirits, she attempts to hold still and analyse fragments of the sound, whilst resisting an impulse to ride its skeltering turns and let the video play on. And simultaneously, as a wordsmith tethered to the constraints of grammar, this scribing listener is also trapped in the paradoxical work of translating, frame by frame, word by word. Her intention is to transform the virtual pixels and invisible sound, from ephemera into language.

As a lithographer, the listener is intimately familiar with the events in the video: preparing and drawing a lithography stone. And yet, she struggles to find words for the sounds, and so stares at the screen for some moments, catching a glimpse of tide-washed sand before a pair of hands come into view. Travelling across the frame in time to the fricative soundtrack, the cupped fingers clasp a small block as they rotate rhythmically, covering their tracks in a circular dance akin to the whiskered shuffle of wire brushes on the skin of a drum. Mesmerised by the moving hands, it becomes evident that our listener is also an attentive observer. Her senses trained on auditory and visual phenomena, whilst she speculatively casts out lines, summons up memories, and calls for analogies. Listening, thinking, wondering, and waiting.

Poised over a keyboard and peering at the screen, whilst trying to hold in mind fleeting sounds, moving images, and elusive words. Such is the nature of being engrossed in the work of transcription. And of being in a state of mind that patiently negotiates the dynamics of disparate elements, stays with 'discordance between imagination and fact', and contemplates the uncertain, fluid, and unresolved (Weil, 1947, p 144). In this, our scribing listener and lithographic subject consents to a slow labour that requires a time unequal to the two brief moments of video recording. And submits to a mode of attention that is untroubled by 'seemingly incompatible truths' and temporal discrepancy (Nye, p 60).

'We hear through our skin and feet. We hear through our skull, abdomen and thorax. We hear through our muscles, nerves and tendons. Our body-box, strung tight, is covered head to toe with a tympanum... Resonating within us: a column of air and water and solids, three-dimensional space, tissue and skin, long and broad walls and patches, and wiring, running through them; moorings receptive to the lower frequencies, as though our bodies were the union of ear and orchestra, transmission and reception.

Michel Serres (2008, p 141).

Resonating bodies: the mystical vibrations and primordial culture of sonorous stones.

'The use of two stones permits both to be grained at once. This method, although safe and efficient when the two stones are of a similar size, must be used with great care when one stone is much smaller than the other, for uneven grinding can easily come about (Antresian and Adams, 1970, p 20).'

It is not only lithographers who have noticed the sonorous properties of limestone. Archaeologists and musicians have also heard the audible vibrations of a sonic landscape left by the traces of evolution. Familiar to stonemasons checking for cracks and flaws, and to geologists using the knock of a hammer to detect subtle changes in lithology, the acoustic properties of stone have been known since Neolithic culture (Morgan, 2012). When these sonorous stones are used for their audible qualities, Catherine Fagg makes a distinction between 'naturally situated' rock gongs, bearing the evidence of repeated play, and the more portable lithophones, which have been either artificially tuned or selected for their tonal suitability' (Fagg C, 1994).

The cultural significance of rock gongs was a subject of interest for archaeologist Bernard Fagg, whose research into Nigerian culture took him to the granite hills of Birnin Kudu in 1955, where he encountered a collection of stones scattered on the ground adjacent to a site of cave paintings (Fagg B, 1956). Observing recent 'chattermarks' made by children, alongside the patinated depressions left by earlier generations, he noted 'indisputable evidence' of their use as an ensemble of percussion instruments and considered it probable that this musical practice reached back to 'remotest antiquity'. The rudimentary musical analysis he conducted included the use of a tuning fork, to measure the pitch of each hammered depression, and the recording of a performance on five of the stones by local drummers. He concluded that to produce resonant tones a stone must be clear of dampening contact with the ground and that in good conditions the sound could be heard from some distance. Indigenous knowledge taught him onomatopoeic terms for particular stones (kalangu: 'talking drum') and something about the stones' association with ritual practices and beliefs. In his brief report, Fagg also mentions the frequent use of rock gongs in connection to 'secret religious ceremonies', and that when stones were used to communicate with spirits, replies were said to echo from the nearby caves (Fagg B).¹

The hypnotic sound of rock gongs can also be heard echoing through hills above the Caspian Sea in Gobustan, Azerbaijan, where gravel miners in the 1930s unearthed what is now classified as the world's largest site of prehistoric art and culture. Unique for its semi-desert landscape of mud volcanoes, the surrounding rocks created by these unusual geological events, are pitted with the percussion zones of countless drummers, and inscribed with petroglyphs that date back 12,000 years. The journalist Paul Salopek, retracing the footfall of early humans, described the haunting voice of these Stone Age instruments and their use as signalling drums, as 'a proto-Internet', a 'primordial human technology, echoing from the basement of time' (Salopek, 2016). In recent film documentation, a local guide clambers amongst the boulders. In response to their hollow chime, he tells of rhythmic beats that call up mountain spirits, bodies that resonate to the vibrations of the stones, and states of trance invoked by the sound of the stones (Humanresonance, 2016).

Water and limestone: a confluence of real and imaginary worlds. It is with an attentive gaze that the listener's eyes follow the gyrating hands, pacing their tracks in moving shadows when they momentarily slip out of view at the top of the screen, and re-

joining their path when they reappear in step with the dissonant chorus. In response to these moving events on screen, ocular and auditory vibrations in the listener's body anticipate the momentum and tempo of the body out of view, as it leans, tips, and swings. While distanced by time, space and contact, in the listener's world these two bodies pulse with synchronic resonance.

When the discordant scouring is silenced by an edit in the video, relief is brought by a gentle trickle of water. Eyes closed, she replays the tape several times and discerns a miscellany of other erratic splashes, drips, and noises that briefly populate the audio before it quietens to a faint hush. Returning to the screen, a stream of water is seen flushing around and over a single outstretched hand that breaks its fall. At home in this environment, the hand slips gracefully through the current, skin coupling with the water's flow. In tandem, they move around with the ease of a familiar partnership. Hand flat to the stone, the fingers and palm skate through the milky sluice, stirring up a small fleet of bubbles that ride the flood.

Constantly returning to the moving images and sound, with one hand resting on the computer mouse and the other braced on a cheek, the listener allows her attention to reside in the flooding scene and evocative soundscape. Trying to imagine the feel of cool water running between her fingers, just as intimately as she can feel the resistance of the scrolling wheel on her index finger and the warmth of smooth flesh against her slightly cooler palm. Determining the nature of this sensory experience and its relationship to the environment being portrayed through written words, is the laptop and headphones. Open on the screen are two adjacent windows, one being the documentary video, the other the text with its flickering cursor. This is the scribing listener's material world, and the site in which she is both present to her fingertips hesitating over the keyboard, whilst speculatively hovering in a realm that exceeds the tangible space occupied. Glancing away, she listens again, her attention suspended between ephemeral sounds streaming through the headphones, lingering aqueous memories, and the labour of being present to a language borne in the confluence.

'Imperfect stones form one of the real difficulties of the business, and much care is required to select and use stones best suited for the work in hand' (Cumming, 1919, p 12).

It was by chance, that Yorkshire farmer and musician Neddy Dick discovered the sonorous quality of stones in the River Swale. Listening carefully to the particular tone of each stone he drew from the water, he gathered many from which he assembled a lithophone. Pitching each stone correctly, Dick created a full musical scale and supplemented the resonant ring of these stones with several clock bells that could be struck with a wooden mallet, as he sang and played (Amsden et al., 2009–21). Predating his instrument by centuries, lithophones made with limestone from the sediment-filled Huang He (Yellow River) Basin, were played during the Late Neolithic Longshan culture in China. Subsequent development of grinding technologies, during the Shang dynasty, led to the production of sets of stone chimes tuned to an eight-tone scale (Liuliu et al., 2019).

One of several explorations of the musical rocks of Northern England, the geological source of Dick's limestone lithophone were deposits first laid down in tectonic depressions of the Pennine Basin, from the late Devonian to Early Carboniferous period. Known as the fells and dales of Yorkshire and Cumbria, this region is formed of sedimentary and volcanic rocks, with underlying granite intrusions, and was shaped both by events from the Ordovician (when England was part of the Southern Hemisphere continent of Avalonia) and by centuries of mining that continue today. Within this landscape rich deposits of high-quality greywacke, limestone, and slate, quarried for use in

construction, agriculture, and the chemical industries, have also become renowned for their resonating tones.

Acoustic ephemera: the mystery and matter of resonating stone.

‘Veins in stones should be watched carefully from one printing to the next. Fracturing of the stones under press pressure will most often occur along these lines’ (Antresian and Adams, 20).

The skating fingers depart, leaving trails of surf in their slipstream, and for a moment the translucent glaze of floating silt is undisturbed until a brush is briefly shuffled through the slurry. Just perceptible are a few faint sounds in the background. Breathing slowly, she listens again and hears close-up the punctuation of a couple of drips. Whilst gathering in the distance is a reverberating sibilance, a muted echo that quietly generates a sonorous spatiality. With metallic hints, its gentle tone is akin to the soft burnishing sound of fine emery paper in the hands of a silversmith. Barely audible, and seemingly with only tenuous relation to events on screen, for these moments the audio track no longer offers reassuring synchronicity with the visual information.

Clutching a rubber blade, the hand now returns to take broad even strokes across the wet stone, an action that clears the surface of water and silt and reveals in its wake stains of pigment and fine black veins. Simultaneously arising from this encounter between soft rubber and limestone, is the sotto voce hush of a theatrical sigh, a sound that intermittently pauses, as if to draw breath, before audibly expiring in time with the arching gesture of hand and blade. Countering this harmonic phrasing of sound, image, and text, the listener also detects resistance in the abrasive touch. A slight antagonism that brings to mind fleeting shrill notes caused by impurities in a stick of chalk, the skittering taps of a cursive hand on a wooden blackboard, and the sweep of a compressed felt wiper erasing the white traces. She imagines now, although not then, white powder accumulating in the crevices of a thumb and index finger, and the muscular effort that must have been needed to sustain the autographic dance of writing on a blackboard.

‘The greatest possible care is exercised by the quarrymen when taking out large slabs’ (Rhodes, 1924, p 10).

In Upper Black Eddy, Pennsylvania, heaps of broken diabase have become known for a mysterious chime that has prompted both geological and supernatural speculation. Curious tourists climb amongst these rocks and use hammers to test for those that ring. There is no visible difference between the rocks that ring and those that do not, so this is a serendipitous activity. The reason for the ethereal sounds made by this strange landscape has not ever been fully understood. Sharon Hill, the Pennsylvania geologist with an interest in anomalous natural phenomena and the paranormal, suggests that it is possibly due to microclimate differences and differential weathering around the site. Her theory is that the creep of damp vegetation at the edges of the pile enables some rocks to slowly weather and exfoliate. Whereas rocks at the top are exposed to the heat of the sun and develop a high degree of internal tension and sonorous properties (Hill, 2020).

In the ethnographic collections of French museums, several long cylindrical rods have been a source of fascination for paleo-musicologist Erik Gonthier. Examination of these meticulously crafted objects led him to the conclusion that these previously silent artefacts displayed in glass cases, were not, as had been assumed pestles for grinding, but lithophones. Gonthier’s

research showed that these Neolithic instruments were acoustically and ergonomically optimised by rock selection, and in their flawlessly carved dimensions, and revealed a quartertone difference between the lateral and dorsal faces. He concluded that for clear tonality the optimal length of the lithophones was at least 4.5 times the diameter. And that to be easily grasped by a hand, these instruments needed to be at least 36 centimetres long. In New England, equally rare long stone rods almost identical in both rock type (chloritoid schist) and dimensions, have been identified as two-tone lithophones. One small difference is a lateral curve that led researchers to test the acoustics of the instrument, as it may have originally been used, resting across a lap with the dull zones of the sinusoidal wave corresponding with the player’s knees (Caldwell, 2013).

The measure of language: finely tuned instruments of communication.

‘Take care to grind the whole of the stone evenly, paying particular attention to the edges’ (Weaver, 1964, p 59).

To gather her thoughts before continuing the listener writes some words in her notebook: attention, labour, noise, ephemera, disparity, language. As she does so, the tip of the mechanical pencil loops and dives across the page, words mutely appearing to the irregular sound of her hand shuffling across the paper. Reflecting on this small act a day later, she wonders about its significance: her matter-of-fact acceptance of the ubiquity of handwriting, the detailed engineering of the clutch pencil, the intricate lines left by its diminutive choreography, the erasable nature of the insubstantial graphite trails, and the incidental shuffling noise. Closely observing evidence left on the page, she considers the seemingly tacit residue of weightless glyphs produced by the contact between the moving hand, carbon dust and substrate. The same list now hovers as pixels on the illuminated screen. Both legible trace and language, at this point the words are placeholders for the arc of an unfolding narrative. Words that contingently stake out the territory of a score in the process of being imagined. Critically, in crafting a written account of transitory phenomenological experience, these lexical instruments are the listener’s singular means of communication. Simultaneously visual ephemera and symbols with a twofold semantic function, they are signs that provisionally hold ground within the visible realm whilst generating meanings that reverberate beyond the dimensions of screen and page. And phonemes that call up transient audible vibrations—phenomena that escape the static capture of indexical trace.

In the slippery task of creating a written interpretation of the video, these words, with their constraints and potential, are understood as implicit. Perhaps less so, is the percussive clattering of the keyboard heard in time with the surfacing text. Produced by each strike of a finger, both a letter form and a resounding tap. Coupled with sporadic thoughts, these fragments of data and sound coalesce into words, phrases, and an intermittent chattering that frequently stutters and stops. Holding each pause is not quite silence, but the audible presence of a body, and a continuous buzz from the laptop that mingles with the ringing in the listener’s ears. Surrounded by this acoustic ephemera, she brings her attention back to the task. And notices the sprung resistance of keys under her fingertips, her watchful gaze tracking the cursor, the rattle, tap, and hum of the electronic device, and equivalent fluctuations in her train of thought. Physically immersed and unable to divide this resonating environment, she breathes and thinks, as formless noise disperses through the atmosphere and virtual text flickers on the screen. And whilst simultaneously typing and reflecting, she

finds herself, in this self-synchronic process of writing, listening, thinking, and witnessing, indivisible from both 'language in the making' and its auditory excess (Manning, 2016, p 25).

Lithophones are tuned by grinding or knapping, which alters both the dimensions and pitch of the individual stones. Shortening a lithophone stone will usually raise the pitch, whilst reducing thickness in the centre can lower the note. As with a xylophone, sound is generated when the impact of a strike causes molecules to oscillate under pressure and create sinusoidal waves. The pitch of each note is determined by the frequency of these waves, and the clarity of its tone by the speed with which the vibrations travel through the material. Discontinuities in the stone, such as pores, cracks, or structural irregularities, interrupt the clear transmission of sound waves, resulting in random vibrations that make noise, but do not ring (Luilui et al. 2019; Martorano, 2018).

In the 1950s, Leland Sprinkler spent many hours fine-tuning hanging limestone stalactites with a grinding disc in the underground caverns of Luray, Virginia. The outcome of his devoted labour is the Luray Stalacpipe Organ. A lithophone in the style of a pipe organ, with a 37-note keyboard with pedals and draw knobs, it is reported to be the largest musical instrument in the world. When a key is pressed a corresponding stalactite is tapped by a solenoid-actuated rubber mallet. The sound of these electrically amplified 480-million-year-old stalactites can be heard anywhere within the 64-acre area of the caverns (Cox, 2010).

Archaeologist Marilyn Armagast Martorano, in her research into 'highly modified' cylindrical form lithophones found in the deserts and dunes of Colorado, suggests that such lithophones tend to be pitched to a pentatonic scale, this being the most commonly used musical scale structure globally (Martorano). Two instruments produced more recently in the English county of Cumbria, were likewise modified with precision to achieve tonal accuracy, but alternatively tuned to the concert pitch of Western music. One with four chromatic octaves weighing 100 kg, the other a 12-key electronic lithophone with sensors linked to visualisation software. Both instruments used rock cut selectively from Borrowdale Volcanic Group slate, Shap blue clinker, Honister green slate, and Carboniferous limestone. With dimensions predicted through computer modelling to within a few millimetres, the final tuning to the 100th of a semitone was done with the aid of computers by shaving fragments from each bar with diamond powder (Wainright, 2010).

Notation: catching spirits, vibrations, and gestures, in the scripto-visual world of lithography.

'In this matter of smoothness of the stone it is impossible to be too careful. The beauty of the imprint depends upon it. Errors in the polishing cause great trouble afterward. Therefore the manager of a lithography (sic) must pay close attention to this work' (Senefelder and von Schlichtegroll, 1819, np).

But for a slight change in tone, an almost imperceptible edit moves on to a scene of the dried stone, coming in and out of view a pair of hands frisk the surface with a magician's haste. In contrast to the slow measurable drag of the rubber blade, the moving hands barely make contact with the stone as they dance with shadows to the sound of a distant beatboxer. Eyes and ears unable to hold still these fleeting moments, the listener pauses the video and witnesses not a brush that gently sweeps away residual dust, nor a hand that lightly strokes the surface to test for stray grit, but the spectral fuzz of camera shake. Abstract, formless, and unrecognisable. Frozen on the screen are the blurred shapes of

chimera that bear no resemblance to the familiar hands. Standing in their stead, in place of these familiar forms and their practised gestures, are phantasmal traces that illusively hover in the virtual space.

Intrigued by the novelty of these images, she plays and pauses the recording several times. Realising in the process, that it must be almost impossible to stop the video in the same place twice, and that each random pause unrepeatably captures a singular configuration on screen. Almost abstract, these still frames fail to offer what the listener might have anticipated seeing: detailed views of the subjects of her transcription that could be closely observed for the purpose. Alternatively manifested by each fragment of the video, is an unpredictable screen grab. Generated by the unique configuration of pixels, is ambiguous visual ephemera that disrupts the notion of a static observable subject, and puts into the realms of speculation the language that might describe these unnameable sounds and ghostly apparitions.

Zooming in, a motionless chiaroscuro fills each frame. In this particular cut, pinkish flesh hues centre screen blend into the deep grey tone of what can be taken as a brush handle. In the lower section, a dark horizontal band gives contrast and clarity to the navigation panel overlay. Dropped through the image in white text, the display shows the title of the video, figure/ground, several editing icons, a digital counter paused at 55 seconds, and a thin blue line indicating the time played. Coupled with this functional graphic is the paused scene, in which moving hands, brush, stone, and shadows, contingently transformed through digital signal processing, have merged into a nebulous haze. In contrast to the distinct legibility of the media icons, individual elements in this background bleed into one another, disintegrating the perceptible relations between figure and ground. As a means to aid the description of how a lithographer might carefully dislodge residue from the freshly grained stone, this visual information is of little use. Alternatively presented for the listener's attentive gaze, in this process of stop and start, is a sequence of ambiguous screenshots that evoke fictitious worlds, in response to the slight pressure of an index finger on a mouse clicker.

The instrumental part played by geological deposits in the sonic landscape of the world is not always audible. Tacitly documenting music played to the god Apollo, the crystalline metamorphic rock used to construct Delphi's Panhellenic sanctuary (now housed in the Delphic Archaeological Museum), is inscribed with the glyphs of musical notation. Cut with regularity into the fragments of patinated marble, these Delphic hymns for strings and voice were first performed in 128 BCE. More recently in 1796, when Senefelder the inventor of stone lithography began to test the use and value of his new technology, the quality of printed music was still being determined by the costly labour of skilled engravers. Published at the same time, the digitally available printed copies of the first edition of Beethoven's String Trio in E-flat Major, Opus 3 (1796), give some indication of the economic constraints of printing music from engraved metal. Representing both the composer's imagination, and the complex variables of a system, Beethoven's handwritten score is re-configured through discs, lines, dots, and wobbling letters: a system of notation assembled from a range of indentations punched and scored into the plate. Also visible on a few of the printed pages, is the ghostly plate tone left from a previous manuscript, indicating that the expensive copper had been recycled but not burnished completely smooth before reusing.

By the time he composed his late String Quartet in C Sharp minor, Opus 131 (Beethoven, 1830), the mature Beethoven was deaf and could only imagine the sonorous harmonics of its melancholic counterpoint. Published in 1830, the first printed edition bears witness to his audacious musicianship in battalions of sharps and flats, gracefully arching slurs, cursive Italian text,

and freehand gestures marking the swell of frequent crescendos. Tacitly evidenced, is the transformative effect of the parallel lives of Senefelder and Beethoven, on both the repertoire and the economical availability of sheet music for chamber musicians. Indicated by the sleight of hand visible in the innovative notation of this sheet music, is evidence that Beethoven's late opus was printed lithographically from stone.

In China, the potential of lithographic limestone to capture the 'authority of knowledge' embedded in handwriting, made it an ideal matrix for reproducing the complex scores of traditional music and the calligraphy of illustrated newspapers. Its introduction to the country in 1826, is attributed to Presbyterian minister and lexicographer of the first Chinese-English dictionary, Robert Morrison. As an economic alternative to engraved plates or woodcut blocks, the method took hold quickly and led to the importation of significant quantities of Bavarian limestone to Hong Kong. Writing on the indigenisation of lithography in modern China, Xie Xin and May Bo Ching note that the process enabled complex page layouts previously only possible in hand-drawn manuscripts. Without the constraints of a typographic format, vernacular Cantonese characters, unique symbols of varying sizes, and illustrations of fingering gestures could be autographically transcribed with a continuous tone, and compositely assembled on the printed page. Consequently, the mass reproduction of music tutorials by string instrumentalist and teacher Qiu Hechou, printed by the Asiatic Lithographic Printing Press in 1916, led to the wide transmission of musical knowledge that had hitherto only been passed on orally between generations (Xie and Ching, 2018).

Noise: listening to the dust between resonant phenomena and language.

'Special attention is required when switching from one grit to another. Should one coarser grain of carborundum remain, it will surely cause scratching. Accordingly, great care should be exercised in storing grit in properly marked containers' (Antresian and Adams, p 26).

It was Thomas Edison who received a patent for the phonograph in 1878, an invention that radically altered the speculative relationship between the ephemeral and fleeting phenomena of sound, its materially registered trace, and the listener. Capturing the human voice by way of a vibrating membrane attached to a stylus, his acoustic device translated waveforms of sound into corresponding deviations in an inscribed line. Edison's particular innovation was that the information drawn onto a soft wax cylinder could be played back and amplified. Subsequent technologies, including vinyl discs, electromechanical recorders, and magnetic tape, marked stages along the journey from the variable amplitude of analogue signals to the binary coding of digital sound.

Playing the video on, in the next frame an illumination fills the screen, becoming recognisable some seconds later as white paper. Heard in the shadow preceding its appearance, a crackle from the sheet's tension as it encounters air that slows its descent onto the stone. Movement stops as the paper falls into place and drawn marks become just visible on its surface. Obscuring these barely perceptible lines are waves of light that travel vertically up the screen, a mirage-like flickering that distorts the image field and returns an ambiguity of scale to the scenic view.

When reading through her written account, the listener notices other ambiguities in the text that distort the clarity and obscure distinctions: a percussive rattle synchronic with the emergent language, invisible auditory phenomena that mingle with the sound of a breathing body, interludes that alter the viewpoint, and temporal cuts that interject and divert the course of the

narrative. As much as evoking the ephemeral sounds of limestone, the text also seems to reflect the mutability of the listener's cognitive processing. Falling 'out of the frame', moving between registers, and dwelling in the noise between resonating phenomena and language, both the listener and the objects of her attention seem indistinct and hard to locate (Voegelin, 2016, p 66). The lithographic subjects under consideration: evaporating water, dispersing silt, resonating stone, moving hands, and the listener, mutate and shape-shift in their transformative interplay with technological and grammatical constraints. Engendered by this metamorphic act of inscription, is both a scribing listener coupled to the disparate natures she encounters, and a 'sonic subjectivity' contingently mobilised and shaped by fictitious and ephemeral worlds. A subjectivity simultaneously in perpetual flux, whilst tethered to a mode of contemplative labour that bears witness to, and negotiates with, the paradoxical, fleeting, and obscure (Voegelin, 2014, p 113; 2016, p 67).

In his 2001 album *Midnight in the Caverns*, Julliard-trained professional organist, Monte Maxwell plays popular classics on the Luray Stalacpipe Organ. Available to listen to online, the album was produced through the digital editing process of sampling. In orchestrated counterpoint with the haunting melodies played on the lithophone, are drips and echoes from water in the caverns. Seemingly tuned to the pitch of the stalactites, the stereophonic placement of this watery noise gives a sense of the ethereal ambience in the caverns. An earlier recording of Leland Sprinkle (1960) playing the instrument can also be listened to online. From the opening moments, it is clear that little has been lost in transferring his original magnetic tape recording to a digital sound file. Filling the headphones, before the haunting resonance of limestone speleothems can be heard, is the whisper of static noise, mingling in unrehearsed symphony with spatters of rain, and a continuous high-pitched fluttering that presumably is the sound of scrolling tape as it moves through rotating wheels. Anticipating from the playlist folk tunes and hymns played on the lithophone, a listener might strain to hear the fragile melody in the background, its faltering pace and unscripted pauses suggesting that Sprinkle's fingers hovered tentatively over the keyboard. A mathematician and electronic engineer of significant accomplishment, Sprinkle was not a trained organist. Captured in his performance, however, amongst its quivering cadences, erratic amplification, and signal interference, is the distant voice of a soul who spent hours sanding dust from limestone to make music.

Losing her focus in the flickering beams of light, the listener closes her eyes and listens to the second minute of the video, and wonders how she might write a score for this fleeting chorus of ephemeral noise. Not being a composer, she has no knowledge of notation that might represent the erratic chinks, scrapes, taps, crackling, shuffles, and stuttering chirps. She can, however, give words to the quiet but continuous ticking of a clock, and identify two percussive knocks that punctuate the recording at 00:01:11 and 00:01:41. Their distinct notes briefly resonate with an idiophonic timbre. She knows these sounds to have been made by the impact on the lithography stone of the oblong slate paperweight she now holds in her hand. A gift some years ago, she remembers a dusty workshop and the sound of air compressors and Dremel tools in the hands of youthful labourers. Inscribed into its smooth underside is Chinese calligraphy she cannot read, but clearly audible, when she scrapes her fingernail across the inscribed surface, is a high-pitched metallic resonance.

Data availability

Data sharing is not applicable to this research as no data were generated or analysed.

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Note

1 The 'secret religious ceremonies' mentioned probably included the practice of FGM: 'Nigeria, due to its large population, has the highest absolute number of female genital mutilation worldwide, accounting for about one-quarter of the estimated 115–130 million circumcised women in the world' (Okeke et al., 2012).

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