

Sonic Knowledge Production in Archaeoacoustics: Echoes of elsewhere?

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Declaration

I declare that this thesis and the work presented in it is entirely my own. Where I have consulted the work of others, this is always clearly stated.

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Abstract

This thesis is a critical investigation into the production of knowledge in archaeoacoustics. The recently emerged field of acoustic archaeology explores how sound and listening might relate to human behaviour as evidenced in material remains from the past. Pursuing a methodology of *sounding situated knowledges* and tracing the figure of the echo as a material-semiotic actor, this research project asks to what extent sonic knowledge production in archaeoacoustics challenges the visually-dominant epistemology of Eurocentric thought.

In the first in-depth analysis of how sonic knowledge is produced in the field to date, this thesis uses interviews of researchers as well as participant-observer fieldwork at the caves of Isturitz-Oxocelhaya and Arcy-sur-Cure, France as well as at Chavín de Huántar, Peru to describe the formation of archaeoacoustics as a discipline.

Archaeoacoustics uses sound to conceive of an alterity, often to imply that past cultures were more sound-oriented. I diagnose prevalent trends of sonic knowledge production in archaeoacoustics as *sonic positivism* and *sonic naturalism*. I take the capacity of a sonic alterity to task by asking what kind of political-philosophical “elsewhere” is being imagined. I argue that despite the ontoepistemological potential of sound evident in archaeoacoustics, sonic knowledge production in the field has been unable to fully respond to the challenge that the sonic makes to visuocentric Western conceptions of knowledge.

Echoes have been important to archaeoacoustics, yet remain bound to Eurocentric conceptualisations. In response to these current limitations, the thesis reconceptualises echo as a feminist and decolonial sonic figuration. In introducing a theory of *aural gnosis* to address alternative modalities of knowing through sound and listening, my thesis explores whether echoes can indicate an “elsewhere” of possibilities for the notion of knowledge itself.

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Scientific knowledge is a lion without antelopes and without zebras. It is gnawed from within. Gnawed by hunger, the hunger of feeling, the hunger of life.

Aimé Césaire, *Poetry and Knowledge*, 1944-45

(Translated by A. James Arnold)

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Introduction

0.1 In the cave

Igor Reznikoff: Let's try here, listen...
Rupert Till: [makes smacking noise with mouth]
IR: Wait a moment.
(sings): "Oh-oh."
[pause]
RT: Just reverberation. No echoes.
IR: Two echoes. Listen! (sings): "Oh-oh."
[pause]
RT: Well, the reverberation tail...(trails off)
[They walk along further]
RT: Listen! (shouts): "Hey!"....[pause] ..."No echo."
IR: I hear one!
RT: That's not an echo, that's reverberation.
IR: No! It's separated!
RT: It's not.
...[A bit later]
RT: Let's try some different sounds.
(raises voice): "Ta!"
[pause]
IR: I hear two echoes.
RT: No that's just reverberation.
...
RT: What do you hear Annie?
Me: I can hear at least one....
IR: I heard "ah..ah," a second one.
RT: Sometimes that's late reflections, rather than an echo.
[The discussion continues...]

This interaction happened in the cave of Oxocelhaya, beneath the cave of Isturitz in the Pays Basque region of south-western France, around 50km south-east of Biarritz. The land and caves are owned by Joelle Darricau, whose great-grandfather was in possession of the land when the cave's archaeological relevance was first discovered in 1895. Isturitz is famous for the discovery of several bone "flutes" dating back approximately 30,000 years to the Aurignacian period, bringing the site into public prominence as well as attracting music archaeological research since the 1920s. Archaeological digs have confirmed the existence of 80,000 years of human presence in Isturitz cave, with some 50,000 items of bone and lithic pieces found at the site. Paintings, markings and engravings were discovered in the cave of Oxocelhaya in the second half of the twentieth century. Several paintings of horses in red-ochre line the

wall, which have been dated to the Magdalénien period around 17000-13000 BP (Before Present).

The conversation above took place between two of the main protagonists of a fledgling sub-field of archaeology called archaeoacoustics – Igor Reznikoff and Rupert Till. Reznikoff is an emeritus professor of mathematics and philosophy at the University of Paris Nanterre in France, a singer of Early Christian Chant and a specialist in the art of antiquity and resonance. Till is a reader in music technology at the University of Huddersfield, UK, as well as a composer and an electronic music producer and performer. I had been commissioned to make a radio programme for a German public radio channel *Deutschlandradio Kultur* on the topic of archaeoacoustics (Goh, 2015). This part of the trip involved a contemporary flute player, Anna Frederike Potengowski playing a reconstruction of a bone flute inside the Isturitz cave, as part of Till's European Union-funded music archaeology research project. The scene above, in which Reznikoff and Till make various noises, listening to the results of these noises, and debate the existence or non-existence of echoes at these particular positions, is part of an investigation into a theory put forward by Reznikoff in the 1980s, which led to the field's foundation.

The great hall of Isturitz has a very reverberant acoustic. It is known that people lived and worked in the upper cave of Isturitz, as tens of thousands of remnants of tools have been found there. It was also here where the bone flutes were found. In Oxocelhaya, which was not a settlement area, the acoustics are much more dampened. Yet in comparison to Isturitz, where few paintings or engravings have been discovered, many are found in Oxocelhaya. Archaeological evidence shows that the cave was not used for living or working in, hence it is believed people came here only on specific occasions, perhaps, as our guide tells us, for "ritual" activities concerning the rock art. It was here, and in other caves in France in the 1980s, that Reznikoff began theorising a connection between the acoustics of the cave and the incidence of paintings. The conversation above between Reznikoff and Till in March 2015, as well as being part of a radio documentary, was part of an effort to test out Reznikoff's theories using relatively sophisticated portable contemporary acoustic measurement equipment and techniques, an area of Till's expertise.

At the time when the prehistoric archaeologist Michel Dauvois invited Reznikoff to the caves of Niaux and Le Portel in the Ariège area of Southern France in the mid-1980s, the location of rock art paintings (alongside other aspects), formed a substantial part of discussion on Western European Paleolithic rock art. There has been significant public intrigue into Palaeolithic rock art since the discovery of European cave paintings of suspected “prehistoric”¹ origin in the late nineteenth century. Dauvois and Reznikoff’s article published in *Bulletin de la Société préhistorique française* in 1988 posited that there was a positive correlation between the size of the resonance and the location of the cave-paintings: the larger the echoes and reverberations, the more paintings (Reznikoff & Dauvois, 1988). This was the first published material explicitly connecting acoustics to theories of Palaeolithic cave paintings. Although the theory did not receive much attention in French archaeology, it was taken up by British prehistoric archaeologist Chris Scarre who reported their findings in the journal *Nature* where it reached an international audience (Scarre, 1989). As a result, Dauvois and Reznikoff’s article can be seen as foundational for the field of archaeoacoustics. This new sonic thesis about cave acoustics opened up some intriguing avenues of research for Palaeolithic rock art paintings, as well as other areas of archaeology.

This scene paves the way for this thesis’ investigation into sonic knowledge production in the field of archaeoacoustics. Its development as a sub-field of archaeology over the past three decades provides occasion to examine how sound and listening can be understood to challenge the conventions of academic knowledge production. Inherent in the development of archaeoacoustics as an academic discipline are the questions: how is “knowledge” being produced and what “knowledges” are being produced? This thesis addresses how sonic knowledge production – knowledge produced through sound and listening – might challenge academic knowledge production more broadly.

¹A note on terminology: although the term “pre-historic” is problematic for the implication of superiority of the historic and civilised White Western culture over “primitive” or uncivilized ethnically and culturally “othered” cultures (González-Ruibal, 2013, p. 14), and many archaeologists prefer to use terms relating to the dating of periods back from the present day, i.e. Upper, Middle and Lower Palaeolithic, the term “prehistoric” is still commonly used in archaeoacoustics and archaeology more generally to differentiate cultures before historic records of writing have been discovered. Thus, despite the ethically problematic nature of the term, I have adopted it due to its commonplace amongst researchers and maintained the quotation marks around it.

There are many issues which complicate the study of archaeoacoustics: the relationship between the bodily senses and knowledge production is far from straightforward; the traditions of academic knowledge production have multiple epistemological limitations; the speculative nature of archaeological investigations into the uses and meanings of material remains proffers many areas of ambiguity. Nevertheless, despite these obstacles, archaeoacoustics is engaged in the production of knowledge through sound and listening.

This thesis undertakes the first in-depth analysis of the field of archaeoacoustics to date. It follows the premise that all knowledge production is situated and proposes to address this using a method of *sounding situated knowledges*. Using a mixed methodology to gain access to how knowledge is currently being produced within the field of archaeoacoustics – combining interviews and participant-observer fieldwork with critical readings of literature from archaeology, feminist and decolonial theories – I argue that archaeoacoustics poses unique challenges to Western epistemologies. However the potentials of these challenges are not currently being fully exploited. The investigation is split into two main parts: first, I seek to gain an overview of the field’s sonic knowledge production. Secondly, I provide an ethnographic case study of Dr. Miriam Kolar’s research at the site of Chavín de Huantar, Peru. In doing so, I seek to demonstrate that archaeoacoustics’ sonic knowledge production poses potentially path-breaking epistemological challenges which extend into the very concept of “knowledge” itself.

0.2 The “turn” to the sonic

Before this investigation can begin, there are several conceptual obstacles to negotiate which constitute the epistemological bases this thesis addresses. The first concerns a turn to the sonic. Sound studies scholars and archaeoacoustics researchers alike have pointed to the dominance of the visual in Western thought, culture and knowledge production paradigms, yet they have often done so with different aims in mind. Archaeoacoustics researchers have challenged the sensorial bias and neglect of sonic approaches to argue for its greater inclusion as a mode of investigation during site excavations and correspondingly within archaeological theory (Blake & Cross, 2015;

Devereux, 2001a; Díaz-Andreu & Mattioli, 2015; Scarre & Lawson, 2006a). Sound studies scholars have diversely assessed what a sonic or acoustic “turn” can bring to cultural theory more broadly (Bijsterveld & Pinch, 2004; Meyer, 2010; Sterne, 2012b). Situated between two relatively emergent fields – archaeoacoustics and sound studies, this thesis seeks to productively align their respective enquiries.

Both archaeoacoustics and sound studies signify a turn to the sonic, but these “turns” are not coeval. The distinct disciplinary ferments of archaeology and sound studies have meant that this new attention to sound and listening manifests itself differently for each field. Archaeology, with a history as an academic field dating back to the late eighteenth century when systematic archaeological excavations began (Trigger, 2007, p. 61) is subjected to different disciplinary conventions to a field such as sound studies, a relatively new interdisciplinary field, predominantly situated in the humanities and social sciences (Sterne, 2012b, p. 4). The field of archaeoacoustics serves as a conjuncture in this thesis; it is what Stuart Hall terms a complex of forces, “a period during which the different social, political, economic and ideological contradictions that are at work in society come together to give it a specific and distinctive shape” (Hall & Massey, 2010, p. 57). This thesis examines the conjuncture of archaeoacoustics with a sound studies approach; a cursory survey of differences between the two fields will be presented below. Their respective turns to the sonic, whilst not identical, share many similarities. The frictions between them provide opportunity for generative cross-readings. Sonic knowledge production is examined to reveal what the sonic is doing, which gestures are being performed in archaeoacoustics’ turn to the sonic. Whilst the thesis deals with archaeology’s turn to the sonic as it is encapsulated in the field of archaeoacoustics, examining sound studies’ turn to the sonic first enables the divergences and convergences between the two fields to be more clearly described.

The acoustic or sonic turn, like so many other turns designated before it in the humanities (such as the “linguistic turn” or the “the pictorial turn”), is less of a *volte-face* away from all previous ways of knowing and more of a reconfiguration of attention onto a new theme or concept. Studies of the visual hegemony of Western culture have typically noted the centrality of visual metaphors in philosophy and everyday language. Scholars have exemplarily traced an “ocularcentrism” of Western

philosophy since Aristotle's designation of vision as "the noblest of the senses" (Jay, 1993), a thorough "rationalization of sight" in modernity (Levin, 1993, p. 2) or the growing autonomy of the observer in the visual techniques developed in Western modernity (Crary, 1990). The historical privileging of sight, however, has always been accompanied by a reminder of "all the dangers in placing too much trust in vision and its objects" (Levin, 1993, p. 1). The visuocentrism of Western thought has thus always been in dialectical relation with a distrust of vision, exemplified by Plato's allegory of the cave. Scholarly work – such as Jay's analysis of twentieth century French philosophy – has traced the modes of resistance to it (Jay, 1993). Nevertheless, as these theorists articulate, the centrality of vision, or "visuocentrism" pervades modern Western interpretations of truth, reality and knowledge and all other concepts of key importance.²

Faced with such deep-reaching ramifications of visuality, scholars have been ambitious what a fresh emphasis on the sonic can achieve. Approaches have been diverse: R. Murray Schafer's *The Tuning of the World* of 1977 has been foundational for the field of sound studies. As well as popularizing the term "soundscape", Schafer's work sought to ameliorate the negative effects of urbanism evident in noise pollution by cultivating an approach of "acoustic ecology" which focused on educational practices of attentive listening (Schafer, 1977, 1994). The text by French economist Jacques Attali *Noise: A Political Economy of Music* by from 1977, frequently cited in sound studies, affords music a prophesizing ability as it explores in its "styles and economic organization...faster than material reality can, the entire range of possibilities in a given code" (Attali, 1985, p. 11). Anthropologists, often engaged with investigating non-Western cultures, have led many notable ethnographic studies dealing with how senses are figured in cultural relations (Classen, 1993b; Classen et al., 1994; Feld, 1996; Howes, 1991, 2003, 2005). These have informed sound studies and broadened the horizon of how sensory experience can be understood and its corresponding epistemological implications.

² Although the term "ocularcentrism" is more commonplace, I have chosen to use "visuocentrism" to refer to the dominance of visuality in this thesis. This decision has been made due to the predominantly anatomical inflection of "ocular"; the prefix "visuo-", indicating that which "pertains to the visual" invokes the broader association intended.

The “sonic turn” can thus be better characterized as a renewed amount of scholarly attention to the sonic as a theoretical construct within the humanities and social sciences specifically. As Jonathan Sterne points out, within physics, acoustics, physiology and otology in the nineteenth century, sound was already an object of knowledge in those fields (Sterne, 2003, p. 23). It is evident that many philosophers and writers across the twentieth century turned to sound as a way of making sense of cultural change or as a way to articulate an alternative and perhaps desirable future scenario. Yet as Sterne reminds us, scholars also turned their attention to many other modes of analysis in the twentieth century, such as race, gender or technology. Therefore, the purported newness of the sonic is only true *in certain ways*, as the undebated cultural importance of music demonstrates. Yet growing attention to the sonic, evident in the enthusiastic uptake of the term soundscape, is certainly discernible in cultural and social texts in the twentieth century.³

Paying heed to the historical oversimplifications of visuocentric Western thought, the marginalisation of the sonic can be located within histories of colonialism. Constance Classen points out how global capitalist trade routes established in the era of European empires in the nineteenth and early twentieth centuries, produced a “homogenization of sensory worlds” led by Western modernity’s visuocentrism: “The European hierarchy of the senses, with sight and hearing associated with cognition and place[d] above and apart from the so-called lower senses, was likewise exported abroad where it contributed to marginalizing divergent local sensory practices and values” (Constance Classen editor, 2019, p. 17). As Steingo and Sykes write in *Remapping Sound Studies in the Global South*, “ever since Rousseau, the South has been associated with sound, music, body, presence, nature, and warmth” (Steingo & Sykes, 2019, p. 1). Alongside the connotations of “sound” and South, notions of the sonic have often been associated with femininity. There have been numerous theorisations of “the sonic” and “the feminine” in feminist musicology. Such theorisations work to examine gendered roles in classical music, this analysis notes the equation of weakness with femininity in the musicological phrase “feminine ending”

³ For the sake of simplicity, the relationship between music and sound will presume the common working definition of music as “organized sound” coined by composer Edgar Varèse (Varese & Wen-chung, 1966).

(McClary, 1991); traces masculinist social and epistemological histories of musicology itself (Cusick, 1999); or seeks alternatives to masculinist models in approaches to composition in proposing a “lesbian musicality” in the work of Pauline Oliveros (Mockus, 2007). These tendencies demonstrate how the sonic as a theoretical construct has been gendered and racialized as Other. However, sound studies has not yet recognised this sufficiently.

In describing sonic knowledge, I draw upon Foucaultian power-knowledge relations to compare sonic knowledges to *subjugated knowledges* which are “unqualified, even directly disqualified knowledges...located low down on the hierarchy, beneath the required level of cognition or scientificity” (Foucault, 1980, p. 82). Given the aforementioned visuocentrism which permeates Western knowledge production, sonic knowledges are posed as subjugated in opposition to the rationalistic visuality of qualified knowledges. Although attempts have been made to draw parallels between ocularcentrism and androcentrism, critiquing the Western cultural associations which characterise men as 'naturally' visual learners and women as 'naturally' good listeners (Devorah, 2017), such analyses risks perpetuating binaries rather than dismantling them.

Within this increased uptake of the sonic as a theoretical construct, then, it is pertinent to heed Sterne’s critique of the “audiovisual litany.” He diagnoses a persistent problem in writings on sound, in which visual and auditory sensory modes are often ascribed a distinct set of cultural values “in-themselves.” He lists a number of characterisations of seeing and hearing respectively. For example: “hearing places us inside an event, seeing gives us a perspective on the event; hearing tends towards subjectivity, vision tends towards objectivity; hearing is a sense that immerses us in the world, vision is a sense that removes us from it” (Sterne, 2003, p. 15).⁴ The term “litany” denotes the theological nature of these constructions which affords it much of its rhetorical power (Sterne, 2011). Such generalising binaries, which risk descending into sensorial

⁴The other statements of the audiovisual litany not listed here are: “hearing is spherical, vision is directional; hearing immerses its subject, vision offers a perspective; sounds come to us, but vision travels to its object; hearing is concerned with interiors, vision is concerned with surfaces; hearing involves physical contact with the outside world, vision requires distance from it; hearing brings us into the living world, sight moves towards atrophy and death; hearing is about affect, vision is about intellect; hearing is a primarily temporal sense, vision is a primarily spatial sense.” (Sterne 2003, 15)

essentialisms, can distract from acknowledging vital cultural baggage such as Eurocentrism or androcentrism. The challenge of sound studies, therefore, is to think “across sounds”, considering sonic phenomena in relation to one another or other things, rather than “as things-in-themselves” (Sterne, 2012b, p. 3). Whilst Sterne’s critique is directed at sound studies, it also has implications for archaeoacoustics.

Considering archaeoacoustics and sound studies as separate but interrelated fields, this thesis therefore takes a considered approach to negotiating the role of the sonic in knowledge production. I concur with the enthusiasts within sound studies that the sonic affords novel approaches, however, I seek to temper the tendency to generalize where specificity is needed. Whilst acknowledging the radical potential offered by thinking through sound, in this thesis I understand the sonic as Sterne does in a somewhat more reserved way: “There is always more than one map for a territory, and sound provides a particular path through history” (Sterne, 2003, p. 3). The sonic, as it is employed in this thesis, is understood to be a powerful epistemological mode through which to pursue research; however, it has certain hidden seductions which this thesis attempts to identify. *How* archaeoacoustics engages with the affordances of the sonic lies at the core of this thesis.

0.3 Thinking the sonic past

The sounding past provides particular problems for knowledge production. This is a further conceptual obstacle this thesis must first explicate. Whilst archaeology, traditionally conceived, has always purported to deal with human cultures of the past, its sonic elements constitute a new set of challenges. All sensorial experiences are culturally conditioned by their specific historical contexts, as evidenced by the work of sensory anthropologists (Classen, 1993b; Constance Classen editor, 2019). It is common within sound studies and beyond, to find statements about sound which emphasize its “ephemerality” – its transitory and fleeting character. A typical interpretation of the scenario in the cave above can exemplify this: the paintings of horses in Oxocelhaya appear to have a permanence in that *visually* they have remained over thousands of years, whilst any remnants of sounds from that era have disappeared, apparently due to their transiency. This lends itself well to an argument

about sound's ephemerality; the visual has remained whilst the sounds have vanished. Within archaeology it is true that the dominance of the visual has led to the images horses primarily been considered visually, with little or no intellectual space given to sound and listening until relatively recently. However, here is where analytic attention is needed, as it would be a mistake to equate correlation with causality and in so doing suggest that archaeology's neglect of sound is *due to* sound's ephemerality. Rather, it is a question of what, given the existence of material remains over the period of thousands of years, is discerned as legible to a researcher today and how this legibility is dealt with? How do they propose to use the materials to investigate and understand a site? The predominance of visuocentric epistemological modes plays a large role in this, but ascriptions of permanency and ephemerality can be misleading.

Within archaeology, archaeoacoustics is part of a movement towards multi-sensory archaeology, which defies the heavy reliance on conventional visual methods and takes seriously the multi-modal experiences of past cultures to think through possible meanings of the material remains of archaeological sites (Hamilakis et al., 2002, p. 5). Where archaeologists study material remains, and sensorial-epistemological frameworks remain unknown or implicit, ascertaining how the two areas relate is burdened with many problems. To use the model of the "five senses", although it is itself a construct of Western thought (Howes, 2005; Serres, 2008), archaeoacoustics is faced with a particular constellation of sensorial-epistemological problems. Visible material remains are typically afforded a sense of permanency, and material remains which might feasibly pertain to smells, tastes, and touch are contrastingly acknowledged as ephemeral and long-disappeared, however material remains pertaining to sound straddles both of these two poles. Even in cases where the architecture offers the opportunity to recreate a sonic experience true to the acoustics of 10,000 years ago the "ephemerality" of sound nevertheless persists. Yet remembering that all sensorial experiences are culturally conditioned means that even the most verisimilitudinous reconstruction of a sonic experience in terms of material-acoustic authenticity will not enable the researcher to know what social and cultural meanings this experience might have had.

This leads me to identify a crucial epistemological problematic in the field of

archaeoacoustics which recurs throughout this thesis as it investigates researchers' procedures of knowledge production. As archaeoacoustics seeks to produce sonic knowledges about the past but is placed within the present, it is situated within a (possible) *retrievability of sonicity* paired with an *irretrievability of aurality*. This borrows from historian Mark M Smith's designation of the impossibility to determine cultural meanings about sound beyond written accounts, which he refers to as the "irretrievability of sonicity" (M. M. Smith, 2015, p. 56). Whilst Smith does not differentiate between "sonicity" and "aurality", it is necessary to do so in order to fully characterize the problem of sonic knowledge production in archaeoacoustics. Here I characterize sonicity similarly to Wolfgang Ernst, where it describes the material oscillatory characteristics of sonic (technical) media as an epistemic form (Ernst, 2012). On the other hand, I use aurality similarly to Veit Erlmann's definition which describes "the conditions...for something to become recognized, labeled, and valorized as audible" (Erlmann, 2010, p. 18). The sonicity refers to the material-acoustic reconstructability of a sonic experience, for example through the architectural preservation of a site and knowledge about the use of particular instruments to which archaeological research might contribute. The "possible" sonicity refers to cases in archaeoacoustics, where sonicity can – by verifying and simulating sound production and its behaviour in space – sometimes be re-created to a materially archaeologically "accurate" extent. Yet despite these precise archaeological reenactments, *aurality* remains irretrievable in that the rendering of sound in a specific sociality cannot be known. In the vast majority of archaeological sites, where it is material remains and not written records which are being examined, the irretrievability of aurality remains a stubborn problem for archaeoacoustics.

To return to the question of sound's purported "ephemerality," it is one area where sound studies and archaeoacoustics overlap. A typical characterisation of sound as ephemeral is found notably in Schafer's widely-circulated concept of "schizophonia", which was coined to dramatically evoke the separation of "natural" sounds onto "artificial" electroacoustical machines and imply the negative disruption audio recording technology has had on an implied otherwise whole human consciousness (Schafer, 1994, pp. 90–91). Sterne traces the intellectual history which has come to prominence in sound studies to Walter Ong's *Orality and Literacy* (1982) which divides

between cultures with and without writing to emphasize sounds as “occurrences” and “events” (Ong, 1982, p. 30) in contrast to the supposed permanent character of writing (Sterne, 2011, p. 211). Yet as Sterne rightly points out, ephemerality is not a characteristic unique to sound, it is true for any event – “any *process* that you can possibly experience” (Sterne, 2003, p. 18). As part of the audiovisual litany such statements about sound’s ephemeral quality can give such observations, which are culturally specific and borne within particular intellectual (in this case Christian spiritual) constellations of thought, a dangerously “transhistorical” character which critical scholarship must interrogate. Following this, I might assert that my visual experience of the red horses in Oxocelhaya, is just as ephemeral as my sonic experience of the cave’s acoustics. Both were specific to my visit to the cave back in March 2015. Yet to impose my own culturally conditioned aurality of that experience, in any transhistorical way, could not be done in any simple manner.

Scholars of multi-sensory archaeology have sought to address similar problems to these. Yannis Hamilakis, a leading proponent of multi-sensory archaeology, takes the visibility of modern Western epistemological modes of archaeological practice into account by foregrounding his own sensorial archaeological history (Hamilakis, 2013, p. 10). In doing so, Hamilakis alerts us to the issue that there are multiple sensory frameworks within the modern West and their developments over time have been diverse and disunified. Therefore, to make claims or assertions about frameworks of cultural meanings which surround human sensorial behaviours is difficult. How is it possible to both acknowledge the historical neglect of the body and the senses in archaeology *and* be sceptical about the transhistorical assumptions around human sensory-epistemological experience at the same time? Hamilakis proposes to foster an understanding of “the entanglement between materiality and human sensory and sensuous action and experience” (Hamilakis, 2013, p. 9). A focus is set on memory and affect, while the embodied, sensing, remembering researcher is placed centrally in an attempt to avoid the pitfalls of claiming to represent the past, often found in archaeology.

Concurrent to these considerations, knowledge production in archaeology is irremovable from its colonialist legacies. Uzma Rizvi has argued that the dynamic of

colonial othering applies to objects, and not just human others. The “epistemic inequality” or “injustices” which prevail in archaeology’s endeavour to speak about the past is a “systematic, structural unequalness in the manner in which the knowledge about the past is formulated and structurally (re)instantiated” which is premised upon recognising that the *being* of objects is not distinct from archaeologists’ *knowledge of* objects (Rizvi, 2015, p. 157). Unheeded, such cultural modes led to the colonial fetishization of collecting objects and artefacts. Archaeologists’ pursuits as researchers are never removed from their knowledge production and its corresponding colonial inheritances. The oppressive conditions under which social and knowledge-producing interactions take place have given rise to a call for an “epistemology of resistance” to counteract epistemic injustices with both an analytic and normative function – to understand and change epistemological structures of oppression (Medina, 2013). “Epistemic laziness” occurs when the producer of knowledge over, say, a particular object, does not acknowledge the privilege the knowledge producer holds over the human or non-human others, including how their research might sustain such colonial structures. This is how archaeology is “deeply colonial on every level of knowledge construction around the world” (Rizvi, 2015). Recognising such colonial relations of knowledge is part of the project of a possible decolonized archaeology, as well as an appraisal of archaeoacoustics’ sonic knowledge production.

0.4 Sounding Situated Knowledges

How, then, might it be possible to examine the sonic knowledge production of archaeoacoustics, given the multi-layered limitations on its endeavour? Modern Western culture is visuocentric and the sonic is an alluring theoretical and phenomenological pursuit, yet the deep-time proportions of archaeoacoustics prevents anything from being unequivocally knowable about sound and human behaviours. Nevertheless, amongst the growing number of researchers who have devoted time to this small but expanding field of archaeoacoustics over the past few decades, there are indeed knowledges about sound and listening being produced. Being situated in the present, then, as contemporary archaeoacoustics researchers, there are knowledge practices which are observable. It is these practices that form the object of analysis in this thesis. As outlined above, the interrogation of the processes

of sonic knowledge production are central in this thesis. However, following Foucault, it is pertinent to underscore that the focus is not to uncover “truths” of sonic knowledge as absolute and ahistorical, but rather the “effects of truth,” which are historically specific (Foucault, 1980, p. 94). The genealogical method, differentiated from his archaeological method, emphasizes the multiplicity of possibilities and contingencies of historical events; it does not gravitate back towards institutionalized definitions of knowledge for example in science nor progressivist readings of history. Rather, contingencies can be examined in order to gain proximity to what and how sonic knowledges are being produced.

Therefore, it might be more accurate to describe my examination of sonic knowledge production in archaeoacoustics as *nested*. The thesis draws on my observations and analysis of archaeoacoustics researchers’ sonic knowledge production.

Archaeoacousticians’ *own* frameworks of sonic knowledge production, although they may not use these terms to conceive of it, are nested within *my* observation of them. As I study what and how they appear to be producing sonic knowledges, I link these into broader sound studies and cultural studies’ contexts and questions. Whilst I will lay out my thesis methodology and chapter plan in the final part of this introductory section, it bears remembering that the theorisation of sonic knowledge production in this thesis has this dual character. As a first step of each stage of this thesis, I seek to ascertain and describe the processes of sonic knowledge production, before assimilating these into larger social, cultural and political contexts of knowledge production. As a researcher is never really separate from her research, there will be times when these two areas merge, overlap and perhaps become usefully and un-usefully entangled. Nevertheless, this nested character is important to note.

I propose to counter the epistemological challenges outlined in this thesis with an approach of *sounding situated knowledges*. Whilst this has implications for *my* knowledge production, which will be addressed in the reflections on methodology below, this is intended as a framework for understanding the sonic knowledge production of archaeoacoustics researchers. It brings together affordances of the sonic

to Donna Haraway's ethico-onto-epistemological⁵ project of "Situated Knowledges" (Haraway, 1988) as a method to interrogate the processes of knowledge production in archaeoacoustics (Goh, 2017) (Appendix I). The term "sounding" makes use of Julian Henriques' definition of the term, described as "encompass[ing] everything, everyone and all the activities that go into the making of sound" including listening. Henriques' "sounding" is an adaptation of Christopher Small's concept of "musicking" (Small, 1998) for sound studies, replicating Small's wide-reaching and inclusive approach to studying musical practices and related activities for considerations of the sonic.⁶ Taking "sounding" together with "situated knowledges" is to link the all-encompassing approach to studying sonic practices with the demand from feminist technoscience to foreground positionality in ontology and epistemology.

Taking ethics, ontology and epistemology to be fundamentally entangled and co-constitutive, the term foregrounds how all knowledge production is the result of interactions between humans and non-humans in situations subject to ethical and political considerations. In particular in this thesis, I will use the term "ontoepistemology" to emphasize the inseparability of theories of being from theories of knowing. Following Karen Barad, this term works to encapsulate how "The separation of epistemology from ontology is a reverberation of a metaphysics that assumes an inherent difference between human and nonhuman, subject and object, mind and body, matter and discourse" (Barad, 2007, p. 185). These are core to the predominant dualisms of Western culture which many theorists of the twentieth century have sought to dismantle in various ways. The term *intra-action* indicates the mutually constitutive relation of interaction, between human and non-human agents (Barad, 2003), which the ethics and politics of knowledge production fundamentally shape. Such intra-activity is fundamental to understanding how sonic knowledges are

⁵Karen Barad's articulation of an "ethico-onto-epistem-ology" is deeply influenced by Donna Haraway's work. As such, although this term was coined by Barad, I attribute it to Haraway's influential thought within and beyond science studies. See (Barad, 2007, p. 185).

⁶ Christopher Small's "musicking" is explicated in an eponymous book and defined as a useful conceptual tool which as the present participle of the verb "to music" is intended to encompass the following: "To music is to take part, in any capacity, in a musical performance, whether by performing, by listening, by rehearsing or practicing, by providing material for performance (what is called composing), or by dancing." (Small, 1998, p. 9).

produced between the human researchers and their often non-human, i.e. sonic material, objects of study.

In making the case for the importance of sounding situated knowledges, I argue that *both* Haraway's specific notions of embodiedness and situatedness are necessary for a feminist intervention into archaeoacoustics (and sound studies). There is *embodiedness* in the scenario described above in the cave, but thinking through the body which is commonplace in sonic knowledge production does not necessarily bring about the partiality, anti-universalism, and political-ethical demands of *situatedness*, as Haraway urges for. Situated knowledges requires not only a complex reflected/diffracted nature of embodied vision (Haraway, 1997, p. 273) (examined in further depth below), but also the *politics* of situatedness – positioning, partiality, and an anti-universalism. As Haraway warns, the “god-trick” of the detached, supposedly transcendental view from above, which is inattentive to its own processes of knowledge production, is most vehemently rejected. It is the problems borne by the implicit or explicit universalisation of epistemologies that situatedness seeks to counteract. Within the politics of situated knowledges are the complex ontoepistemological considerations which researchers often unwittingly bring with them as researchers. It is through these ontoepistemological frameworks that “truth effects” are produced; this is where critical interrogation can illuminate relations of knowledge and power and their historical contingencies.

Situatedness has particular purchase on historical contexts, which as Haraway and others would argue are always also political. “The Past is the Contested Zone” declared Haraway when speaking about gendered narratives in the history of the primate studies (Haraway, 1978); this is a statement which will be shifted from the biological sciences and applied to archaeological sonic knowledge production in this thesis. Archaeologists who have investigated the role of archaeology and national identity in the era of colonialism and nation-state building will confirm this (Díaz-Andreu, 2007; Díaz-Andreu & Champion, 2015). Haraway’s work is central to this thesis as the feminist, anti-capitalist, anti-racist critiques of white Western, masculinist technoscience across her work embody a deconstructionist intervention to defy accusations of a key dichotomy frequently set up in contemporary debates: that of

naturalism-essentialism and social constructivism. To this, Haraway commits in her scholarship to “a serious historical effort to get elsewhere” (Haraway, Lykke, Markussen, & Olesen, 2004, p. 330). The characteristics and implications of the “elsewhere” will be addressed below. Given the contested nature of the past in archaeology, as always inherently political, I take sounding situated knowledges to be a method which can help foreground discussions around the ethico-onto-epistemological and renegotiate the traditionally dominant dualisms of nature-culture and subject-object relations for sound studies. The situatedness of sounding situated knowledges refers to the political-ethical accountability surrounding the material-semiotic production of sonic knowledges including a Harawayan push to re-think commonly-held notions of traditional dualisms.

0.5 Echo

Echo appears in this thesis repeatedly and in different forms. It is posed as a material-semiotic actor⁷ in order to examine how knowledge is produced through sound and listening. By comparing Echo to Haraway's cyborg (Haraway, 1991) as a *sounding* feminist figuration I propose echo as a productive site to reconfigure traditional knowledge practices of Western philosophy and thought. Instead of being a phenomena of “nature” or “culture”, echoes – following Haraway – are naturecultural, they are entanglements of the two and not separate from either. Rooted in sonic phenomena but not always used to describe actual listening experiences, echo is proposed to mediate between sound and the production of knowledges – between sonic materiality (real or imagined) and networks of signification poised for an as-yet-unspecified use. An echo is conceived of as a boundary figure, alerting us to the contingencies of subject-object relations and other pervasive dualisms as part of an understanding of sounding situated knowledges.

In the scenario presented between Reznikoff, Till and myself in the cave of Oxocelhaya

⁷ Haraway writes of this term, “I have used the term “material-semiotic actor” to highlight the object of knowledge as an active part of the apparatus of bodily production, without ever implying immediate presence of such objects or, what is the same thing, their final or unique determination of what can count as objective knowledge of a biological body at a particular historical juncture” (Haraway, 2004c, p. 67).

above, the two archaeoacoustics researchers are debating the existence of an echo. The nebulosity of this sonic phenomenon in this particular scene demonstrates its liminal character in a number of ways. Firstly, it highlights the subjectivity of listening – Reznikoff claims to hear two echoes, Till claims to hear none, when the question is posed to me, I claim to hear one. Till refers back to the scientific definition of echo, in order to argue that what Reznikoff and I are hearing are “late reflections” rather than an echo. Secondly, this discussion points to the role of technology in sound measurement and reproduction. Till says, at a later point, “If we recorded this and examined the data, we’d see that there isn’t a significant repetition of the sound”.⁸ This opens up the question: when is an echo an echo? Do we listen with our ears or with our instruments to determine it?⁹ Although definitional accuracy is not amongst my main priorities in this thesis, it is worth pointing to the many potential reasons for the disagreement around echo in this particular scenario. In complex spaces such as a cave, multiple reflections of varying overlapping delays can cause ambiguities. These might depend on listener location, listener acuity, training, linguistic or definitional differences, or any number of other factors. Most importantly, however, echo’s boundary character explicates what this thesis is interested in: not the “truth” of the echo, but its truth-effects. Whilst in archaeoacoustics researchers might debate about whether an echo is an echo or a reverberation, this thesis is less interested in what an echo *is* and more interested in what an echo *does*.

A cyborgian conception of echo situates this examination of sonic knowledge production in the “belly of the monster,” a term Haraway uses to refer to the context of late-industrial techno-scientific cis-hetero-patriarchal regime of racism, imperialism,

⁸ In other published work, Till and his team have used a variety of different measurements such as, “reverberation ((T20, T30, EDT), speech intelligibility (Speech Transmission Index - STI) as well as those often used in the context of concert halls, such as definition or “deutlichkeit” (D50), Clarity (C80), lateral energy (LEF) and envelopment (LG80)” (Till, Wyatt, Fazenda, Sheaffer, & Scarre, 2013) (Till *et al.*, 2013, p. 7). With regards to reverberation time, Till’s team used T20 as the time it takes for a signal to decay by 20dB, T30 as the time it takes a signal to decay by 30dB, whilst EDT stands for Early Decay Time – a parameter derived from the decay time in the portion from 0 to -10dB.

⁹ Both of these issues, in different ways address issues of auditory subjectivity and histories of measuring hearing in the fields of acoustics and psychoacoustics. The former revolves around an implied “ideal listening subject” named the *auraltypical* subject by John Levack Drever, as a normative hearing subject which becomes falsely universalised in discussions of acoustics (Drever, 2017). The latter is exemplified well in scholarly work such as Mara Mills’ work on the development of telephonic communication technologies, hearing measurement, and deaf people in early twentieth-century America (Mills, 2011) and Jonathan Sterne’s work on the “golden-eared” test listeners involved in the evaluation of audio compression in the making of the MP3 format (Sterne, 2012a).

global capitalism and militarism (Haraway, 1988, p. 581, 2004a, p. 49, 2004b, p. 1, 2004c, p. 70). Feminist critics of science and philosophy have long argued that knowledge production has been an exclusionary practice by white European, upper and middle class men in the West (Alcoff & Potter, 1993; Haraway, 1997). Post and decolonial theorists have diversely studied how European modernity has asserted its own systems of thought as superior over non-Western cultural formations (Bhabha, 1994; Mignolo, 2002; Quijano, 1971; Said, 1985; Santos, 2014; Spivak, 1988; Wynter, 2003).¹⁰ Reinforcing a cyborgian reading of echo, Spivak's deconstructive reading of Ovid's story posits echo additionally as a subaltern figure (Spivak, 1993). Referring to Spivak's famous essay *Can the Subaltern Speak?*, which problematises the self-determined articulation of a subaltern subjectivity in the structures of white supremacist patriarchy underpinning colonialism and neo-colonialism, echo faces comparable hurdles (Spivak, 1988). As such, echoes come with this multifaceted burden of cultural and intellectual baggage; knowledges potentially produced through echoes are buried within multiple layers of political, social and cultural histories. As a subaltern cyborgian figure, echo foregrounds the inter-connectedness of materiality and signification, which Spivak's literary reading of echo and Haraway's material-semiotic approach acknowledges how sound as vibratory matter has been intimately interwoven in cultural, social, and political networks of meaning. Given the aforementioned visuocentric character of European modern thought (Jay, 1993; Levin, 1993), these layers are implicated as sensorial-epistemological regimes too. Yet following Haraway and Spivak conceived in this way, echo is proposed, despite prevailing conditions set by patriarchy, colonialism and capitalism, to be able to gain agency within repetition to potentially enact cultural subversion and transformation.

A brief explication of echo's scientific and mythical roots exemplifies this

¹⁰ By mentioning huge bodies of postcolonial and decolonial thought together I do not mean to conflate these two distinct but overlapping traditions of thought. I follow Gurinder K Bhambra's useful delineation of postcolonial studies (associated most frequently with the work of Edward Said, Homi Bhabha, and Gayatri C Spivak) from the "modernity/coloniality" school of decolonial thought (associated with the work of Anibal Quijano, María Lugones, and Walter D Mignolo) in terms of their respective disciplinary and intellectual trajectories and research foci, as well as geographical (and temporal-historical) remit – the former broadly characterizable as pertaining to the Middle East and South Asia and arising from readings of "cultural texts" in various forms since the nineteenth century, the latter characterizable as arising from world-systems theory to understand the implication of European colonisation of the Americas since the fifteenth century –, which nevertheless share an overarching aim of challenging Eurocentric historical narratives (Bhambra, 2014).

characterisation of echo as a material-semiotic figure *within* European systems of thought. Architectural acoustics tells us that echoes are omnipresent. They pervade our everyday sonic experiences. Sound reflections generally provide us with a “rudimentary spatial ability” (Blesser & Salter, 2006, p. 1) and give us a sense of space as we move through our surroundings; echoes and reverberations provide us with information about the size, location, movement and surface materials of our surroundings. In their mathematical definitions, echo and reverberation are typically differentiated around the measure of a tenth of a second.¹¹ In acoustics handbooks, echoes are usually talked about in terms of “echo control” and “echo suppression” (Everest, 2009, p. 378; Rossing, 2007, p. 1170) signifying how for acoustical engineers, echoes are deemed a nuisance, an unwanted aberration of built environments, to be avoided wherever possible for their disturbance of clarity, “late sonic reflections are perceived as echoes or reverberation, degrading intelligibility” (Blesser & Salter, 2006, p. 53). Beyond the physical-material definition of echo taken from acoustics, an echo is understood figuratively as a recognisable repetition or imitation of an event, utterance or idea. We may think of Echo the nymph in Greek mythology, who most famously appears in Ovid’s *Metamorphoses* of 8AD in which her deviance foretells her tragic demise as an aural correlate to that of Narcissus.¹² Other Greek myths depict Echo as the nymph who spurns the god Pan’s advances as a mysterious force of nature, with the curious gift of repetition or as a figure of scorn as in Philostratus The Elder in the

¹¹ In Torgue and Augoyard's handbook *Sonic Experience*, a comparison of entries on 'echo', 'reverberation', 'delay' and 'resonance' allows us to place echo and reverberation as types of delay, potentially cumulating in an instance of resonance. 'Echo' as the “simple or multiple repetition of a sound emission” (Augoyard & Torgue, 2006, p. 47), is principally similar to 'reverberation' as “reflections of the sound on surfaces in the surrounding space ... added to the direct signal” (2006, p. 111). Indeed, “echo and reverberation are thus two types of delay”. As they note, everyday language often interchanges “reverberation” as “echo” and even “resonance” as “reverberation” (2006, p. 37). From a technical point of view, echoes are usually differentiated from reverberation if the delay is more than a tenth of a second and the repeated sound is distinguishable as a replica of the original sound. Reverberation, is understood as overlapping, multiple echoes with delays of less than a tenth of second – no clear replica of the original sound is tangible. Modal resonance refers to the phenomenon of standing-waves in a three-dimensional space so that acoustic resonance is only produced under certain physical conditions (such a constant energy input exciting at the system's resonant frequency). For a rich account of the history of measurement in modern science and the “invention” of *A Tenth of a Second* see (Canales, 2009).

¹² In Ovid’s *Metamorphoses* Echo is a nymph, whose excessive feminine chattering and noisy deception of the Goddess Juno leads to her punishment. She is bound to only repeating the words of others. Upon seeing and consequently falling in love with Narcissus, she manages to converse with him by repeating his own words back. In a narrative typical of Greek tragedies, Echo's declaration of love is rejected by Narcissus and Echo withers away, left as a voice in the mountains. Later on, Narcissus famously also meets his fate, after falling in love with his own reflection in a pond.

third century A.D. This cursory sample of echo's current material-semiotic configurations in Western culture is taken as tentatively indicative, they bear many of its conventional hallmarks as common tropes of patriarchal and Western imaginaries.

The scientific definition and mythological narrative of echo both convey the specific ways echoes as material-semiotic articulations have thus far been able to be conceived of within Eurocentric thought. In science or acoustics, echo is a nuisance, which disturbs the clarity of verbal communications. In myths where Echo appears, echoes are often portrayed as feminised "enfeebled reproductions" of an original entity. It is derivative from its supposed original source and weak in its mimetic character. As a material-semiotic figure in Western myths, echo is found associated with ideas of reflection, repetition and imitation closely embedded with traditional binaries of masculine/feminine, visual/aural, controlled/excessive, agential/agentless. Both of these understandings of echo – scientific and mythical – are traceable within histories of European culture and become consolidated in particular ways in modernity. Yet to return to the potentials opened up by archaeoacoustics described above - archaeoacoustics often has, as its object of knowledge, cultures or human behaviours *which have not* had knowledge systems conditioned by this specific modern European set of thoughts. Therefore, archaeoacoustics addresses sensorial-epistemological configurations *outside* of its own systems of knowledge production. It is this outside which provides it with its intriguing provocations: just how different were cultures "back then" compared to "now"? Echo acts to exemplify the scope of this difference.

Archaeoacoustics research offers some conceptualisations of echo beyond Eurocentric knowledge systems. Researchers often reference peculiar echoes that were noticed during fieldwork. It is the "unusual sound qualities" of spaces which often lie at the centre of archaeoacoustic research – these can take the various forms of notable reverberation, resonance, sound carrying unusually far and echoes (Scarre & Lawson, 2006a, p. vii). In the 1950s Bernhard Fagg noted in Northern Cameroon echoes of rock gongs in caves as replies from "spirits" (Fagg, 1956, p. 18) cited in (Díaz-Andreu & Mattioli, 2015). Numerous other examples of echo in archaeoacoustics research have been noted in work in Europe (Great Britain, Ireland, France, Spain, Finland), North and Central America (Canada, New Mexico, Utah, Arizona) (Devereux, 2001b, p. 95; Díaz-

Andreu & Mattioli, 2015, pp. 15–18). Steven J. Waller's work which places the role of echoes centrally in archaeoacoustic field work, both physical echoes and comparisons drawn to mythology (Waller, 2006). The idea of echoes as “spirits” emanating from rocks is further developed by Waller and his collation of echoes in ethnographic research from around the world seems to indicate its potentially widespread nature. For example, the Acoma Native American people situated in contemporary New Mexico, USA, have a migration story which describes the community leader travelling to different places and calling out “Aaaaaakoooo!”, finally settling the people where the echo resounds and is deemed “good” (Waller, 2006, p. 38).

Such cultural explanations of echo demonstrate a distinct departure from the typical way echoes usually discussed, as the Western scientific and mythological accounts above demonstrated. Therefore, echoes in archaeoacoustic, far from being an acoustical annoyance, offer explanations in which their “mystery” contributes to an ongoing site of fascination. Such characterisations reflect some of the epistemological ambition of the field of archaeoacoustics. A cyborgian, subaltern, naturecultural echo enables us to reconsider human and non-human relations. As an acoustic phenomenon an echo might be seen to require a human listener, and it may or may not have a human source. However, the material reflection of sound as vibrations of air indicate the purchase of echo for posthuman considerations – both the receiver and the emitter of the “original sound” might in different contexts be perceived as a non-animate object, a spiritual force, an animal, an organism, a human, or a collision of any of these. I follow feminist posthumanists in placing this study in “more-than-human-worlds” to acknowledge the importance of decentring human agency whilst concurrently asserting the anthropogenic situatedness of histories of knowledge production (Bastian, 2016; Puig de la Bellacasa, 2017). Echo exemplifies some of these intra-active material-semiotic entanglements.

In this study of the emerging field of archaeoacoustics, echo is taken to be a mediator of sonic knowledges and a boundary figure capable of encompassing many potential meanings and effects. If the Eurocentric masculinist knowledge of Western philosophy and science which has borne both archaeology and acoustics has thus far produced our contemporary understandings of echo, it remains to be asked what

echoes can do when conceived in critical opposition to this. What does it mean to consider a cyborgian echo that is “resolutely committed to partiality, irony, intimacy, and perversity... oppositional, utopian, and completely without innocence” (Haraway, 1991, p. 151)? Re-figuring echo means searching for new meanings created by echo in which sonic repetition is more than a mere acoustic curiosity or a myth of unrequited love. Due to limitations of space, echo often only exists in the background of each part of the investigation, whilst the analysis of sonic knowledge production and its intricate workings necessarily take the foreground. However, the final chapter will revisit echo’s potentials as a feminist and decolonial figuration. Within more-than-human worlds echo, as an arbiter of sonic knowledge, is proposed as a figure which can open up the very concept of knowledge to new alternatives.

0.6 Hegemonic “here” and a philosophical-political “elsewhere”

Archaeology has been an endeavour thoroughly entwined with the histories of Western colonialism and imperialism. As the influence of post-colonial studies has spread across the social sciences, this has been increasingly recognised in archaeology (Dommelen, 2006; Gathercole & Lowenthal, 1990; Gosden, 2004; Lydon & Rizvi, 2010; Lyons & Papadopoulos, 2002; Stein, 2005). Any investigation which claims to attend to the politics of knowledge production within archaeology must simultaneously attend to the deep-rooted Eurocentrism which pervades the field, from its epistemological inheritances to its current practices. The stakes of archaeoacoustics’ sonic knowledge production, in terms of its political horizons, will here be conceived of as a tension between a hegemonic “here” and a political-philosophical “elsewhere”.

The question posed by archaeoacoustics could be formulated as: what can echo mean beyond hegemonic systems of thought in Western modernity? What do echoes, as material-semiotic actors, *do* when “outside” of European systems of knowledge production? In the discussions so far, a certain intellectual gesture may be identified which is imaginatively aspirational; it indicates the pursuit, in some form, of a “beyond” of the contemporary political-philosophical imaginary. It is the allure of a culture which orientates itself differently to the sonic which undergirds archaeoacoustics. This tension between a “here” and an “elsewhere” as imagined by

archaeoacoustics can be conceived of as a tension of difference. How is difference being constructed within archaeoacoustics? I propose that “here” and “elsewhere” can be construed as two distinct intellectual domains that are at play within archaeoacoustics’ sonic knowledge production.

First, a brief overview of the limited amount of existing sound studies literature on archaeoacoustics provides insight into how the field is currently being understood. Blesser and Salter’s aforementioned work on architectural acoustics takes a brief detour in their exploration of the perception of aural spaces and the historical development of spatial acoustic design to so-called “pre-literate” cultures. However, they appear skeptical about the field’s epistemological security, “Unfortunately, acoustic archaeology is a highly speculative field, supplementing sparse evidence with culturally linked inferences that necessarily include a modern perspective” (2006, p. 69). Nevertheless, and somewhat contradictorily, they do draw some conclusions after they survey the work done in acoustic archaeology so far to propose that, “The aural experiences of early cultures, which did not have science to explain sensory perception, were almost entirely subjective, emotional, and affective” (Blesser & Salter, 2006, p. 77). Two other works which have hitherto dealt with archaeoacoustics – Trevor Cox’s *Sonic Wonderland* and David Hendy’s *Noise: A Human History of Sound and Listening* – are journalistic accounts which assess various contemporary and past acoustic scenes. Hendy draws on historical events with unusual sonic characteristics, whilst Cox provides descriptive accounts of his sonic experiences during trips around to various global locations, to the “sonic wonders of the worlds” (T. J. Cox, 2014; Hendy, 2013). Both include some work of archaeoacoustics in their surveys of sonic curiosities, either through visiting sites of archaeoacoustical interest with the researchers themselves – as I have – and surveying the publications and media outputs of researchers. Aside from Blesser and Salter’s contradictory and rather undecided comments about the integrity of archaeoacoustics’s knowledge production, none of these accounts offer a substantial evaluation of the implications for sound, listening and knowledge production. This thesis seeks to address this absence.

Surveying all three of the accounts of archaeoacoustics by Blesser and Salter, Cox and Hendy described above, a trope emerges which forms an entry point for the present

conjectural investigation: all three accounts use the term “our prehistoric ancestors” in setting the scene for imagining an acoustic experience of a proposed past human subject (Blessner & Salter, 2006, p. xi; T. J. Cox, 2014, p. 58; Hendy, 2013, p. 3). Although it is not unusual to find this phrase in archaeological studies, I propose this phrase reveals a certain dynamic of “here” and “elsewhere” within its conception of an implied subjectivity of “we”. Contemporary popular interest in prehistoric cultures is evidenced by best-selling books such as Yuval Noah Harari’s “Sapiens: A Brief History of Humankind” (Harari, 2015) or articles such as “Were we happier in the stone-age?” (Harari 2014). The “we” of “our ancestors” arguably suggests a unified collective of humans who existed thousands of years ago, an idealized imaginary of a past humanity. The findings of archaeoacoustics have found much public interest, with numerous newspaper articles and websites citing its findings (anon, 2009; Ball, 2004; T. Cox, 2014; Than, 2008; Trivedi, 2002; Whipps, 2008). It appears that imagining these buildings, monuments, or decorated caves in relation to sounding practices feeds off a general public interest in prehistoric pasts. The speculative deep-time era of archaeoacoustics contributes to the popular interest in the field. In this form archaeoacoustics appears to pose the question: just how radically different were the lives of “our ancestors”? What does it mean if they were “more sonic” than we are today?

Archaeoacoustics seeks to produce knowledge in the present about cultures of the past; this is proposed as a philosophical and political *outside* of the here and now of the present. Primarily, it would seem, that the “elsewhere” is distinct *temporally* from “here” – the archaeologists of “now” want to find out more about the people of “then”. The difference in era, is constructed temporally and culturally. Time, however, is not an apolitical construct. As evident in the terms “prehistoric”, “primitive” and “pre-literate”, linear, progressivist narratives of histories prevail, despite having been critiqued for the implied superiority of the present over the past, implying a prehistoric savage, as well as the “brutish modern primitive” against the historic/civilised (González-Ruibal, 2013, p. 13). Such narratives place Western modernity at the pinnacle of human civilisation. Johannes Fabian has poignantly demonstrated in *Time and The Other* how contemporary anthropological subjects are temporally othered within this prevailing narrative of Western superiority. A “denial of coevalness” takes

place which is, “a persistent and systematic tendency to place the referent(s) of anthropology in a Time other than the present of the producer of anthropological discourse” (2014, p. 31). Such critiques of constructions of the Other have followed on from key works of postcolonial studies (Bhabha, 1994; Said, 1985; Spivak, 1988) which have kept “the discourse of the 'West and the Rest' [...] alive and well in the modern world” (Hall, 1992b, pp. 221, 225). Frequent comparisons of contemporary non-Western subjects of anthropological research to “prehistoric” people evidences how the construct of time is inherently political.

Although there is no denying that time has elapsed between the material remains excavated by archaeologists and the time of excavation, it is nevertheless apt to observe the political stakes of knowledge production around temporality. They are entangled with Eurocentric historical narratives of Christian morality and evolutionary and cultural superiority. Therefore, this thesis constructs these two domains as “here” and “elsewhere” as a way to incorporate the temporality necessarily involved in archaeoacoustics of “then” and “now”, but also to emphasize the cultural constructedness of these two domains. These intellectual domains are each populated by a multitude of social constructs and their own ontoepistemological frameworks. Although it is wrought with difficulties to speak of a “we” in the “now”, and correspondingly of a “they” in the “then”, there are times when it is necessary to speak in these terms within this thesis. This is done so without presuming any ontoepistemological, social, political or cultural unity within the earth’s current population, but in order to characterize a generalized post-Enlightenment late industrial Western mentality, which academic knowledge production often takes for granted.

The domains of “here” and “elsewhere” can be likened to Foucault’s notion of the “episteme” as the “total set of relations that unite, at a given period, the discursive practices that give rise to epistemological figures, sciences and possibly formalized systems, the way in which, in each of these discursive formations, the transitions to epistemologization, scientificity, and formalization are situated and operate” (Foucault, 2013, p. 191). I propose that the “here” and “elsewhere” are always subjected to situatedness in the manner outlined by Haraway’s *Situated Knowledges*

above, which is to say, embedded within the politics and ethics of knowledge production. These domains designate multiple overlapping, and at times contradictory tendencies, gestures and practices of thought. Some key structural characteristics of these domains will be outlined below.

Grasping these two distinct domains of “here” and “elsewhere”, from a feminist and decolonial perspective then, a few distinguishing characteristics can tentatively be drawn. “Here” is undeniably Eurocentric: it is the historic fulcrum of academic knowledge production. It is also androcentric, or male-dominated, as feminist philosophers and scientists have made clear. It is visuocentric, as highlighted by sound studies and other humanities scholars. It is based on a Cartesian division of mind and body, and is based on individualism, as body studies scholars have pointed out. It tends towards a biocentric conception of the human which foregrounds the body as a natural organism (Wynter, 2003). It uses a predominantly representative framework, as scholars of visual cultures have surveyed. These are all constitutive factors within the “domain” or “episteme” of an intellectual “here”. With all of these characteristics of “here” in place, what remains of a potential “elsewhere”?

This is where conceptions of difference and sameness play out in curious ways. As Stuart Hall described in *The West and the Rest*, the discursive formations as a practice of producing meaning developed in the West have long histories of imposing a “regime of truth” on non-Western “Others” based on difference. Further, such analyses are epistemologically destructive in that “it draws crude and simplistic distinctions and constructs an over-simplified conception of “difference”” (Hall, 1992b, p. 189). Sounding situated knowledges, following Haraway's situated knowledges instead foregrounds an interrogation of the notion of difference and diffraction in opposition to one of “reflection”:

diffraction over reflection is a central metaphor to refuse the stable ground upon which knowledge production is premised: “diffraction patterns record the history of interaction, interference, reinforcement, difference...Unlike reflections, diffractions do not displace the same elsewhere... Rather, diffraction can be a metaphor for another kind of critical consciousness...one committed to making a difference.
(Haraway, 1997, p. 273)

Within a poorly considered notion of difference, Haraway warns that instead of producing genuine difference, the same Eurocentric, androcentric, capitalist modes of knowledge production are simply reproduced elsewhere. Difference and the notion of diffraction therefore become central in the political-ethical construction of an elsewhere. This is intimately tied to a conception of “here”.

Therefore, within the imaginations of what a prehistoric “elsewhere” is like, if the processes of knowledge production are not being properly acknowledged for the privileges and relations of power which inhere in them, the politics of “here” and “elsewhere” are not properly being examined. If the imaginaries proposed involve the continuation of these knowledge-power discourses which carry many of the same unexamined assumptions of contemporary mainstream culture, then such an imagination will be hegemonic rather than striving towards a genuine alternative. For archaeoacoustics, this would mean that the accountability and responsibility of sonic knowledge production will not be sufficiently situated, with its political and ethical implications thoroughly considered.

The stakes of imagining an “elsewhere” are high. Recurrently throughout her work, Haraway speaks of an “elsewhere”. Regarding her commitment to anti-racist, feminist, anti-capitalist politics, and her intellectual inheritance of Western philosophy and science which runs throughout her writing, Haraway writes:

in the face of many established disorders we need to practice saying "none of the above." There can be an elsewhere, not as a utopian fantasy or relativist escape, but an elsewhere born out of the hard (and sometimes joyful) work of getting on together in a kin group that includes cyborgs and goddesses working for earthly survival.

(Haraway 2004b, 3)

A practice of feminist speculation which disrupts hegemonic imaginaries strives towards this “elsewhere,” as a speculative philosophical-political space. In archaeoacoustics, this is somehow also a sonic elsewhere.

The speculative nature of archaeoacoustics can have powerful implications. Urging caution in conjuring imaginary worldviews does not imply a negation of the joy and potential profundity of feminist and decolonial world-making. As Eduardo Viveiros de

Castro provocatively proposes in *Cannibal Metaphysics*, if anthropology remains at the level of an epistemo-political reflexivity in which the anthropologist herself continues to be central (a charge of “narcissism”), the potential of Indigenous knowledges to create new concepts in philosophy will be ignored (Viveiros de Castro, 2014). A similar argument can be made for archaeology. If archaeologists continue to implicitly and explicitly maintain the “here” of Eurocentric hegemonic thought in investigating potential meanings and uses of sites, then what emerges from archaeological engagement with material remains will persist as part of an “impoverished” imaginary, of the dominant epistemologies of the North (Santos, 2007, p. 11, 2014).

Various theorizations of the role of political-philosophical “elsewheres” in recent new materialism, speculative realism and object-oriented ontology debates can be found variously addressed. Jordy Rosenberg addresses the recent turn in the humanities to “ancestrality” within the ontological turn as part of a settler rationality which fetishizes ontological “strangeness” (Rosenberg, 2014). Similarly, Mel Chen describes new materialism’s logic of “going cosmic” as “(futuristically or relatively)...a cosmology whose material participants or collectivities are not as they seemed, and whose interrelations or relational potentials are experienced as novel” which takes matter to be “deracinated” and depoliticized (Chen, 2016). Such fantasies about a pure *terra nullius* which European Man can conquer or own in any material or intellectual sense are therefore identified as occurring, when normative cultural values remain unexamined. Thiele, Van der Tuin and Asberg seek to reclaim the importance of feminist speculation amidst the contemporary flourishing of speculative realism and object-oriented ontologies. This speculation entails drawing on science fiction to imagine visionary pasts, futures and presents as a practice of feminist world-making (Thiele, van der Tuin, & Asberg, 2015). Therefore, alongside the recognition of the dangers of speculating about an imagined past or future, the reach of speculation must also be recognized for its potential transformative power.

As I will explore in later chapters, notions of nature and culture play a significant role in these ancestral speculations. “Where we need to move is not “back” to nature, but elsewhere, through and within an artifactual social nature, which these very scholars have helped to make expressible in current Western scholarly practice” (Haraway,

2004c, pp. 78, 90). In “The Promises of Monsters,” Haraway's notion of “artifactualism” contests the idea of an *a priori* nature or reality and insists upon a conception of nature as always constructed. “If organisms are natural objects, it is crucial to remember that organisms are not born; they are made in world-changing technoscientific practices by particular collective actors in particular times and places” (Haraway, 2004c, p. 65). Thus, even seemingly “natural” artefacts which appear as the core material of scientific research, conceived within complex human and non-human intra-actions, are in fact artefacts constructed “as both fact and fiction” in scientific discourses. This rings true for laboratory experiments in primatology as it does for the acoustics of caves or monuments in archaeoacoustics. Such material remains are not purely “of another time”, rather we are implicated in their co-constitution as artefacts in each one of our engagements with them. This destabilizes the long-established nature/culture binary, demanding, following Haraway the notion of the “natureculture” of sound. The speculative “elsewhere,” according to Haraway, can only be conceived of through the relevant artefacts; material-semiotic readings of these artefacts may help us there. For the sonic elsewhere theorized by archaeoacoustic researchers, the artefacts in the forms of buildings or other material remains, form a crucial meeting point for the human and non-human intra-actions of scientific knowledge production. How these are interpreted will have implications for the theories of sonic knowledges proposed in this thesis.

To avoid the pitfalls of an “epistemic laziness” (Rizvi, 2015) which reproduces colonial epistemological inheritances uncritically in an evaluation of sonic knowledge production, therefore, we need a multi-faceted critical approach which negotiates the hegemonic “here” with the political-philosophical “elsewhere”. This will be one which follows Dipesh Chakrabarty’s call to “provincialize” Eurocentric knowledge production from the trappings of its universalising urges (Chakrabarty, 2000), as well as the situatedness of feminist epistemologies (Haraway, 1978, 1988) to similarly ward off the false aspirations of ahistorical and supposedly apolitical statements about the sonic past. The approach takes into account the powerful potentials of feminist, decolonial speculation which conceives of a radical political-philosophical “elsewhere” to propose ways of being in the world undetermined by Eurocentric cis-hetero-patriarchal capitalist modes of knowing. For feminist and decolonial projects, this

envisaging is a “power of the imagination” (Flusser, 1999, 2011) limited only by the constraints of one’s own imaginations of the past, present and future.

0.7 Sonic Knowledge Production - Definitions

In investigating uses and meanings of sound and listening as a significant factor in cultural communication, both sound studies and archaeoacoustics are understood in this thesis as engaging in some form of *sonic knowledge production*. Sound, listening, hearing, the auditory, the aural all pertain in different ways to “the sonic,” which is taken in this thesis as a general term that encapsulates practices, theoretical constructs and physical phenomena related to sound and listening. These different terms have been deployed for various reasons. Typologies of listening have often distinguished the physiological mode of hearing, as the physical incursion of sound waves upon the ear drum, from listening, as the use or interpretation of the vibrations received and a fundamentally communicational practice (Truax, 2001, p. 11). Listening, in typologies such as that proposed by Barry Truax can be categorised according to the amount of attention one pays – background listening, listening-in-readiness, and listening-in-search are identified as shifting levels of engagement (Truax, 2001, pp. 21–23). Sterne’s use of “auditory” in the history of sound reproduction technology refers to physiological perceptual mechanisms of the auditory nerve (Sterne, 2003, p. 32). Aural is often used to mean ear-related, as a complement to oral as mouth-related and visual and eye-related, in uses such as in Blesser and Salter’s “aural spaces” (Blesser & Salter, 2006). The term “sonic” is chosen in this thesis to denote the multi-faceted human and non-human relations at play within this constellation of terms. The terms “sonicity” and “aurality” as defined above, however, are not intended to correspond to these broader uses of “sonic” and “aural”. This is an approach which does not cede too much to recent criticisms of anthropocentrism, criticisms which have led to philosophical trends which overplay the role of the non-human. Rather I follow feminist posthumanists’ “human de-centred” approach to sound and listening which allows for the centrality of humans in the history of sound and listening, without presuming an a priori importance. As the listening-hearing distinction is often burdened with cultural associations, I simply understand listening to be a procedure of sonic communication. Listening, is understood as a process taking place between

humans, their technological equipment, their objects, their surroundings without presuming any particular hierarchy between them. As such, human decentred listening is presumed implicit; however, a primary analytic focus is placed in this thesis on the broader term production of sonic knowledges.

There have been a few precedencies within sound studies for theorising sonic thinking in an expansive sense. Steven Feld's work on "acoustemology" – a neologism of acoustics and epistemology – emerged from ethnographic work over decades with the Kaluli people in Papua New Guinea in which he describes the fundamental role played by an acute sense of hearing in cultural relations (Feld, 1996, 2015). Julian Henriques' notion of a "sonic logos" or "sonic ways of knowing" was borne from an ethnographic study of Jamaican reggae dancehall soundsystems and an analysis of sonic practices between the various actors which make up the scene (Henriques, 2011). Both Feld and Henriques address conceptions of knowledge directly: Feld describes in the Kaluli, how "This way of hearing and sensing the world is internalized as bodily knowledge" (Feld, 1996, p. 100), whilst Henriques draws on Michael Polanyi's idea of "tacit knowing" to describe "ways of knowing" which are not directly representational (Henriques, 2011, p. 233; Polanyi, 1962).

Within the history of science addressing sound and listening, there have been a few approaches which are useful regarding the audio technologies many archaeoacoustics researchers use in their work. Sterne coined the term "audile techniques" to describe a set of practices within the development of sound reproduction technology which linked listening to a "coding and rationalization" of what was heard, in order to trace historical changes in listening (Sterne, 2003). Alexandra Supper and Karin Bijsterveld describe "sonic skills" utilized in processes of knowledge-making in science, medicine and engineering to denote how listening practices and corresponding technical equipment forge particular types of listening (Bijsterveld, 2008; Supper & Bijsterveld, 2015). Different forms of listening are certainly at work within archaeoacoustics; for this project, however, a detailed analysis of the different modes is not of core importance.

As mentioned above, anthropologists specialising in sensory studies have broadened

conventional Western understandings of how the senses relate to knowledge production. Classen and Howes detail a hierarchy of the senses in the West, in which sight is commonly denoted as the 'noble' sense, and hearing – due to the importance of speech – is also closely associated with the intellect and the ability to reason, whilst the other senses of touch, taste and smell are considered to be lower down (Howes & Classen, 2014, pp. 1–3). These studies attempt to understand how different sensory regimes produce different knowledge regimes, as “sensory knowledges” or “epistemologies of perception” (Howes, 2003, p. 54,58). Such anthropological studies have been decisive in understanding how human sensory modalities and cultural practices in non-Western societies produce other sensory knowledges. Yet given how perception is conditioned by culture and the complexity of interrelations of sense and meaning which arise, theorising sonic knowledges is an open-ended endeavour. Rather than indicating *a* form of sonic knowledge, as opposed to an implied unitary form of visual knowledge, a plurality of sonic knowledges are implied which indicate a multitude of possible knowledges related to sound and listening.

Given the status of the body as a persistent but overlooked “absent presence” in academic discourses (Shilling, 2003, p. 8, 2008, p. 162; Turner, 2008, pp. 33–34), body studies scholars have located in Descartes’s famous “*cogito ergo sum*” the splitting of body and mind, and the privileging of the thinking mind over the machine-like fleshy body, as that which defines individual humans as social beings (Shilling, 2003, p. 8) as well as exacerbating a binary divide between interior/exterior and self/other (Blackman & Walkerdine, 2001; Turner, 2008). Eurocentric epistemological traditions exercise a disregard of the sensory and of embodied experiences. The dualisms overlay other aforementioned binaries in Western thought: man/woman, nature/culture, mind/body, self/other, interior/exterior, religion-spirituality/secularism, human/animal, seeing/hearing.

This thesis proposes an ecology of sonic knowledges exist. Henriques, in describing sonic ways of knowing within the Kingston sound system participants he surveys, differentiates various types of knowledge derived from Ancient Greece most notably comparing “episteme” as analytical or scientific knowledge, (derived from the Greek ἐπιστήμη) to “techné” (derived from τέχνη) denoting craft skills, and phronēsis

(φρόνησις) denoting a practical wisdom (Henriques, 2011, pp. 245–246). I identify a set of sonic knowledges within archaeoacoustics that help navigate the key tendencies of the field.

Finally, some considerations on the term “knowledge production” are necessary. Knowledge production in late capitalism is irrevocably bound within labour relations. Sociologists of knowledge have focused on how knowledge is produced in particular culturally conditioned ways as well in relation to the “knowledge management” strategies as part of a Taylorist system of “knowledge societies” (Fuller, 2002). The university is a site where culturally dominant forms of power are cultivated by a self-reproducing elite, as Pierre Bourdieu describes in *Homo Academicus* (Bourdieu, 1988; Bourdieu & Passeron, 1990). Within the political economy of knowledge production, in which institutions such as universities play a significant and decisive role, the term sonic knowledge production is necessarily inflected with ideas of production, distribution, exchange and consumption. Within the modes of academic knowledge production, such as research, publication, teaching, public dissemination of ideas, the immateriality of intellectual thought enables the circulation of capital to function differently to traditional commodities; there is nevertheless an idea of “productivity” inherent in knowledge production. There are “more productive” and “less productive” sonic knowledges within the ecology of sonic knowledges, which this thesis only deals with to a limited degree. Although such a political-economical perspective is not pursued extensively within this thesis, the so-called “immaterial” labour of intellectual work which constitutes knowledge production remains important in the configuration of material-semiotic relations.

0.8 Methodology

An analysis of archaeoacoustics’ sonic knowledge production is inevitably faced with the problem of complexity with regards to the level of detail to pursue. Marilyn Strathern describes the anthropologist’s dilemma of organising their complex observations and interactions of fieldwork when she writes “the more closely you look, the more detailed things are bound to become” (Strathern, 2004, p. xiii). As such, Strathern poses “partial connections” which isolate a few practices for consideration

which may be described at any one time. These often arise from switching from one perspective or scale to another (Strathern, 2004, p. xiv). This commitment to partiality resonates with the Harawayan endeavour of situated sonic knowledges. This project is situated within a particular time period, between approximately 2015 and 2019 and as such it reflects a snapshot of time, as well as representing the partiality of my own subjective experiences of the field and interactions with the field's protagonists.

Being a small and highly-specific field of study, with no extensive studies of it hitherto undertaken, a mixed methodology has been employed to gain proximity to the material and intellectual conditions which structure its knowledge production. The methodology is comprised of interviews, participant-observer fieldwork/site visits, a review of secondary literature and fieldnotes. My own encounters with the field, began as a sound-artist and researcher with a developing interest in the topic of archaeoacoustics after my initial discovery of its existence reading Blesser and Salter's aforementioned book. As such, some of the experiences, which I retrospectively called "field-work" such as that which enabled the scenario described at the beginning of the thesis to take place, occurred within the framework of a radio documentary. A number of personal and professional encounters enabled me to develop this investigation into the examination of sonic knowledge production within this thesis. Attendance at the first international archaeoacoustics conference in Malta in 2014, organized by the Old Temple Study Foundation (OTSF), a US-based non-profit educational organization, was my first entry into the field. The scenario in the cave above, as mentioned, was part of a radio program called *Auf der Suche nach Echo* (In search of Echo) for German national radio channel *Deutschlandradiokultur* which was aired in June 2015 (Goh, 2015). I presented part of my PhD research at the third "International Archaeoacoustics Conferences" organized by the OTSF in Tomar, Portugal in 2017. As a result of my participation at the two OTSF conferences, I contributed to the respective conference proceedings publications (Goh, 2014, 2018). Therefore, far from being a neutral, detached observer of the field, I have been an active participant and contributor. My presence as someone studying the field as opposed to a researcher of archaeoacoustics has, nonetheless, been noticed by its protagonists.

The review of secondary literature on the topic has taken into account academic

articles, non-academic articles such as writings in newspapers and magazines, books, websites, TV programmes, and reviewed the publications of each of the interviewees. Given the extra-academic nature of a substantial part of the research, newspaper and magazine articles as well as television and radio documentaries played a significant part of the literature review. Research of published material on archaeoacoustics was restricted to English-language publications. Surveying this material enabled me to obtain an insight into the types of audiences who were engaging with the topic, particular those outside of the academic study of archaeology. Such observations have consequently shaped the formulation of questions and the intellectual-theoretical framing of the thesis. The role of interviews was to enable closer analysis and examination of procedures of knowledge production in the nascent field. I undertook twenty semi-structured relatively long-form interviews with archaeoacoustics researchers between 2015 and 2017. Ethical clearance for conducting these interviews was granted by Goldsmiths, University of London in 2015. Names of participants, academic titles and other interview details as well as list of prompt questions are listed in Appendix C, alongside template consent forms in Appendix D. Interviews were recorded as audio recordings and fieldnotes were made after interviews, as well as during and after fieldwork trips. Access to interviews was predominantly through the personal-professional encounters mentioned above, and consequently through recommendations of interviewees, until a sample of twenty researchers was reached.

Following this process of literature review and interview, data was organized for analysis. Interview conversations were transcribed from recordings. This allowed for re-listening; my own reflections then emerged in comparison during the analysis stage of the research. Data collected in interviews was subjected to a loose thematic coding in which I identified emerging patterns and common themes, as well as areas of divergence. Following an inductive approach, I built “theories” from the material itself up, which resulted in the analysis of Chapters 2 and 3, in order to analyse the ways in which sonic knowledge is being produced by its main protagonists. This follows the sociological method of grounded theory (Glaser & Strauss, 1999) and some of its contemporary manifestations (Charmaz, 2013), in organizing data in terms of loosely identifying coded thematic areas, putting forward concepts and categories which are then used to theorize from. In my investigation, all encounters related to

archaeoacoustics were considered data for the research. Consent has been sought for all of the quotations used by interviewees, with some used anonymously (with consent). It can be noted that all of the interviews were conducted in English, my native language, which admittedly poses some restrictions and asymmetries onto the non-English native speakers whom I interviewed. This has some clear restrictions in maintaining the Anglocentric and European and North American bias of the existing historico-structural overemphasis on the authority of academic knowledge of these regions; I have endeavoured to reflect upon this within the larger structures of cultural and epistemological hegemony I am complicit in.

I was fortunate to be the beneficiary of good overall interpersonal relations with my interviewees; although not all participants of the field necessarily welcomed my presence and interventions, I have enjoyed largely pleasant relationships with all those whom I interviewed. The socio-political make-up of the interviewees is predominantly white in ethnicity and of European and North American nationality, the gender representation was 80% male- and 20% female-identified. Being a British-born woman of Malaysian-Chinese descent and educated within Europe, navigating a predominantly white, male, Euro-American-centred field brings with it a particular dynamic. Interviewing “experts” is often characterised in ethnographic literature as “studying up” as the social status and influence of the interviewees is often higher and larger than that of the interviewer, such as myself. Around 80% of the interviewees were very highly-educated, insofar as they possess an advanced research (doctoral) degree with many interviewees employed in university lecturer or professorial positions. However, given the nature of the field of archaeoacoustics currently, which is made up of academics and non-academics alike, there was an additional dynamic of “studying across”, as the non-academic participants of the field saw my academic work as part of a prestigious system of intellectual knowledge production they were not necessarily party to. There was an overall openness to my research, for which I am grateful to all of my interviewees, who understood my primary interest in the processes of knowledge production. The researchers whom I interviewed although by no means the entirety of the field constitute a substantive majority including its most well-known, active and influential protagonists.

As mentioned above, the trip to the caves in France informally constituted fieldwork which had taken place within the realms of a radio-documentary production. Whilst this experience provided rich insights into the key questions and concerns of the field of archaeoacoustics, I sought a further fieldwork study to observe more closely within a framework of sonic knowledge production. I was fortunate to gain funding and access to accompany archaeoacoustics researcher Dr. Miriam Kolar to the site of Chavín de Huántar, Peru in July 2018. Kolar's work is admired and respected within the field and the 3000-year-old site of Chavín is accepted to have significant acoustical properties and characteristics. Being able to experience the site itself in person, to observe Kolar's work-in-progress as well as interview and enquire into her multiple investigations which have taken place over several years at the site, provided a rich set of experiences and ideas to explore within the framework of sonic knowledge production. The experiences of this fieldwork, as well as an analysis of the site's archaeological history itself, form the analysis of Chapter 4 and the basis of Chapter 5's challenge to current theories of sonic knowledges. Being located in South America, particular attention has been paid to the work of decolonial scholars in the region who have numerous and diversely addressed the impact and implications of Spanish and Portuguese colonizers beginning in the late fifteenth century, in formulating critiques of Eurocentric epistemologies. Navigating this particular cultural and political conjuncture at Chavín de Huántar in Peru, I sought to reflect upon my own Eurocentric modes of knowledge production whilst examining the potentials for sonic knowledges at the site and beyond.

Whilst the two case studies drawn upon in this study reflect the time limitations of this particular project, and as mentioned above the in-depth study of Chavín demanded particular attention to relevant facets of Peruvian studies and Latin American studies, the theorisations which arise here do however allow for transposition to further case studies in a multitude of geographical and archaeological contexts. Section 2 of the thesis, constituted by Chapter 4 "Archaeoacoustics at Chavín de Huántar, Peru" and Chapter 5 "Chavín's Sonic Knowledge: Towards an aural gnoseology" can be considered a template of an analysis, evaluation and theorization of sonic knowledge production at an archaeological site. The methodology pursued in this thesis could be adapted to interrogate sonic knowledge production at other sites; the history and development of

archaeological research at a site will need to be examined specific to each potential further case study, as will the analysis of a particular researcher or research team's epistemological approach to sonic knowledge production, in relation to their given context. The theorization of sonic knowledge production in Section 2 of this thesis was given great depth and detail due to my ability to be a participant-observer at a site where archaeoacoustical research is taking place, however methods could be adapted (i.e. by using literature reviews of archaeological sources, *in situ* fieldwork notes of observations, or the use of 3D auralizations and visualization digital software, interviews with previously engaged researchers, if any of these are accessible) to examine other case studies where observing a live research project is not possible.

In all of my encounters with researchers I endeavoured to handle their professional (or in some cases non-professional) work with care and respect. As scholarly work on academics and intellectuals has demonstrated, scrutinising them brings with it particular challenges. In outlining the "habitus" of university academics in *Homo Academicus*, Bourdieu's description of how academic power is established by individuals and maintained was a useful framework for my study; they are an elite in possession of large quantities of academic and intellectual capital (Bourdieu, 1988). During interview and consequent interactions I faced challenges around issues of "accuracy, confidentiality and self-representation" of academic informants to those recounted by anthropologist Elizabeth Sheehan, who similarly to me was a PhD student as she interviewed academics with a higher status than herself (Sheehan, 1993, p. 253). The large majority of interviewees were keen to submit revisions and amendments to their interview transcripts to ensure accuracy of the depictions and details of their research, veracity of their statements and in order to maintain some control of how they were being represented in my work. It was furthermore discernible to me, then that the role of the "intellectual" and the division between "academic" and "independent researcher" brought with it certain frictions as the hierarchical division between being "in" the academy or "outside" of it also played out in my interactions with interviewees who were university-employed intellectuals as distinct from non-university-employed intellectuals; the university is a "'ground' ...enabling as well as restricting the activity of intellectuals" (Robbins, 1990, p. xviii). Ethnographers often have to adapt conventional methods to the specific concerns of their fieldwork

research, such as Luis Manuel Garcia's extensive work at Electronic Dance Music events (Garcia, 2013, 2016) in which methodologies deployed ensure that values inherent within a particular social sphere such as those of "fun", "intimacy" or "tactile togetherness" in club cultures are not disrupted by the presence of the ethnographer observing the scene with a video camera, microphone and notebook. My ethnography was multi-sited in its inclusion of individual interviews, conference attendance and fieldwork to archaeological sites such as caves, and I necessarily adapted my behaviour to match my role as participant-observer in these situations. Largely these adaptations to my behaviour were to ensure my informants that I am a trustworthy observer of the field whose endeavours, whilst not entirely aligned with theirs, were nevertheless earnest and conscientious in intention. Thus, my main challenges during fieldwork involved negotiating access by giving reassurances about my own scholarly integrity.

Accordingly, my approach to the material has a dual aim arising out of the nested nature of the project described above. On one level, I attempt to give an account of the processes of knowledge production in the field which is as fair in its depictions and comprehensive in its scope as was possible. In chapters 1 and 2, this manifests itself as a matter of surveying the spectrum of positions and opinions when formulating concepts and theories arising from interview data. This also entails delineating where significant divergences, as well as convergences, occur. In Chapter 4, this meant giving time and attention to Kolar's work as it is situated within the archaeological knowledge producing structures in place and ensuring a narration of key aspects of importance of the research as accurately as possible. As part of the memorandum of understanding laid out between Kolar and myself (in Appendix F), I allowed her to read draft versions of the material where her work and my observations of it substantially occurred and offer glosses, amendments and elaborations. These were all considered and taken into account in the final drafting of the text. Where there were areas of disagreement, I have noted this in a footnote. Moreover, as part my ethical and intellectual considerations in this project I have been careful to separate out where my analysis and theorizing of the field of archaeoacoustics departs from being predominantly descriptive. Where I have begun to incorporate frameworks, particularly interdisciplinary humanities sound studies and cultural studies concepts to my analysis, I have highlighted this shift from the researchers' own immediate frames of reference.

This is the case in chapters 3, 5 and 6 in particular where my own theorisations and critiques of the field and its researchers emerge most strongly. In each of these evaluations I seek to clarify that the research aims and objectives of the researchers is acknowledged as distinct to my own. What I hope to contribute in terms of critical reflection on sonic knowledge production is independent of the procedures of sonic knowledge production which the researchers themselves are engaged within. This may not always meet the expectations of the interviewee's own epistemological or scholarly frameworks; nevertheless, as an endeavour which is aimed at an expansive, generative critical reflection on sonic knowledge production and its conditions and mechanisms, I hope this modest contribution will be of interest to the field's researchers.

0.9 Chapter Outline

This thesis spans the expanse between the hegemonic "here" and a political-philosophical "elsewhere" described above. Following this introductory chapter, in Part 1: Chapter 1 – *Archaeoacoustics: The Formation of a Field* the development of the field of archaeoacoustics as an academic discipline is traced. Two main phases are traced, prior to and following on from the 2003 Cambridge meeting where the field was named. Its journey towards legitimation is described. This is narrated as an "invention" and the development of a "core-set" of scientists. In Chapter 2 – *Sonic Positivism and Sonic Naturalism*, I describe processes of sonic knowledge production within the field by drawing on interview material and secondary literature by archaeoacoustics researchers. I identify two trends of sonic knowledge production: sonic positivism and sonic naturalism. Sonic positivism is constituted by various epistemological mechanisms, whilst sonic naturalism is constituted by various "tendencies" of thought. The complex texture of archaeoacoustics as an "epistemic culture" is described in accounting for how various researchers approach sonic knowledge production. Together, and despite their substantial differences, sonic positivism and sonic naturalism are demonstrated to belong to the hegemonic "here". In Chapter 3 – *Sonic Alterity and Its Limitations* I examine the epistemological gesture which underpins conceptions of sound's otherness, its sonic alterity. I trace the previously identified trends of sonic positivism and sonic naturalism as sharing an epistemic history rooted in sonic materiality. I argue here that whilst the field has

substantial epistemological ambitions evident in its sonic alterity, it currently strongly resembles the hegemonic “here”, rather than a political-philosophical “elsewhere”. An idea of “innocent listening” is mobilized to demonstrate this argument.

In Part 2, I turn to a specific case study in order to assess the dynamics of sonic knowledge production in archaeoacoustics in more depth. In Chapter 4 – *Archaeoacoustics at Chavín de Huántar, Peru*, I describe Dr. Miriam Kolar’s archaeoacoustical work at the three-thousand-year-old ceremonial temple complex in the Central Andes. I situate her work within the historical context of Peruvian archaeology as well as within the current institutional formation of the site. I describe how her practice constitutes one of the most sophisticated and extensive bodies of work within the field. I designate her practice one of “robust post-positivism” which illustrates what Sandra Harding promotes as a responsible use of positivism’s legacies. In Chapter 5 – *Chavín’s Sonic Knowledge – Towards an Aural Gnoseology*, I evaluate to what extent Kolar’s sonic knowledge production stays within the hegemonic “here” of Eurocentric thought or departs from it. I analyse it against the particular set of epistemic relations at the site I call the “Chavín episteme” which takes the epistemological effects of colonialism into account. Examining an ecology of sonic knowledges, I propose a notion of “aural gnosis” as one which may navigate beyond the hegemonic “here” and into the unknown realms of a political-philosophical “elsewhere”. Some speculative comments are made to probe what such an approach might mean for Chavín.

Finally in Part 3, Chapter 6 – *Echoes of Elsewhere?*, I identify the various forms of echo which have appeared in the thesis as a whole. Reviewing the challenges of sonic knowledge production as it currently functions within the field, I explore the figure of echo as a material-semiotic feminist and decolonial figuration. It is here that the political-philosophical “elsewhere” referred to in the earlier parts of the thesis is elaborated upon. In evaluating the multi-faceted challenges which face the field and sonic knowledge production the thesis poses, I revisit the potential of echo and evaluate its propensity for disturbing the dualisms of Western thought. The conclusion of the thesis revisits the questions posed in this introduction; in particular, I assess how archaeoacoustics poses some substantial challenges to conventional European

academic knowledge production yet, in its current instantiation does not fulfil the ontoepistemological potential to re-frame and re-think sonic knowledges.

PART 1: SONIC KNOWLEDGE PRODUCTION IN ARCHAEOACOUSTICS

Chapter 1 - Archaeoacoustics: The formation of a field

1.1 Introduction

I'm standing in the caves of Arcy-sur-Cure in the Bourgogne-Franche-Comté region of France, around 200km south-east of Paris, in March 2015. Igor Reznikoff climbs into a niche at considerable height. He usually uses a walking stick to walk so I offer him my hand as he clammers upwards, and he hoists himself up onto the uneven wet stone ledge successfully. He demonstrates the niche's resonant acoustics to me as I stand recording him with a microphone. He starts off quietly with short low tones seven or eight times, getting increasingly louder. He pauses. Then he grunts four times, first loudly into the resonant space, fading quieter. He hums a few tones very low, sliding and meandering, at times recognisable as belonging to a "just intonational" tonal scale, tinkering up and down it. Before finally he starts in earnest: repeated grunts of varying amplitude into the niche, animal sounds, gruff, short forceful bursts of raspy breaths, eventually ascending into loud wild howls which tip over into a high-pitched wail, alternating with low raspy utterances recalling in turn, a dog, a boar and a wolf. At one point a horse-like whimper emerges from Reznikoff with short patterns descending in pitch and with audible overtones, before he returns to the dog-like grunts and a few longer very low tones to finish.

The *grand grotte* of Arcy-sur-Cure is said to be the second most ancient decorated cave in the world after the famous site of Chauvet in the south of France. The caves are damp and dark; the animal sounds reverberate around them to stunning effect. The cushioned acoustics of the space, well isolated from the outside world, create a confined atmosphere which is speckled with the occasional sound of water dripping from the ceiling. The long tail of the space's resonance – activated by Reznikoff's voice in the long chain of interconnected caves – is exquisite and curious. A concrete path leads the way through the subterranean caves, keeping visitors off the slippery rock surfaces. Where I stood listening to and recording Reznikoff was dark, although bodily

movement in the space triggers the sensor-activated artificial lighting illuminating some of the over 140 images that have been found there. The images identified by archaeologists there include negative handprints, geometric patterns, dots, curved lines and over sixty of animals. A large proportion (around half) of these animals are mammoths. Bears, rhinoceros, felines, and birds also appear, which have been placed by radiocarbon as dating between 28,000- and 33,000-years BP. For a moment I reflect briefly on the absurdity of the situation, which as an artist, researcher and in this case radio documentary-maker, I have found myself in. Reznikoff's channelling of various animals in his vocal performance in the cave is done entirely earnestly, yet a casual observer might be mystified to witness this scene.

Whilst some traditional archaeologists might resist including Reznikoff's method in "serious" archaeological research, for others including adherents of an archaeology of performance (DeMarrais, 2014; Inomata & Coben, 2006) and archaeologists of the senses (Hamilakis, 2013; Hamilakis et al., 2002; Joyce, 1998; Montserrat, 1998; Rautman, 2000), his approach might be considered a performative embodied translation of the visual representations of animals via his voice into sound. Reznikoff's actions follow a logic, even if they defy the more conventional methods of archaeological practice. Historians of science and technology have described the "rationality debates" which pervade academic knowledge production as being far from conclusive (Collins & Pinch, 2009, p. 2), in that rationales to explain a given phenomenon or justify a particular method are constantly being contested amongst the various groups involved. In this case we might imagine a conflict between a traditional archaeologist who insists on only using methods with visual and symbolic interpretative frameworks for archaeological research, and Reznikoff who foregrounds sound and listening in his approach; these might form contrasting and perhaps conflicting rationales. Consequently, understanding the notion of rationality – including rival notions of it – is central to enabling a closer appraisal of processes of knowledge production.

Archaeological sites are notoriously difficult to access for researchers as they are very often embedded in personal, intellectual and territorial disputes between individuals, community groups, families and the state; local council or international institutions;

and any combination of these. Reznikoff's ability to access the caves of Arcy-sur-Cure, located on a private property, was contingent upon his good relations with the cave's director; this, in turn, enabled our group's access during this visit. In contrast to regular visitors, we were allowed full access over several hours to the cave's spaces instead of being restricted to a guided tour lasting an hour.¹³ The question of access to archaeological sites evinces distinct dynamics of inclusion and exclusion, between archaeologists or archaeological teams as well as between archaeologists and the larger public. Historians of science and technology have examined the social construction of knowledge and artefacts as part of a "technological frame" in which interactions between individual actors or social groups can be understood as taking place from "different degrees of inclusion" (Bijker, 1987, p. 174) in relation to a "core-set" of scientists (Collins, 1981). In archaeology, then, physical access to a site parallels intellectual access to knowledge production in science; in both there are core-sets of actors whose degrees of inclusion determine their ability and legitimacy to produce knowledge.

Insofar as it foregrounds the question "what and how can one know through sound?", I propose that the scenario described above encapsulates some of the core issues faced by the recently emerged field of archaeoacoustics. Prior to the scene, the other archaeoacoustics researcher present, Rupert Till, had used his laptop, portable speaker and microphone to emit sinewave-sweeps, record audio and generate a spectrogram to determine the resonant frequency of the niche. Both researchers are attempting to get closer to understanding how the acoustics and sonic experiences within the space of the cave might relate to archaeological interpretation of the site. Till's approach has obvious contrasts to Reznikoff's; where the latter primarily uses his voice, ears and body to sound the cave, the former's approach uses electrical equipment and derives substantially from the experimental scientific field of acoustics in its procedures of measurement and analysis. Both protagonists were respectful of the other's preferred methods, although both believed with different emphases on the importance and

¹³ The current director of *Les Grotte d'Arcy* is François de la Varende. During our visit he explained that Reznikoff had been working in the caves with his father, the previous director, since the mid-1990s. Private ownership of archaeological sites in France is not uncommon, even where sites have been shown to hold remains dating back to "prehistory". Due to the history of public heritage legislation in France, the law restricts state intervention into monuments or archaeological sites only to specific circumstances (Schnapp, 2009).

relevance of their respective approaches. These procedures each address the central problematic of archaeoacoustics identified in the introduction as the *potential retrievability of sonicity and the irretrievability of aurality*. It highlights how the phenomenological experience of the sonic, the sensory and the body enter into complicated relation with the production of academic knowledge, a theme which emerges throughout this chapter.

According to Ezra Zubrow in the proceedings of the 2014 *Archaeoacoustics Conference* in Malta, archaeoacoustics exists in a “pre-paradigmatic” stage, as “there are no generally accepted theories... methodologies... or data yet” (Zubrow, 2014, p. 9), referring to the diversity of approaches to research in archaeoacoustics. Zubrow refers to Thomas Kuhn’s famous description in *The Structure of Scientific Revolutions* [1962] that in the early stages of the development of a discipline, various pre-paradigmatic schools vie for ascendancy. Before so-called “normal science” and its “puzzle-solving activities” can occur, a paradigm must be established. Kuhn calls the necessity of scientists to occasionally have to live in a world “out of joint” as “periods of crisis” the “‘essential tension’ implicit in scientific research” (Kuhn, 1996, pp. 69, 79).¹⁴ However, Zubrow’s statement reveals a useful ambiguity for theorising sonic knowledge production. As a commentary on the status of archaeoacoustics at the time of writing, it can be understood in two different ways: firstly, it could propose that archaeoacoustics provides proof of a need to fundamentally enact a paradigm shift within scientific thought of the magnitude Kuhn discusses (such as exemplary in the Copernican Revolution [1957] (Kuhn, 1997); it implicitly predicts a revolution to come, which might – in a somewhat theatrical manner – be triggered by the turn to the sonic within archaeoacoustics. Secondly, it could propose that archaeoacoustics itself simply has not yet established a set of internal disciplinary methods of a “normal science”. This would be more modest in scope for suggesting merely a re-arrangement of existing paradigms, rather than a fundamental overhaul. The question of how radical a paradigm this is re-occurs throughout the thesis.

In this chapter I describe the emergence of the field of archaeoacoustics as an

¹⁴According to Kuhn, “what is surprising, and perhaps also unique in its degree to the fields we call science, is that such initial divergences should ever largely disappear” (Kuhn 1996, 17).

academic discipline, outlining key figures and events in its foundation and development. In tracing archaeoacoustics' institutional establishment, this chapter aims to understand why archaeoacoustics emerged when it did, in the form which it did. There is only space for a relatively brief account of the field's emergence. This narrative sets its focus on the developing field as it came to be a legitimate area of study. I contend that archaeoacoustics partially contains the character of an invention, which historians of science have theorized in order to trace the development of "successful" and "failed" artifacts (Bijker, 1987). Some actors contest its "emerged" status. However, drawing on Karin Knorr-Cetina's description of "epistemic cultures" as "cultures that create and warrant knowledge" and as "amalgams of arrangements and mechanisms-bonded through affinity, necessity, and historical coincidence- which, in a given field, make up how we know what we know" (Knorr-Cetina, 1999, p. 1), I argue that the journey of archaeoacoustics to become an epistemic culture has, by this definition, already been established.

Studying the formation of an epistemic culture has several advantages. As described in the introduction, the object of knowledge of archaeoacoustics researchers is only empirically accessible in limited ways; even in the best cases of retrievable sonicity of a given archaeological site, where the auralities of the cultures in question remains largely irretrievable, archaeoacoustics researchers' knowledge production *is* empirically accessible to me. As Harry Collins and Trevor Pinch write in their introduction to their sociological study of parapsychology *Frames of Meaning*, "science is a peculiarly accessible social institution" (Collins & Pinch, 2009, p. 3). Science is done in, "laboratories, conferences, journals, books, universities, and, of course, it is done here and now," (2009, p. 3) which might not afford full transparency to every aspect of the development of scientific discourse, but nevertheless afford a "a visible and investigable 'outcrop'" (2009, p. 3) to be analysed. These activities which have made archaeoacoustics visible and investigable form the basis of this chapter as it traces the field's development.

My narrative of archaeoacoustics might be grasped as fortuitously situated at a time *before* a unity of purposes or conventional norms of methods have been established. The resulting multiplicity of approaches can be grasped as a rich web of interconnected

actors and actions which can be traced in order to ask what the ensuing tensions and discontinuities reveal. Writing on the complexities of knowledge production, Annemarie Mol and John Law describe multiplicities as “coexistences at a single moment” (Law & Mol, 2002, p. 8). Foucault traces the emergence or *Entstehung* of history as an “endlessly repeated play of dominations” (Foucault, 1977, p. 150) genealogically in order to resist the pursuit of unitary origins and instead to “uproot its traditional foundations and relentless[ly] disrupt its pretended continuity” (Foucault, 1977, p. 154). A corresponding approach to archaeoacoustics’ more revolutionary leanings can be appreciated for its potential to throw conventional power-knowledge formations into disarray. Archaeoacoustics’ legitimacy can be described as contestations between “qualified” and “subjugated” knowledges of various kinds (Foucault, 1980) which are in turn situated on tangible and less tangible divisions between “academic” and “non-academic” practices. As put forth in the introduction, it can be conceived of as a series of struggles between competing systems within an ecology of sonic knowledges.

Insofar as archaeoacoustics can be read as a socially-constructed “invention” of a novel academic field, Wiebe Bijker’s theory of invention provides the terminology “social group,” “technological frame” and “inclusion” to help elaborate its development. These are defined as follows: different “social groups” are identified in such a history in order to distinguish between the varying meanings a group might attribute to an invention. “Technological frames” include the “current theories, goals, problem-solving strategies, and practices of use” (Bijker, 1987, p. 171), and is applicable broadly to scientists and non-scientists alike. Bijker foregrounds the interactions *between* actors as key to the technological frame which provides the conditions for an invention’s emergence. I follow sociologists of scientists in endeavouring not to make *a priori* distinctions amongst different types of social groups (Pinch & Bijker, 1984), nevertheless as mentioned above, “degrees of inclusion” (Bijker, 1987, p. 173) can describe the authoritative, hegemonic status of the social group who wield the largest amount of power, in cases within science this can usually be discerned as the “core-set” of actors. This is evident within the formation of an academic field such as archaeoacoustics in the hierarchical status those with the largest degree of inclusion to the core-set.

In light of the nascent emergence of a core-set of archaeoacoustic actors, the relation between social groups can be distinguished as follows. Within science and technology studies, the “core set” of scientists are “those who are actively involved in experimentation or observation, or making contributions to the theory of the phenomenon” (Collins, 1981, p. 8). Following the aforementioned analogy of archaeoacoustics as an “invention”, sociological studies of invention have theorized that actors with a relatively low degree of inclusion in a core-set often identify non-standard problems and recognise more quickly when “radically different system will do a much better job” (Constant, 1980, p. 15) in (Bijker, 1987, pp. 183–184); which is to say, the outsider status can afford epistemic advantages. I propose for the narrating of archaeoacoustics that there are three categories of degrees of inclusion which exist in decreasing proximity to a proposed core-set who wield the largest amount of power and influence in the field. In the first set are protagonists working directly within the academic field of archaeology. They are employed in respected archaeology departments in renowned academic institutions. In the second set are those working within academia more generally, but who are not trained archaeologists or do not have archaeology as the primary research area. The third set are those who do not primarily work within academia. The degree of inclusion to the core-set decreases across the three groups, with the latter exhibiting the lowest degree of inclusion.

Following Collins’ definition of the core-set, he proposes that in the event of a controversy, the core-set of scientists are those “who are actively involved in experimentation or observation, or making contributions to the theory of the phenomenon...such that they have an effect on the outcome of the controversy” (Collins, 1981, p. 8). Here, then, the dynamic of competition between scientists takes the form of intellectual prestige and scholarly reputation plays a role. Within academia, those with relatively-conceived “higher” academic credentials as recognized by other academics are more likely to be situated within the core-set of scientists. In the final section of this chapter, a brief analysis of exemplary controversies within the field explicates the characteristics of the core-set in archaeoacoustics.

In describing the field’s development, I also offer an explanation of archaeology’s increasing attentiveness to embodiment which aims to elucidate why the knowledge

structures of archaeology became more amenable to accepting the importance of the role of sound and human behaviour. This was, I argue, a key pre-requisite for the emergence of archaeoacoustics. Auditory experiences are a challenge to the conventionally conceived cognitive-focused disembodied subject of philosophy and science, and this is complexly imbricated in the production of sonic knowledge in archaeoacoustics. Archaeoacoustics challenges certain traditions of Western academic knowledge production, especially the conventional disembodiment of thought and visuocentric conceptual biases. I read the emergence of archaeoacoustics as a part of a larger challenge of embodiment which gained increasing prominence in intellectual thought in the twentieth century. In so doing I explore the corresponding challenge posed by the sensory and the sonic to traditions of Western epistemology which have typically governed academic knowledge production.

1.2 2003: The institutionalisation of archaeoacoustics

In 2003, a symposium held at the McDonald Institute for Archaeology at the University of Cambridge, UK, became a crucial point for the field as it was here that “archaeoacoustics” was named. Organized by archaeologists at the institute Chris Scarre and Graeme Lawson, the event entitled “Intentionality and Acoustics Meeting” gathered twelve presenters, in addition to the two organizers and six respondents, to present and discuss past and current research which connected archaeology and acoustics. The 2006 publication entitled *Archaeoacoustics* emerged as a result of this meeting, featuring chapters by almost all of the invited presenters and edited by the two organizers. A core-set of “scientists” were consolidated during this meeting and publication. Hitherto disparate research projects came together under one subfield as archaeoacoustics and the publication became foundational in setting the parameters of research, introduced it to a larger archaeological academic community and enabling its wider circulation as academic research (Scarre & Lawson, 2006a).

There are several other dates which come under consideration when describing the emergence of the field of archaeoacoustics as a discipline: fieldwork on the acoustics of Palaeolithic rock art in caves in France began in 1983 (cited in (Reznikoff & Dauvois, 1988) as mentioned in the introduction); acoustics consultant David Lubman chaired

two panels on “Archeological Acoustics” at the *Acoustics '08* conference of the Acoustical Society of America (ASA) in 2008 (“Acoustics 2008, Paris,” n.d.), and the first conference with an open call for papers (also mentioned in the introduction), took place in Malta in 2014. An international association of archaeoacoustics has, at the time of writing, yet to be established.¹⁵ One could feasibly trace the field further back in time to the mid-1950s when the first published work on rock-gongs (or lithophones) in an archaeological context appeared (Fagg, 1956).¹⁶ Another alternative starting point would be in the mid-1970s when music archaeology, as the study of past musical behaviours and sound primarily through attention to “musical artefacts” came into existence as a field (Hickmann, 2000, p. 1).¹⁷ Further back in time still, one could argue that sound and music archaeology have even longer roots stemming all the way back to the earliest days of the modern field of archaeology itself when European merchants began exchanging their non-European material artefacts during the eighteenth century (Thomas, 1991, 1994) in (Gosden, 2004, p. 20), including sound-producing objects thought to be musical instruments (Lawson, Interview 2017).¹⁸ Nevertheless, 2003 serves as a useful starting point, as it was pivotal that at the prestigious archaeological institution at the University of Cambridge, the field was named and it signified the beginning of the drive towards the establishment of the study of the acoustics of archaeological sites as an academic field.

¹⁵The 2003 meeting in Cambridge was for invited speakers and guests only. The first large-scale open conference of the field was called *Archaeoacoustics: The Archaeology of Sound* which took place in Malta in February 2014 organized by the non-profit educational organization Old Temple Study Foundation (OTSF). A further iteration of the conference took place in Istanbul in 2015. The question of forming an international association of archaeoacoustics was raised and hotly debated at the OTSF's third conference on archaeoacoustics in Tomar, Portugal in October 2017. At the time of writing (October 2017), there has not yet been a decision reached by the group as to whether the formation of such an association will go ahead or not.

¹⁶Rock gongs' also known as *lithophones* or ringing rocks, are rocks which emit a bell-like ringing sound when struck and can and could have been used as sounding, percussive instruments. These often have cup-like marks on their surfaces which indicate practices of percussive striking of the rock. Fagg's work in Birnun Kudu in Nigeria associated the rock-gongs with nearby painted caves. His work has been frequently cited by archaeoacoustics researchers e.g. (Devereux 2001, 120; Díaz-Andreu, Benito, and Lazarich 2014, 9–10).

¹⁷The related field of music archaeology was born in fact from a study group within ethnomusicology, rather than archaeology itself.

¹⁸As Graeme Lawson recalls in interview, “in the very first volume of the *Archaeologia* in 1770, William Stukeley presents a paper on what he calls an ‘antient bronze horn’ from York. There's a flurry of activity in the British Archaeological Association, formed in 1843: for ten or fifteen years a series of articles they published a series of articles on different aspects of music's antiquity, from the point of view of archaeology and antiquarianism.” (*Archaeologia: Or Miscellaneous Tracts Relating to Antiquity 1779*) (Lawson, Interview 2017). William Stukeley (1687-1765) was an English antiquarian who undertook archaeological investigations of Stonehenge and Avebury and is considered a pioneer of the discipline of archaeology.

In the 2006 publication, archaeoacoustics as an epistemic culture became substantially consolidated. A definition of archaeoacoustics is offered by Scarre and Lawson as, “[the study of] the role of sound in human behaviour, from earliest times up to the development of mechanical detection and recording devices in the nineteenth century” (Scarre & Lawson, 2006b, p. vii). The use of relatively broad terms appears to be purposeful, with a correspondingly imprecise timeframe “from earliest times” to an end point in the middle of the nineteenth century when technological devices to record sound were invented. The designated time-range is not further justified, but the authors identify research around the acoustics of Palaeolithic caves and late prehistoric stone monuments, as originating in “the need to unravel the enduring mysteries” (2006b, p. vii) of these places; and refer to work around rock-art panels in North America, South Africa and Australia to suggest “a growing realization that their acoustics might tell us something useful about the human activities which may or may not have taken place there” (2006b, p. vii). The field’s agenda is identified as “primarily prehistoric in scope and architectural or topographical in nature” (2006b, p. vii). Foregrounding “prehistory” and its “mysteries” characterizes archaeoacoustics as it is framed in this influential publication.

As described in the introduction, employing a perspective which searches for archaeoacoustics’ origins does so in awareness of the conceptual traps of fantasizing truths or eternal essences, as Foucault’s notion of genealogy through Nietzsche reminds us (Foucault, 1977, pp. 139–145), and instead aims to be attentive to the social organization of knowledge (Fuller, 1991, p. 5). Embedded within European academic traditions, archaeoacoustics can be seen to replicate not only the Eurocentrism of the imperialistic history of archaeology itself (Gosden, 2004; Lydon & Rizvi, 2010) but also submits to the Anglocentric global biases which see English-language publications as better circulated than non-English publications. For example, the case studies referred to in characterising the field by Scarre and Lawson are primarily from countries of the so-called “Global North” - Europe, North America and Australia, although some mentions are made to “non-European” cultures, the chapters of the edited volume largely reflect the European and North American bias in the

geographical location of the case studies (Scarre & Lawson, 2006a, p. iii).¹⁹ This will likely have been informed by Scarre's research interests stated in the publication's blurb as a "specialist in the later prehistory of western Europe" (Scarre & Lawson, 2006a). There is acknowledgement of disciplinary archaeology as a Western institution implicating the field of archaeoacoustics; Scarre and Lawson, for example, make reference in their methods to the huge diversity offered by "non-western" conceptions of sound and music and the practices and meanings attached by ethnographically-studied cultures (Scarre and Lawson 2006, viii). This indicates an awareness of the limitations of established methods of Eurocentric archaeological knowledge production.

Scarre and Lawson make reference to the emergence of an "archaeology of the senses" which is presented to "serve[] as a timely, even overdue reminder that the past which we experience – and which others before us have experienced – is multisensory" (2006b, p. vii). Exemplary sites are given as megalithic tombs, painted caves from the Palaeolithic period or Romanesque churches, in which "unusual sound qualities...strike us immediately" (2006b, p. vii):

Voices resonate, external noises are subdued or eliminated, and a special aural dimension is discerned which complements the evidence of our other senses. Such sounds are intrinsic and indeed prominent elements of such experiences, elements that *we ignore at our peril* in seeking to understand the human use of places and the construction of buildings and monuments.
(Scarre & Lawson, 2006b, p. vii) (my emphasis)

Within this, an analytical and scholarly centring of the body is implied, "the inherent interest of particular kinds of instruments of monuments should not obscure the fact that the most obvious and most ancient sound producer of all is the human body: feet,

¹⁹ The location of case studies dealt with the authors of the volume include: Easter Aquortheis and the Ring of Brogdar in Scotland (Watson, 2006); Neolithic chambered tombs in Newgrange, Ireland and Avebury, UK (Devereux, 2006); Horseshoe Canyon, Utah, USA & Hieroglyphic Canyon, Arizona, USA (Waller, 2006); Scandinavia (Holmes, 2006); Medieval stone buildings in Norwich, UK and Fyrkat, Denmark (Lawson, 2006). In Scarre's introductory chapter he briefly reviews English-language literature relating to sound and archaeology in the Maya Culture of Mesoamerica and at the temple of Chavín de Huántar, in modern day Peru (Scarre, 2006). Iain Morley's chapter on hunter-gatherer music which draws on ethnographic studies from "modern hunter-gatherer groups" indigenous cultures in North America, equatorial Africa, Australia and Canada and Alaska (Morley, 2006). Regarding this latter contribution, a problematic tendency to align aural-oral activities of contemporary non-white communities with past human groups will be addressed as part a critique of Marshall McLuhan and Walter Ong's concept of acoustic space in chapter 3.

hands and voice” (2006b, p. viii) with prior reference to the “evolutionary importance of human musical behaviour” (2006b, p. vii).²⁰ The authors frame the previous neglect to consider bodily sensations – with a particular focus on auditory experiences – as an almost scandalous oversight which is only just beginning to be recognised by mainstream archaeology.

The conceptual gesture presented in the volume’s preface exemplifies a description given by Kuhn in a later writing, where he speaks (again, albeit this time with a different meaning) on the “essential tension” of scientific revolutions. To make advances in scientific progress, “the successful scientist must simultaneously display the characteristics of the traditionalist and of the iconoclast” (Kuhn, 1991, p. 140). Whether as a professional group or individual scientist, negotiating this essential tension is part of the “complex set of intellectual and manipulative commitments” (1991, p. 140) undertaken. The scientist must “discard[] some elements of his prior belief and practice [and] find[] new significances in and new relationships between many others” (1991, p. 140), framed as a balance between convergent and divergent thinking. Scarre and Lawson tread along this essential tension. Regarding the neglect of the sonic, the sensory and the body, as well as Eurocentric approaches to sound and music, they suggest divergent thinking from the established epistemological norm is necessary. However, this convergent thinking is also repeated in the dynamic between the various protagonists.

Scarre and Lawson’s negotiation of disciplinary boundaries demonstrates this further. The authors make reference to music archaeology in positioning the novelty of archaeoacoustics (Scarre & Lawson, 2006, p. vii). As mentioned above, music archaeology developed in the 1970s where scholars pinpoint its emergence in an (ethno)musicological context. As Hickmann describes, a round table entitled “Music

²⁰ There is not sufficient space to address this latter point in any satisfactory depth. However, I would refer to Gary Tomlinson’s epic and ambitious study *A Million Years of Music* to indicate the dangers, spearheaded by some strands of evolutionary psychology, which have “tended... to adopt an overly simple model of Darwinian variation and selection” (Tomlinson, 2015, p. 14) to nevertheless show that an approach which refuses nature/nurture dichotomies and insists upon “a biocultural coevolution” (2015, p. 13) can grapple with this complexity as “a continuous network of intermeshed mechanisms that, in some hypothetical full picture of all the forces that have acted in our evolution, would extend from the molecular level out to such things as mind, society, and culture” (2015, p. 15).

and Archaeology” at the International Musicological Society at Berkeley in 1977 included led to the consequent formation of the “Study Group on Music Archaeology” established within the International Council for Traditional Music (ICTM). Further international meetings and conference reports fuelled the field’s eventual consolidation (Hickmann, 2000, p. 1). The fact that music archaeology was borne in the context of an (ethno)musicology conference, and not within archaeology was commented upon by some interviewees (Till, Interview 2016), implying archaeology’s reluctance to accept and incorporate newer innovations as they happen. Arnd Adje Both has, amidst a more recent terminological reflection on music archaeology in comparison to “archaeomusicology” (Vendrix, 1994), and within a survey of other related sub-fields of “paleo-organology” (Megaw, 1968), “ethnoarchaeomusicology” (Olson, 2002), “music philology” (Lieven, 2004) and archaeoacoustics itself (Scarre & Lawson, 2006), surmised a broad definition of music archaeology as “the study of the phenomenon of past musical behaviours and sounds” whilst asserting that a common concept of “music” cannot be assumed across all societies and all epochs (Both, 2009, pp. 1–2).

Scarre and Lawson outline the two interwoven approaches to archaeoacoustics as those which focus on sound-making devices, tools or instruments, and those which study “spaces themselves” (2006b, p. viii). In this sense, the archaeoacoustics project distinguishes between “objects” and “spaces,” that is, between the study of the acoustics of spaces (of built or “natural” environments) in archaeoacoustics from previous music archaeological work on instruments or sound-making devices, although many concerns overlap and intersect. Both contrasts the approaches and respective research foci of music archaeologists and ethnomusicologists, noting how most music archaeologists focus more on past behaviours with any attention paid to living musical cultures subtended to the archaeological method, whilst ethnomusicologists interested in archaeological and historical questions tend to study present musical cultures in order to hope to understand the past, thus subordinating historical or archaeological methods (Both, 2009, p. 3). This longer view of disciplinary development taken by Both allows him to incorporate archaeoacoustical questions within those of music archaeology. Commenting on “obvious music archaeological paradox” that music of the

past is “lost” before the invention of sound recording, Both states “nevertheless, archaeoacoustic research is possible” (Both, 2009, p. 3). He includes a diagram in which “acoustics” appears alongside a number of components which can feed into the general objective of studying past musical behaviours and sound such as “organology”, “music iconology” and “philology” within individual research projects (see figure 1 in (Both, 2009, p. 4)). Thus, Both appears to imply archaeoacoustics is – or perhaps *should be* – simply subsumed within a larger umbrella term of music archaeology. Indeed, the Swedish music archaeologist Cajsa Lund has incorporated studies of acoustics and soundscapes, with musical instruments in their work for longer than the field of archaeoacoustics has been named (Lund, 1988).²¹ It is perhaps in this context one can best understand Rupert Till’s call as one led by diplomacy, in a later essay, for the field of “sound archaeology” to include both music archaeology and archaeoacoustics, emphasising its advantages as an interdisciplinary field (Till 2014a).

Yet at this stage in 2006, however interconnected objects and spaces are accepted to be, there is a measured degree of both convergent and divergent thinking. Divergent thinking is evident insofar as it appears necessary for the authors naming the field of archaeoacoustics to delineate where a spatial understanding of sound through the scientific study of acoustics departs from previous object-focused studies of music archaeology. However, convergent thinking is demonstrated insofar that the objects and methods of research can be demonstrated to have overlapping concerns with those of music archaeology, as Both seems to argue later (Both, 2009). Indeed, contrasting Scarre and Lawson’s aforementioned definition of archaeoacoustics as the that which studies the “role of sound in human behaviour” (Scarre & Lawson, 2006b, p. vii) with Both’s definition of music archaeology as that which studies “the phenomenon of past musical behaviours and sound” (Both, 2009, p. 1), one might conclude rather negligible difference in aims and objectives, and only a slight terminological variance, between the two fields. It is however clear that in their introductory comments in the volume, that Scarre and Lawson are keen to accentuate the novelty of the focus on acoustics in the then nascent field of archaeoacoustics.

²¹This is just one of several examples Both mentions that exhibit a cross-disciplinary approach and the wide array of sources and analytical processes encompassed by music archaeology (Both, 2009, p. 3).

Other disciplinary objectives are set in this volume, including the key question of “intentionality” (2006b, p. viii) which represents a traditionalist, rather than an innovative tendency. Here, the authors refer to the “common sense” approach which has hitherto enabled researchers to assert the “probability that ancient people – like ourselves – would have responded to and even engineered acoustic space” (2006b, p. viii). It urges caution in that “such arguments risk becoming circular” (2006b, p. viii). Therefore, the volume is described as an endeavour in which “contributors consider aspects of their own observations or methodologies which might enable us to convert data drawn from measurement of the ancient phenomena we study into admissible evidence of behavioural connexion” (2006b, p. viii). This term “admissible” is further clarified as, “based on compelling arguments derived from specific evidence” (2006b, p. viii). There is a palpable sense of urgency to the future of archaeoacoustics as a discipline in that such so-called “circular” arguments are framed as “represent[ing] a considerable challenge to our ingenuity” (2006b, p. viii). Here, the authors exhibit a stronger traditionalist sensibility in the manner which they emphasize the importance of methodology and evidence. Although Scarre and Lawson’s framing of the *Archaeoacoustics* volume in the book’s preface constitutes a mere two-pages, it was shaped by the conversations shared by world-leading experts at the 2003 Cambridge meeting and has been highly influential on the field since then.

1.3 Phase one: 1983-2003 – Primary encounters

1.3.1 The “pioneers”

In the period prior to the 2003 Cambridge meeting, there were a number of researchers who began independently to research the acoustics of archaeological sites. The main actors who undertook archaeoacoustical fieldwork, in chronological order with the first known fieldwork studies listed, were: 1983 – Igor Reznikoff (with Michael Dauvois), 1987 – Steven J. Waller, 1993 – Paul Devereux, 1995 – Aaron Watson (with David Keating). These researchers began within the typical frameworks of scientific knowledge production, publishing their work and presenting at academic conferences. Although recent work in science studies has criticized the “lone-pioneer” model of scientific discovery in favour of more complex descriptions of social

constructions of knowledge (Latour & Woolgar, 1986; Moon, 2014), I have used the term “pioneer” as a few of the interviewed researchers from this period refer to themselves in these terms, either directly as a “pioneer” (Devereux, Interview 2016), or in an allusion to this status in other words. For example, “I initiated...alongside Paul Devereux, a completely new avenue of research” (Watson, Interview 2017) or “at first when I read his article I thought, “Oh damn! Somebody beat me to it!” (Waller, Interview 2017). Such comments suggest an element of pride and gentle competition in being amongst the first in the nascent field.

Attention is given to these four figures leading up to the “invention” of archaeoacoustics according to Bijker’s theory (Bijker, 1987). They share the key characteristics of what I call “primary encounters” with archaeoacoustics. Primary encounters of archaeoacoustics are defined as on-site sonic experiences which led to the further pursuit of acoustic archaeological research. In this time period these all took place without prior knowledge of the existence of this type of research. Other figures considered for potential inclusion in this phase of research but who were ultimately excluded from examination were: Luis G. Lumbreras and David Lubman. Lumbreras’ 1976 study proposed that the temple of Chavín de Huántar, Peru had an acoustic system of hydraulic origin (Lumbreras, González, & Lietaer, 1976), however as I was unable to interview Lumbreras and his colleagues nor research into relevant Spanish-language research, this strand of research is not elaborated upon here. David Lubman began publishing archaeoacoustic research in 1998 in the form of a conference paper (Lubman, 1998a). However his arrival at the research questions is considered secondary rather than primary, in that he came to learn about intriguing acoustic effects at the Temple of Kukulcan, Chichen Itza, Mexico through Waller’s website in the 1990s (Lubman, Interview 2017); and although his research into the acoustic effect was pioneering in a considerable ways, his story is more closely aligned with researchers from the second phase, to be detailed below. Although it is possible other research exists which might fall into this category as laid out below, most likely to be non-English language archaeoacoustics research, the survey of knowledge production carried out here has not revealed any further such figures since the beginning of research in 2015 until the time of writing in 2019.

1.3.2 Discovery

As described in the introduction, Reznikoff's work with Michel Dauvois in the caves of Le Portel, Niaux and Arcy-sur-Cure in France in the 1980s appears to be the first published work in archaeoacoustics, as it has since been defined. These studies took place in 1983 and 1985 (Reznikoff, Interview 2015). Reznikoff, an emeritus professor of mathematics and philosophy at the University of Paris X Nanterre, is also a singer, who received a classical music education and who has an extensive discography of recordings of Gregorian and early Christian chant sung in Romanesque and Gothic churches. He was invited to the caves by Dauvois, a prehistoric archaeologist.²² A framework of institutional archaeology and academic knowledge production was already in place. In the caves, Reznikoff's practice of humming and singing in testing the acoustics led him to theorize the connection between the location of Paleolithic rock art in caves and acoustics with a positive correlation:

I immediately start humming "hmm hmm, oh oh, hmm, oh..." just to test whether there is resonance at all. I make such sounds almost everywhere where I can feel a possible resonance. When you are trained you can feel the resonance of a space, even silently. The quality of silence of a resonant space is different from the quality of silence of your dining room, let's say. And so I started humming and I discovered that here it sounds good and here it sounds not so good. Then immediately came the idea, what could be the relationship between acoustics and locations of paintings in the cave. (Reznikoff, Interview 2015)

His voice plays a central role in this discovery as his embodied experience of the cave and his self-avowed "natural" inclination to test the acoustics with his voice led him to linking the appearance of rock art to the acoustics of its locations (Reznikoff, Interview 2015).²³

In 1987, without any knowledge of Reznikoff and Dauvois's work, Steven J. Waller began undertaking research into the acoustics of rock-art sites. Trained with a PhD in bio-chemistry, Waller described in an interview how he developed an interest in cave-

²² A note on terminology: Although I have already outlined the criticisms of the term "prehistoric" in the introduction, I continue to use this term as it is commonly used by the large majority of archaeoacoustics protagonists.

²³As a personal observation, Reznikoff is a hugely gifted singer with a technically and stylistically impressive voice and keen musical ear.

art paintings as a hobby after his wife brought home an art history coursebook containing pictures of cave art and the “unsolved mystery” of cave paintings fascinated both of them. His first realization of a potential acoustic connection to the placement of cave paintings came when visiting the Bedeilhac cave in southern France. He experienced the striking and powerful echo of the cave as he stood in front of the cave entrance and happened to shout back to his wife, who had returned to the car to collect her sweater: “I yelled “hey, Pat!!!!” and then the cave spoke back! I just heard that echo come out of the cave and it almost knocked me over” (Waller, Interview 2017). Reporting being so struck by the power of the sonic experience of this echo, imagining how a prehistoric man might have cognized such an experience, led Waller to pursue acoustic tests at archaeological sites in the form of pilot studies, later leading to more formalized studies.

Paul Devereux who later became a significant researcher in the field of archaeoacoustics, began his fieldwork in 1993. A self-described independent researcher of various “earth mysteries” (Devereux, n.d.),²⁴ Devereux was unaware of both Reznikoff and Waller's work when he first began undertaking acoustic studies of archaeological sites. Originally trained as a painter, his research emerged out of his artistic interest in ancient monuments and he situates his work within the field of consciousness studies; he is a founding editor of the journal *Time & Mind: The Journal of Archaeology, Consciousness and Culture*. Devereux describes his first foray into archaeoacoustics as emerging from his work with the International Consciousness Research Laboratories (ICRL) group, an interdisciplinary research group based at Princeton University. Devereux reflects in interview, “The ancient mind has always been a focus of my work, and asking: what were they thinking? what were they doing?” (Devereux, Interview 2016). Devereux's friend Robert Jahn (a Professor of Aerospace Sciences at Princeton University, founder of Princeton Engineering Anomalies Research (PEAR) program) set-up the group and during one of the ICRL group meetings Devereux took a trip with Robert Jahn and his wife to visit an Anasazi

²⁴This term is taken from Devereux's personal website where Devereux describes himself as “author, lecturer/workshop presenter, researcher, broadcaster, artist, photographer,” whose main areas of research are “archaeoacoustics (study of sound at ancient places), ancient and traditional lifeways, the anthropology and archaeology of consciousness, sacred sites and landscapes, general consciousness studies including psi phenomena, unusual geophysical events, and what are loosely termed “earth mysteries.”” (Devereux, n.d.).

(Native American) ritual centre in New Mexico. Devereux – in the third group – describes how recordings of voices chanting were playing out of a loudspeaker system at the visitor centre and that Jahn had commented that the buildings were built for chanting, as cathedrals are built for Gregorian Chant (Devereux, Interview 2016). This sonic experience developed into a discussion of how to incorporate a study of Neolithic sites in the UK and Ireland and a decision was made to visit these sites.

Independently of Reznikoff's, Waller's, and Devereux's work, in 1995, Aaron Watson first began taking an interest in the acoustics of archaeological sites. Watson, the first institutionally trained archaeologist of the early pioneers and also a self-identified artist, was part of an excavation at Easter Aquorthies in north-east Scotland, a Neolithic recumbent stone-circle site, when he began to take an interest in the acoustics of the space. At the time, Watson noticed echoes and reflections from the noises made by other people there and found them curious, leading him to reflect on how such sounds would have been perceived by people of the past (Watson, Interview 2017).

A theory of invention is useful to characterize the four pioneer's first encounters with an idea of archaeoacoustics *avant la lettre*, due to a palpable sense of competition between some of the four men. In interview Waller expressed disappointment that he was not the first to "discover" the phenomenon when he came across Reznikoff and Dauvois's research through Scarre's aforementioned publication (Waller, Interview 2017) and realized that Reznikoff had "beat him to it", as quoted above. According to the three groups identified above with varying proximity to a proposed core-set of archaeoacoustics researchers, the following categorisations can be made. Watson, a trained archaeologist, has the highest degree of inclusion in the core-set. Reznikoff and Waller, both educated up to PhD level, were trained in mathematics and biochemistry respectively. Their familiarity with scientific procedures and academic publication processes undoubtedly contributed to their archaeoacoustic publications, however, arguably, their archaeological work could be considered "amateur." Thus, they are positioned in the second group of proximity to the core-set. Devereux, who was trained in fine art up to BA level, is also not a trained archaeologist but nevertheless published his work in academic journals such as those listed above in collaboration

with his friend and colleague Robert Jahn, who was employed by an academic institution (Princeton University, USA). Devereux has the lowest degree of inclusion in the third group. It is noticeable, then, according to Bijker's aforementioned theory of invention, that this pattern is well-exemplified in archaeoacoustics; three out of four of the initial pioneers of the field do not have a high degree of inclusion, suggesting that "outsiders" of a field can often provide epistemological advantages in the "problem-solving" activities of science (Bijker, 1987, p. 184).

1.3.3 Experiment

Researchers of this first phase undertook experiments of various kinds. Reznikoff's pursuits after publication with Dauvois continued over years, alongside his other academic and musical activities. It is notable that as Reznikoff considers the voice "the first (human) instrument" (Reznikoff, Interview 2015), and has a highly-trained voice and ear; he was not overly concerned with applying acoustical-technical methods to substantiate his theories until our trip together with Till in 2015. Reznikoff's experimental method and proof are folded into his own sounding capabilities of his voice and ears. This sets Reznikoff aside from all three of the other pioneers of archaeoacoustics, who each sought to formalize experimentation more thoroughly immediately following their initial realizations as described above.

Waller began taking measurements at sites with the aim of publishing a theory which connected acoustics to the content and context of rock-art. Waller's earliest publications cite his own considerably detailed acoustic measurements suggesting "statistically significant sound reflection" at a variety of sites in France (Waller, Interview 2017) (Waller, 1993a, 1993b). Devereux, in 1993, the same year of his initial discovery, planned and undertook a trip with Robert and Brenda Jahn in the UK (Devereux, Interview 2016). Amongst the sites visited were Wayland's Smithy in Oxfordshire, UK; Newgrange in County Meath, Ireland; and Chûn Quoit, Cornwall, UK. He has since conducted archaeoacoustics research at numerous sites in North America, UK, and Ireland. On his return to his university after his striking sonic experience at Easter Aquorthies in Scotland, Watson contacted an acoustician colleague in the department of cybernetics, Dr David Keating, who advised him how he might take

acoustic measurements in a meaningful way by using pink noise from an electronic generator as a sound source and taking measurements on a grid.²⁵

1.3.4 Dissemination

The predominant mode for dissemination of each researcher's work was academic conference presentation and publication. Reznikoff and Dauvois published their findings in the French language peer-reviewed academic journals *Comptes rendus de l'Académie des Sciences (Proceedings of the Academy of sciences)* in 1987 and *Bulletin de la Société préhistorique française (Bulletin of the French Prehistoric Society)* in 1988 (Reznikoff, 1987; Reznikoff & Dauvois, 1988).²⁶ As mentioned in the introduction, these publications proved to be a major thesis in the field after Scarre, who came across the research in a French journal saw it of significant interest to summarize the work in *Nature*, which introduced the work into the English-speaking domain (Scarre, 1989). Reznikoff and Dauvois's work and its dissemination through publication triggered a huge amount of interest, it formed the basis for numerous other research projects in archaeoacoustics which set out to verify the relationship between rock-art and acoustics in various ways.²⁷

In interview Waller reflected that his work expands on Reznikoff's theory by attempting to explain not only the location, but also the content of rock art through the acoustics:

What I brought to the table, I feel, in retrospect, is the mythology... I have a theoretical framework for why there is an association between sound and art. It's because of the mythology that documents that the ancient people perceived echoes as being spirits. (Waller, Interview 2017)

²⁵ In acoustics, pink noise is a noise signal which has been filtered to distribute energy equally throughout the human hearing range. This is often contrasted with white noise where energy is distributed across all frequencies in absolute terms.

²⁶ Although some of the work was published together with Michel Dauvois, Reznikoff has elaborated in interview that the acoustic hypothesis was predominantly his contribution. Dauvois had noted the resonant properties of the caves during his work there and this motivated him to invite Reznikoff, but the theories around the acoustics including that of correlation only arose after Reznikoff's visit. This point appears to be confirmed by Dauvois' publication history as prior to the fieldwork with Reznikoff, Dauvois's research was not concerned with sound and acoustics: (Dauvois, 1976a, 1976b; Nouel, Dauvois, Bailloud, Riquet, & Poulain-Josien, 1965) compared to publications afterwards which were: (Dauvois, 1989, 1992, 1999; Dauvois, Boutillon, Fabre, & Verge, 1998).

²⁷ Such as (Díaz-Andreu & Benito, 2013, 2015; Díaz-Andreu, Benito, & Lazarich, 2014; Till et al., 2013).

He proposed that echoes produced from sound-making activities like striking rocks together resemble “the sounds of galloping hooved animals” and are observable where there are depictions of hooved animals in rock art and the acoustics are “good” (i.e. strong acoustic reflections). Furthermore, Waller suggests that in correlation, in places with diminished sound reflection such as Lascaux's Chamber of Felines or Fonte-de-Gaume's Terminal Fissure, hooved animals are absent and one observes depictions of felines (Waller, 1993b, pp. 98–99). Waller's aforementioned first publication was published as a “text of scientific correspondence” in the journal *Nature*, and the second was published in *Rock Art Research Journal*.

A running theme in Waller's publications is the connection between sound, rock-art, and mythology. By considering ethnographically-recorded or locally-known myths of the areas in which he conducts acoustic measurements, Waller describes his contribution not only in terms of the large amounts of quantitative empirical data, but also offers an interpretative approach drawing on anthropological methods of considering the role of myths and location-specific cultural narratives (Waller, Interview 2017). Waller has continued working on rock-art acoustics as a hobby since the late 1980s and has conducted acoustic measurements and published numerous papers on sites internationally, with a particular focus on US-American sites in Utah, Texas, New Mexico, Nevada, Arizona, California and in Canada. He can likely boast the largest number of sites tested to date by any individual researcher estimated to be around five hundred at the time of writing (Waller, n.d.).

In 1996, three years after their initial research trips, Jahn and Devereux published two articles, one a full article in the *Journal of the Acoustical Society of America*, and another a “note” in *Antiquity* on this research (Devereux & Jahn, 1996; Jahn, Devereux, & Ibison, 1996). Devereux's work has included a focus on lithophones, or ringing rocks, which he considers a hugely neglected part of musical history (Devereux, Interview 2016). The results of Devereux's multi-faceted archaeoacoustics research, which he summarizes to be an “early pioneer of modern archaeoacoustics” of both “resonance and lithophones” (Devereux, Interview 2016) were further documented in the book *Stone-Age Soundtracks*, which was published on a non-academic press Vega Books in conjunction with a Channel 4 documentary entitled *Sounds of the Stone-Age* first aired

in November 2001 (Devereux, 2001a; *Sound from the Stone Age*, 2001).

Excited by the findings of his research in 1995, Watson first presented this research in an academic forum at the Theoretical Archaeology Group conference in 1996, after which he was approached by the editor of the popular archaeology journal *British Archaeology* to write a piece on this work (Watson, 1997). This work also included fieldwork at Camster Round, a passage grave in Caithness, north-east Scotland which Watson undertook following on from the work at Easter Aquorthies stone circle. In collaboration with his colleague, Keating published their research in the journal *Antiquity* in 1999 (Watson & Keating, 1999). When asked about the main contributions of his archaeoacoustics work, Watson describes that his work alongside Devereux's and in contrast to Reznikoff's more "subjective" use of the voice, were bringing a "scientific element to it" in thinking more in the context of architectural space and using data and measurements. Watson also understood the integration of anthropological approaches into archaeoacoustics as significant to his contribution to the field (Watson, Interview 2017). Archaeoacoustics research in this phase was disseminated in both academic and non-academic channels and some researchers became aware of others' work as a result.

1.3.5 Summary of Phase one

This first phase of pioneering archaeoacoustic work is characterised by its time period between 1983 and 2003, as well as by the *in situ* first-hand sonic experiences at archaeological sites which triggered curiosity and led researchers to pursue research more formally, resulting in publication and public dissemination of various kinds. Their "primary" auditory experiences are evidenced in interviewee's comments, such as Reznikoff's description of his activity humming during the first visit to the caves in France (Reznikoff, Interview 2015), or Waller's detailing of how he noticed the echo of the cave of Bedeilhac (Waller, Interview 2017), or Watson's recounting of undertaking archaeological landscape study at the stone circle of Easter Aquorthies in North East Scotland and hearing surprising echoes (Watson, Interview 2017). The researcher's attentiveness to unusual sonic experiences can be read as evidence of an *embodied* approach to archaeology, signifying an openness to the significance of multi-sensory

stimuli, as human bodies in a particular space. The centrality of the embodied experience lessens in the shifts to the later phase of the field, as outlined below.

This period can be characterized as an epistemic culture not yet fully formed. From the early-to-mid-1980s there was a surge in activity around the topic of acoustic archaeology arising after the first fieldwork projects picked up scholarly and popular attention. By the late 1990s with a notable TV documentary, co-produced by Devereux and a handful of newspaper articles particularly in the UK dealing with archaeoacoustics testified to its increasing recognition by 2003 (Johnson, 2001; Shaw, 1999; *Sound from the Stone Age*, 2001; Urquhart, 1999). This popular attention and the disparate nature of the research motivated Scarre and Lawson to organize a meeting bringing together many of these key figures for the first time. In interview, Lawson describes one aim of this meeting as the discussion of methodological issues in archaeoacoustics, with an additional concern around ensuring that the popular interest and sensational media headlines did not de-legitimise the field in archaeology:

One was a little bit sceptical, and a little bit anxious really, that claims were being made that would disappoint and might therefore undermine the progress of archaeologies of sound. You know, it would only take one debunking of an acoustical Stonehenge to cast the whole of music archaeology and archaeoacoustics in a bad light. (Lawson, Interview 2017)

Diverse conceptual framings were being used by each of these pioneering researchers. Disparate strands, or social groups, of archaeoacoustic work being undertaken, with researchers working largely in isolation from, though increasingly aware of one another. The 2003 Cambridge meeting acted as a key turning point in the field's growing self-awareness.

There were some areas of academic exchange between Devereux and Watson within this period. Watson's *Antiquity* article describes acoustical experiments undertaken at these two sites and suggests that the configuration of rocks at Easter Aquorthies directs sounds in unusual ways which would have given speech and other sounds across the site "subtle...complex reverberations" and of which listeners outside of the stone circle would not have been able to perceive (Watson & Keating, 1999, pp. 326–327). At the megalithic tomb of Camster Round, it was noted that the cairn filtered

different sounds variously so that sounds were on the whole audible from the outside when sounds were generated inside, but that there was a large disparity between these experiences. Additionally, the largely closed interior produced standing waves, which made reference to Devereux's work. Calculating the resonant frequency from the plans of the passage-grave and using a scale model, Watson and Keating suggests that a resonance at 4Hz, within the infrasonic range (below the range of human audition), would have been theoretically present if sufficient acoustic energy from singing or drumming was present. In connection with this, research is cited which details the psychological and physiological responses to infrasound, including a range of "unfamiliar sensations" such as speaking difficulties, vibration, drowsiness, and headaches in modern test subjects (Evans, 1976) in (Watson & Keating, 1999, p. 333). Although Watson and Keating state that the presence of infrasonics in sufficient quantities to influence people in this way cannot be absolutely confirmed in the tomb, they suggest strongly, that "it was certainly apparent that the tomb interior was conducive to the creation of unusual experiences." (Watson & Keating, 1999, p. 333). This proposition was in turn taken up by Devereux in his *Stone-Age Soundtracks* book (Devereux, 2001a, pp. 100–101).

1.4 Phase two: 2003-2018 – Secondary encounters

The second phase following the 2003 Cambridge meeting onwards saw the beginnings of the establishment of archaeoacoustics as a subfield of archaeology proper.²⁸ Once the field archaeoacoustics had been named and established, the field continued to develop in that the aforementioned "pioneers" of archaeoacoustics continued their work,²⁹ whilst further work by newer researchers began. A defining characteristic of

²⁸Some protagonists of the field say that this process is still ongoing, as the following have not yet been reached: establishing an international academic association of archaeoacoustics, designing curricula for teaching archaeoacoustics within archaeology degree programmes.

²⁹Paul Devereux states that he began to focus on acoustics from around 2000 onwards (Devereux, Interview 2016). Steven Waller's research appears to have continued steadily since his first fieldwork in 1987. Aaron Watson's archaeoacoustics work continued, but was similarly one of several research interests which he pursued in this time. Reznikoff in interview expresses regret that due to his many fields of study, he did not have the time to pursue archaeoacoustics rigorously and cites problems of access and academic legitimacy. Reznikoff describes how after his initial acoustic work in 1983 and 1985 he toyed with the idea of making contact with the renowned French prehistoric archaeologist André Leroi-Gourhan. He specifically mentions his regret at not making contact due to wanting more concrete proof of acoustical connections to present to him, and being disappointed he had not done so when Leroi-Gourhan died in 1986. This, he projects, would have opened many doors in terms of

this second phase of the field is that, in contrast to “primary” encounters of first-hand sonic experiences at archaeological sites described above, researchers were now coming to the field through “secondary encounters” such as hearing presentations at public lectures, reading academic work on or through finding information on websites about archaeoacoustics. The embodied encounter plays less of a significant role in this phase of the field’s development. Where the methods used by researchers during the first phase were relatively ad hoc and simple, the second phase is characterized by increased attention to methodology and an attempt to establish its wider legitimacy as a field of study. Archaeoacoustics researchers arriving at the field through “secondary encounters” whom I interviewed are (in alphabetical order): Ian Cross (Interview 2017); Margarita Díaz-Andreu (Interview 2017); Linda Eneix (Interview 2017); Bruno Fazenda (Interview 2017); Miriam Kolar (Interview 2017), Graeme Lawson (Interview 2017); Damian Murphy (Interview 2017); Rupert Till (Interview 2016); Victor Reijs (Interview 2016); Chris Scarre (Interview 2016); Nektarios Yioutsus (Interview 2016). There are others whom I interviewed, whose work does not nearly fall into this description of “secondary encounters” with archaeoacoustics, however their work is considered to be part of Phase Two due to its taking place after 2003: Braxton Boren (Interview 2016); Paolo Debortolis (Interview 2017); Pablo Padilla (Interview 2016). I include David Lubman’s work in this second phase: as mentioned previously, although his work was innovative in the ways he incorporated acoustic experimental methods and was publishing with these relatively sophisticated methods and analyses prior to 2003 (Lubman, 1998b, 2002), his mode of encountering archaeoacoustics was secondary in that he found Waller’s website on rock art acoustics in the mid-1990s and from there pursued the acoustic phenomenon of the chirped echo at the pyramids of the temple of Kulkulkan in Chichen Itza. (Lubman, Interview 2017) (Lubman, 1998b, 2002, 2010).

There are too many individual accounts of researchers in the second phase 2003-2018 which could be detailed here; therefore, I have chosen three of these to focus upon. Due to their significant academic output during this second phase of archaeoacoustics, I have chosen to focus Rupert Till's and Margarita Díaz-Andreu's respective paths. They exemplify the route of two different academics who both had secondary encounters

access to archaeological sites and, as he speculates, would have brought an acoustic awareness into a whole generation of scholars had Leroi-Gourhan publicised these ideas. (Reznikoff, Interview 2015).

with archaeoacoustics which led to them making it one of their main academic research interests. In addition to Till and Díaz-Andreu, I will describe how the 2014 Archaeoacoustics Conference in Malta organized by the Old Temple Study Foundation (OTSF) came into being through the trajectory and work of its main organizer Linda Eneix. The three figures described, who all came to be active contributors to the field, can be seen in different proximities to the core-set. Díaz-Andreu, a trained archaeologist, can be assigned to the first group; Till, an academic but not an archaeologist, might be positioned in the second group but due to his interdisciplinary skills and ability to draw experts together in research terms is also assigned to the first group; Eneix, the conference organizer and not a professional academic, could be categorized in the third group, however her active status in bringing researchers together might put her more ambiguously between the second and third groups. In this second phase of the field's development, as its institutionalization had already begun, the status of actors' respective degrees of inclusion relates to their degree of belonging to the core-set.

1.4.1 Exposure

Rupert Till, was a lecturer in music technology at the University of Hull in 2007 with research interests in popular music when he attended part of an event series organized by the popular electronic musician Martyn Ware (of the pop groups Human League and Heaven 17) entitled "The Future of Sound" at Sheffield Hallam University. Ware's presentation at the event featured archaeoacoustics and Till was fascinated by what he had learned. Devereux was also present at this event and the two men came into conversation (Till, Interview, 2016). Till familiarised himself with the literature, in particular Devereux's 2001 book *Stone Age Soundtracks* and the 2006 Archaeoacoustics volume and noted that certain methods could be improved with the aid of acoustical expertise (Till, Interview, 2016). From there, Till's engagement in the field began.

Margarita Díaz-Andreu is a professor of archaeology, who specialises in prehistoric archaeology, history of archaeology, and identity and heritage, and had worked extensively on prehistoric rock-art and landscapes when she first became aware of the

field. Díaz-Andreu describes her introduction to the field in around 2010 when she heard Steven J. Waller present at the University of Quebec in Montreal, Canada (Díaz-Andreu, Interview 2017). She had recently returned from fieldwork at the Valltorta Gorge in Spain working on rock-art iconography and location. Consequently, Díaz-Andreu began to wonder if the acoustics could have a significance at the sites she was investigating.

Linda Eneix, president of the Old Temple Study Foundation (OTSF), a not-for-profit educational organization, and principle organizer of the three Archaeoacoustics Conferences, names the chance-viewing of Devereux's TV programme as part of a transatlantic in-flight entertainment service in the early 2000s as the catalyst for her initial interest in archaeoacoustics (Eneix, Interview 2017) (Eneix, 2016, pp. 9–10). Soon thereafter, Eneix made contact with Robert Jahn at Princeton University (Devereux's aforementioned colleague) and arranged a meeting with him, hoping to produce or initiate a further documentary on the topic which did not come to fruition (Eneix, Interview 2017). She mentions owning Devereux's book *Stone-Age Soundtracks* but lamented the lack of research available, "I had Devereux's book but there wasn't much else to be honest. There was one publication which came from the meeting at Cambridge. But there wasn't much until we got it moving again" (Eneix, Interview 2017). Here, Eneix is referring latterly to her own role as part of the OTSF in organizing the 2014 international archaeoacoustics conference with an open call in Malta.

1.4.2 Authentication

Díaz-Andreu describes in interview that she was initially sceptical when first introduced to archaeoacoustic research. However, she was open to trying out acoustic tests and when these resulted in convincing data, she pursued the line of research further (Díaz-Andreu, Interview 2017). The results of this first pilot study were published in the *Journal of Archaeological Science* in 2012 (Díaz-Andreu & Benito, 2012). As an accomplished archaeologist she notes in interview that archaeoacoustics has simply become "one" of her several research foci amongst other topics within archaeology. This is different to the other two researchers Till and Eneix, for whom archaeoacoustics was a trigger to initiate a deeper engagement with archaeology, at

least for Eneix as part of a more serious concrete pursuit of research (Till, Interview 2016; Eneix, Interview 2017). In interview, neither Till nor Eneix placed emphasis on processes of authentication in the way which Díaz-Andreu did.

1.4.3 Participation

In 2009, Till conducted his first archaeoacoustic fieldwork at Stonehenge (which included experiments at the Stonehenge replica monument in Maryland, USA), enabled by an American TV programme aired on the History Channel (*MysteryQuest: Stonehenge*, 2009). A paper was published in 2009 on this work (Till, 2009). He initiated the research network “Acoustics and Music of British Music Prehistory (AMBP) Research Cluster” in 2009, part of the AHRC/EPSRC Science and Heritage Programme. Till was successful as research director in procuring a large-scale EU-funded project grant for the “European Music Archaeology Project (EMAP)” in 2012. Out of the research network, he along with a number of colleagues from various UK universities successfully obtained the large-scale grant for an interdisciplinary study of caves with Palaeolithic rock-art in Northern Spain which enabled probability testing. Further fieldwork undertaken in 2012 and 2013 to caves in Northern Spain produced an initial report published in 2013 (Till, Wyatt, Fazenda, Sheaffer, & Scarre, 2013) and a further publication emerging in 2017 from Bruno Fazenda, which Chris Scarre, Rupert Till and others co-authored (Fazenda et al., 2017).³⁰ Due to this range of output activities with a large focus on public outreach, Till's work has attracted a large amount of academic and media attention and contributed significantly to the progress of the field. He gave a keynote speech at the 2014 Archaeoacoustics conference in Malta entitled “European Sound Archaeology: A Multi-disciplinary Perspective”. Many interviewed researchers made references in admiration of Till's work, which appears widely known and respected amongst researchers (Scarre, Interview 2016; Lawson Interview 2017; Fazenda Interview 2017; Murphy Interview 2017).

³⁰The project involved ten universities from across Europe and boasted outputs of a music archaeological exhibition across several European venues, conferences, concerts, workshops, a series of CDs, as well as the development of an app entitled Soundgate which enables the interactive virtual exploration of a number of European archaeological sites. These are: prehistoric caves in Spain; Stonehenge in England; and Paphos Theatre in Cyprus. (‘Soundgate App’ n.d.)

Since the experiments and publications of 2011-2012, Díaz-Andreu has undertaken several other cases of archaeoacoustic fieldwork, including with a PhD student Carlos García Benito and later with PhD and post-doctoral student Tommaso Mattioli. Together, Díaz-Andreu and Mattioli initiated the SONART project (2014-2016) performed acoustic measurements in ten rock art areas in Spain, France, and Italy. Numerous publications on archaeoacoustics have emerged from their research group over the past few years (Díaz-Andreu & Benito, 2015; Díaz-Andreu, Benito, & Mattioli, 2015; Díaz-Andreu & Mattioli, 2015; Díaz-Andreu, Mattioli, Farina, Armelloni, & Hameau, 2017; Mattioli & Díaz-Andreu, 2017). This research cluster has contributed a significant body of work on archaeoacoustics. Their work has made a considerable social impact with TV and radio programmes featuring their work and several journalistic articles featuring their work (Bower, 2017; Vasso, 2017). A significant publication was a global overview of rock-art, music, and acoustics in the Oxford Handbook of the Archaeology and Anthropology of Rock Art (Díaz-Andreu & Mattioli, 2015).

For Eneix, the OTSF conferences in 2014, 2015 and 2017 served as important sites of research exchange within the field of archaeoacoustics. Eneix's comment that there "wasn't much else" regarding scholarly activity around archaeoacoustics might be slightly overstated, given that other interviewees described conference panels and publications which occurred during the period 2003-2014 such as two panels organized by Lubman at the *Acoustics '08* Conference ("Acoustics 2008, Paris," n.d.) and various conference presentations and publications by Jonathan Abel, John Chowning, Perry Cook, John Rick, Miriam Kolar and colleagues stemming from interdisciplinary work at the Chavín de Huántar temple complex in Peru through Stanford University, USA (Abel et al., 2009, 2008; Bryan, Kolar, & Abel, 2010; Cook et al., 2010; Kolar et al., 2010, 2009). Nevertheless, it is plausible that Eneix, who is not an academic archaeologist nor directly involved in any such institutional archaeology projects, was unaware of these activities; even if she was, her statement is accurate insofar that there was little which was visible and welcome to researchers in a truly multi-disciplinary fashion, which as she stated in interview was one of the aims of the OTSF conferences (Eneix, Interview 2017).

Eneix's publication record consists of a co-authored article with Paolo Debortolis and Fernando Coimbra on the acoustics of the Hal-Saflieni Hypogeum following the work undertaken during the 2014 conference (Debortolis, Coimbra, & Eneix, 2015), editing and publishing two Archaeoacoustics Conference proceedings (out of a total of three conferences at the time of writing) (Eneix, 2014; Eneix & Ragussa, 2018) and a single-authored book entitled *Listening For Ancient Gods*, published by the OTS Foundation (Eneix, 2016). In the preface to Eneix's book, she describes the nascent field of archaeoacoustics and suggests a connection between Devereux and Jahn's work on low frequency resonances in the range between 95 and 120Hz at megalithic sites in the UK and Ireland, and the Hal-Saflieni Hypogeum. Leaning heavily on Devereux's suggestions as outlined in *Stone-Age Soundtracks*, Eneix writes, "Whether it was deliberate or not, the people who spent time in such an environment as the Hypogeum under conditions that may have included a low male voice - in ritual chanting or even simple communication - were exposing themselves to vibrations that may have impacted their thinking" (Eneix, 2016, p. 21).

1.4.4 Summary of Phase two

In this period, researchers came to the field primarily having heard through secondary encounters – conference presentations, books, TV programmes, journal or magazine articles – about its premise and topics. In contrast to the first-hand embodied experiences which researchers of the first phase detail, researchers joining in the second phase described more cerebral encounters. As mentioned, during the first phase prior to 2003, the only TV/film documentary on the topic was Devereux's *Sound from the Stone-Age*, accompanied by the book *Stone-Age Soundtracks*. For a significant number of interviewed researchers, it was Devereux's book or TV programme which alerted them to the field's existence. The increase of active researchers in the field and academic research output during this period is significant.

It is therefore important to acknowledge that whilst archaeoacoustics was being established as a "serious" academic field incorporated into mainstream archaeology, the field was substantially propelled by popular interest. Between 2003 and 2018, several more TV and radio programmes which dealt with acoustics and archaeology

emerged. The aforementioned TV programme on the US History Channel's MysteryQuest series entitled "Stonehenge" featured Rupert Till and Bruno Fazenda ('MysteryQuest: Stonehenge' 2009); a 30-part radio series entitled "Noise" for BBC Radio 4 by David Hendy featured an episode with Igor Reznikoff in caves in France, which was also accompanied by a book publication (Hendy 2013a, 2013b); a radio programme on acoustic archaeology and acoustic heritage featuring Damian Murphy ('Hearing the Past' 2016) emerged in the English-speaking domain, and likely many more. A variety of newspaper headlines emerged in this period too: "Cave Men Loved to Sing" on *Live Science* website (Whipps, 2008) and "Stone Age Art Caves May Have Been Concert Halls" on *National Geographic* website (Than, 2008). Reports in the UK have focused in on the nation's most famous neolithic mystery, Stonehenge, touting attention-grabbing headlines such as, "Was Stonehenge built for rock music?" in *The Guardian* (Cox 2014), "Heavy rock music: Stonehenge was a 'neolithic rave venue'" in *The Daily Mail* (anon 2009) and "Is Stonehenge just a gigantic xylophone?" in *The Mail Online* (anon 2014). The Mayan pyramid of Chichen Itza in Yucata, Mexico have elicited headlines such as "Mystery of 'chirping' pyramid decoded" on *Nature.com* website (Ball, 2004).

At the time of writing, the field of archaeoacoustics can be characterised as an emerging field which has been established as a legitimate academic field of study by some archaeological schools. The anxieties addressed by Eneix directly above suggest some of the struggles for legitimacy the field is currently facing. My fieldnotes written upon returning from the OTSF Archaeoacoustics III conference in Portugal 2017, encapsulate this anxiety well:

The final plenary session which should have been a methodology session was a heated debate about the future of the field of archaeoacoustics. Prof. Ezra Zubrow instead of giving his intended paper had given a rousing speech which pleaded for the legitimate establishment of the field of archaeoacoustics, and a push to get it out of being a pseudo-science into being a science. He wanted the creation of an international association of Archaeoacoustics and an official peer-reviewed journal. (Goh, fieldnotes, October 2017)³¹

³¹ In this instance, as no interview was possible with Zubrow, I have used an extract from my fieldnotes. I attempted several times to contact Zubrow for interview after making his personal acquaintance during the conference, hoping he would elaborate on his strongly held convictions about the future of the field, however unfortunately I was unable to reach him for interview. Nevertheless, his speech at the OTSF conference in Portugal, testified to concerns around the continuing struggle of establishing the field's

Zubrow's speech at the conference reinforces his statement quoted at the beginning of the chapter. From his perspective, archaeoacoustics has not yet found a paradigm in which to undertake its procedures of "normal science". Furthermore, as is evident here, he views some strands of the field as endangering its progress and risking its descent into "pseudo-science." Collins' writing on the core-set of scientists who "have an effect on the outcome of [a] controversy" is apt here. Zubrow, one of the original attendees and participants of the 2003 Cambridge meeting, has a high degree of inclusion into the core-set. He has been part of the field's emergence from its early stages and has participated at each of the OTSF international conferences. His concerns around legitimacy, however, seem to be shared by a few other participants. Evaluating the co-existence of these different perspectives from actors within the field, it is possible to identify that whilst by my definition archaeoacoustics exists as an epistemic culture, for Zubrow and others, it still does not fulfil the requirements of a legitimate field.

1.5 Tensions: controversy, legitimacy, resources

Zubrow's speech at the OTSF conference in 2017, identifies a fear that archaeoacoustics runs the risk of being conceived of as a "pseudoscience," a sentiment which also played a significant role across interviewees' responses. This tension between "science" and "pseudoscience" might arguably qualify what sociologists of scientists consider a "controversy," the outcome of which is most often determined by those who constitute a core-set of scientists (Collins, 1981, p. 16). Two potential controversies within archaeoacoustics have been defined which help to characterize the field with its legitimacy potentially under threat. The first can be considered "resolved" at the time of writing, whilst the second remains "unresolved".

1.5.1 The pottery-as-sonic-media myth

The development of the definition of "archaeoacoustics" itself is revealing as a story of legitimacy.

the field's journey to legitimacy. A few interviewees commented on the entwinement of myth and fact with frustration and bemusement with regards to previous entries on the user-created Internet encyclopaedia platform Wikipedia page "Archaeoacoustics." Of particular chagrin was an early definition of the field (dated from 2006) which defined archaeoacoustics as "the discipline that explores acoustic phenomenon encoded in ancient artifacts. For instance, a pot or vase can be "read" like a compact disc for messages from the past." ("Archaeoacoustics," 2006). This pottery-as-sonic-media idea was mentioned with derision by several researchers (e.g. Fazenda, Interview 2017; Waller, Interview 2017; Kolar, Interview 2017) and has since been "debunked," with all three of those who mentioned it emphasizing it was a hoax. Evident in the comments of interviewees, this association of archaeoacoustics with the pottery-as-sonic-media idea is the source of irritation to researchers even now, for its delegitimation of the topic. "This was nonsense," as Fazenda said in interview (Fazenda, Interview 2017), or in Waller's words, "It basically gave a bad name to the whole idea of being able to hear sound from the past. It was ... something that had to be overcome" (Waller, Interview 2017).

Tracing back through the history of the Wikipedia entry, when the page was created in April 2006 it contained the "pottery-as-sonic-media" myth. The text describes, "One cannot say that it is the study of sounds before the invention of recording, since "to record" is a technically ambiguous action. Sound itself is so ubiquitous to the universe that it can be recorded or naturally (sic) emanate from a variety of materials and objects" ("Archaeoacoustics," 2006). Its main source of reference an article called "Spirits in the Stones" written by Devereux which appeared on the *Fortean Times*.³² However, Devereux's cited text deals with rock-art engravings in Canada and India and the local sonic and cultural environments and makes *no* mention of an idea of pottery being able to record ancient sounds. It appears that the Wikipedia author introduced this idea of their own accord, perhaps incorporating it from further unnamed sources. As Fazenda mentioned in interview, frustrated by the inaccuracy of such statements, he edited the Wikipedia entry in 2009 with a more academic definition "Archaeoacoustics considers [sic] the study of acoustic behaviour of pre-historic

³²The *Fortean Times* is a popular magazine dealing with "anomalous phenomena" which bears the slogan "the world of strange phenomena."

buildings and structures as an insight into uses, social structure and behaviour of people using it,” making reference to the “Acoustics and Music of British Prehistory” Research Cluster which Till had formed (“Archaeoacoustics,” 2009). Till himself undertook a substantial revision of the entry in 2011, making several references to the serious academic work being done and published, including his own, and creating new rubrics of “past interpretations” and “in popular culture” under which the pottery hoax was listed (“Archaeoacoustics,” 2011).³³ At the time of writing the text of the Wikipedia page draws clear doubt around the pottery idea (“Archaeoacoustics,” 2017). Therefore, increasingly through the contributions of Fazenda and Till and others (including Díaz-Andreu) on the Wikipedia entry to “Archaeoacoustics,” we can observe a palpable struggle for legitimacy in which the “pseudoscientific” definition of archaeoacoustics was ultimately displaced in favour of a “legitimate” definition. This definition has been relatively stable since Fazenda's editing intervention in 2009.

1.5.2 Wider concerns of legitimacy

Concerns about the field's wider legitimacy are evident across interviewee's comments. Lawson, as quoted above, commented on the organization of the 2003 Cambridge meeting as partly motivated for a desire to avoid it being “undermined” by less robust research (Lawson, Interview 2017). Scarre, in interview, simply commented that archaeoacoustics “is not a mature field” (Scarre, Interview 2016). In publication and in interview, Eneix emphasized her desire for the field to be elevated from the conception of a pseudoscience into the realm of legitimate study, “There's...this feeling from many circles, that archaeoacoustics is pseudoscience and that it's not based in any real, worthwhile enterprise or scholarship” and “some older reports laugh off as being not an authentic field of research and a waste of time. Now we're all laughing behind our hands! The truth is, it's very worthwhile” (Eneix, Interview 2017). Eneix then reflected further on challenges to the field of archaeoacoustics: “It's not helping us... We need support from academic institutions which are interesting in fostering research in this field...I'm worried...The best thing we can do, is stay as legitimate as we

³³Margarita Díaz-Andreu has also edited the Wikipedia entry, adding references to her team's research. Aside from Díaz-Andreu, Fazenda and Till, no other researcher whom I have interviewed is recognisable from their username as an editor of the page at the time of writing.

can, and associate only with the highest calibre people with legitimate credentials” (Eneix, Interview 2017).

Although Eneix was the only person in interview to mention “pseudoscience” directly, comments were often made around the field’s legitimacy. Waller, for example, commented, “The people who want to do the whole holistic healing nature of sound. I can see their viewpoint and everything, but I wouldn't want archaeoacoustics to be associated with that kind of touchy-feely-kind of thing” (Waller, Interview 2016). When, in conversation with Ian Cross I mentioned the myth around 111Hz, he exclaimed in disgruntlement following reading the first few webpages of his internet search on his office computer, “Insofar that it gets into the archaeoacoustical discourse, on an equal footing with more epistemologically secure discourse, then it's a problem and a significant one. If it is out there doing its own thing, then it's fine” (Cross, Interview 2017).

There was considerable controversy around the OTSF conference series itself, despite many researchers acknowledging that it was the only international and open conference currently accessible to a large proportion of researchers in recent years. In the publication of his 2014 keynote speech at OTSF Malta conference, Till describes his role as an artist and musician as affording him an openness to alternative perspectives. His position is one which accepts that, “Archaeoacoustics often relates to ritual cultures that are enmeshed in the messy spirituality, cosmology, emotionality and individuality of humans” (Till, 2014, pp. 26–27). With reference to archaeoacoustics researchers who are interested in “paganisms, spirituality and the mind/body/spirit movement”, Till takes an open approach, “my own attitude to this is that one should not assume that any approach is of no value, especially if it comes from people who are serious and committed to their own path. There is often a germ of wisdom to be found within what clashes with our own priorities and expectations...This does make archaeoacoustics a difficult minefield to navigate for those academics whose own reputation may feel threatened, if they are associated with the unconventional” (2014, pp. 26–27). Devereux referred in particular to the third OTSF conference in Portugal, stating that “New age appropriation of archaeoacoustics is unproductive and confuses issues. It is then work to untangle misunderstandings” (Devereux, Interview 2016).

Another interviewee who remains anonymous stated, “I think there should be a standard in the field. There were very interesting people [at the OTSF conference and in the publication]. But there should be quality...I need to be sure about the quality of the conferences I attend and the publications I publish in and I'm not convinced that there was a quality filter in this case” (Anon, Interview 2016/17). This was a sentiment echoed by a few other interviewees. This loosely defined “controversy” around the field’s overall legitimacy still remains to have reached any clear agreement. There appears to be willingness for a core-set, as Zubrow’s speech testifies to, to emerge which would mediate a resolution. However, at the time of writing, this remains an unresolved issue.

1.5.3 Funding resources for research

The question of funding of research is worth some attention here as the material-structural conditions to enable research to take place are a crucial part of understanding the social organization of knowledge. As Fuller notes in *Social Epistemology*, there is a kind of survival logic which operates amongst scientists when it comes to funding “it is not uncommon for scientists to let politicians make what they will of their research, as long as it leads to continued funding (Haas, Williams, & Babai, 1977) in (Fuller, 1991, p. 282). Of those professionally based within academic institutions, several interviewees reported on small successes either in funding for research such as individual fieldwork trips or post-doctoral funding with small groups. Most researchers have additionally undertaken research without large funding grants, either by paying for research costs (travel and accommodation, audio equipment) from their own pockets or for those in academic institutions, they often had research costs covered. Till and his colleagues seem to have been the most successful in acquiring large-scale grants including a large EU-funded grant for the EMAP (European Music Archaeology Project) project in 2012.³⁴ Of those not professionally based within academic institutions, most researchers expressed disappointment that they had had to pay for their own research costs. A significant factor which has enabled research

³⁴These include a research cluster grant for Acoustics and Music of British Prehistory funded by the Arts and Humanities Research Council (AHRC) in 2010, Science and Heritage Programme, and Engineering and Physical Sciences Research Council; out of which the Songs of the Caves project in Northern Spain was born which received support from AHRC Science and Heritage Programme in 2013.

trips, which not all academic areas would benefit from, is the funding for research to take place on location through the production of a television or radio broadcast, such as in Devereux's case at Stonehenge (*Sound from the Stone Age*, 2001), Till's research at Stonehenge (*MysteryQuest: Stonehenge*, 2009), and my own radio-documentary to caves in France with Reznikoff and Till (Goh, 2015). Almost all interviewed researchers, both academics and non-academics lamented a broad lack of funds available and accessible; all, without exception, expressed the desire for more archaeoacoustic work to be done in order to help the field develop further.

1.6 Conclusion

The field of archaeoacoustics has, and continues to face, various challenges. Those that are foregrounded by interviewees at the time of writing concern the purported lack of legitimacy of the field as it is seen by some parties, and the resulting battle against "pseudoscientific" associations and lack of funding for archaeoacoustic research necessary for the field to thrive. The activities, events, publications and other media outputs described here, as well as the figures introduced, begin to depict the complex nature of the field as a site of sonic knowledge production. As an academic field which carries innovative qualities, it shares some characteristics of an invention which competing social groups strive to be the first to successfully "discover" (Bijker, 1987). As expressed above, as the field is still considered "emerging" as an academic discipline, according to my definition it already constitutes an "epistemic culture". The negotiation of "controversies" as described using the two examples above, one of the myth of "pottery-as-sonic-media" and the other the overall legitimacy of the field, demonstrate the existence of an emerging core-set of researchers who determine the outcome of such controversial matters. In the next chapter, archaeoacoustics' theories of sonic knowledge production will be examined in more depth.

The field's academic legitimacy, as traced through its institutionalisation, and the anxieties around it currently reveal much about this particular conjuncture of sound, the sensory, the body and knowledge production. Beyond their immediate concerns, most participants during interview did not situate the development of the field in broader terms, for example relative to longer traditions in academic archaeology. To

address the slight absurdity of the scenario which opened this chapter, of Reznikoff stood in a niche in the cave of Arcy-sur-Cure earnestly making animal noises, in closing this examination of the field's establishment I offer an interpretation of another significant aspect which concerns the field's struggles for legitimation. This concerns the role of the body in academic knowledge production, which remains largely overlooked by researchers themselves.

Examining sound and listening centres the role of the body in archaeoacoustic research, in both implicit and explicit ways. As mentioned above, Scarre and Lawson explicitly reference the emergence of an "archaeology of the senses" and long overdue attention to a "multisensory" past in the 2006 publication (2006b, p. vii). Multisensory archaeology scholars describe the emergence of the body as an increasingly central site of debate and discussion in the humanities and social sciences since the 1970s, describing its entrance into archaeology as "relatively recent", citing research in the 1990s and early 2000s (Hamilakis et al., 2002, p. 1). Hamilakis et al. refer to a coalescence between work in the humanities more broadly in which the body had become a considerable focus point of major debate by philosophers and theorists such as Foucault, Merleau-Ponty, Bourdieu, Douglas and Butler, with an emerging interest within archaeology naming studies by a selection of scholars addressing the role of the body in archaeology (Joyce, 1998; Montserrat, 1998; Rautman, 2000) in (Hamilakis et al., 2002, p. 1). A turn to the body can be witnessed in the humanities which influenced research questions being asked in archaeology.

In interview with Scarre, he elaborated upon the reference to multisensory archaeology in the preface to the *Archaeoacoustics* volume, drawing on the broader trend towards phenomenological approaches in archaeology, found in Chris Tilley's key publication from 1974 *A Phenomenology of Landscape* (Tilley, 1994), which inaugurated the approach of Landscape Archaeology. Scarre also mentioned work from the anthropology of the senses scholars Constance Classen and David Howes, whose work on the cultural role of the non-visual senses was integral to the development of the interdisciplinary field of sound studies (Classen, 1993b, 1997; Howes, 1991, 2005). Although most archaeoacoustics implicitly acknowledge the importance of the role of the body in their research, only a few researchers

acknowledge the intellectual turns and trends which enabled such experiences to be taken seriously as academic knowledge production.

As Watson corroborates Scarre's comments in interview, he describes in more detail the trends within British archaeological research in the 1990s when this research was becoming known:

When I was a student, it was all about landscape and Britain was leading with that. I remember encountering colleagues from other countries who were really against that at that stage but who would now be in total support of it. It was seen as too subjective, too diffuse, too based around the modern individual sensibilities to be relevant. That argument still gets used now. As these ideas have gone out of fashion again, in favour of very objective narratives, so the phenomenological move is less popular now again. (Watson, Interview 2017)

The role of phenomenological experience, as rooted within the body and the sensory and its relative authority within the field of archaeology, vis-à-vis the "objective narratives" Watson refers to, will be examined in more depth in the next chapter in which sonic positivisms and its others will be described in archaeoacoustics.

Situated within this environment of increased attention to landscape, phenomenology, the body, the environment and the sensory, Reznikoff's enthusiastic animal noises into the niche of the cave of Arcy-sur-Cure do not seem to pose great challenges to the academic legitimacy of the field. Historical archaeologist Bruce Trigger contextualizes Tilley's influential work on landscape, "With the development of landscape archaeology, increasing attention was paid to the role played by architecture and other spatial controls in imposing such discipline. The goal of the archaeology of the body is to ask questions about how in the past humans may have experienced their world both discursively and nondiscursively through their bodies and in relation to specific cultural settings" (Trigger, 2007, pp. 473–474). Therefore, As Watson describes in interview, phenomenological and experiential approaches have been broadly accepted even if it has fallen out of fashion again to some extent since then. Instead, it appears, challenges lie in evaluation of different forms of knowledges, positivistic and otherwise.

Casting a longer historical scope at archaeology as a discipline beyond the detail of the

two phases of archaeoacoustics research identified here, a larger set of issues lies underneath which see the challenge of embodiment and the role of the sensory experiences in the production of knowledge play a significant role. Implicit, and perhaps even taken for granted, by almost all of the archaeoacoustics researchers is a tacit *valuation* of the role of the body and its sensory experiences as a knowledge producing device, beyond the visual modes which have traditionally dominated academic knowledge production. In Foucault's terms, non-visual sensory knowledges became "qualified" in specific ways which before certain intellectual trends in the twentieth century enabled them to be recognised within academic knowledge production as valuable. Rather than shocking, then, Reznikoff's animal sound performance in the cave of Arcy-sur-Cure, appears in this light as *almost* – or perhaps even – commonsensical. The more unspectacular point within archaeoacoustics' historical narrative, and only point articulated by some of its protagonists, is that the importance of the body and its sensory faculties as sites of knowledge production, particularly in non-visual ways, became increasingly normalized and accepted by academic archaeological convention. Reznikoff's untamed animal is not as strange as it might initially seem. In the next chapter, a closer analysis of the field's sonic knowledge production will be undertaken to further theorize archaeoacoustics' challenges to traditional Western epistemology.

Chapter 2 - Sonic Positivism and Sonic Naturalism

Igor Reznikoff: Now, however, there is an absolute evidence of the red dots in the narrow tunnels of some places. You walk, you walk, you crawl you crawl, you make, “omm omm,” and then, “OOOOM!”. It sounds! And the probability that a red-dot, because you can paint a red-dot, you just put ochre, a big picture of an animal you need a good surface, and why do they put it here? If the change is at the maximum. If you take all the tunnels with always the red-dot of the maximum. The chance will be one to one million. So, there is very high evidence.

Me: So it is important for you to have a scientific verification...?

Reznikoff: Oh yes, it is, as otherwise it is meaningless.

2.1 Introduction

The dialogue excerpted above is taken from an interview with Igor Reznikoff, which took place during the aforementioned trip to Isturitz and Arcy-sur-Cure in France in 2015. Earlier that day we – Reznikoff, Till and myself – had been inside the cave of Oxocelhaya where, in the “Gallery Laplace,” the several paintings of horses in red ochre described in the introduction were located. Further to the paintings and engravings of animals found here, several small markings of red ochre dots have been found, which Reznikoff refers to above. He calls this part of the cave, “the kingdom of red dots.” The red dots are not easy to spot and in interview Reznikoff describes how he was involved in their discovery. He emphasizes how he was able to locate them by using his preferred method of archaeoacoustical research, his voice and listening.

This conversation forms the starting point for the examination of sonic knowledge production in archaeoacoustics in this chapter. In the previous chapter, the field of archaeoacoustics with its key events, figures and activities was introduced and its formation as an academic field over the past approximately thirty-five years was described. As outlined in the last chapter, the challenges identified by archaeoacoustics researchers themselves lay primarily in the future of the field, in which concerns about establishing its legitimacy were foregrounded by many interviewees. Alongside this, the matter of the field’s material continuation was

central, in terms of ensuring an ongoing and active research culture dependent on successful funding bids and a thriving scholarly community. However, despite some uncertainty expressed by some protagonists about the perception of the field in the eyes of the wider academic community, I demonstrated that the field of archaeoacoustics, defined as an “epistemic culture” which “create[s] and warrant[s] knowledge” (Knorr-Cetina, 1999, p. 1), has effectively already established itself as a knowledge producing culture. As I argued, within a historical sociology of knowledge, archaeoacoustics is situated within an archaeology of the senses which poses significant challenges to conventional modes of knowledge production in terms of centrally incorporating sound, the senses and the body. Reznikoff’s performance of animal noises in a niche in the cave of Arcy-sur-Cure, demonstrate how bodily experiences have been taken increasingly seriously with the advent of multi-sensory archaeology. How sound and embodiment are being incorporated into or resisted by traditional Western epistemology constitutes one of the most striking and complex facets of the field.

In archaeoacoustics, “science” plays an authoritative role. It shapes the field’s knowledge production distinctively. Reznikoff speaks in terms of “absolute evidence” of the correlation of the size of “resonance” in a cave and the positioning of cave paintings, in this case he speaks about the red ochre dots discovered in the caves, as well as the images of horses. He confirms, in answer to my prompting, the necessity of scientific verification of his theories, which he had already insinuated in his use of scientific terminology such as “probability”, “change” and “evidence”. In the network of tunnels in the cave, his comments pertain to his conviction that statistical testing of the incidence of red dots will prove that they are positioned where the “resonance” or reverberation is the largest. This is a fairly bold hypothesis – it suggests a predictive power of acoustical experiences in identifying the potential location of the red ochre dots. He proposes that by using voice and listening one can identify where red ochre dots might be.

This chapter examines the processes of sonic knowledge production in archaeoacoustics to diagnose its key overall trends as sonic positivism and sonic naturalism, whilst also detailing the breadth of internal convergences and divergences

of individual researchers within these. As described in the methodology in the introduction, these trends have been identified in relation to analyses of interview and publication materials using a procedure of loose thematic coding. The analysis draws from Karin Knorr-Cetina's goal in *Epistemic Cultures* to shift focus from the construction of knowledge itself, onto the "construction of the machineries of knowledge construction" (Knorr-Cetina, 1999, p. 3) and aims to address both - the knowledge which is being produced in archaeoacoustics, as well as the machineries of its production. Therefore, this chapter deals with sonic knowledge production and the epistemological mechanisms that shape it. Sonic positivism is proposed as a term that effectively characterizes sonic knowledge production in archaeoacoustics, exemplified to some degree in Reznikoff's acknowledgement of the importance of scientific verification of his theories above. Simultaneously there are many other tendencies which when taken together characterize the field, which collected, form what I call sonic naturalism. This pertains to an idea of a past pre-industrial pre-civilisational culture which is conceived of as having potential relations to sound and listening different to the context of the researcher. The analysis investigates meanings within articulated statements, as well as conceptual, cognitive or intellectual gestures which implicitly underpin – but are often only partially tangible in – the comments by archaeoacoustics researchers. In the scenario above, this can be exemplified in Reznikoff's hypothesis that the red ochre markings were made according to the acoustics of the space, rather than for other reasons. Within this hypothesis there are a plethora of cultural and epistemological associations at work which are contained within a characterisation of sonic naturalism.

In the Kuhnian terms mentioned previously, with regards to the "essential tension" of science, this means to map out how and in which ways the field and its protagonists in turn embody ideas of iconoclasm and traditionalism (Kuhn, 1991), how they simultaneously challenge and affirm conventions of academic knowledge production. In order to more closely characterize the ecology of sonic knowledges within the field, I follow Knorr-Cetina in aiming to grasp the "texture" of knowledge as practiced in the "knowledge machineries" of epistemic cultures of modern institutions (Knorr-Cetina, 1999, p. 3). These textures can be understood as "made up of several layers edging against and folding into one another, and at times clashing against one another".

Although the field, with its various researchers, research teams, approaches and methodologies, can be considered as fairly diverse, this chapter attempts to map out some of the overarching characteristics of this “texture” – of sonic positivism and sonic naturalism – which is particular to archaeoacoustics as compared to other fields. This will be investigated in further depth in the following chapter, for its broader social, cultural and political implications for sonic knowledge production.

In the first section of this chapter, I explain the identification of sonic positivism. I outline the epistemological mechanisms of the disciplinary inheritances of archaeoacoustics which have led to positivistic-scientistic epistemological models dominating the field. The “waxing and waning of positivist dominance” (Steinmetz, 2005, p. 3) cf. (Knorr-Cetina 1991) is traced within the field of archaeoacoustics in order to demonstrate how sonic positivism’s influence and authority has complexly manifested itself in the field so far. This is framed as competing “epistemological mechanisms” of positivism, anti-positivism and non-positivism in archaeoacoustics. Within the broad term “post-positivism,” different constellations of the strands of positivism, anti-positivism and non-positivism appear in different measures in the field’s current instantiation. These will be explicated further below. I frame these as epistemological mechanisms in order to emphasize their dynamic occurrences and ability for more than one to be at work at a time. They can be imagined as cogs in a complex epistemological machinery which can each work separately, in concert, together or against one another, in which all movement works in some way to push knowledge production of archaeoacoustics along.³⁵

In the second section of this chapter I propose the term sonic naturalism to understand sonic knowledge production in archaeoacoustics. Put simply, sonic naturalism encapsulates the tendency to conceive of a pre-modern past as simultaneously “more natural” and “more sonic” than the present. As a construct it is more wide-reaching, complex and internally contradictory than sonic positivism. It is less tangibly traceable as it does not circulate around a concrete set of definitions as

³⁵ When speaking in a generalized way about the legacies of positivism I will refer to sonic positivism, when speaking specifically about sonic post-positivism this will be expressed as such. However, at times when the “post” is only of secondary interest or only partially relevant, it will be expressed as sonic (post)positivism.

closely as sonic positivism does. Rather than identifying epistemological mechanisms, which a concrete historical construct such as positivism allows for, sonic naturalism is characterized by three looser strands or tendencies of thought which each reveal important dynamics of archaeoacoustics's sonic knowledge production. These tendencies have been identified as: anti-visuocentrism; imaginations of pre-modern mentalities and sonic supernaturalism. In each case there are differences discernible between positions in the field, for which the breadth and depth of are sketched below. Overall, however, these three tendencies serve to propagate a larger overall trend of sonic naturalism in which the subject of research is a potentially more sound-oriented pre-industrial culture. Sonic naturalism functions as an umbrella term to house these three overlapping tendencies found in archaeoacoustics which put together share a pervasive imagination of a more sound-oriented past. The "naturalism" of sonic naturalism enjoys a different but nevertheless substantial authority to positivism cf. (Daston & Fernando Vidal, 2004). The two trends of sonic positivism and sonic naturalism are proposed to exist side-by-side in the analysis of sonic knowledge production as a whole.

In the third section, I briefly examine how some researchers reflect upon heterodox knowledge paradigms and alternative beliefs in the field and how they deal with the epistemological limitations of their research. This helps to articulate how – when researchers addressed epistemological questions in interview or publication, which not all of them did – they approach conflicting conceptual frameworks or epistemological unknowns in their work. In the following chapter, I evaluate the relationship between sonic naturalism and sonic (post)positivism as characterisations of a sonic "here" in archaeoacoustics. This forms a counterpoint to the later elaboration of a political-philosophical "elsewhere", theorised in Chapter 6. This analysis is aimed at assessing the potentials and limitations of the field's challenges to traditional Western epistemology.

2.2 Sonic (post)positivism

2.2.1 Epistemological mechanisms: positivism

Given archaeoacoustics' journey towards establishing itself as a legitimate academic field as described in the previous chapter, the traditions of "science" which have typically relied heavily on positivistic epistemological models play a particularly important role. It is significant to note that legitimacy and scientificity are closely entwined, particularly where an emerging field seeks to establish itself as a "real" science against any accusations of it being "unscientific".³⁶ As described in the previous chapter, theorising a core-set of actors and degrees of proximity to it in a given field, is crucial to understanding how power and dominance occurs in everyday intellectual workings and in cases of "controversy". The scientific-rationalistic mode of thought is placed hierarchically as central in scientific and academic work.

Sonic positivism is proposed to be an epistemological mechanism which tangibly drives knowledge production in the field forward. It exists as an "ideal type" in archaeoacoustics, which due to it having some concretely definable features allows for its characterisation as an epistemological mechanism. This draws on Max Weber's description of an ideal type as a "conceptual construct" which, "is neither historical reality nor even the 'true' reality...a purely ideal *limiting* concept with which the real situation or action is *compared* and surveyed for the explication of certain of its significant components" (Weber, 1949, p. 93).³⁷ Sonic positivism is therefore an abstracted, purposefully constructed ideal model of a position deployed for the benefit of socio-cultural analysis, in this case an analysis of sonic knowledge production. Although positivism is hard to characterise satisfactorily given its many iterations since the early-nineteenth century, sonic positivism draws on the definition of positivism which proposes:

that science is the only valid knowledge and facts are the only possible objects of knowledge; that philosophy does not possess a method different from science; and that the task of philosophy is to find the general principles common to all the sciences and to use these principles as guides to human conduct and as the basis for social organization". (Abbagnano, 1967, p. 414)

³⁶ A noteworthy parallel case here can be made with reference to the intellectual tensions during the formation of musicology as a discipline. Suzanne Cusick describes not only the exclusion of women and the topic of gender from the field and its institutions but also the aspirations by some parties towards it becoming a "science" of music (Cusick, 1999).

³⁷ Although some theorists have pointed to the disavowal of Max Weber's original usage of the term "ideal type", other theorists have argued for its continued usefulness in terms of its ability to connect a subjective meaning constituted by individuals and collectively constituted structural forms (cf. (Hekman, 1983)).

Auguste Comte's influential 1830 formulation of positivism foregrounded the "positive stage" of human knowledge as that in which "man...turns exclusively toward discovering the laws of phenomena by observation and reasoning" (Abbagnano, 1967, p. 415). We can observe sonic positivism if we recall Scarre and Lawson's foundational volume of *Archaeoacoustics* which pleads for data from measurements to be used towards the formulation of "admissible evidence" in order to avoid "circular arguments" becoming prescient in the field (Scarre & Lawson, 2006b, p. viii). Correspondingly, the prominent role played by data and measurement, as evident in the work produced by archaeoacoustics researchers, demonstrates the prominence of modes of sonic positivism in the field.

There is overall consensus about the need for the use of acoustical testing and measurement methods. For example, the pioneering status of Reznikoff's work in the field is widely acknowledged and accepted. In interview, whilst almost all researchers showed admiration of his work, many simultaneously expressed criticisms of his method. In particular, exploring spaces with his voice was described as "subjective" (Watson, Interview 2017; Scarre, Interview, 2016) and "biased and unrepeatably" (Fazenda, Interview 2017). Some alluded to their own respective contributions to the field as bringing a "more scientific methodology" (Till, Interview 2016) and "remov[ing] ambiguity and subjectivity" (Fazenda, Interview 2017). However, Reznikoff himself, as the dialogue at the beginning of the chapter evidences, is fully aware of the "need" for scientific measurement and experiment to verify his intuitive findings. Yet, rather than this being a conflict between Reznikoff's more "subjective" methods, most researchers were in agreement that both embodied sonic practices were valuable but needed to be backed up by rigorous acoustical testing. As Fazenda notes, "I don't think the phenomenological or exploratory methods are wrong, but they are complementary" (Fazenda, Interview 2017). Across the field researchers affirmed the relative importance of different methods of research. A majority of the core-set of archaeoacoustics researchers interviewed substantially produced quantitative data through measurement at the sites they were investigating. The results appeared in their publications as graphs, spectrograms, and diagrams of various kinds. Following such protocols of conventional scientific practice enables experiments to be repeated

by other researchers, as well as reaffirming the authority of positivistic-scientific methods.

Positivism has been such a central epistemological model in the natural sciences and in academic knowledge production more broadly that it is hard to gauge where its realm of influence ends. Indeed, scholars tracing positivism's legacies in academic knowledge production across the so-called human sciences have commented on its "surprising longevity" and attempts to demystify the autonomy of positivistic science is likened to "driv[ing] a stake through the heart of a vampire," which nevertheless continues to besiege social sciences as a "positivistic haunting" (Steinmetz, 2005, p. 4). Similarly, others have frequently commented upon the "science-envy" of humanities scholars which led to vehemently fought battles around science's claims to objectivity and truth such as the "Science Wars" of the 1990s (Collins & Pinch, 1993; Robbins, 1998). For the present matter, however, grasping positivism's legacy as omnipresent and deeply embedded in academic knowledge production is key to theorising sonic knowledge production in archaeoacoustics.

The degree and forms of "science-envy" can be seen to play out in archaeoacoustics in ways specific to its disciplinary inheritances. Positivism, in its various historical iterations by Saint-Simon (1760-1825) and August Comte (1798-1857) in the nineteenth century, was driven by efforts towards an understanding that social sciences, like natural sciences, should be conceived of as governed by laws. The writings of the Vienna Circle in the 1920s and 1930s revived and reasserted some of these premises in putting forward "logical positivism" or "logical empiricism" (Carnap, 2003) [1928], as a framework for formalized scientific activity founded on empirical and logical considerations of observations drawn from data. Archaeoacoustics, primarily constituted by the fields of acoustics and archaeology, inherits positivistic epistemological models from these respective fields differently. The field of acoustics as derived from physics as a "natural science" has a relatively direct relationship to positivistic models in that it focuses on quantitative measurements, repeatable experiments and applying the laws of physics to the study of sound. However, the field of archaeology has a more complicated relation to positivism.

Against a myriad of approaches in the history of archaeology – including text-based and material-object-based studies – in the 1970s, protagonists of “New Archaeology” demonstrated an avid neo-positivist resurgence. This resurgence is currently traceable in archaeoacoustics. New archaeologists pursued a desire for establishing governing laws to systematize many aspects of archaeological analysis, stigmatizing the study of cultural idiosyncrasies as “old-fashioned and unscientific” (Trigger, 2007, p. 392); they aimed to make archaeology as objective a science as the natural sciences supposedly were. As Alyson Wylie surveys, the self-branded New Archaeologists reacted against the heterogeneity of traditional archaeology mired in systematization of observations and tentative inductionism to advocate for a sustained engagement between analytic philosophers and archaeologists (Wylie, 2002, pp. 2–3). Amongst the continued diversification of archaeological approaches since the 1990s, there has been some rapprochement between the two supposedly opposite forces of cultural-historical and objectivist-positivist archaeology and a “theoretical convergence” has occurred (Trigger, 2007, p. 497), which applies scientific-positivistic methods sagely. In the place of “simplistic, deductive schemes for inferring behaviour” which prevailed in the 1960s, more recently consensus has been built around “more diverse, overlapping strategies” (Trigger, 2007, p. 515), including those rooted in positivism. For example, archaeometry has emerged as an increasingly common approach used to apply scientific methods to archaeology, with the journal *Archaeometry* founded in 1958 and its subsequent incorporation across sub-fields of archaeology (cf. (Jones, 2004)). Such archaeometric approaches are found frequently in archaeoacoustics.

The legacies of positivism in archaeoacoustics are rehearsed in another manner through the importance of empiricism in experimental scientific method, around which it demonstrates a strong consensus. This too inherits from positivism’s complex history in a manner relevant for the trends described later in this chapter and the next chapter: Comte’s theorisation of a positive science positions it at the most progressive apex of a three-stage “hierarchy of sciences” (Gordon, 1997, pp. 287–290); this third “positive stage” proceeds following earlier stages of the “theological” and the “metaphysical” sciences. Positivism “denies the existence or intelligibility of forces or substances that go beyond facts and the laws ascertained by science” and underscores that it “denies any kind of metaphysics and, in general, any procedure of investigation

that is not reducible to scientific method” (Abbagnano, 1967, p. 414). The strong rejection of transcendental metaphysics in positivism, shared by the Vienna Circle’s revival of Comte’s theories (Gordon, 1997, p. 304), is reinforced by both acoustics and archaeology’s groundedness in empirical study, either in the form of the observational work of scientific (acoustical) experiments or as traditional site excavations. However, the positivism of archaeoacoustics’s research methods comes into conflict with its reliance on empiricism and observable proof of its theories, as so many aspects of archaeoacoustics remain un-observable and empirically inaccessible. This returns to the problem of retrievability/irretrievability identified in the introduction to this thesis. This relation between empiricism related to physical reality and the metaphysical comes into tension in archaeoacoustics researchers, with the tendency outlined below as conceptions of sound as supernatural.

In an extreme form, a sonic positivism as an ideal type might constitute a belief in the insurmountable importance of acoustical data and repeatable experiments to the extent that only knowledge produced through strict scientific method can contribute meaningfully to the field. This is, of course, an exaggerated position – given the cultural and anthropological nature of many of the research questions in archaeology, based around patterns of human behaviour, the complete quantification of archaeoacoustical research questions seems unlikely; the large majority of researchers would position their work as some combination of sonic positivism with other modalities of knowledge production. Nevertheless, this straw figure of an ideal-type sonic positivist helps to illuminate one of the field’s core epistemological mechanisms.

2.2.2 Anti-positivism and non-positivisms

Within sonic positivism’s hegemony there are numerous divergences in its application which are revealing of the epistemological mechanisms of sonic knowledge production. Here, Karl Popper’s concept of falsification, with its widespread influence on the philosophy of science, is useful – particularly for its demarcation between science and non-science or “between science and metaphysical ideas” (Popper, 2005, p. 16). According to Popper, “genuine” scientific theories should be falsifiable in that they should be able to make predictions which can be proved correct or incorrect.

Popper deems theories which do not fall within this logic as outside of the domain of science to be pseudo-sciences, including systems of thought as diverse as Marxism and Freudianism (Sismondo, 2010, p. 4). Taking a Popperian stance which demarcates science from non-science, anti- and non-positivistic approaches can correspondingly be characterized as “ideal types” in the way they deviate from the sonic positivism described above. In this extreme stance, anti and non-positivistic knowledges are unscientific.

It is evident in the methods employed and described in multiple archaeoacoustics research articles, that although a solid idea of what constitutes “science” prevails, most researchers would question that only falsifiable statements can constitute the *only* “valid knowledge”. Archaeoacoustics, inheriting from archaeology’s anthropological research questions, is inevitably faced with its own speculative and unfalsifiable aims. Referring back to Scarre and Lawson’s foundational volume, they had asked whether “acoustics *might* tell us something useful about the human activities which may or may not have taken place” at a given archaeological site (my emphasis). The conditional tense used is significant in that it simultaneously allows for the potentiality that acoustics *might not* tell us anything useful about a site and the cultural questions it raises. Overall, then, the sonic positivism identified in the field is contested: as an ideal type it imagines a position which would advocate for the complete exclusion of cultural questions or approaches in archaeoacoustics. This is a position that none of the interviewed protagonists would subscribe to. However, in the interests of gaining better insight into the texture of the field’s sonic knowledge production, a brief taxonomy of the ideal types of these epistemological mechanisms will be given.

Sonic anti-positivism is posited as the antithesis of sonic positivism. It may be located in the complete denial of the importance or relevance of quantitative (and perhaps qualitative) measurements, facts or repeatable experiments. Such a position might advocate for experiential or performance archaeology reenactments on a site, but it would maintain that scientific experiments in a positivistic tradition play no role in furthering archaeoacoustical knowledge; it may be actively hostile to positivistic-scientific pursuits. It can be noted that none of the interviewed researchers in this

project took this position, however, it might be imaginable that cultural belief systems exist where the sonic experimental methods used by archaeoacoustics would be resisted or unwelcomed. For example, Australian sound artist and composer Ros Bandt who contributed to the OTSF conference in Malta in 2014 writes about her own methodology of *Sonic Archaeologies* in the conference proceedings:

Sonic Archaeologies...is not of the type executed in other excellent studies which codify the acoustic parameters and pursue the re-creation of original sonic rituals...[it] offer[s] a methodology for re-hearing the past founded on the interdisciplinary intuitive response through experiencing sound itself, as it is sounded in the moment".³⁸ (Bandt, 2014, p. 91)

Whilst Bandt recognizes the value of acoustic studies, she describes her own preferred methodology as one which is much more grounded in listening and experiencing sound. Although there is no hostility towards an approach of sonic positivism, her position most closely replicates a position of sonic anti-positivism.

A larger category which many researchers draw from are non-positivistic approaches of sonic knowledge production. These encompass a large range of knowledge producing mechanisms which do not derive from measurements, facts, and repeatable experiments. These can involve interpretative, cultural-historical approaches and subjective, qualitative observations, all of which do not amount to the formulation of falsifiable statements. Popper's extreme demarcation of science and non-science (which would effectively deem a large majority of humanities scholars work to be "pseudo-science") highlights the wide-range of approaches which non-positivism incorporates. In everyday archaeoacoustical practice, non-positivistic approaches often contribute to the framing of positivistic methods of experiments, but they pertain to knowledges which are not those contained within the establishment of "laws" of observable phenomena governed by scientific reasoning. Non-positivistic approaches pertaining to explanations of human behaviour at a site valorize knowledges which may lie outside of the realms of scientifically knowable facts and which refute the absolutist approaches to scientific knowledge as the totality of knowledge. Again, this

³⁸ Elsewhere in the article, Bandt articulates her position as a white Australian woman engaging with Indigenous cultures and lands, foregrounding in her personal methodology "Protocol and ethics: *It's their place not mine*. Write for permission. Better to be invited by locals" (Bandt, 2014, p. 94).

is where many archaeoacoustics protagonists will likely depart from such an ambitious understanding of science as well as such a strict delineation of science and non-science.

2.2.3 Post-positivism

Actors within archaeoacoustics can be designated according to their proximity to the ideal-type of sonic positivism. Sonic knowledge production in archaeoacoustics is characterized overall as sonic post-positivist, which manifests as an overarching consensus for approaches which combine archaeometric methods with socio-cultural research questions. The “post” of sonic post-positivism indicates approaches which arise from different combinations and balances of positivistic, anti-positivistic and non-positivistic elements within an individual’s research methodology. In terms of its disciplinary positioning, archaeoacoustics’ inheritance of positivism sits between that of archaeology and anthropology. Anthropology has historically been characterized by a stark resistance to positivistic models, even verging on a general consensus of anti-positivism (Keane, 2005, p. 63). Therefore, as described above, archaeology’s more complex historical engagement with positivism leaves archaeoacoustics patterned diversely with its legacies. In archaeoacoustics, it is primarily in the areas of epistemological contestation where positivism is being resisted, challenged or expanded, where its reach and its corresponding limitations become apparent. Sonic post-positivism denotes an overall adherence to the importance of positivistic modes.

Positions of post-positivism are widely discernible in the field. For Fazenda, an acoustician in his academic training, improving methodology is closely tied to scientific method in which tests can produce statistical analyses and that research data is repeatable, unbiased and “understandable from a technical point of view” (Interview, Fazenda 2017). However, he warns, “acoustics is a tool not a solution” and interdisciplinary questioning is essential in that one needs to ask “what can I substantiate? What is it that repeatable and re-analysable data can tell me about this?... Rather than making up ideas which might be suggested by the data but are not substantiated by the data” (Interview, Fazenda 2017). This demonstrates a post-positivistic approach as a combination of quantitative measurement and systematised

experimentation with cultural or anthropological research questions exemplarily.

Aiming to contribute to the discussion on methodology, Ian Cross and Elizabeth Blake address practices of acoustic measurements, sociocultural as well as physiological and ethological-perceptual processes of listening such as the effects of the environment on sound perception (Blake and Cross 2015). Cross explains the motivation for publishing this article:

One has to work out more appropriate metrics. So when you go out into the field – what are you measuring, why are you doing so?...If you are going to measure that you need to measure this, this, and this as well. And only when you put it all together, you get some idea of the ways in which people moved through these soundscapes and how these soundscapes may have impacted on what they did and why they did it in various ways. (Cross, Interview 2017)

Cross and Blake's methodological theory also demonstrates a post-positivistic approach in the search for "appropriate metrics" and careful consideration of what is being measured, alongside motivations for doing so and methods for undertaking measurements. A further example is found in Miriam Kolar's work. Kolar's methodology at the Chavín de Huántar temple complex in Peru, involves close collaboration with archaeologists at the site as well as acousticians within her larger "integrated anthropological" approach. These elements inform a post-positivistic mode of sonic knowledge production. Kolar's approach, has the additional rigour of extensive *in situ* psychoacoustical experiments with live participants (Kolar, 2012, 2013b, 2013a, 2017). This is explored in further depth in Chapters 4 and 5. From a core-set of archaeoacoustics researchers, according to the definitions set out in the previous chapter, it can be observed that a consensus has been reached overall for some variation of sonic post-positivism as the most viable paradigm for the field. Within the varying approaches and implementations of this combination of positivist and non-positivist modes, however, there is substantial diversity to be found amongst researchers.

2.2.4 "Strong" and "weak" sonic positivism

Within the overarching characterization of sonic post-positivism, I propose two categories within the field – "strong sonic positivism" and "weak sonic positivism" to

denote the closeness of adherence to the positivistic models. In this sense the “post” of sonic post-positivism recedes in importance, and both the terms sonic post-positivism *and* sonic positivism refer to the consensus in the field regarding the importance of positivistic models. When referring to sonic positivism as an overarching trend (i.e. as an epistemological mechanism) in archaeoacoustics, this can effectively be understood as referring to a sonic post-positivism. As described in material above, none of the researchers identified in the field take a staunch anti-positivistic approach. This will be indicated henceforth as sonic (post)positivism when emphasis on “post-positivism” is being implied, or simply as sonic positivism. The two categories of “strong” and “weak” sonic positivism indicate *degrees of adherence to positivistic models* within individual researchers’ methodologies. Therefore, according to the comments of researchers cited above, Reznikoff represents a “weak” sonic positivism in his described preference for the use of the human voice and listening as a method of research. Other researchers such as Till, Fazenda, Watson, Blake and Cross, and Kolar amongst others represent the position of “strong sonic positivism” in their explicit advocacy of standardized principles of measurement and repeatable experiments. Strong sonic positivism indicates researcher methodologies which adhere strongly to models which derive strongly from positivism, whereas weak sonic positivism describes researcher positions which do not actively foreground and prioritize positivistic models. There are of course positions between the two poles identified here, nevertheless the distinction serves to delineate researchers’ methodological and epistemological priorities.

2.3 Sonic Naturalism

The second overall trend of sonic knowledge production in archaeoacoustics, sonic naturalism, is more challenging to discern as it pertains to broader social and cultural assumptions which are less concretely tied to the more tangible histories of academic knowledge production, such as positivism. The term “naturalism” within sonic naturalism has an extremely broad range of potential meanings which relate to the multiple imprecise meanings of “related to nature”. Sonic naturalism describes the mode of sonic knowledge production which projects a pre-industrial culture as more sound-oriented: it expresses the pervasive and wide-reaching sentiment of human

culture being simultaneously “more natural” and “more sonic” in the past.

According to this definition, sonic naturalism may be found as a wider cultural construct in other instances. Comments arising from the analysis of archaeoacoustics researchers’ statements in interview within this chapter and the next, particularly those demonstrably influenced by the work by R. Murray Schafer and the “acoustic ecology movement” indicate the expansiveness of this tendency. This accords with existing scholarly critiques of Schafer’s work and extensive influence in the field of sound studies (E. A. Thompson, 2004; Akiyama, 2010; Kelman, 2010; Sterne, 2011, 2015; M. Thompson, 2017). However, this coinage of sonic naturalism emphasizes the implicit connection made between the sonic and naturalism in various contexts, which has hitherto remained unnamed in this manner (for further explication see (Goh, 2017), also attached in Appendix I).

In the field of archaeoacoustics, however, sonic naturalism and this implicit and close association between the “more sonic, more natural past” manifests in three substantial “tendencies” (rather than the epistemological mechanisms of sonic positivism): anti-visuocentrism, imaginations of pre-modern mentalities and conceptions of sound as supernatural. The definitions and histories which surround positivism are not as immediately apparent for sonic naturalism, due to their broad-reaching implications. Thus, sonic naturalism is a less clearly definable construct than sonic positivism. The relation between sonic positivism and sonic naturalism will be dealt with in more depth in the following chapter. It is sufficient to note here that in this analysis the two exist alongside one another.

The identification of the three tendencies of sonic naturalism together begin to build a coherent picture of the cultural and intellectual approaches within the field. They have been chosen to represent a large majority of the approaches to sonic knowledge production within the field as comprehensively as possible. Where possible, these have been grouped together to identify similar and dissimilar groups of researchers who exhibit these positions and account of the breadth of these positions is given. Once more, Kuhn’s description of the “essential tension” of the scientist is observable. Scientific discovery is conceivable within archaeoacoustics as the coalescence of

“divergent” elements such as flexibility and open-mindedness, alongside a firm rootedness in contemporary scientific tradition. Emerging themes are framed as tendencies in order to enable these various strands of thought to be conceived of as distinct for the purposes of analysis, but to enable overlaps and frictions with one another, as generalized tendencies of the field and between individual researchers’ positions. The tendencies in certain iterations echo one another.

2.3.1 Anti-visuocentrism

Amongst archaeoacoustics researchers there was a recurrent sentiment and critique of the visually dominated nature of modern Western culture. This can be seen to operate firstly, at the level at which visuocentrism is identified; and secondly, at the level of a normative or remedial action. In all cases of those interviewed, there was some form of palpable articulation of a desire to redress the domination of the visual; among those, there were two distinct positions of anti-visuocentrism amongst archaeoacoustics researchers. Variance was identified between the two groups in the degree to which archaeoacoustics researchers explicitly engage with visuocentrism, and the manner in which they seek to impose their normative action. The tenets of sonic naturalism coincide with anti-visuocentrism in the way that an increased sensitivity to sound is inferred as a characteristic of the past cultures under investigation although, again, the manner this is expressed in varies across researchers.

The first group of researchers expressing the tendency of anti-visuocentrism is characterized by an apparently principled criticism of modern-day visually dominant culture. The language tends to lend intellectual importance to the role of the auditory to address the problems caused by visuocentrism. For example, Devereux configures it in terms of archaeology's “deafness”³⁹ to the past:

People in remote antiquity would probably have heard with greater acuity than we do, living as they did in a quieter world, a world in which listening for

³⁹ Such ableist language is unfortunately found frequently across sound studies as it is in many other academic fields. As Michele Freidner and Stefan Helmreich observe, “audist and phonocentric tendencies suffuse everyday interactions as well as cultural theory, which tune to hearing and voicing as key modes of discriminating human sociality (Friedner & Helmreich, 2012, p. 73).

danger would have been a constant and more important activity than in modern times... Yet we have tended to be deaf to this likelihood, and when we visit megalithic monuments or ruined temples our preconceived pictures of the past run like silent movies in our heads. (Devereux, 2001a, p. 12)

In interview Devereux elaborates:

The modern Westernised world is about 70% visual. We rely a terrible lot on vision... We're very fast, very visual and digitised, we are increasingly cut off from direct experience, you know people cross the road with a wire in their ear and iPhone in their hand and they don't even look around. They're totally disconnected from the world around you. If you live in a city there's so much noise and mental jumbling.
(Devereux, Interview 2016)

In this group, the observation of the dominance of vision is closely linked with a normative and imperative statement. The language is more outspokenly negative in its evaluation of contemporary visuocentric culture. There is some sense in Devereux's comments that the practice of archaeoacoustics is considered an amelioration of the problem of visuocentrism, which suggests that there is a substantial degree of emancipatory rhetoric evident in Devereux's position. He has great ambitions about what the contribution of archaeoacoustics can be:

It's eluded us until now, because something as permanent and long-lasting as an ancient monument seems at odds with something as ephemeral as sound which is of the moment. It's an interesting innovation to put those two aspects together. There's a sense of wonder, of producing a sound, by knocking on a rock, or stalactite, and hearing a sound, the same sound, which people heard thousands or tens of thousands of years ago. ... it helps us reconnect in a way people originally did... It reconnects us with the landscape... (Devereux, Interview 2016)

Present in Devereux's comments is a strong link between observation and normative conviction. He expresses a conviction that sound and listening form a way to mitigate the social disconnectedness caused by visuocentric cultures, and implies that archaeoacoustics offers some form of potential rehabilitation of those negative effects. This position appears to suggest a centrality of sound, or "sonocentrism," as a solution to the visuocentrism of modern Western culture.

A second position is characterized by a comparable acknowledgement of the problems of visuocentrism. However, the response to this tends to take the guise of a de-

centring of the sensorial-epistemological prominence afforded to the visual. This is exemplified by researchers Scarre and Lawson when they remark on the “overdue” incorporation of sound and listening to move towards a “multi-sensory archaeology” (2006b, p. vii). In interview Scarre expanded on this position:

We all begin with the starting point that the multisensory world must include acoustics and musical behaviours and vocalisations. There are three ways to approach this archaeologically. 1) Ethnographic parallels, which are unspecific but demonstrate the likelihood that sound-related behaviours could be important in a specific context. 2) The remains of sound-producing artefacts, musical instruments including bone flutes, drums, rattles ...the body (singing, shouting, stamping) etc. ... and 3) The acoustics of space, such as caves and painted rock shelters.

(Scarre, Interview 2016)

Scarre’s position acknowledges the large amount of attention historically given to the sense of vision above other sensory inputs. His three-part analysis is put forward as an approach to rectify visuocentrism through sound and listening, with some indication of its limitations suggested in the first approach. A comparable sentiment which demonstrates a measured response to visuocentrism surfaces in Ian Cross’ comment on the development of the field of archaeoacoustics from the 2003 Cambridge meeting, “I saw it as a necessary development out of what you might call a privileging of the visual in material culture” (Cross, Interview 2017). In both of these statements, a moderate conceptual shift is observable away from the visual and towards multi-sensory and auditory modes.

Expressing a similar position, some researchers related the problems of visuocentrism to other academic debates. For example, in Watson’s work, he places attention to sound and listening within intellectual trends of institutionalized archaeological study and the turn to landscape archaeology and phenomenology:

when I was a student landscape was becoming increasingly important as a context for human activity. Human experience in that landscape was coming through. But it was very ocularcentric. It was more about seeing. But the more people started to talk about the importance of buildings from the perspective of a moving, sensing person, the nearer you get to the possibilities of sound being important. (Watson, Interview 2017)

Watson describes here how the human body and its movements in landscape came to

play an increasingly important analytical role in archaeology and suggests “ocularcentrism” as a problem to be overcome. Comparably, Till commented on the oft-asserted implicit idea of a competition for attention between vision and auralty within larger sound studies debates:

Some people are trying to say it's all about sound - Ingold talks about looking and listening together as perception. Part of the trouble is that the words for looking and listening are separate, we don't have a term for both, apart from something like perceiving. But when we are perceiving, in contemporary society, the visual, because of writing, has taken over. The visual and photography have become dominant...

Certain areas, such as archaeology, have focused a lot on physical objects and it has been very visually dominated. People in the past went to Stonehenge and didn't listen, and what I'm trying to say is that when you go there you need to look and listen together. (Till, Interview 2016)

Till criticises a perceived exaggerated position which might attempt to focus solely on sound in archaeoacoustics. He foregrounds his opinion that multisensory, not just aural, perception needs to be part of the analytic and epistemological modes of understanding in archaeoacoustics. His reference to Tim Ingold is likely to be to the text *Against Soundscape*, well-known in sound studies, which argues against the analytical separation of the senses inherent in the oft-used concept of soundscape (Ingold, 2007). Some archaeoacoustics researchers agree with this overall approach; it aligns archaeoacoustics with the more general “sonic turn” as well as “bodily turn” found in the humanities encompassed by the development of the fields of sound studies and body studies. All of these positions demonstrate a decentring of visuocentrism, rather than a sonocentrism, as a preferable approach to archaeological investigation.

However, within the tendency of anti-visuocentrism clear delineations prove difficult; Till's language is quite similar to Devereux's when discussing modern Western society:

As we're looking back in to aural/oral cultures, I think the rediscovery of these cultures is important. I think society is too visually based today. I know Marshall McLuhan has talked about the dominance of the visual and the eye...I think I've always been keen to look and listen together. I started off maybe focusing on sound, but it's about audiovision it's about bringing the two together. (Till, Interview 2016)

Therefore, the tendency to speak in quite powerful terms about the problem of

visuocentrism and the role of sound and listening can be seen to pervade both “strands” within this tendency. The references to Marshall McLuhan and ideas of orality and visuality will be addressed in more depth in the next chapter.

Overall, there is a substantial degree of conviction that visually dominant “Western” culture has led to a neglect of attention towards sound and listening, evident in both the moderate and more polemical variations of this position. This general tendency can be presumed constant whether or not visuocentrism was explicitly mentioned in interviews. Anti-visuocentrism constitutes a part of sonic naturalism insofar as it reinforces an idea of a pre-industrial culture which was more sonic and less visually-led. The work of archaeoacoustics, in both versions of this tendency, is proposed as a form of redress of the problem of visuocentrism. There is a persistent idea that the researcher or innovator might be alert enough to consider the role of sound, or indeed sensitive enough to listen to their surroundings, which a visuocentric culture normatively neglects. In its most extreme form, archaeoacoustics has an ameliorative function in that the sonic is proposed to have powers of social connectivity which have been lost to visuality.

2.3.2 Imaginations of “pre-modern” mentalities

A second facet within the overall trend of sonic naturalism is found in researchers’ frequent comments, implicit and explicit, on modernity and “pre-modern” minds or mentalities. This relates closely to the tendency of anti-visuocentrism, given archaeoacoustics’ focus on so-called “prehistoric” cultures as a contrast to the conception of modern Western society as visually dominated, and relatedly with reference to the pre-industrial cultures of sonic naturalism. There was a persistent idea evident across the interviews, that modern modes of knowing are fundamentally different to those of the “prehistoric” people present on the sites in question; modernity and visuality were frequently conflated. For analytic purposes, however, they are separated here in order to understand where they deviate from one another. Interviews revealed three discernible positions of the relationship between the modern and the “prehistoric”, between which overlaps occurred. In the first group, aspects of modernity are emphasized which allude to industrialization and the

increasing dominance of technology which is associated with a kind of harmful toxicity. Such positions often coded sound, in opposition to visuocentrism, as a potentially emancipatory force. In the second group, emphasis was placed on epistemological shifts which have come about to discern the difference between contemporary mentalities of Enlightenment science in contrast to “pre-scientific” ones. In the third group, a more concrete envisaging of “prehistoric man” was observed.

The first group can be exemplified by statements by Devereux and Eneix. Devereux expresses:

In the ancient past, in remote prehistory, people communicated with places through sound. Shamans, throat singers and people generally, communicated with place... Yes it's the idea of listening to place, being more aware of place... that's what the RCA [project] was all about. It was about getting kids off their iPhones and getting them to go into the landscape and getting them to see and hear things that people will have heard in prehistory, 5000 years ago. Things that we no longer notice, because we are locked away in our digital world, our modern world of speed and hurry and noise. (Devereux, Interview 2016)

Similarly, Eneix articulates:

Sound today is something very different in our culture. It's music, it's an entertainment industry, that's sound. When we talk about hearing we don't use it the same way. It's very difficult for most people in the world today to sit for any length of time in silence, without the hum of a motor or engine, or airplane going overhead, or a refrigerator running. We don't know what silence is, how can we understand sound? (Eneix, Interview 2017)

In both of these quotes, modernity is invoked as “noisy”. In Eneix’s statement, noise in a classic definition of “unwanted sound” is clarified as an omnipresent feature of contemporary urban life. In Devereux’s, he uses “noise” in a less literal manner to describe the hectic or busy nature of “the modern world,” in effect deploying an idea of noise as an interference in one’s communication with, and understanding of the space they inhabit. In addition to a scepticism about visual biases which might have prevented the incorporation of acoustics at archaeological sites up until recently, both Devereux’s and Eneix’s comments also incorporate a sense of moral disdain for modernity and its commonly denounced illnesses. These are evidenced in references to consumerism (“the entertainment industry”), social alienation (“getting kids off their iPhones”) and industrialization (“the hum of a motor”). This characterisation of the

noisiness of a visuocentric modern culture encodes a moralistic criticism, both Devereux and Eneix level that these modern illnesses can be countered through better listening practices, or more sonic experiences. Indeed, as I discuss in the following chapter, this tendency has commonalities with acoustic ecology's "aesthetic moralism" identified by Marie Thompson (2017a).

A second grouping was characterized by an imagination of the pre-modern mind as a simultaneously "pre-scientific" mind. Steven Waller's approach directly articulated attempts to conceive of sonic experiences outside of the wave-based propagation model of sound:

Sound waves were only proven in the seventeenth century...echoes...[are] only "obvious" because we have a scientific background and the education to know about soundwaves....[There is a] perception of sound as being spiritual, as being something mysterious, unknown to these people who didn't know about sound-waves... So that's why I've been doing a lot of research on the mythology of echo and thunder gods....[there is a lot of] mythology that documents that the ancient people perceived echoes as being spirits. (Waller, Interview 2017)

Waller clarifies his position that soundwaves constitute a large part of how a contemporary subjectivity expressed as "we today", understand sound and the phenomenon of echoes. In his published work, Waller incorporates many considerations of echo myths using ethnographic research based on the fact that, "most ancient cultures held the belief that certain natural phenomena were caused by supernatural beings...categorized as 'animism,' a form of personification" and that legends from all over the world, "show that echoes were perceived as emanating from spirits or were considered spiritually important." (Waller, 2002a, p. 11). Citing examples from Native Americans in North America, as well as Ancient Greece, South America, Central America and South Asia, Waller comments on the "magical" and "numinous" experience of echoes to theorize that "ancient cultures" may have attributed the reflection of sound from rock-surfaces to producing echoes themselves, and that following this observation, echoing surfaces may have been considered sacred (Waller, 2002a, p. 12). For Waller, a large part of these supernatural connotations of echoes evident in mythology is to do with the "pre-scientific" understanding of sound. In a similar way, Cross described a similar approach of imagining "pre-scientific" mentalities

when asked about the phenomenon of a flutter-echo⁴⁰ he describes in an article:

Just because I do science, doesn't mean I don't think things can't be magical and mystical. I just want to try and explain them or understand them. Not to explain them away. What I said about the flutter-echo... yes, to a pre-scientific understanding, that would have been magical and mystical, and even after we worked out what it was, it was still extraordinary! ...It's anomalous and weird. Even if we know what's going on.

(Cross, Interview 2017)

Both Waller and Cross foreground how in the absence of a scientific understanding of sound, a phenomenon such as echo might give rise to its “magical and “mystical” interpretations. This is a recurrent theme in researchers’ imagination of pre-modern mentalities.

In the third group, the experiences of “prehistoric” man emerged in interview, usually through researchers detailing their own engagements with the space of the archaeological site. Amongst the interviewed researchers, this was always framed as “man” rather than “woman” or “person”, the implications of which will be explored further in the next chapter. To recall an example from the previous chapter, Waller proposed his imagined pre-modern subject as male when describing his initial intrigue into the acoustics of archaeology outside of the cave of Bedeilhac in France: “If I was a cave man, why would I go deep in the cave and risk my life, and only paint certain species, in certain chambers? Why would I be motivated to do that?” (Waller, Interview 2017). Here, Waller elaborates on his “pre-modern” mindset by expressing that he was “thinking like a cave man” when he made his initial connection between archaeological sites and acoustics. In a related way, Reznikoff speaks of the sonic exploration of caves as taking place on two levels:

[Firstly]... all the ancient oral traditions, in all ancient societies, including the ones still alive today, which are primitive from an economical point of view – they have a very rich musical and mostly singing traditions. They always address through voice to the invisible... Sacred art ... it is a way to reach deeper levels of consciousness, it's liturgical. It's related to the invisible...

[Secondly]... the use of voice which is functional. Functional for the discovery of the cave. Why? Well because in the caves there is complete darkness.... So how can you proceed to discover the space? It's very dangerous by the way, there

⁴⁰ A flutter-echo is an acoustic phenomenon caused when two-parallel reflective surfaces cause a rapid succession of echoes, which give it an unusual and sometimes striking chorus effect”.

can be holes, stalagmites and stalagmites, you can have wild animals... So you can use what we call "echo location" known through the bats... (Reznikoff, Interview 2015)

Reznikoff presents here his embodied and mental imagination of "prehistoric man" exploring the caves in which he proposes the voice to have a dual functionality – liturgical and for spatial awareness.⁴¹ He, unlike Waller, makes no explicit mention of the conceptual role of soundwaves but instead emphasizes links between sound and "sacred art", "deeper levels of consciousness" and "the invisible." However, it is the projection of the subjectivity and bodily experiences of an imagined "prehistoric man" which both Waller and Reznikoff share. The invocation of "ancient oral traditions" and descriptions of the "sacred" relations to art and music Reznikoff describes align broadly with Waller's although Reznikoff places less direct emphasis on the absence of a wave-based propagation model of sound and more generally imagines what he calls a "primitive society".⁴²

Within this tendency of imagining pre-modern mentalities there are some significant contrasts. Such an approach did not appear across all interviewees' research methods. Whilst for Waller and Reznikoff envisaging a "pre-modern man" as a speculative subject in their fieldwork directly shapes their research methods, Scarre offered a marked challenge to these direct approaches of imagining such a subject, "The idea of being able to put ourselves in the mindset of people of the past is a problem. It's not a secure route to knowledge. But as I say, bodily engagement is valuable, by taking note of how we encounter things. But we can't easily demonstrate what they meant to past people" (Scarre, Interview 2016). In a comparable way, Cross expressed sharp criticisms of generalistic approaches and when asked about negotiating the speculative nature of archaeoacoustics he offers that "there are ways of constraining the range of speculation...[it's about] narrowing down the possibilities" (Cross, Interview 2017). This third group within this tendency reveals significant methodological tensions in the

⁴¹ Reznikoff also qualified the gender of the cave explorer as men giving the reasons: "It is clear you need men for that, it's like going for hunting or for something dangerous" and "for the discovery you need rather low voices, strong voices, male voices."

⁴² Reznikoff is careful to qualify that this use of "primitive" relates to the economic structure of the prehistoric cultures in question. This may be a response to statements such as "we may say that the sounds and the whole situation are *primitive*" in an earlier article, which could have been subjected to criticisms of potential interpretations of the term "primitive" to have evolutionary implications.

field, which will be discussed further in the following chapter.

All three positions identified here, the first more pointedly “anti-modern”, the second more explicitly an imagination of “pre-scientific man”, and the third an imagining of the bodily and sonic experiences and subjectivity of “prehistoric man” express different modes of the projection of pre-modern subjectivities present in archaeoacoustics. The ways each of the three positions inform the processes of sonic knowledge production varies. The normative approach of rectifying visuocentrism *qua* modernity is more apparent in the first position, and overlaps with the anti-visuocentric tendency outlined above. The second position pays greater attention to the epistemological modes which inform an exploration of space through sound and listening, and the ways visuocentrism and modernity impinge upon the manners within which this is commonly undertaken. The third reveals a significant methodological divergence in the appraisal of the relative value of imagining (and gendering) prehistoric subjectivities as part of archaeoacoustical work. As constitutive of the overall trend of sonic naturalism, each of these imaginations of pre-modern mentality rehearses a past human subjectivity which existed in a pre-industrial and “more natural” environment.

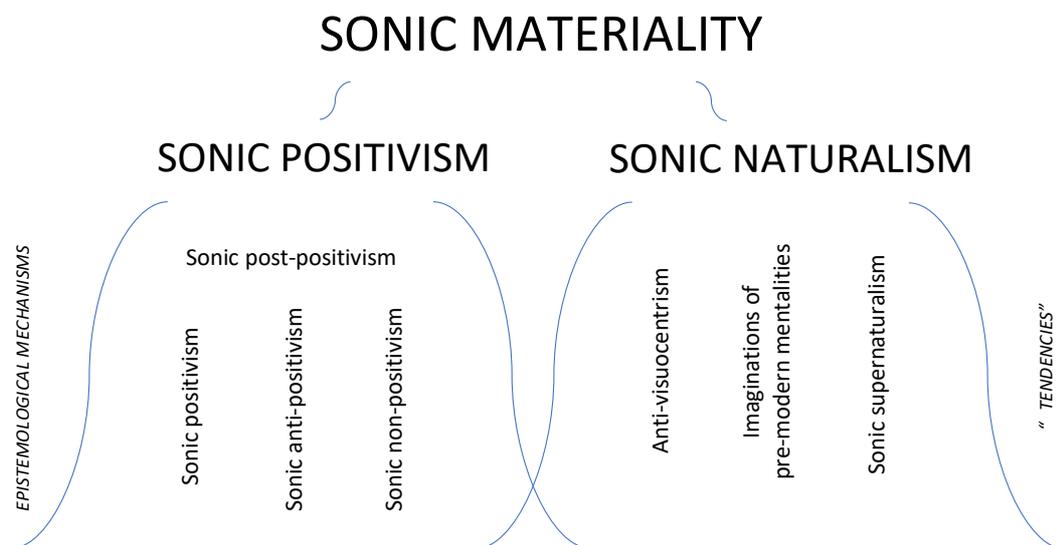


Figure 1 Diagram of Sonic Knowledges

2.3.3 Conceptions of sound as “supernatural”

A third tendency of sonic naturalism articulates notions of the “supernatural” in relation to sonic phenomena. Comments emerged relatively frequently from interview and published material which associated sound with the magical, mystical, or mysterious. The term “supernatural” is defined as that which goes “beyond the natural.” Typically, this is a concept which has connotations of “magical” or “beyond scientific understanding”, the occult or paranormal, as well as to historical Christian references to the divine. In this light, the natural and supernatural are seen to be intimately related in the broader characterisation of sonic naturalism. The range of responses observed around this theme of the sonic supernatural within archaeoacoustics falls into two groups. The first group exhibits a more pronounced expression of how sound and the supernatural relate, albeit ambiguously, whilst the second group approaches affective sonic experiences related to archaeoacoustics through a rationalistic prism as “curiosities”.

Amongst the first group, we find statements which strongly affirm a relationship between sound and the supernatural. This is found in published work such as in Devereux's influential book *Stone-Age Soundtracks*, “sound in the ancient world was conceived of as a supernatural phenomenon” (Devereux, 2001a, p. 15) and “if in the ancient world sound was thought of as being so powerful, magical and sacred, then it would surely have been a considered factor in the establishment of a temple or sacred monument” (2001a, p. 65). Similarly, Eneix's book features the following questions on the back cover, “How were megalithic monuments made for reaching the hallowed? What effects did ritual sound have on ancient minds? Can it still do that?” (Eneix, 2016). Waller’s aforementioned comments around the cultural perceptions of echo spirits living in rocks also fall – at least partially – under this category, and overlaps with the conceptions of pre-modern or pre-scientific minds.

Reznikoff's primary experience in the caves is also comparable in this sense. In interview with Reznikoff, his initial encounter with the acoustics of caves was prefaced with an extended account of development as a musician and the relationship between music and “the sacred,” stemming from his Christian spirituality as he identifies it:

At the age of 11 I decided I would be a composer. Very soon, the question came to me, what is the relation between music and the sacred...Sacred art means it

is a help to reach deeper levels of consciousness, it's liturgical... I became a specialist of the resonance of mostly churches, Romanesque and then Gothic...Then being a specialist of Romanesque resonance, I was invited to the resonance of a cave...And so I started humming and I discovered, here it sounds good and here it sounds not so good. Then immediately came the idea, what could be the relationship between the acoustic quality and the location of the paintings. (Reznikoff, Interview 2015)

Reznikoff describes his life-long association of sound and music with “the sacred,” which he also refers to as “the invisible,” which according to his research trajectory appears to find a logical demonstration in the caves, acoustics and rock-art. In the same interview Reznikoff compares his own Christian spirituality and related sonic practices evident to cultures he refers to as “Eskimo” cultures. As he relays, “in hunting rituals...address[ing] the invisible” is comparable to rituals which took place in the caves. According to Reznikoff, where there are pictorial representations of animals these represent for ancient traditions “the energy of the animal and also the spirit of the animal. It addresses... the spirit and the invisible” (Reznikoff, Interview 2015). An assumption is evident, as in Devereux’s and Eneix’s statements, that there is an inherent connection between sound and the supernatural, whether this is named as such or in other terms such as Reznikoff’s use of “the sacred” or “the invisible.”

A connection between sound and the supernatural was also expressed by Paolo Debertolis. In interview, he offered in response to a question about how he views his own contribution to the field and subsequently elaborated on other aspects of his position as a researcher:

I think that my contribution is understanding better the souls of ancient people, the spirit... When I started studying ancient civilisations... it was impossible to analyze their aims, their spirit, without having the same mentality. How can we go back to the past? We can, we can! So, I did a course of meditation... After some time, I understood that it was really important for me to understand how they prayed, how they meditated, so I entered in the head of these people...[Meditation] transformed me!... I also understood another important thing... that spirituality and science are two different faces of the same coin... spirituality speaks about vibrations... as a scientist I can say photons... you can have a scientific approach to spirituality. (Debertolis, Interview 2017)

Debertolis proposes science and spirituality to be “two sides of the same coin,” and proposes this to be central to his approach as a researcher. There is a strong suggestion

here of imagining pre-modern and pre-scientific mindsets too, expressing a similar tendency as described above. Although no unity of positions can be assumed across this group of researchers, in their statements, a connection between sound and realms of the “magical”, “spiritual” or “supernatural” emerges in a strongly affirmative manner. Across these positions, there is little evidence of a critical reflection of this relation, and this presumed connection between sound and spirituality appears, crucially, self-evident to researchers.

In the second group, a scientific-rationalistic framework was more prominent in relaying experiences of unusual sonic experiences. This emerged from interviewees narrating sonic discoveries at archaeological sites or relating to music archaeological artefacts, which was often accompanied by a sense of wonder, puzzlement or fascination. Where in interview more detail was elaborated given, it was evident that researchers prioritized a positivistic, rationalistic understanding of sound with descriptions of the affective dimensions of the sonic experience serving as sonic “curiosities”. For example, Watson who describes being at an archaeological excavation in Scotland:

This stone circle is visually distinctive, and includes different kind of rocks, colours, patterns, and a relationship with the moon. I was looking at the landscape setting... I was doing the usual archaeological thing, looking, making notes, and taking photographs, when I started to hear echoes and reflections of other people there. I realized I was hearing reflections of their voices. I thought, if I'm noticing it, then people in the past must have noticed it. If I think it is significant, then how might this have been interpreted in the past? (Watson, Interview 2017).

As quoted in previously, the description by Waller of his initial inspiration to pursue archaeoacoustics was the experience of the echo of the of Bedeilhac in France where he spoke of the beliefs of “ancient people” that “echoes were spirits that lived in the rock”. Both Watson's and Waller's accounts describe an affectively powerful sonic experience at an archaeological site which confounded them in some way and piqued their curiosity to explore the acoustics in greater detail. Waller’s account falls somewhere between these two groupings described here.

The distinguishing characteristic of this second grouping can be best observed in the

comments by Ian Cross, a professor of music and science, who researches sound, music and cognition through neuroscientific rationalistic frameworks. Nevertheless, he is candid about the affective sonic experience which has mystifying qualities. As mentioned above with regards to pre-scientific mentalities, Cross's account of a flutter-echo produced by tapping a flint with another flint, which gave off a bell-like sound, is evocative:

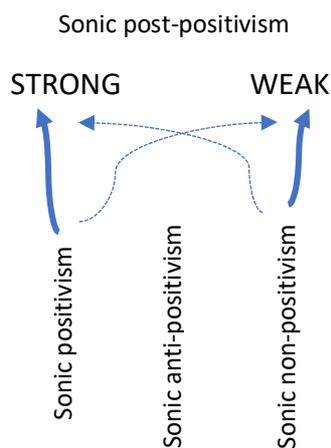
Suddenly, a single tap on the blade was followed by a high-pitched flutter – an animate sound seemingly located some distance from the sound source – that appeared to recede into the distance. The effect was quite unearthly; though out of doors and in the full afternoon sun, it seemed that the tapping had suddenly awoken some real yet invisible entity – perhaps a bird, or at least an avian spirit? – that evanesced, disappearing somehow into the (brick) boundary walls. (Cross and Watson 2006, 113).

Even after Cross and his colleague had identified the phenomenon as a flutter-echo, he describes how accounting scientifically for the acoustic effect did nothing to dispel the “magical” qualities of the sound (Cross and Watson 2006, 113). As Cross reflects upon elsewhere in the interview, scientific epistemological frameworks are one way of understanding something, but in most cases, multiple epistemological frameworks are needed in order to understanding something (Cross, Interview 2017).

Amongst these range of accounts, I propose there to be convergences found between sonic experiences and conceptions of the supernatural, yet divergences within how this is affirmed. As a constitutive element of sonic naturalism, the supernatural can be considered closely entangled with ideas of a pre-industrial pre-civilisational past environment, albeit in a slightly different register to the previous tendencies identified. In cases of initial discovery of a sonic phenomena, there is a frequently a characterization of the affective experience as magical, mystical, mysterious or supernatural, whether this is couched in religious or secular terms. Whilst one group assumes a connection between sound and supernaturalism which remains critically uninterrogated, the other group prioritizes a scientific-rationalistic worldview over such experiences depicted as curious or unusual. In broad terms, the characterization of sound as “supernatural” aligns with commonly-accepted notions of “the visual” as disenchanted and rational as theorists of modernity's visuality have often emphasized and as such, this tendency of sonic supernaturalism overlaps with the tendency of anti-

visuocentrism. Overall, this tendency emerged starkly and across the spectrum within archaeoacoustics, with clear relations are being drawn between sound and the supernatural which are embedded within a conception of a more sonic, pre-civilisational past. In the next chapter, some of the implications of the ideas of the supernatural, magic, mysticism, spirituality and religiosity in relation to sound and the sonic will be addressed in more detail.

SONIC POSITIVISM



SONIC NATURALISM

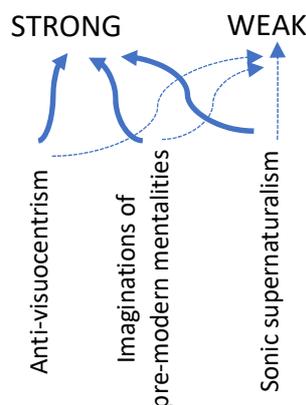


Figure 2 Diagram of "strong" and "weak" sonic positivism and sonic naturalism

2.3.4 "Strong" and "weak" sonic naturalism

Sonic naturalism describes a general trend of sonic knowledge production in the field. As stated above, it expresses a sentiment that the pre-modern past was both "more natural" and "more sonic." Within the three tendencies described here – anti-visuocentrism, the imagination of pre-modern mentalities and conceptions of sound as supernatural, a conception of a potentially "more sonic" pre-industrial culture as the subject of research emerges. However, the ambiguity of a term such as "naturalism" deserves some greater attention here, as the meaning of "relating to nature" can have a wide range of implications. Two versions of sonic naturalism are discernible in positions expressed by the archaeoacoustics researchers interviewed. These are distinguished as "strong" and "weak" sonic naturalism. Indeed, although expressions of each of the three tendencies have sometimes been fairly divergent, two overall points of convergence can be ascertained.

A first point of convergence is found in strong sonic naturalism. This is characterized by an understanding of a “more sonic” and “more natural” past which is often strongly implied as desirable to return to. This is often also backward-looking insofar as it suggests the sonic practice and research of archaeoacoustics to be an ameliorative solution for visuocentric modernity’s illnesses, such as social alienation. A second point of convergence is “weak” sonic naturalism. This refers more broadly to an ontological and epistemological framework of philosophical naturalism. What unifies both groups, however, is the conception of a pre-industrial past culture in which sound and listening play a greater role than is perceived to exist in present-day paradigms. “Strong” sonic naturalism is the more accentuated version of “weak” sonic naturalism.

Within the “strong version” of sonic naturalism, a position is identified which advocates for a return to “nature” either as part of a normative moral impetus or as part of a research methodology which imagines the subjectivity of pre-modern “natural” lives in order to theorise sonic experiences in archaeoacoustics. Evidence of key sentiments of the first group is found in statements by Eneix and Devereux such as:

Before civilisation got underway which led to the world we are in today. That time period when humankind was still feeling that it was part of nature, and not dominating nature, it changed – why did it change? Did sound have a role in that? Could be, could very well be.... If we could find out where we went wrong, maybe we'd have a chance at fixing some of the mess that we've made of the world today. (Eneix, Interview 2017).

The ancient mind has always been a focus of my work: what were they thinking, what were they doing?...[Archaeoacoustics is] a reminder that ancient people had ears, because we have forgotten that through the decades. It sort of links you through time, to being a human being over time, it's the human story, the human journey, like a sound thread through time. It's wonderful. It shows us the origins of music, that music first of all came from the earth itself. (Devereux, Interview 2016)

There is a “back to nature” sentiment underpinning much of these researchers’ motivations, as well as socio-political anxiety about contemporary society, evident in Eneix’s comment “if we could find out where we went wrong...” (Eneix, Interview 2017). This is significant in its positing of an implied morally “better” past.

Furthermore, there is an idea of a universally continuous idea of “nature” inherent within this as Eneix candidly writes in her book, “Basic human nature hasn't changed

much in five millenia and neither has Malta's Hypogeum" (Eneix, 2016, p. 18). Within these anti-visuocentric and pre-modern/pre-scientific sensibilities, an idea emerges of a noisy, sullied, visually dominated present-day culture against which imagined "prehistoric people" are contrasted. This might entail a projection of a "pre-scientific" experience of sound, but more prominently, a past is imagined which is quieter, more natural, morally better and with it "more sonic." An implicit dichotomy emerges between a rationalized, visually-dominated, urbanized, commercialized modernity on the one hand, and a pre-rational, pre-capitalist, pre-industrial, aurally-dominated pre-modern era on the other. The association between sound and the supernatural provides a further compelling aspect of the way sound is theorised in archaeoacoustics, proposed as sonic meanings which go beyond those of the hegemonic imagination of contemporary Western scientific epistemology. The epistemological openness identified in various guises as heterodox knowledge paradigms characterises a widespread acknowledgement of the limitations of Western scientific knowledge production. Being "closer to sound" is implied as returning to a better and "more natural" state. This will be addressed in greater depth in the next chapter.

In the variation of this trend called "weak sonic naturalism", researchers take a position which refers in a general sense to scientific naturalism. As philosopher Roy Wood Sellars proclaimed in 1922, "we are all naturalists now" which speaks of a "naturalism" in a meaning that has faded from contemporary understandings. This approach does not contradict that of strong sonic naturalism, rather it designates the general ontological and epistemological framework of the natural sciences. One interviewee directly articulates a different form of naturalism which is relevant for sonic knowledge production. In interview, Cross refers to a "naturalistic" epistemological framework:

One of the points I make in [recent] a book chapter... is that the epistemological framework that seems most appropriate to explore music is the naturalistic one, i.e. one that relies on scientific understandings – but, you cannot apply one sole epistemological framework and expect to get away with it. You are going to need multiple epistemological frameworks. (Cross, Interview 2017)

Whilst contemporary understandings of the term "naturalism" are diverse, the meaning invoked by Cross accords with one that has a rich intellectual tradition within

Western philosophy. Historically, ontological naturalism emerged following the scientific revolution as a rejection of supernatural or religious explanations of the world. It came to prominence as an alternative way of understanding the world, but has since given way to its common-sense understanding. Contemporary “naturalism” in this sense is a product of the scientific revolution and is indebted to a scientific world-view.⁴³ In this sense, naturalism has become subsumed in contemporary “realism.” Weak sonic naturalism designates a physical-material model of sound as vibrating matter is the epistemological basis of investigation. Some contemporary theorists of sound have referred to this in diverse ways as “sonic materialism” or “sonic realism” (C. Cox, 2011; Henriques, 2011; O’Callaghan, 2007). Within archaeoacoustics, weak sonic naturalism is equivalent to a scientific-realist understanding of sound which implicitly appeals to naturalist philosophical understandings of sonic matter.

Whilst the characterisation of strong sonic naturalism in the form does not pertain to all interviewed researchers, nor all researchers of the core-set of archaeoacoustics, it would appear that almost all researchers would ascribe to weak sonic naturalism, being premised upon a physical “realist” understanding of sonic materialism. This unites both overall trends of sonic positivism and sonic naturalism. This will be addressed in more depth in the next chapter. Although the weak sonic naturalism does not necessarily advocate for the moral superiority of a more natural, sound-oriented past culture as strong sonic naturalism does, there is nevertheless a tacit acknowledgement of a past culture’s *potentially more-sonic sociality*. Thus, sonic naturalism as an overall trend can characterize a wide range of researchers.

Overall, the trend sonic naturalism identified across archaeoacoustics researchers holds a broad diversity of the positions on a spectrum between “strong” and “weak”

⁴³ Evaluated by Kelly James Clark, this statement is considered as even closer to being true now than it was then: increasingly in the discipline of philosophy, philosophers are identifying as naturalists (Clark, 2016, p. 1). Clark divides this further into “strict” and “broad” naturalism in which “strict” naturalists downplay elements of human experience and claim to be able to explain everything with proper scientific understanding, whilst “broad” naturalists are more willing to accommodate common or “folk” understandings of human experience into explanatory models and that consciousness, morality, and freedom are not reducible to the physical. Clark differentiates between ontological or metaphysical naturalism, and the “more modest” methodological naturalism. Clark describes how metaphysical or ontological naturalism claims that everything exists is the natural, as opposed to supernatural world. Methodological naturalism, incorporates both theistic and atheistic beliefs in promoting that science should not appeal to supernatural entities or forces (Clark, 2016, pp. 2–5).

sonic naturalism within it. The diversity is constituted by different emphases on and negotiations of the problem of visuocentrism, the imagination of pre-modern mentalities, and the relation between the sonic and supernaturalism. Each individual researcher pertains to have their own ontological and epistemological framework for undertaking their research which cannot be elaborated in any great depth in a survey such as this. It also affects how they broach the epistemological limitations of archaeoacoustics research, and to some degree, how they address the acknowledgement of heterodox knowledge paradigms within the field's research questions, as surveyed below. Nevertheless, as a deliberately broad and overarching characterisation of sonic knowledge production in archaeoacoustics, sonic naturalism as a whole encapsulates the prevalent idea of a "more sonic, more natural past"; it describes the potentially more important role of sound and listening in an imagined past culture.

2.4 Heterodox knowledge paradigms

A further tendency identified across researchers was the manner in which they contended with different ways of knowing and doing in the cultures of the distant past in their research. Devereux commented during interview that, "Archaeoacoustics is a topic which opens you up" (Devereux, Interview 2016) – a statement which many researchers across the field might agree with. This can be identified as a form of epistemological openness evident within the field, in that the social relations around sound and listening are unknown and conceived of as "different" within the cultures under investigation. Rather than being a significant distinctly identifiable trend such as sonic positivism or sonic naturalism, this tendency is positioned across both and has some more general indications about the field's sonic knowledge production. In relation to the framework set out in the introduction to this thesis, the existence of heterodox knowledge paradigms in archaeoacoustics researchers' statements suggests that they understand their endeavours at least partially as striving towards what one might consider to be a political-philosophical "elsewhere", away from the hegemonic "here" of modern Western visually dominant society. However, as the detail of these comments indicate and as the following chapter expands upon, the

ontoepistemological frameworks of this position show that fulfilling the pre-requisites of accessing this “elsewhere” are not so easily accomplished.

The identification of heterodox knowledge paradigms refers to broadly conceived “alternative” epistemological positions defined as those which in this current historical moment deviate from a hegemonic system of knowledge production. These may concern issues considered “anomalies” in a Kuhnian sense – that they do not fit within the puzzle-solving activities of “normal science” and instead “violate... the paradigm-induced expectations that govern normal science” (Kuhn, 1996, pp. 52–53). This includes both conjectured ideas considered “yet to be proven” by the scientific establishment, as well as those which have already been dismissed by parts of the scientific establishment, either as anomalies or as explained by other means. The discussion at the end of the previous chapter highlighted anxieties around the legitimacy of the field, which some protagonists articulated as a necessity to protect it against accusations of being perceived as a “pseudoscience.” The contentious role of so-called “new-age” beliefs plays a significant role within a conception of heterodox knowledge paradigms, which are met with some controversy amongst protagonists. In general, it was notable that even from the academics who most fervently advocated for rationalistic and (post)positivistic modes of knowledge production whom I interviewed, there was an overall openness to the heterodox knowledge interventions in the field. Broadly there was little outright hostility expressed when the issue of “new-age” beliefs was raised, “It’s a broad church”, was a phrase which came up a few times in interview (for example, Cross, Interview 2017). However, it should be noted that as this did not necessarily emerge as a theme in all interviews, it is difficult to discern detailed or coherent approaches across the group of interviewees.

Amongst those who explicitly expressed an acknowledgement of non-orthodox knowledge paradigms there are two groups of archaeoacoustics researchers who did so in slightly different ways. Both negotiate the epistemological constraints of conventional positivistic knowledge production paradigms, and in their contrasting resolutions, these groups offer differing characterisations of a sonic alterity. The first group exhibit an epistemological modesty which emphasizes the limitations of orthodox ways of thinking, whilst the second negotiate the epistemological problems

of archaeoacoustics by foregrounding present-day experiences or knowledge-production. Whilst these two positions overlap substantially, the emphasis of the former on “learning” and the latter on “art” or “creativity” demonstrate two distinctive strands of thinking.

In the first group, a form of epistemological modesty was observed in which limitations and shortcomings of the dominant Western modern modes of knowledge production were acknowledged. This relates to the aforementioned “pre-scientific” as “pre-modern” mentalities mentioned by researchers. For example, Waller relativizes the limits of present-day knowledge paradigms:

it's a really interesting case of how the human mind perceives reality. There are many examples in the history of science. You know people used to think the earth was flat and that the sun was a god and it rose and set and went through the underworld at night. Now we know that the earth rotates, so there are whole different ways of perceiving the exact same phenomenon, but interpreting it differently...it's all a matter of perception and the knowledge, and how different cultures have different knowledges. It's just a way of thinking. (Waller, Interview 2017)

Waller reflects – without any explicit reference to Kuhn – on the archetypal definition of “paradigm shifts” given by Kuhn to describe the deep-reaching effects of scientific revolutions, the Copernican revolution which inaugurated the heliocentric astronomical model (Kuhn, 1996, p. 68). In expressing that “different cultures have different knowledges” Waller advocates a position of cultural-epistemological relativism; each system of knowledge is specific to the paradigm it is borne within. Waller’s reflection on perceiving “the exact same phenomenon, but interpreting it differently” indicates his rationale for understanding the physical-material acoustic phenomena which have persisted across time, whilst highlighting the variance in cultural frameworks of understanding. This position acknowledges the prior existence of different knowledge paradigms which in this relation are heterodox compared to current hegemonic systems of thought.

In a related way, a few researchers discussed the epistemological limits of archaeoacoustics. Watson commented when asked about the interest in the topic from non-archaeologists, on the relativity of cultural meanings and their groundedness in

cultural-historical context:

... half of my battle is that I'm so conscious all the time of how rigid the terms of engagement are with let's say, Western Europeans and landscape. We come to it and it's already fabricated through the natural sciences. We experience weather, we have geology, we talk of an ecosystem or the environment. All of these terms are archaeological, they are artefacts of culture. They are concepts that we have made! (Watson, Interview 2017)

Watson exhibits both a similar gesture of epistemological openness as Waller as well as the definitive acknowledgement of cultural specificity of knowledge paradigms as suggested by Waller. In comparison to Waller, Watson's position elaborates in more depth an awareness of the situatedness of concepts and conceptual frameworks suggesting a high degree of self-reflexivity in his epistemological reasoning. Another iteration of this position was expressed by Díaz-Andreu and Cross. Díaz-Andreu explicitly acknowledged the epistemological limitations of archaeoacoustics in her work:

You can just say things up to a point... We will never be able to know about past communities' deep ritual beliefs. We can only reach a superficial level in our understanding of what was happening there. ...I think we have enough reasons to think that these places were not functional (in the sense that they were not habitation sites or cemeteries), these places were related to the sacred, but what type of religion or kind of rituals were taking place – there's no way to know. (Díaz-Andreu, Interview 2017)

In a comparable manner, Cross who had advocated positivistic, fact-based evidential approaches reflected on the potential importance or relevance of non- or anti-positivistic approaches to archaeoacoustics in interview, "When it's just the science, it's not enough, and when it's just an edge of an aspect of culture – which is how I would regard the spiritual side of things – it's not enough either. There has to be an awareness that there are other ways of thinking and a motivation to enter into dialogue." (Cross, Interview 2017). Thus, Cross appears to acknowledge the magnitude of the problem of retrievability to diplomatically point to the limitations of both positivistic and anti- or non-positivistic forms of sonic knowledge production. It also reinforces the scientific-realist version of sonic naturalism, as well as alluding to the tendency of sonic supernaturalism. Although it is not discernible to what degree Watson, Díaz-Andreu and Cross advocate cultural-epistemological relativism, there is some substantial degree of it evident in their comments. The groundedness of

contemporary conceptual frameworks and their respective limitations when faced with the problems of understanding cultures of the distant past is perceivable in each of their positions. Overall this group exhibits some degree of relativization of one's own knowledge paradigms alongside a substantial sense of epistemological openness. The large amount of unknowable aspects of "prehistoric cultures" translates into the possibility of vastly different human behaviours. For some of these researchers there is a palpable fascination in this pursuit.

In the second grouping of this tendency which acknowledges heterodox knowledge paradigms, the epistemological openness is implicitly similar yet emphasis has been placed on its resolution differently. This is a shift in register and focus, rather than contradicting the premises of the first group in any substantial manner. References to present-day experiences, often in the form of art or musical performances, are mentioned to foreground a conviction for predominant epistemological value *within* contemporary culture, rather than as knowledge producing mechanisms around past cultures. For example, Lawson qualified the epistemological openness which can endanger the field, "Very often in music archaeology, the enthusiasm runs away with the science", with statements which advocated experimental archaeology practices, "even the wildest, most frivolous experiments can actually produce interesting results!" (Lawson, Interview 2017). Comparably, reflecting on the breadth of epistemological approaches in the field, Till remarked on his own arrival as a researcher to the field:

Being from a musical background I'm used to making artistic interpretations. Acoustics and archaeology are stuck with sets of rules, they don't want to suggest things that can't be proven by hard science. But this isn't always what archaeoacoustics is trying to do, we're trying to present interpretations. On the other hand, archaeologists don't want to produce a model if they don't know if the stone was standing up or lying down. The freer approach has an advantage. (Till, Interview 2016).

Thus, here it can be noted that artistic practice or interpretations emerge as sort of "third way" in which non-traditional knowledge paradigms are sanctioned as legitimate, if they remain in the realm of artistic production. Some of Till's sound archaeological work has been involved with music archaeology and the performance of site and epoch-accurate instruments *in situ* on archaeological sites with extant

architecture and acoustical settings, which he is referring to when he comments that “we’re trying to present interpretations.” Till decries the rigidity of some more strictly positivistic scientific approaches in the field which shy away from creative or artistic explorations for not being archaeologically accurate, which he references with the comment about whether the stone “was standing up or lying down”. For Till, these debates around archaeological accuracy are not of primary interest in this project; instead, he valorizes musical or artistic performances that draw on archaeological acoustics and archaeologically-accurate musical instruments as valuable material for present-day creative outputs.

A further example of this second position is provided by Damian Murphy who spoke in interview about his own creative sound practice and his work with sound artists in acoustical heritage projects. Murphy describes being awarded an AHRB art and science fellowship which, in his words, “enabled me to explore my own creative interests in the acoustics of various heritage environments” (Murphy, Interview 2017). Within this Murphy spoke of his research aims:

You know, people are always interested in this, in this kind of work – what does it say about past people – I'm very open about saying, I don't think we can say what it says about past people. It's another tool that we can bring to a particular problem and shine a light on a past environment, but we can't necessarily think in the same way that those people thought about sound. We have a very different perspective on our understanding of our sound environment than people from the past did! I like to make clear that what we do certainly helps to tell that story, but I'm not trying to tell that story in one particular direction or another. (Murphy, Interview 2017)

Murphy articulates quite directly his response to the problematic identified in the introduction to this thesis described as the problem of retrievability. His comments suggest an abdication of that problem which, instead of being addressed with a pursuit of archaeological truths, focuses more on contemporary creative and experimental performances. In doing so, his response is comparable to those described by Watson, Díaz-Andreu and Cross above in that his elaboration posits a belief that aurality, as the socio-cultural significations of sonic experiences, cannot be accessed: “we can’t...think in the same way that [they] thought about sound.” However, more prominently than them, his research has instead pursued performative and artistic projects in a heritage site. As such, different modes of sonic knowledge production are evident in these

variations of methodology.

In summary, the first group of this tendency of heterodox knowledge paradigms placed more emphasis on the unknowability of past epistemological paradigms whilst the second group laid focus more often on their own individual research approaches based on present-day artistic or other performative experiences. Nevertheless, the conceptual divergence between the two groupings of this tendency was not large. For those who broached the topic, it was commonly accepted that epistemological paradigms existed which were different from their own. However, for those interviewees who did not explicitly reflect on knowledge production it has been hard to discern a full range of opinions on the issue of heterodox knowledge paradigms. The controversy around “new-age” beliefs in the field was identified in the previous chapter, however, no coherent position or group of positions can be precisely determined beyond a general recognition of heterodox knowledge paradigms and the two distinct approaches outlined here.

The existence of heterodox knowledge paradigms evident across archaeoacoustics researchers’ statements is significant in that they represent how forms of political-philosophical “elsewheres” are being alluded to. Whether this takes place as with the first group described here, in which an epistemological modesty evident emphasizes shortcomings of the hegemonic “here”, or as with the second group elucidated here, in which present-day and often creative experiences are foregrounded as the solution to archaeoacoustics’ uncertain subject matter, both positions confirm the large ontoepistemological unknowns which separate the present day archaeoacoustics researchers from the cultures they interrogate. As I will argue further in the following chapter, underpinning this sonic alterity is a persistent dynamic which pervades the hegemonic “here”, even when it aims towards the “elsewhere.”

2.5 Conclusion

In this chapter, I have examined the texture of archaeoacoustics as an epistemic culture at this moment of the field’s emergence. Within the richness of the field’s sonic knowledge production and its convergences and divergences, some “partial

connections” have been outlined, in which positions and relations are traced without any false illusions towards a totality of knowledge (Strathern, 2004). Nevertheless, the material introduced begins to provide a comprehensive account of the core themes which constitute archaeoacoustics’ sonic knowledge production. I have proposed there to be two overarching dominant trends – sonic positivism and sonic naturalism – which characterize the field as it currently stands. The trend of sonic (post)positivism is more easily identifiable by researchers and more easily recognisable, whereas that of sonic naturalism remains more ambiguously expressed in researchers’ comments. Whilst there is a consensus around sonic (post)positivism as the prevailing mode of sonic knowledge production in the field, sonic naturalism emerges as a set of looser, less explicit, semiotic and symbolic significations. Together, overall, sonic positivism and sonic naturalism make up broad-reaching and overarching characterisations of the field’s sonic knowledge production, whose multi-faceted overlaps will be further analysed in the next chapter. Alongside these two trends, a general characterization of sonic knowledge production which acknowledges heterodox knowledge paradigms was observed.

Interview material and published research by researchers was drawn upon to form an analysis within two distinct frameworks. Firstly, at the level of epistemological mechanisms in relation to the ideal type of sonic positivism, knowledge production was described to reveal how sonic post-positivism pervades and shapes the field. Positivistic, anti-positivistic and non-positivistic strands of thought were identified in order to examine the field’s sonic knowledge production as post-positivistic overall. Although the limitations of a strict positivistic framework was outlined, including the narrowness of the concept of falsifiability which fails to reasonably address the complexity of archaeoacoustics’ research questions, sonic positivism is a useful analytical category for illuminating the role of scientific-rationalistic knowledge paradigms which are pervasive within the field. Strong and weak positions of sonic positivism are discernible. The strands of “strong” and “weak” sonic positivism which denote the degree of adherence to positivistic models inherent in individual researcher’s methodologies.

Secondly, using a broader socio-cultural framework, sonic naturalism was identified as

a broad trend in which a more sonic and more “natural” past is imagined. Sonic naturalism in archaeoacoustics is constituted by three tendencies which emerged from comments by researchers: anti-visuocentrism, imaginations of pre-modern mentalities and conceptions of sound as supernatural. Different positions within each of these tendencies were described to indicate the breadth and diversity of these within the field. Together, the larger thematic of sonic naturalism which again in different guises seeks to encapsulate the cultural and social stakes of archaeoacoustics’ sonic knowledge production. This sonic naturalism, whilst it can be found in wider cultural contexts, manifests within archaeoacoustics in particular ways. There are strands of “strong” and “weak” sonic naturalism which denote the manner of advocacy of “naturalism”, whether as the “return to nature” of strong sonic naturalism or more simply as the philosophical-epistemological understanding of sonic matter in weak sonic naturalism.

Identifying sonic naturalism is important as it exists as a tendency much more implicitly than sonic positivism does. Whereas the pursuit of scientifically testable hypotheses and the implementation of scientific-rationalistic knowledge paradigms is likely to be uncontroversial when articulated to archaeoacoustics researchers in these terms, the looser cultural tendency of sonic naturalism which I have diagnosed in comments by archaeoacoustics researchers in interview and publication, might be met with puzzlement and disagreement. However, within a broad spectrum of positions, this trend of thought is nevertheless distinctly tangible; sonic naturalism exists as a tendency to presume a more natural and sound-oriented pre-modern past. As the next chapter reveals, the implications of a paradigm such as sonic naturalism are significant when its framing of a distinctly “other” culture – a sonic alterity – are the subject of investigation.

Naming and delineating the contours of the trends of sonic positivism and sonic naturalism in archaeoacoustics in this chapter has served to more clearly map out how they are produced by and reproduce the ontoepistemological hegemonic “here” of sonic knowledge production. Nevertheless, the positions detailed of individual researchers, particularly the variances between “strong” and “weak” sonic naturalism are a testament to the breadth and diversity of the varying extents to which the

hegemonic “here” has grasped archaeoacoustics. Ubiquitously, and enduringly, the notion of a sonic naturalism pervades; it is the thirst for knowledge about the possibility of more sound-oriented pre-modern human cultures which persistently guides the research questions of archaeoacoustics. Even whilst it seeks to explore political-philosophical “elsewheres” as the existence of heterodox knowledge paradigms indicates, archaeoacoustics researchers remain bound to the ontoepistemological frameworks their knowledge production takes place within.

Sonic positivism and sonic naturalism are understood to be overlapping and simultaneously occurring trends which characterize archaeoacoustics’ sonic knowledge production overall. They neither exist as competing with one another, nor do they simply reinforce one another. Their complex manifestations make up the epistemic texture of the field as it has been described here. In the next chapter, tendencies pertaining to broader cultural, ideological and historico-structural issues which inform sonic positivism and sonic naturalism are addressed.

As I have demonstrated, the contemporary visuocentric, post-Enlightenment Western knowledge paradigm, described as part of the hegemonic “here” in the introduction, is being opposed by some protagonists of the field of archaeoacoustics. This is correspondingly entwined in a negative depiction of contemporary society as “noisy.” In its place, an imagination of alternative ways of living which existed in the speculative time-space of “prehistoric” cultures is being pursued. This is conceived of as a quieter, uncorrupted, pre-rational, pre-urban, and crucially, “more natural” way of living. Often, this conception incorporates ideas of sound as magical, mystical, mysterious or supernatural. Underpinning the broader tendency of sonic naturalism, I contend, is a characterisation of the limitations of a Western, visuocentric knowledge paradigm and the proposal that archaeoacoustics has the potential to give us access to alternative knowledge paradigms.

In the next chapter, I will explore in more depth some of the issues which arise regarding sonic knowledge production in archaeoacoustics. Some of the overlaps inherent in the tendencies identified here will be framed in order to identify the degree of alterity which they aspire to, as part of a notion of a sonic alterity. This leads on from

the discussion of heterodox knowledge paradigms outlined above. A broader sociocultural and historical approach will be applied to the trends of sonic positivism and sonic naturalism in order to understand how they align with an idea of sonic materiality. Using feminist and decolonial perspectives to examine the knowledge production of the field, I illustrate potential limitations and shortcomings for the field. I examine how sonic knowledge production in archaeoacoustics uses a potentially radical interpretation of Kuhn's "paradigm incommensurability" in order to examine in which ways it addresses a political-philosophical "elsewhere," as discussed in the introduction to this thesis. I demonstrate that despite the emancipatory epistemological potentials which are implicit or explicit in archaeoacoustic researchers' comments, the tendency of sonic naturalism of archaeoacoustics acts as a limitation on the potentials of sonic knowledge production. The following chapter which concludes section 1 of the thesis, outlines the problems of sonic knowledge production of the hegemonic "here" with a view to the theorisation of aural gnosis and proposal of echo as a material-semiotic figuration of an "elsewhere" of sonic knowledge production in Chapter 6.

Chapter 3: Sonic Alterity and Its Limitations

3.1 Introduction

The ecology of sonic knowledges in archaeoacoustics is rich in complexity, as the description of the field over the previous two chapters has demonstrated. This chapter proposes that within the multi-faceted texture of archaeoacoustics' sonic knowledge production, there is a persistent – yet ambiguous – idea of “difference” attached to the sonic subject matter of the field. I refer to this as the field's “sonic alterity”, which I propose is a pivotal characteristic of the field in need of critical interrogation. Sonic alterity describes how researchers use the “sonic” materially and theoretically to strive towards (potentially) radically different ways of knowing and doing than conventional traditions of archaeology. Given the development of archaeology within European intellectual history and its corresponding patriarchal and colonial inheritances, this chapter addresses the extent to which archaeoacoustics' pursuits are part of a hegemonic “here” of Western epistemology or a political-philosophical “elsewhere” which ventures beyond these.

As posed in the introduction to this thesis, the turn to the sonic in archaeoacoustics demonstrates how sound provides a substantial challenge to the historically visuocentric conventions of archaeology. However, the precise role of the sonic and what it can afford remains fairly ambiguous in the material surveyed so far. Evident in some of the material presented in the previous chapter, the challenge of the sonic can be construed as critiquing not only a visuocentric archaeology but academic knowledge production more largely. This chapter aims to explicate the sonic alterity of archaeoacoustics in order to demonstrate that whilst it has palpable epistemological ambition, it remains strongly rooted within Eurocentric epistemologies to the extent that it thus far only replicates its hegemonic structures.

The nested character of archaeoacoustics' sonic knowledge production is foregrounded in this chapter. Whilst the previous two chapters have undertaken a close reading of the field broadly within its own terms, this chapter departs from the

paradigms which directly accompany archaeoacoustics and opens it up to the wider range of social, cultural and political theoretical debates. This chapter theorises the sonic knowledge production in the field in categories which may exceed the archaeoacousticians' own frameworks. Returning to the questions posed in the introduction, complex challenges are being negotiated within the field such as the relation between the bodily senses and knowledge and the potential *retrievability of sonicity paired with the irretrievability of aurality*. Yet where researchers of the field are occupied with the production of sonic knowledges within the disciplinary formation of archaeology, this chapter is concerned with critiquing and reflecting on the dynamics of knowledge production more largely.

The challenges of such an endeavour are substantial. As the mapping out of archaeoacoustics' formation as an academic field and its description of its current instantiation demonstrate, it is a field which exists within the conventions of Eurocentric academic knowledge production. As the description of the hegemonic "here" in the introduction put forward, academic work in the humanities – in particular feminist epistemologies and decolonial theories – have enabled a critical interrogation of its limitations. These approaches help illuminate the epistemic injustices or inequalities which reinforce oppressive structures whilst often remaining invisible (Medina, 2013). In archaeology this can manifest itself as an "epistemic laziness" which the discipline risks if it continues to ignore the structures of colonialism, neocolonialism, sexism and patriarchy in its knowledge production (Rizvi, 2015). Given the ambiguity afforded to the sonic in archaeoacoustics, it remains to be explored to what extent it acts to reinforce existing structures or push back in resistance against them. This chapter aims to illuminate the constraints of the "epistemic injustice double bind" (Rizvi, 2015, p. 160) which in archaeoacoustics blocks an understanding of the sonic past, as well as invisibilizing its own epistemic ignorances. Therefore, alongside attention to colonial and patriarchal epistemic injustices, the role of the sonic in knowledge production will be examined in this chapter to ascertain whether and in what forms it provides substantial challenges to conventional epistemologies.

The approach proposed in the thesis introduction of *sounding situated knowledges*

demands a critical interrogation into sonic knowledge production in the field which is rooted both in physical embodiedness as well as political-ethical situatedness. As I described, one might envisage that the embodiedness of researchers' experiences at archaeological sites helps to reinforce a located positioning of their processes of knowledge production. To some extent this can be seen to be true. However, the situatedness Haraway advocates involves acknowledging the political-ethical demands of partiality in epistemological processes: *the situatedness does not necessarily arise out of embodiedness*. The knowledge production of archaeoacoustics is locatable in its researchers, but to what extent these processes are thoroughly reflected in critical terms is addressed in this chapter. The crucial question underpinning the questions this chapter raises can be formulated as: *Who listens for whom in archaeoacoustics?*⁴⁴ The implications of some answers to this question will be addressed below.

By relating the tendencies of sonic knowledge production in archaeoacoustics identified in the previous chapter to the broader fields of sound studies and cultural studies, I am able to examine its existing trends within broader contexts. This is guided by a pursuit of "politicized" scholarship, itself a slippery term, but one whose form will become clear within this chapter. This chapter is split into three parts. In the first section I examine the notion of a sonic alterity evident in the field currently. As identified in the previous chapter, an acknowledgement of heterodox knowledge paradigms and anti-visuocentrism is evident in the field, yet the implications of these for sonic knowledge production is ambiguous. In this section I ask what the turn to the sonic in archaeoacoustics means and identify a significant epistemological ambition in the field. This analysis interrogates the role of a sonic otherness. I characterize what the ontoepistemological affordances of the sonic being proposed in archaeoacoustics are as well as the risks of a sonic alterity.

In the second section, I address the epistemic heritage of sonic positivism and sonic naturalism and propose that a conception of sonic materiality unites them. I demonstrate how both sonic positivism and sonic naturalism in both weak and strong forms are dependent on a fundamental understanding of sound as matter which itself

⁴⁴ This formulation leans on Jonathan Sterne's question "who listens for whom, to what end, and under what circumstances?" in his critical technological history of the MP3 (Sterne, 2012a, p. 148).

has a history traceable to Western science and intellectual thought. This history is described for its propensity to universalize in order to evaluate its corresponding implications for archaeoacoustics. Understanding sonic materiality as arising within the particular historico-structural episteme of European modernity, I elucidate my argument that the intellectual patterning within archaeoacoustics is aligned with a hegemonic “here” rather than to a political-philosophical “elsewhere.”

Finally, in the third section, I address more concretely the question of “who is listening for whom” in archaeoacoustics. I return to the notion of sounding situated knowledges and identify the problem of “innocent listening” as a form of sonic knowledge production which does not fully situate itself in terms of the politics and ethics of knowledge production. Some key areas are outlined which demonstrate the limitations of the already-present and dominant hegemonic “here”. These pertain predominantly to the version of “strong” sonic naturalism identified in the previous chapter which valorizes a “more sonic” “more natural” past. These are formulated as the potential dangers of innocent listening, which exemplify the problematic tendency of universalising from subjectivities producing sonic knowledges which have not been fully interrogated for their specific historical occurrences, or sufficiently “provincialized” (Chakrabarty, 2000). As such, they are proposed to pose significant limitations for the proclaimed epistemological ambitions evident within the field.

Each part of this chapter serves a different facet of the argument. Whilst the first part serves to clarify and more precisely characterize the field’s sonic alterity and identify in what ways it exhibits epistemological ambitions, the second part outlines how sonic materiality –the shared epistemic heritage of sonic positivism and sonic naturalism – indicate a firm rootedness in Eurocentric histories which provides the field with substantial difficulties in departing from the hegemonic “here” of its intellectual heritage. Following this, some of the limitations resulting from Eurocentric thought are identified as risks of “innocent listening”. These three parts together demonstrate how archaeoacoustics attempts to, but does not fulfil, its epistemological ambitions.

3.2 Sonic Alterity

3.2.1 Degrees of sonocentrism

A notion of difference runs throughout archaeoacoustics. Associations of sound and otherness have appeared in different manners implicit throughout the previous two chapters. However, it is necessary to further examine how a sonic alterity and its particular dynamic and scope is manifested in archaeoacoustics. Indeed, there are many forms of “difference” which appear in the field. Most obviously, there is the difference of the past to the present, or in the words of some researchers between “ancient man” and “modern man.” Amongst this, there are a plethora of ways in which the sonic is being mobilized to constitute this difference. Sonic otherness was inherent in the characterisation of the “invention” of archaeoacoustics in Chapter 1. The novelty of a listening-oriented analytic lens was accompanied by a sense of a new epistemological domain being revealed by researchers. Sonic alterity was also present within all three tendencies of sonic naturalism diagnosed in Chapter 2, as anti-visuocentrism, imaginations of pre-modern mentalities and conceptions of sound as supernatural, where there was a consistent notion of an alternative past way of life being described. Within the strong version of sonic naturalism, in its description of a “better” “more sonic” and “more natural” past, a particularly potent dynamic of difference is found.

Greater attention is required to interrogate what inheres in the often ambiguously proposed “otherness” or “difference” accorded to the sonic in archaeoacoustics. As identified in the introduction to this thesis, the challenge of the sonic also brings with it certain epistemological potentials given the visuocentric models which have been historically dominant. How archaeoacoustics positions itself within these possible radical affordances can be observed within the interviewee’s comments. Building on the anti-visuocentric tendency of sonic naturalism outlined previously in particular, I propose there to be different characterisations of sonic alterity that can be discerned. These are brought into relief when looking at how contemporary visuocentric knowledge production in archaeology is negotiated.

Within the strong version of sonic naturalism, in which a “better” “more natural”

“more sonic” past is proposed, the problems of visuocentrism are countered with a proposed sonocentrism. A turn to the sonic is suggested to aid or ameliorate some of modernity’s cultural “illnesses” such as the disconnectedness of social alienation. It is imbued with an emancipatory rhetoric. This position was expressed by protagonists Devereux and Eneix, who as cited in the previous chapter, expressed ideas that “sound...helps us reconnect in a way people originally did” (Devereux, Interview 2016), or that an implied negative change in civilisation occurred in modernity in which sound may have played a significant role (Eneix, Interview 2017). Attention to sound and listening in the way that they advocate, supports a notion of a sound-oriented culture which is contrasted with the visuocentric modernity the interviewees describe. Alternative knowledge paradigms are appealed to which might qualitatively effect positive transformation on a present-day political social reality. At times, the supernatural is proposed as that which is in excess of an impoverished disenchanting modern Western epistemology. This sonocentric culture is proposed as different, other and *better than* the modern visuocentric West.

Across researchers, there are wide divergences in how the sonic is being used to bridge the otherness of the past cultures under question in archaeoacoustics. In some guises, sound can help “reconnect” researchers to the “natural” world and perhaps heal some of the perceived illnesses of modernity, in others sound helps to ground researchers in an embodied way when navigating the landscape at a site, in others still it foregrounds the epistemological affordances of a multi-sensory approach, in further variations yet it reveals curious sonic-affective phenomena which might have been perceived to be mysterious in character without a scientific understanding of sound or it is even claimed to commune with a spiritual world. It is this huge diversity of applications and mobilizations of the sonic which contribute to the ambiguity in how its epistemological implications in archaeoacoustics.

In mobilizing a sonic alterity in a variety of ways, I propose that archaeoacoustics and its “prehistoric” subject of study invokes a substantial degree of epistemological ambition in an equally ambiguous manner. Both versions which express sonic naturalism outlined above – either firstly regarding the emancipatory gesture afforded by the sonic in strong sonic naturalism, or secondly by decentering visuocentrism in

weak sonic naturalism – contend with the epistemological limitations of modern Western visually-dominated culture. The tendency of some archaeoacoustics researchers to rectify visuocentrism with the “corrective” of sonocentrism reiterates the problematic identified by Jonathan Sterne as the “audiovisual litany” which ascribes cultural values to a binary understanding of seeing and hearing (Sterne, 2003, p. 15). Within the overall conception of the subject matter of archaeoacoustics as a potentially more sound-oriented pre-industrial pre-civilisational culture, sonic alterity encapsulates this broad-ranging and ambiguously characterized association of sound and otherness.

3.2.2 Radically Different Paradigms

If a distinct characteristic of a sonic alterity – however ambiguous – can be observed in the field, then the question becomes relevant of *how* radical the notion of epistemological difference sonic alterity enacts is. There are elements of continuation and difference which come into productive friction: once more Kuhn’s essential tension of science is observable (Kuhn, 1991). Scientific practice is premised upon principles of rationality although these are often implicit rather than explicit. The problematic of the *retrievability of sonicity and the irretrievability of aurality* is one which straddles this epistemological problem in that it highlights how continuous or discontinuous an idea of rationality could be when projected from the present into the “prehistoric” past. Within the gesture of sonic alterity identified in the field, a proposal of radically different conception of rationality – and with it ontoepistemological frameworks – is at least partially evident.

The term paradigm shift contains a sense of revolutionary ideas within it. As mentioned at the beginning of Chapter 1, Ezra Zubrow frames the whole field of archaeoacoustics as existing in a “pre-paradigmatic” stage (Zubrow, 2014). As mentioned, it is as yet unclear to what extent researchers attribute a sense of deep-reaching transformation to the overall impetus of the field. It is useful in this light to reflect upon the terms “paradigm shifts” and “revolutions of thought” and the debates which emerged following the publication of Kuhn’s famous *Structure of Scientific Revolution* which popularised these ideas. In the previous chapter where Waller made

reference to the role of the Copernican revolution as part of a comment on epistemological relativism to explain differing conceptions of sonic phenomena such as echoes in different cultures, he invokes an archetypal Kuhnian example of what paradigms and scientific revolutions can mean: “people used to think the earth was flat and that the sun was a god” (Waller, Interview 2017). This complete upending of the physical and mental worldview which Waller refers to, brings with it a concomitant epistemological “revolution” in Kuhnian terms. Pinch and Collins propose a “radical” Kuhnian approach where the term “paradigm incommensurability” holds a vital argument for substantive “socio-cognitive discontinuity” across cultures.⁴⁵ This is informed by Wittgensteinian ideas about the “integral nature of the practical and cognitive aspects of social activity” precipitated from concepts such as 'language game' and 'taken-for-granted reality' (2009, pp. 4, 11–14). Although to some extent it is ambiguous to what degree archaeoacoustics researchers individually advocate for a radical Kuhnian approach, some of the sentiments expressed here – as described previously in the tendency of heterodox knowledge paradigms, versions of strong sonic naturalism and potentially in a position such as Wallers’ – do suggest an understanding of paradigm incommensurability in a potentially “radical” sense. This is a description of socio-cognitive discontinuity across cultures in which the sonic plays a potentially crucial role in mobilizing difference.

There is a bold and intriguing premise to investing the sonic alterity of archaeoacoustics with this paradigmatic revolutionary potential. It proposes that a sound-oriented past culture *might be accompanied by a radically different set of social relations*. If researchers are poised to make potentially meaningful discoveries about archaeological sites which due to their visuocentric approaches have neglected key aspects of exploration, then the sonic appears to be able to play a fundamental role in bridging a potentially crucial epistemological gap. With such theatrical and compelling propositions underpinning the field, its relatively widespread popular appeal and interest becomes more understandable.

⁴⁵ It is notable however, that Pinch and Collins do so with a distinct sense of disappointment in what they perceive as Kuhn’s conservative revisionism of the term “paradigm incommensurability” in his work (Collins & Pinch, 2009, p. 4). They argue, a bolder “radical” version of the argument for incommensurable relationships *between* paradigms, would refuse a separation of social behaviours or actions from categories of thought and that it would therefore be much more deep-reaching than Kuhn’s later elaborations allow for (2009, p. 13).

However, there are some contradictions that emerge. In the manner that some archaeoacoustics researchers, particularly those exhibiting the tendency of a strong version of sonic naturalism, place themselves in the mindset of “prehistoric man” (described as part of the tendency of imagining pre-modern mentalities), a sense of socio-cognitive – and onto-epistemological – *continuity* is being presumed whilst at the same time ideas of radical alterity are being deployed. Within this position, there is an implicit suggestion of a continued notion of human rationality which has persisted over thousands of years. However, the highly speculative nature of such a premise is unacknowledged. The idea of a potential social-cognitive discontinuity of different ontoepistemological frameworks is not always being critically reflected. This is a contradictory tension in the field – it appeals *both* to radical sonic alterity *and* an implied socio-cognitive continuity. This analysis is revealing when applied to the epistemological problem described in the thesis introduction as the *retrievability of sonicity and the irretrievability of aurality*. Whilst many researchers would agree that there are many areas of cultural variance pertaining to cultures under study in archaeoacoustics, there are however hugely differing conceptions of the extent and characteristics of what these areas of variance are across interviewed researchers.

Notions of difference are epistemologically entangled in a multitude of ways. The intriguing prospect that archaeoacoustics may potentially bring about a revolutionary paradigm shift – proposed through its sonic alterity – can be realised only if there is a fundamental acceptance and understanding, on the part of its researchers, of paradigm incommensurability. To fully acknowledge paradigm incommensurability and socio-cognitive discontinuity across historical and archaeological epochs would mean that researchers would concurrently recognize an irretrievability of aurality. Some researchers unequivocally and explicitly reinforce this idea (as detailed in the section on heterodox knowledge paradigms in the previous chapter), yet there are others for whom this issue does not appear to be problematised. A flattening of conceptions of sonic alterity and radically different paradigms leads to the misguided assumption that is implied by some of the researchers – in particular those identified as strong sonic naturalist viewpoint – that the *impossibility* of retrieving aurality might somehow be possible.

It remains ambiguous, however, to what extent individual researchers address such questions of socio-cognitive continuity or discontinuity, a persistence or deviance of notions of rationality and whether they conceive of the turn to the sonic as a potentially radical epistemological notion or not. It is not clear to what extent – or if at all – researchers have reflected on this question in any substantial manner. Thus while comments by researchers across the epistemological spectrum propose a *potential* revolutionary quality of incorporating the sonic into archaeological research, for some researchers this is couched in terms of an irretrievable aurality and for others it appears retrievable. Nevertheless, this is in itself a radical proposition and one which perhaps grants the field some of its compelling appeal, particularly to the popular audiences whose interest has indeed propelled the field forward. Understood in this way, the characterisation of sonic alterity as radical raises many questions about archaeoacoustics' sonic knowledge production, which require a careful negotiation of how the sonic "other" is being constructed. Amidst the various areas of convergence and divergence, there is a potential for radical ontoepistemological sonic alterity within the field's sonic knowledge production currently.

3.2.3 Dangers of sonic allocentrism

The idea of sonic alterity brings with it conceptual dangers that accompany the notion of otherness. The conjuring of a fictitious figure of "prehistoric man" in some accounts by researchers reveals how a mechanism through which conceptions of temporality reaffirms the "denial of coevalness" of many historical anthropological studies (Fabian, 2014, p. 31). This can be compared to a fixation on otherness, identified by Fabian as "allocentrism". Where the otherness is understood to be sound-oriented, a sonic allocentrism can be identified. An earlier article by Reznikoff entitled *On the Primitive Elements of Musical Meaning* uses the problematic term of "primitive" with regards to "prehistoric" Neolithic cultures and their implied sonic and musical meanings, "we may say that the sounds and the whole situation are *primitive*" (Reznikoff, 2004, p. n.p.). In interview he clarifies that when he uses the term "primitive" that he means "from an economic point of view" (Reznikoff, Interview 2015). Perhaps this has been a response to criticisms of the bioevolutionary implications of the term "primitive" and its

politically-loaded history within anthropology. Nevertheless, ideas of a sonic allocentrism in Reznikoff's comments pertain in that a more sound-oriented pre-civilisational Other is the implied subject of research.

Sound studies has already identified associations between sound and the "Global South" (Steingo & Sykes, 2019) and sound and femininity (Cusick, 1999; Devorah, 2017; McClary, 1991) which reinforce ideas of sonic alterity. Yet where the allocentrism of anthropology has been recognized as a "vehicle of Western domination" (Bunzl, 2014, p. xi) which reinforces centuries of European intellectual and economic power relations, a sonic allocentrism in archaeoacoustics might reestablish the same dynamics. The sonic alterity of archaeoacoustical research is evident in phrases such as "our ancestors" or "prehistoric man" used several times by some researchers. If it verges into a sonic allocentrism, it may project an Other onto a referent that is distanced temporally, spatially and intellectually from its implicit researcher subjectivity. Sonic allocentrism therefore signifies a danger of an exoticisation or romanticisation of the sonic past. This then creates epistemological dangers for the field's sonic knowledge production.

Within the strong version of sonic naturalism, the audiovisual litany can be observed as a problematic tendency in the way that researchers often speak of a projected, "more sonic" past in which "our ancestors" were less visually and more auditively-led. In doing so, there is a sense that "nature" has remained unchanged, whilst culture, through related processes of civilisation and industrialisation, has supposedly led to "modern" humans losing touch with their sonic sensibility. As Sterne suggests, this narrative of developmental progression centres a normative, white, male, Western, Christian subjectivity (Sterne, 2011). As mentioned previously, it is intimated in some researchers' comments that by reconnecting with sound, we can re-discover lost aspects of sounding history and perhaps even improve a perceived morally inferior modern visuocentric culture. Given the predominantly "prehistoric" focus of archaeoacoustics and the speculative nature of much of the research, the recourse to transhistorical ideas about hearing and seeing of the audiovisual litany can be conceived of as a hindrance to achieving the aims set out by archaeoacoustics.

One of these dangers of sonic naturalism can be exemplified in the question of accessing sonic alterity. Here, Devereux and Scarre provide statements which demonstrate the range of responses. To recapitulate their accounts – on the one hand, Devereux suggest that the sonic practice of archaeoacoustics, can “sort of link[] you through time” (Devereux, Interview 2016) whilst on the other hand, Scarre countered that such conceptions are, “not a secure route to knowledge” (Scarre, Interview 2016). Whilst Devereux’s position is characterised by an openness to sound mediating experiential access to the past, “like a sound thread through time”, Scarre’s position is characterised by a sharp acknowledgement of the impossibility of this. Strong sonic naturalism appears to propose that the retrievability of the sonicity *can* afford retrievability of aurality, whilst others would maintain that even where a retrievability of sonicity is possible it *is always* matched with the irretrievability of aurality.

Within strong sonic naturalism, sound is implied as having the capacity to link subjectivities over time. This exemplifies how sound is often used as an example of a special case, as has been the subject of Sterne's critique of the audiovisual litany which “idealizes hearing (and by extension, speech) as manifesting a kind of pure interiority” (Sterne 2003, 15). Such idealized and often essentialist conceptions of hearing which attempt to be universal and transhistorical should be treated with caution, especially given the thoroughly theological roots of ideas of orality and acoustic space which invest them with cultural authority and pervasiveness (Sterne, 2011). If these characteristics continue to be considered as “truths” inherent to sound and listening, as for example when the sonic is understood to be consistent across the span of time dealt with in archaeological studies, then the meaning of “the sonic” is shown to be open to misinterpretation by some researchers.

Within an idea of sonic alterity is an implicit hegemonic subjectivity which conceives of its sonic Other as different to itself. Paradoxically, however, there is simultaneously a degree of sameness which persists. There is a suggestion that a transhistorical conception of sound – through nature – can mediate between the present and past. Whether this is an otherness which by virtue of its non-visuocentrism and its sonocentrism can help ameliorate the noisy, visually-dominated, detached, socially alienated, commercialized present and enables a way of re-connecting to the past, or

it is merely a decentring of visuality which contributes to multi-sensory phenomenologies underpinning knowledge production, sonic naturalism – particularly in its strong form – claims to pertain to a radical sonic alterity which is epistemologically ambitious. The question of how radically the Kuhnian term “paradigm incommensurability” can and should be applied in the context of archaeoacoustics raises an important epistemological point that is pertinent at this juncture. According to a radical Kuhnian approach, each term can only be understood within its own historical epistemological epoch and would be logically incompatible outside this. As such, an argument for radical socio-cognitive discontinuity across historical epochs emerges. It is this relationship between succeeding paradigms and the resulting consequences in Kuhn’s *Structure* which entices Pinch and Collins towards a radical reading (2009, p. 13). Similar to Foucault’s concept of the *episteme*, terminologies borne within a specific historical epoch and cultural milieu are not like-for-like transportable into another. Yet, as many theorists caution, cultural relativism can lead down similarly unsatisfactory paths as other deterministic modes of structuralism or other totalizing systems. In order to avoid the pitfalls of unabated cultural relativism the urge to generalize in many instances needs to be resisted where in fact specificity in an analysis of material-semiotic entanglements is necessary.

This section has argued that the characteristic of a sonic alterity is evident in archaeoacoustics, yet it remains ambiguous how notions of radical difference are being mobilized. Within the strong version of sonic naturalism are discernible allusions to a radically different pre-civilisational world, which is invested with a substantial degree of emancipatory rhetoric. Contained within this strand of thought is a daring idea that sound can *mediate* a relationship with the distant past. Sound itself is conceived to be a radical force that bears the potential to lead archaeology out of its epistemological challenges, but also within strong sonic naturalism it is also assigned a transhistorical quality which can *connect human beings* over time. Whilst for some researchers this is tied into a social critique of modern visuocentric Western culture, the radicality of proposed paradigm shifts does not necessarily align with the transformative socio-cultural force that is implied.

3.3 Sonic Materiality

3.3.1 Eurocentric sonic matter

For all of its aspirations towards an imagined alterity of a more sound-oriented past culture, sonic knowledge production in archaeoacoustics is nevertheless epistemologically rooted in a European intellectual heritage. The academic discipline of archaeology is inseparable from its colonialist histories, the dominant hierarchies of “epistemologies of the North” (Santos, 2007, p. 11, 2014) and the epistemic injustices (Medina, 2013) which have resulted. Where the previous chapter outlined the trends of sonic positivism and sonic naturalism as they emerged from researchers’ statements, the authority of science which grounds sonic positivism might appear to suggest that naturalism forms an opposing tendency. However, in this section, I revisit the two dominant trends of sonic positivism and sonic naturalism and explain how sonic materiality is the shared inheritance of both. I demonstrate how a nature-culture dualism underpins both tendencies and how sonic matter is a conception which is emblematic of Western epistemological modes, including a dangerous propensity to universalise. In doing so I formulate an argument for why sonic knowledge production in the field currently remains more tethered to a hegemonic “here” than the political-philosophical “elsewhere” it ostensibly strives toward.

Both the trends of sonic positivism and sonic naturalism are premised on a conception of sonic materiality. In sonic positivism this can be found in acoustical sciences’ close relation to physics, the uses of verifiable repeatable experiments and quantitative measurements to produce sonic knowledges. In sonic naturalism, it is embedded within a scientific-realist conception of matter within pre-industrial, pre-civilisational human cultures. Despite pertaining to different issues, the two tendencies play neatly into the nature-culture dualism inherent in European thought, in which nature – the environment which contains inert transhistorical matter – is molded and formed by “Man”, culture and civilisation, in this instance including scientific development and discovery.

The duality of “nature” and “culture” has been constructed in particular ways in European thought. Its theorisation from the perspectives of feminist theory and post-

and decolonial studies helps to illuminate how such dualisms play out in a field such as archaeoacoustics. The particular Eurocentric configuration of nature and culture has been described by many theorists. Bruno Latour's *We Have Never Been Modern* expresses how the "Modern Constitution" as predicated on the purified ontological separation of two different sets of practices which must remain distinct – that of humans as "culture" and nonhumans as "nature", has actually been permeated by a persistent complex hybridity which negates such easy distinctions (Latour, 1993, pp. 10–11). The trends of sonic positivism and sonic naturalism illuminate how the nature-culture dualism pervades archaeoacoustics. Sonic naturalism in both of its guises – the one that posits a sonic alterity which is quieter and morally redeemed and the other that poses naturalism as a philosophy based on materiality – depends on a dualism which separates nature from culture is evident. Sonic positivism, as part of the intellectual tradition of Western science with its aim of ascertaining laws which govern nature, is also based on a materialist understanding of sound as sonic matter. Both sonic naturalism and sonic positivism presuppose a "natural" environment which existed in the past, which "culture" built upon. However this presupposition is codified differently in each tendency of thought.

The nature-culture dualism of Eurocentric thought itself is not inherently problematic. It is a conception of sonic materiality that lends itself to a dangerous universalisation which causes epistemological problems for sonic knowledge production given the ambitions described above. As illuminated by the problematic of the *retrievability of sonicity and irretrievability of aurality*, a conception of sonic materiality which underpins archaeoacoustics potentially risks universalising the physical-realist conception of matter but also existing socio-cultural conditions for the valorisation of the audible, as well as the slippages between these two positions. The problematic itself rehearses the nature-culture binary that ontologically separates the two realms. Therefore, some closer attention to the histories of European knowledge production as they pertain to sonic materiality enables a better understanding of how such false universalisations might occur.

3.3.2 Beyond "nature" and "culture"

In order to theorise sonic matter, I draw on writings by feminist, postcolonial and

critical race scholars to theorise how sonic materiality is embedded in a European nature-culture dualism. Works by anthropologists such as Marilyn Strathern and Phillippe Descola point to the limited applicability of the nature-culture binary beyond Western culture, whilst Sylvia Wynter's work helps to understand how the universalisation of a conception of Man rooted in European Enlightenment thought sustains its often-unacknowledged hegemony. In light of the enduring legacies of European Enlightenment thought, Chakrabarty's aforementioned call to "provincialise" Europe makes the demand on contemporary scholars' to meaningfully acknowledge how European thought is "both indispensable and inadequate" when theorising the non-Western non-modern "beyond" (Chakrabarty, 2000, p. 17). Therefore, for archaeoacoustics, which might want to broach a conception of sounding situated knowledges, this becomes the task: to provincialise the universalising impulses underpinning sonic materiality, especially when faced with the irretrievability of aurality.

Sonic materiality is predicated on an understanding of physical matter which obeys the rules of science. Scientists since the Enlightenment, have sought a rigorous interrogation of the mysteries of nature and the explanation of all phenomena through scientific explanation (Daston, 1991; Keller, 1985, pp. 33–42). In early modernity, the experimental focus on scientific facts and evidence solidified the move towards naturalistic understandings of phenomena. Descola traces the ascendance of nature-culture dualisms in the West, beginning with the Ancient Greeks where Aristotle's objectification of nature was aimed at systematizing inquiries and inspired by political organization and governance (Descola, 2013, p. 64). However, for Aristotle, humans were still part of nature and it was only with the ascent of Christianity that humans began to be conceived of as separate to nature and superior to it (2013, p. 65). As Lorraine Daston and Fernando Vidal describe, the moral authority afforded to a Western conception of nature needs to be recognized for its particularity as the idea of "nature" as "the sum total of the entire universe" that is only found in European intellectual traditions even where corresponding concepts can be traceable within related linguistic cultures (Daston & Fernando Vidal, 2004, p. 4). It was only following the scientific revolution of seventeenth century in Europe, that "nature", with its universalising and totalizing reach, became conceived as we know it today.

Anthropologists have plentiful examples to illustrate the paucity of nature-culture dualisms in understanding non-Western contexts. Descola provides ample ethnographic examples, “In many regions of the planet, humans and nonhumans are not conceived as developing in incommunicable worlds or according to quite separate principles. The environment is not regarded objectively as an autonomous sphere [...] in an ontological niche defined by the absence of human beings (Descola, 2013, p. 30). The naturalistic cosmology, native to the West is traced in its historical peculiarity by Descola. Rather than nature “revealing its essence”, he demonstrates how it has been constructed “as an ontological tool of a particular kind” (Descola, 2013, p. 63). Thus, the specificity of naturalism to European intellectual histories, which sonic naturalism is part of, can be identified as a peculiarly European way of constructing sonic matter.

This development of Enlightenment science which theorized the inert matter of nature forms the conceptual underpinnings of both sonic naturalism *and* sonic positivism. Rather than being apolitical historical developments, feminist and decolonial theorists have extensively written on the implications of nature-culture dualisms for women and non-European people. As Strathern describes following her ethnographic analysis of the Hagen people of Papua New Guinea, “Western nature-culture constructs...revolve around the notion that the one domain is open to control or colonization by the other. Such incorporation connotes that the wild is transformed into the domestic and the domestic contains within it primitive elements of its pre-domestic nature” (Strathern, 1980). The colonising relation of “culture” over “nature” is mirrored both in histories of Western colonialism and in patriarchal histories in which men have dominated women (Lerner, 1986). Structures of oppression have been epistemological as well as material. For sonic materiality this means that this conception of passive inert matter has underpinned the patriarchal European histories in which positivistic knowledge about the behaviour of sound has been consolidated, at the same time that it has constituted naturalistic understandings of the constitutive elements of sound as “raw” pre-domesticated matter.

3.3.3 Histories of universalisation

Situating the conception of sonic matter in a historical context helps understand the

prevalence of the two main tendencies of archaeoacoustics' sonic knowledge production as sonic positivism and sonic naturalism. Wynter's work poignantly details how European modern Man has been universalised as a representation of all humans. This is a key tendency of Eurocentric thought which urgently needs "provincializing." As Wynter explains, European modern Man is merely one genre of human which has arisen through a specific set of historical-political events but has come to dominate the very conception of what it means to be human. Amongst a multitude of possible genres of humans, Man comes to overrepresent itself above all other genres of human. Although Wynter's aim in explicating this history has the goal of understanding racial oppression,⁴⁶ it can also be grasped as a theory of difference, of alterity, of re-positioning and recalibrating hegemonic ontoepistemological paradigms. Wynter's analysis is useful to assess in some detail here as it spans five hundred years of modernity/coloniality and draws our attention to the ontoepistemological consequences of European domination, including the development of the hegemony of Western science.

For the concept of sonic materiality, Wynter's account is broad-reaching in its ability to theorize race, gender and class in the complex historical development of power-knowledge structures. It accounts for the hegemony which positivistic and naturalistic thought has enjoyed over other systems of thought. Wynter's Man1 and Man2 describe two distinct but mutually reinforcing stages of the establishment of a hegemonic subjectivity of European modern Man, which perniciously and often erroneously claims its right to universalize. Where for Wynter, Man1 describes the transformation taking place between the Renaissance and the eighteenth century and the rise of the physical sciences, underpinned by a Christian, theocentric conception of the human, Man2 describes the transformations which took place in the nineteenth

⁴⁶ Wynter's account distinguishes between Man1 and Man2 in order to describe the systematic subjugation of non-white humans over the past five hundred years since colonialism began. The civic-rationalist Christian humanist Self of Man1, as a religious genre of human also created in this period an Other to its conception of human, found in the indigenous peoples of the Americas and the transported enslaved Black Africans (2003, pp. 281–282). Man2, shifted towards a self-proclaimed secular, and now bio-centrally conceived of human, as subject of the state, paved the way for the intrinsic racialization which came to underpin the very conceptions of human/less-than-human still found contemporarily (2003, p. 282). Man1 and Man2 which came to overrepresent all humans, persisting into today's global inequality and entrenched dynamics of dehumanisation for some (Black populations, Latino populations, the poor, the incarcerated, the criminal).

century with the rise of the biological, and in particular genetic sciences, underpinned by a conception of human as the rational political subject of the state, supposedly “secular” but in reality “hybridly religio-secular” (Wynter, 2003). Across both epochs of Man1 and Man2, an idea of matter is consolidated which through the increasingly elevated role of the natural sciences, underpins an idea of the physics of sonic matter as timeless and enduring.

Part of this conception of physical matter, which constitutes sonic matter, is its universality. It came to represent not only a timeless, but also a placeless idea of physical matter and the laws which govern it. As Wynter describes, in Latin medieval Europe, which inherited from Ptolemaic cosmology an understanding of the universe to be made of different types of matter each with different tendencies, in which heavenly and earthly matter were considered ontologically distinct (2003, p. 274). With the inception of Renaissance humanism in the seventeenth century, which Copernicus’s treatise was central in inaugurating, this non-homogeneity of substance was challenged. Copernican astronomy was famously founded upon the premise that the earth moves around the sun, not the other way around. This was grounded in an new understanding of heavenly and earthly bodies being made of the *same* substance, i.e. earthly matter as homogeneous with the heavenly bodies (2003, p. 280). Therefore, paralleling histories of colonialism, an idea of inert matter universally the same around the world began to take hold. Wynter describes how this principle of non-homogeneity became “adaptively truth” for the new religious, economic, socio-political configuration inaugurated by European voyages to Africa and the Americas. The conception of homogenous matter provided the scientific precept for the universalisation of the oppressive principles which enabled colonialism, patriarchy and capitalism. This same geo-cultural homogeneity that underpins conceptions of sonic matter is relevant for archaeoacoustics, in that its configuration must be recognized as emerging from this peculiarly European history and as part of its universalising urge.

Where this becomes crucial for archaeoacoustics is how a historicized conception of sonic matter can help to explain the dangers of falsely universalising sonic experiences. The problematic that I have identified as the *retrievability of sonicity and the irretrievability of aurality*, when considered through these historical events is thrown

into new light. The timeless and placeless conception of matter, which becomes sonic matter when dealing with sound and listening, is what risks reinforcing the tendency to universalize from a particular contemporary subject position which is normatively white, male and European. An archaeoacoustician whose research involves imagining the subjectivity of “prehistoric man” is at risk of confusing the endurance of sonic materiality and a potentially perfect reconstructability of architecture, instruments and materials which enables a retrievable sonicity, with a transhistorical and universal rationality and aurality of sonic experiences which purportedly persists across all times and cultures. In the context of sonic knowledge production, this means that the epistemological implications of the subject position of the researcher who sets the research questions and interprets the data may not be fully acknowledged. It is not that the conception of sonic materiality necessitates a universalisation of sonic experiences, but rather that the persistence of the materiality which constitutes a conceptually slippery idea of sonic experience which is retrievable in terms of aurality, not just sonicity. Furthermore, a complete separation between sonicity and aurality cannot be truly maintained, following a Harawayan naturecultural ontoepistemological understanding of sonic knowledge production. If the method of sounding situated knowledges is followed, both sonicity and aurality need to be fully situated within the political and ethical responsibilities of knowledge production.

As a final aspect of this analysis, the complex overlapping histories of the natural and supernatural regarding sonic matter are understood in a new light using Wynter’s account. We can infer from Wynter’s insights, that a conception of sonic matter arises from advances in the physical understanding of sound and the dominant Christian theological worldview of the time. This parallels the scientific revolution of the seventeenth century after which the natural sciences are invested with an unrivalled epistemological authority, albeit within a theocentric conception of the human. This new authority is underpinned by an understanding of material substance as homogenous. In this new scientific paradigm, the objectivity of natural physical laws are knowable through rational, non-arbitrary rules (2003, p. 278). The vibrations of sound, were reliably subjected to laws of science, encapsulated in a Newtonian triumph in which “all parts of the universe were made of the same forces” (2003, p. 281). According to Wynter’s periodization of the European subject, the sonic matter,

conceived within Man1, would first be conceived as part of the larger cryptic mystery of nature which a Christian God had created. Sonic matter under Man2, therefore, is then understood according to a transmuted worldview which centred the secular civic and economic subject, rather than the Christian God, and was constituted by a biogenetic conception of the human. In the latter formation, physical sciences were no longer seen as the natural providence of God's masterful craftsmanship, but were further consolidated in a new secular, naturalised biological conception of human life. Here, one notes a modification in the meaning of the "laws of nature" or "the natural", from a theological to a biological foundational basis. Therefore, the conceptual shift in how sonic matter was understood across Man1 and Man2 represents the complete secularization of sonic phenomena. In this process a de-supernaturalization can also be observed in which the supernatural came to mean, "that beyond configured by science as nature" instead of "that beyond God's nature". The magical or mystical association that sound picks up in the sonic supernaturalism tendency in archaeoacoustics can thus be understood to have had a complex history in which the affective capacity of sonic experiences became secularized in the later stages of its historical development.

To conclude this discussion of sonic materiality, this account has identified the *shared* intellectual history of sonic positivism and sonic naturalism. Whilst in certain instantiations they may appear as ideological opposites, their common grounding in an idea of sonic materiality demonstrates that they are mutually reinforcing trends within archaeoacoustics' sonic knowledge production. Sonic materiality helps to identify how the hegemonic ontoepistemological frameworks from Eurocentric knowledge histories are poised to be imported into archaeoacoustics. Sonic positivism and sonic naturalism have inherited European nature-culture dualisms in the way that the object of sonic naturalism is conceived of as inert passive matter whose existence is guaranteed by physical laws determined by the quantitative measurements, repeatable and verifiable experiments of sonic positivism. This is why I propose that as it stands currently, the sonic knowledge production of archaeoacoustics more closely resembles the hegemonic "here" rather than the political-philosophical "elsewhere" as laid out in the introduction to this thesis.

The ethnocentricity of European knowledge paradigms, as Descola suggests, does not

make it unjustifiable to describe non-Western cultures using our own terms, but it does become a formidable obstacle to an accurate comprehension of ontologies and cosmologies whose premises differ from that of a hegemonic “here”. The idea of being able to directly access the past through accurate sonic experiences arising from favourable conditions of material remains of a site is a false one. The irretrievability of aurality remains a stubborn problem for archaeoacoustics, and with the entanglement of ontology and epistemology, in some senses, the idea of entirely retrievable sonicity is also false. Whilst the careful distinctions proffered by archaeoacousticians of more or less likely scenarios helps to express more concisely the likelihood and unlikelihood of events which contribute to the development of knowledge about a site, there is nevertheless the persistent risk of importing Eurocentric ontoepistemological frameworks without fully acknowledging the limitations of doing so.

3.4 Limitations of innocent listening

Despite the epistemological ambitions of sonic alterity as laid out in the first section of this chapter, sonic knowledge production in archaeoacoustics faces various trappings of the hegemonic “here” as constituted by patriarchal and colonial or neo-colonial epistemologies. Whilst the second section has established the shared epistemological heritage of sonic positivism and sonic naturalism as sonic materiality, it is predominantly through the tendencies of strong sonic naturalism, where the past is conceived of as “more sonic” “more natural” and “better” that some of these shortcomings can be identified. If archaeoacoustics’ epistemological procedures remain unreflected – which is to say not “situated” (Goh, 2017; Haraway, 1988) – there will be diverse and varied intellectual and conceptual implications for the radical potentials of sonic knowledges. This section addresses the question of “who is listening for whom in archaeoacoustics?”. For all of the divergent conceptions of sonic alterity which were outlined in the first section, there are nevertheless some forms of difference which remain silenced. This can be explained by the notion of “innocent listening.”

I propose that archaeoacoustics in its current state stands to risk fulfilling its epistemological ambitions of sonic alterity due to a set of limitations I have identified

as “innocent listening.” This draws both on Donna Haraway’s and Gloria Wekker’s use of the term “innocence.” Haraway’s description of the cyborg as “resolutely committed to partiality, irony, intimacy, and perversity...oppositional, utopian, and completely without innocence” (Haraway, 1991, p. 151) emphasizes how innocence is almost always related to origin myths of a Christian theological nature and serves only to exacerbate (white) feminism’s flawed and inadequate claims towards victimhood (1991, p. 157). Gloria Wekker’s description of *White Innocence* reflects on Dutch colonial and imperial histories to describe how the myth of white racial purity and superiority are often invisibly sustained by a continued claim to “innocence” which is underpinned by a lack of acknowledgement of colonialist histories: “the claim of innocence...contains not-knowing, but also not wanting to know” of violent racist histories which evoke “soft, harmless, childlike qualities” imbued with Christian morality (Wekker, 2016, pp. 16–18). This “innocence” in both accounts is a pernicious quality in that its claim of not-knowing protects it from acknowledging political oppressions and resulting epistemic injustices. Marie Thompson’s notion of “white aurality” similarly illuminates an implicit whiteness perpetuated in sound studies debates (Thompson, 2017b). Innocent listening, therefore, describes the processes of sonic knowledge production which purport not-to-know or not-to-fully acknowledge the historical structuring effects of colonialism, capitalism and patriarchy on knowledge production.

This section seeks to evaluate archaeoacoustics’ convergences with innocent listening. If the warning of “epistemic laziness” (Rizvi, 2015) is not sufficiently heeded in the field, then the radical possibilities of a sonic alterity will be missed. In the three areas outlined, reflections on the field’s current practices of sonic knowledge production are analysed. Drawing on relevant critical sound studies and cultural studies debates, in light of the field’s proposed epistemological ambitions distinct limitations are found.

3.4.1 Acoustic Space

The sonic alterity being imagined by archaeoacoustics has a set of intellectual heritages which requires further attention. Underpinning the idea of better “more sonic” “more natural” past cultures of strong sonic naturalism the presuppositions at work in Marshall McLuhan’s formulation of “acoustic space” can be detected. Indeed,

conceptions of a McLuhanesque “acoustic space” are plentiful in archaeoacoustics. As mentioned in the previous chapter, Devereux makes direct reference to Edmund Carpenter and McLuhan’s essay *Acoustic Space* in *Stone-Age Soundtracks*, “they drew attention to our cultural deafness to acoustic space” (Devereux 2001, 25). In a similar vein, Till explicitly puts his work in an theoretical lineage which derives from the Canadian school of media theory closely associated with McLuhan, as quoted in the previous chapter, “I know McLuhan has talked about the dominance of the visual and the eye” (Till, Interview 2016). Although these were the only two instances I found within archaeoacoustics explicitly referencing McLuhanesque ideas, it is possible that other researchers share this intellectual heritage.

The notion of “acoustic space” as described by McLuhan and Carpenter arose in the context of increasingly dominant technologically-mediated communications in the post-war era. As a conceptual tool it gained significant popular attention given its perceived propensity to help understand technological and media-communicational changes in this period. McLuhan describes a transition from the so-called “acoustic space” of “preliterate culture”, to the “visual space” of “literate cultures” exacerbated by the proliferation of the printing press (most famously in *The Gutenberg Galaxy* (McLuhan, 1962)), culminating finally in the “return” to the acoustic space of the contemporary electric world. Part of the appeal of the notion of acoustic space was the contrast it made with visual space wherein auditory redemption was granted to “man” by way of a return to a pre-modern state of consciousness, “Preliterate man was conscious of this power of the auditory to make present the absent thing. Writing annulled this magic because it was a rival magical means of making present the absent sound. Radio restored it” (Carpenter & McLuhan, 1960, p. 69). Therefore, existing within the realms of media theory and cultural studies, “acoustic space” can be understood as a form of sonic alterity which has strong resonances with ideas of sonic naturalism found in archaeoacoustics.

As mentioned in the introduction, R. Murray Schafer’s work in founding the acoustic ecology movement has been an influential force in sound studies. Schafer’s work can be understood as an embellishment and a literal translation of McLuhan’s metaphorical idea of acoustic space for everyday sonic experiences. Schafer makes

frequent references to the work of his senior and more famous compatriot and he accredits the *World Soundscape Project* in the late 1960s with bringing McLuhan's concept of "acoustic space" from a neglected status to critical attention (Schafer, 1985, p. 88; Sterne, 2015, p. 75). Many of the basic tenets of Schafer's project of acoustic ecology from which the notion of "soundscape" was born align ideologically with McLuhanesque ideas.⁴⁷ The liberty with which both McLuhan and Schafer mobilise pre-industrial cultures without dwelling on the historical distance that separates them from their idealised past soundscapes relates directly to the way sonic naturalism in archaeoacoustics pitches pre-modern mentalities against visuocentrism. Furthermore, moralistic ideas are attached to the notion of acoustic space. These are also rehearsed in archaeoacoustics, particularly with regard to notions of anti-visuocentrism and pre-modern mentalities insofar as they propose a moral superiority of a "more sonic" and "more natural" past culture.

The shared sonic naturalism of archaeoacoustics and Schaferian acoustic ecology is rooted ideologically in environmentalist movements. Schafer's work describes a descent from harmonious "natural" soundscapes into dissonant and noisy industrial ones. As Sterne surmises, Schafer's influential notion of "soundscape" is intended as a "total social concept" to describe the field of sounds in a particular place, or an entire culture (Sterne, 2012b, p. 91). Marie Thompson characterizes Schafer's depiction of returning to natural soundscapes as "romanticized" and "nostalgic" (Thompson, 2017a, p. 92). Indeed, both acoustic ecology and sonic naturalism faithfully, if unwittingly, reproduce ideologies from traditional environmentalism: for example, in the simplistic equation of "more natural" as "more beautiful," and "more unnatural" as "ugly." Thompson calls this acoustic ecology's "beauty bias," evident in "the marked preference in ecological practices for 'pristine', 'remote' and 'wild' locations – virgin forests, undisturbed wetlands and ungrazed grasslands – that remain untouched by human activity or development" (Thompson, 2017a, p. 92). Thompson theorizes the "toxicity of noise" against "silence's virtue" revealing the Platonic idealism inherent in Schafer's work, criticizing it for its limited analytical dualisms. The invocation of

⁴⁷ In a letter from Schafer to McLuhan in 1974, the younger man writes with palpable respect to his elder, more famous compatriot addressing the accord between their ideas, criticising him lightly for his lack of precision and knowledge of "aural affairs" (Sterne, 2015, p. 75).

acoustic space in strong sonic naturalism of archaeoacoustics certainly suggest overlaps with such environmentalist sentiments. Where acoustic space purports to have an emancipatory agenda, this too can be found mirrored in archaeoacoustics, as described above.

Looking further back in time into a north American historical context, environmental historian William Cronon's genealogy of the term "wilderness" reveals its white supremacist nationalist meanings in which a sentimental European Romantic conception of the sublime was mapped on to American nation's origin myth (Cronon, 1995, pp. 69–77). The dark underside of the triumphant nationalist historical narrative of America's creation is the brutal removal of Native Americans, commonly neglected in hegemonic versions of history; these act to sustain the myth of wilderness. The heroic conquest of land was imbued with a nostalgia for a romanticized "primitive" way of life, the wilderness became all the more elevated as the "the best antidote to the ills of an overly refined and civilized modern world" (Cronon, 1995, p. 76), all the while a white innocence of settler colonialism was normalized in the formation of the federation of the United States. Thus, the anti-modernism and prizing of a more natural state in Schaferian acoustic ecology in the notion of acoustic space, evinces commonalities with generalized environmental concerns rooted in this notion of "wilderness," itself inextricably entwined in histories of settler colonialism. These too, can be seen to share potential commonalities with some of the sentiments expressed in archaeoacoustics' sonic naturalism.

Due to their similarities, criticisms of McLuhan apply to Schafer too; most obviously, both share a similar racial bias which simplistically posits Western, "visual culture" as developmentally more progressive than non-Western "oral/aural cultures". Such a criticism has been made by anthropologist Constance Classen who has elaborated on the oversimplification of sensory models within such positions. These problematically attribute to whole cultures universalist presumptions around the social functions and effects of sensory experiences, the ideology of which is rooted in racist colonial histories (Classen, 1997, pp. 403–405).⁴⁸ Schafer repeats the gesture of McLuhan and

⁴⁸ Classen uses the example of early nineteenth century natural historian Lorenz Oken who postulated a racist sensory schema of human races in which Europeans as "eye-men" are positioned at the top of a

colleagues in ascribing “oral/aural” modes to all manner of non-Western cultures, using the language of primitivism (Schafer, 1985, p. 94), even referring to them directly as “unprogressive” (1985, p. 95). Furthermore, Schafer directly reveals the settler colonialist and white supremacist base of his thought in his description of Canada's history with native cultures, “When the Indians of Canada were *numerous and threatening*...families could shout warnings across to one another...to defend themselves” (1985, p. 95) (my emphasis). This statement reveals the overt racism which inheres in the notion of “acoustic space.” Sound is used as a signifier of social order or disorder to cement the claims of the white settler population to land in North America. Therefore, the risks of innocent listening and its perpetuation of colonialism evidences how shortcomings are evident within the notion of “acoustic space”. To be clear, these are criticisms about the discourses of acoustic space, rather than direct criticisms of archaeoacoustics, but given the overlaps between them identified above, they indicate areas of concern for the field’s sonic knowledge production.

In sound studies, Sterne’s critique of an audiovisual litany has taken to task the widespread McLuhanesque ideas which underpin the idea of “acoustic space,” traceable to the work of Walter Ong on the concept of “orality” (Sterne, 2011). As Sterne argues, the notion of orality in Walter Ong’s work uses the distinction between “literate” and “non-literate” cultures as a dividing line through which he parochializes concerns and filters them through a binary modality between seeing and hearing. Hearing, as attached to a Christian spiritual understanding of the “word” is placed with a moral superiority above the letter, so that “listening is an activity closer to the divine than seeing” (Sterne, 2011, p. 218). Within this move, an exoticisation is at work in the implication that so-called “oral cultures” are “primitive” and therefore “closer to nature”. Within its gesture towards sonic alterity therefore, here is an area of risk which verges over into sonic allocentrism and its potentially exoticizing pitfalls. The common conception of orality when removed from its religious context becomes a powerful and universalising notion, however this can often prevent a more nuanced and less essentialist approach to pursuing sonic knowledge production regarding past

hierarchical structure, followed by Asians as “ear-men”, then Native American “nose-men”, then Australian “tongue-men”, then African “skin men.” (Gould, 1985, pp. 204–205) in (Classen, 1997, p. 405).

cultures.

The innocence which allows the North American national imaginaries to suppress the role that systematic acts of vicious dispossession played in creation of the United States and Canada, is echoed by the veneration of “nature” in environmentalist movements. The discourses of acoustic ecology and environmentalism coalesce and align rather neatly with the tendency of sonic naturalism outlined above.

Understanding the notion of acoustic space to be at risk of perpetuating a form of “innocent listening” is one area of epistemological represents a limitation in the field’s potentially radical epistemological ambition. It contains few overt forms of racism in its contemporary instantiations, yet is nevertheless complicit with traditional nationalist historical narratives that it unintentionally supports and upholds. This is a crucial aspect of the epistemological limitations that befall archaeoacoustics’ sonic knowledge production when it pursues innocent listening rather than situated sounding knowledges.

3.4.2 Gender Archaeology

To consider archaeoacoustics in relation to feminist theories of gender archaeology illuminates some additional epistemological limitations. Gender archaeologists have interrogated gendered presumptions in archaeological work since the mid-1980s (Conkey & Spector, 1984) evidencing an often-unacknowledged androcentric bias. Indeed, issues of gender in archaeological research were long left without any rigorous analysis. Longstanding stereotypical ideas of rigid sexual divisions of labour have since been taken to task. These include, for example, the “man-the-hunter” model which is underlined by a set of assumptions about specifically male and female capabilities, activities, relations, social positions and contributions to human evolution (1984, p. 7). As Conkey and Spector state, these assumptions present an idea of continuity in gender arrangements and thereby imply a kind of inevitability and immutability of these in these spheres of social life (1984, p. 7).

In archaeoacoustics research so far, there is some evidence that stereotypes of “masculine” and “feminine” characteristics and abilities are being reinforced within research. As outlined in the introduction to this thesis, with the methodological

consideration of sounding situated knowledges, such comments suggest that the subjectivities of researchers themselves are not always being entirely acknowledged for their epistemological implications. For example, Reznikoff comments that it was certainly only men who explored the caves with their voices, as it was “very dangerous” in the caves for women. Devereux claims that due to the resonant frequencies of Neolithic chamber Newgrange at pitches which fall within the “male voice range”, “the potential implication is quite clear: *these “tombs” saw ritual activities, and they were conducted by men.*”⁴⁹ Given the small size of the recently emerged field, the figure of “ancient man” being constructed in archaeoacoustics has not yet been critiqued by researchers within the field. Currently a normatively white, European masculine subject of listening is reified in both research questions and interpretations. Traditional subject-object relations are being upheld which have not been subjected to critical reflection.

Díaz-Andreu is the only interviewed researcher who has written extensively on issues of identity and specifically on gender archaeology (Díaz-Andreu, 2005; Díaz-Andreu & Montón-Subías, 2013; Díaz-Andreu & Sorensen, 1998). As yet, her combined research interests in gender archaeology and archaeoacoustics have not extensively overlapped. In published research it is evident that her team chose to test “male” and “female” voices in acoustic tests at the Valltorta Gorge in Spain whilst working with Carlos García Benito (Díaz-Andreu, Atiénzar, Benito, & Mattioli, 2017; Díaz-Andreu & Benito, 2012, 2013, 2015). Later work, however, undertaken with Tommaso Mattioli used a different methodology at sites in the Central Mediterranean and in which impulse responses were utilised for acoustic measurements and the human voice was mentioned nor evaluated in publication (Díaz-Andreu, Atiénzar, et al., 2017). The work does not theorize about gendered roles. However, it does allow for an examination of gendered roles. Indeed, Díaz-Andreu's own (non-archaeoacoustics) work on gendered analyses of rock art and ritual in Central Spain suggests the existence of complementarity of gendered roles rather than hierarchisation in mythical accounts (Díaz-Andreu, 2003, 2005, p. 20), indicating how such identity-based research could be used productively in future archaeoacoustic research.

⁴⁹ Personal Communication with Iegor Reznikoff. March 2015; Devereux, *Stone-Age Soundtracks*, 89. (Original emphasis)

When in interviews, gendered roles did come up in conversation, there was a general acceptance and recognition of gendered roles and presumptions being an issue of importance. However, such considerations do not seem to be at the forefront of archaeoacoustic researchers' minds when undertaking research. Criticisms from gender archaeology point out where researchers' contemporary assumptions have affected their archaeological interpretations, the nature of how the work itself is conducted and what aspects are paid attention to. For example, work considering sensory experience has argued for more emphasis on domestic contexts of everyday life, set against a tendency in masculinist research cultures to focus predominantly on the exceptional, special ritual contexts. This has included, for example, analyses of architectures of Neolithic settlements to include considerations of how far babies' cries can be heard (Hamilton et al., 2006). Other research in gender archaeology such as scholarship by Sue Hamilton and Barbara Bender has focused on the role of landscape (Bender, Hamilton, & Tilley, 2016; Hamilton, Whitehouse, & Wright, 2007). Archaeoacoustics' frequent focus on rituals and the role of sound and music within them forms a further potential area of critique, insofar as rituals have been foregrounded and the everyday, quotidian listening practices in archaeological context have received less attention. This may form an interesting set of questions to bear in mind in future archaeoacoustics work moving forward.

Considering the gendered and cultural-ethnic make-up of archaeoacoustics researchers – as predominantly male, white, European or North American – comparisons can be drawn to the white male subjectivities of science and philosophy criticized by feminist standpoint theory and feminist science studies (Haraway, 1988; Hartsock, 1983; Keller, 1985; Longino, 1990). Such concerns go beyond standpoint examinations of gendered roles as “men” or “women” and rather, grounding such investigations in the gendered, racialized, classed exclusions which scientific practices have historically enacted (Haraway, 1997), the epistemological ramifications can be explored for sonic knowledge production. What the few gendered statements serve to demonstrate in part, however, is that in terms of the knowledge production of archaeoacoustics, the standpoints of researchers themselves may be limiting the interpretations of their empirical data and also consequently affect how they do further research.

3.4.3 Sonic supernaturalism

As outlined in the previous chapter, there were distinct coalescences between sound and the supernatural which emerged in the analysis of researchers' published material and interviews. This third area of potential epistemological limitation refers to how innocent listening regarding sonic supernaturalism might provide substantial challenges for the field's sonic knowledge production. As described previously, positions varied on whether a connection was drawn between sound and the supernatural, with it being a self-evident trait for some researchers couched in terms of "the sacred" and "the invisible" (Reznikoff, Interview 2015) or as "two sides of the same coin" (Debertolis, Interview 2017) whilst others reflected it through a scientific-rationalistic prism "[a flutter echo would have been] magical and mystical, and even after we worked out what it was, it was still extraordinary! ...It's anomalous and weird" (Cross, Interview 2017). For the present focus, sonic supernaturalism can be understood to manifest itself in at least two distinct ways in archaeoacoustics – broadly distinguished as Western/Christian and non-Western/non-Christian. The former approach is encapsulated by Reznikoff's comments on his own Christian spirituality framing where he makes the association between sound and music and "the sacred." The other approach takes in a wide range of non-Western and non-Christian, including Western pagan religious belief systems. Given the seemingly strong connection between sound and associations of magic, mystical or spiritual experiences across the spectrum, some analysis through the lens of cultural studies indicate some fruitful areas for reflection.

Sonic supernaturalism in its version pertaining to Christian spirituality can be further illuminated by Schafer's conception of "acoustic space", in which sound and listening play an integral role in communicating with the spirit world. For example, Schafer draws on the musical practices of religions to theorize "Sacred Noise" such as bell-ringing, "it is almost as if man is trying to catch the ear of God, to make God listen" (Schafer, 1985, p. 90). Schafer draws on examples of church bells in various early modern European contexts in describing the spherical form of acoustic space, which the noise of the industrial revolution dominated and spoiled, and thus prioritizes the

Christian over the non-Christian, “those who could hear the bells were in the parish; those who could not were in the wilderness” (1985, p. 90). For Schafer this is further endangered since the urban-industrial noise of modern societies; the preservation of natural soundscapes is motivated by a romantic return to a quieter past where church bells could be heard and a strategy to combat noise pollution (1985). However, referring back to Wynter’s model described above, the dichotomy asserted between civilised Western Christian culture over uncivilised, non-Christian non-Western cultures during colonialism is symptomatic of innocent listening. It takes an approach of innocent listening when describing sonic alterity which naturalizes white Christian civilisations returning back to “more natural” pre-industrial harmonious acoustic space and ignores the hierarchical structures of colonialism and its resulting oppressions.

In a different manner, sonic supernaturalism as it pertains to non-Western non-Christian religions has other limitations to contend with. Amongst the many works which theorize sound and musical practices with religious or spiritual rituals, Joachim-Ernst Berendt's *The Third Ear: On Listening to the World* (1988) provides the most extensive demonstration of how practices of sonic naturalism have been closely linked to non-Western spiritual belief systems (Berendt, 1988). Berendt's focus on the spirituality of “world music” and the healing powers of sound in this text, alongside his other well-known work *Nada Brahma: The World is Sound* (1983) are “cult” new-age texts in Germany and wider international new-age community. As an anti-visuocentric treatise, it is cited relatively frequently in sound studies literature (Bull & Back, 2003, p. 2; Goodman, 2009, p. 65; Truax, 1994, p. 177). Berendt had a self-declared fascination with the “wisdom” of the East, which reveals a tendency towards the problematic exotification of a sonic alterity, “When we have learnt to hear we will also be able to correct our eyes' hypertrophy. The Indian spiritual world has far more to offer than the West with regard to the interconnections between the ear and the eye” (Berendt, 1988, p. 32). For Berendt, finding “the third ear” in analogy to “the third eye” is a quest for spiritual enlightenment (Berendt, 1988, p. 55). Berendt's racial politics have been criticized for their naïve exoticism, rooted in ideas of primitivism.⁵⁰ However, the

⁵⁰ See for example, an article examining Berendt’s work particularly regarding jazz and his views on African-Americans (Hurley 2015). A similar point could be made around his notion of *Weltmusik* (world music) in the mid-1980s and his uptake of Indian spirituality. Similar to his love for jazz, his fascination with Eastern mysticism can be read as part of a deep-seated antagonism within post-war German politics

references made to the spirituality of sound and music by archaeoacoustics researchers suggest some potential similarities in the way sound is characterized as a mystical or magical force of sonic alterity.

Across these two different forms of sonic supernaturalism, the epistemological dangers of innocent listening become apparent when wider historical contexts are examined. This is poignantly illustrated when the historical association between “nature” “the supernatural” and femininity are considered. Schaferian acoustic ecology uses gendered depictions such as the sound of the ocean likened to the womb to symbolize the preferential return to “nature” and Berendt comparably valorizes the sonic, the feminine with the natural in his contention that “nature intended that “women should dominate”” (Berendt, 1988, p. 133; Schafer, 1994, p. 15). Amongst the many dubiously grounded (and sometimes incoherently argued) points Berendt attempts to make in his argument for feminine, sonic superiority, from the creation of language “by women” to women's supposed “more dominant” and “more active and intensifying” voices,⁵¹ most of his conclusions reveal the author's own sexist presuppositions rather than creating any new insights around sound and the feminine. This, it could be argued, is sonic allocentrism in its worst case scenario.⁵² In the context of the book as a whole,

which using Nietzsche's terminology he saw as overly Apollonian in its highly rationalized and organized structures, when it should instead move towards Dionysian intoxication, sensuality and spirituality – represented for him in jazz and Eastern mysticism.

⁵¹Exemplary of such arbitrarily founded comments regarding sound and femininity by Berendt which reveal his unacknowledged positionality include: “Perhaps the fact that women talking in their normal voices have not been listened to under patriarchy is one reason *why they had to resort to high-pitched communications*. That may be how the 'hysterical voice' developed” (Berendt 1988, 142). Or, in an observation of a man and woman making their way up a valley, “They are jumping...from rock to rock. Sometimes...they get splashed and get wet...The man simply carries on, but each time the woman slips, goes through ice, or lands on a wobbly stone, she utters a little cry. In my opinion, *such behaviour is relatively characteristic of her sex.*” (Berendt 1988, 148–49), “Women 'can' talk. They are more skilful, quicker, more expressive, and more creative in that sphere. *That is most apparent when they make love.* Women's voices and the sounds uttered are much more active and intensifying than most men's contribution.” (Berendt 1988, 149), Or: “Democracy is a male invention. ... There was no reason why women should have invented democracy. *They had what they needed.*” (Berendt 1988, 152) (my emphases).

⁵² Notable, however, is the clear anti-modernism and disdain for contemporary consumerist culture which persists throughout. Berendt's prose is supported by a vague and lazily constructed social Darwinism – these use in turn simplistic evolutionary and nature-versus-nurture arguments – to account for an alignment between “woman,” “nature” and “sound.” Demonstrative of the combined sexism and anti-modernism and anti-commercialism: “No matter what women do to attract predominantly male attention, involving enormous expenditure which nourishes entire industries and determines shop-windows and the urban street-scene...” (Berendt 1988, 141–42) and “Scientists agree that men were only tolerated on the periphery of the matriarchy's primal hordes. ... Little has changed under patriarchy. Today men take flowers, chocolate, or jewellery so as to be able to stay

there are many presumptions which perpetuate the Western dualisms of an audiovisual litany in which the oral-aural is positively imbued with characteristics of subjectivity, immersivity, decentralisation, multi-directionality, similar to McLuhanesque ideas of acoustic space. Furthermore, characteristics of sound practices are inherently related to spiritual connection as a *universal* “song of praise” (Berendt, 1988, p. 194) which is how Berendt concludes the text, “our task is therefore to listen more intensely, *hearing beyond* what is manifest” (Berendt, 1988, p. 202) (my emphasis). If Schafer's *The Soundscape* represents an archetypal sonic naturalism and Berendt's *The Third Ear* represents its counterpoint in a sonic *supernaturalism*, then pernicious universalising tendencies of both are in need of urgent critical reflection.

Sonic supernaturalism, as it overlaps with sonic alterity and its allocentric tendencies, poses significant challenges to archaeoacoustics if in perpetuating innocent listening it exotifies the sonic, the feminine, the (super)natural and the non-Western. Although Berendt is less concerned with the physical destruction of “natural” soundscapes as Schaferian acoustic ecology is, Berendt's spiritualistic aim is a journey to activate the mysterious “third ear” which allows one to “hear beyond” physical reality into the supernatural world. In this speculative and imaginative domain, one which might resemble the subject matter of archaeoacoustics in some guises, the characterisation of such imaginations can be evaluated for their hegemonic loyalty to the “here” of Western intellectual histories, or their propensity to deviate into the political-philosophical “elsewhere.”

Where vast speculative realms are available, either in terms of “ancestrality” (Rosenberg, 2014) or by tendencies of “going cosmic” (Chen, 2016), a lack of interrogation of cultural and epistemological norms is what will impede the potentials of any radicality of sonic alterity present in archaeoacoustics. By briefly surveying the history of witch-hunting as described by feminist scholars, the strong tendency to return to a hegemonic “here” within the realm of the supernatural depicts the monumental epistemological uprooting needed to valorize sonic supernaturalism towards ends of epistemic resistance (Medina, 2013). Silvia Federici's study *The Caliban*

the night” (Berendt 1988, 143).

and the Witch (1998) reads the transgressive power held by witches in pre-modern times as the inhabitation of a dangerous border area between human and animal (or non-human) which beginning with modernity and Enlightenment came under control and surveillance by masculine authorities (Federici, 2004, p. 12). Part of these mechanisms for control were the systematic elimination of “magic” to undermine the role of women as healers, midwives, and soothsayers, who wielded huge amounts of social-medical power (Federici, 2004, pp. 102–103). The Cartesian model which placed the mind in a hierarchy over the body resonated with the control of both the “weak irrational woman” and the “wild” colonial subject whose closeness to nature is suspicious, shrouded as it was in the unknown – the not yet scientifically rationalized. Both women as witches in Europe and colonized subjects of the “New World”, as Federici demonstrates, were necessarily providing a seemingly limitless supply of labour necessary for accumulation which justified the need to control and surveil them (Federici, 2004, p. 198). “Magic” was seen as an obstacle to the rationalization of work progress necessary for capitalism, as the unpredictability implicit in magic, as well as the existence of powers only available to particular individuals who possibly had “a privileged relation with the natural elements” (Federici, 2004, p. 174), was too subversive to the orderly, predictable form, society was being shaped into.

Therefore, sonic naturalism read concurrently as sonic supernaturalism further reveals the ideologies of archaeoacoustic researchers as embedded in a masculinist, White Euro-American framework inherited from Western philosophy and history of science. The re-emergence and acceptance of spiritual, mystical, supernatural movements in the late twentieth and early twenty-first centuries takes on a very different form as it did in the Enlightenment period. Never were they straightforward or “innocent” histories of magic and spirituality to be simplistically fantasized over. When archaeoacoustic researchers draw upon speculations about pre-scientific sonic experiences as magical or mystical, they refer to a benign post-Enlightenment context of supernaturalism where a plurality of different worldviews and religious beliefs are peacefully tolerated as individual choices. However, as both Cronon's environmental histories and Federici's feminist histories of nature and witchcraft demonstrate, these histories are far from peaceful – they gloss over the bloody, violent, histories of patriarchal control of women and White Euro-American control of non-White subjects,

in order to sustain an innocent listening of sonic naturalism. I contend that some remnant of these ideas is to be found echoed in the affiliation of sound with the mystical, magical, and mysterious in statements by archaeoacoustic researchers and the exoticisation of sound as feminine and non-Western. If left unheeded, the epistemic laziness of such investigations throws up considerable challenges for archaeoacoustics' potentially radical epistemological ambitions.

3.5 Conclusion

This chapter has sought to explicate both the epistemological ambitions of archaeoacoustics through an examination of its sonic alterity, as well as offering an evaluation of the prospects for these to be fulfilled. Whilst the notion of sonic alterity alludes to a potentially radical paradigm-shifting and even revolutionary epistemological transformation, the fact that sonic knowledge production remains embedded in Eurocentric academic and intellectual conventions, suggests that it is in a challenging position to carry this out. Sonic positivism and sonic naturalism were shown to share common roots in sonic materiality – a concept that developed in parallel to the shifting conceptions of matter peculiar to European history. In doing so, I offered a case as to why archaeoacoustics' current ecology of sonic knowledges appears to remain more in the hegemonic "here" rather than stepping over into a political-philosophical "elsewhere."

There remains a question of intention within the areas of concern raised in this chapter. It is clear that the goals and objectives of archaeoacoustics researchers in producing potential sonic knowledges about a site are different to the role of cultural critique I am exercising here. The criticisms identified, therefore, are not aimed at any individual researcher but rather aimed at excavating epistemological shortcomings of the field overall, as it is embedded within archaeology and European knowledge production as a whole. As part of a practice of politicized scholarship, I contend, attending to such critiques such as those raised here from feminist and post- and decolonial theory, would be necessary. However, for the self-proclaimed ambitions of the field in contributing to knowledge about a specific site or cultural practice, such considerations are unlikely to be of primary concern. Nevertheless, in the act of

critiquing, one can find what Stuart Hall once referred to as the “dialogic approach to theory” which indicates an openness as part of intellectual practice (Hall, 1992a, p. 279). The endeavour in this chapter has been expansive in its gesture of critique.

In considering the field’s substantial epistemological ambition, the dangers of an innocent listening become relevant. Some key areas of concern have been examined in which epistemological limitations are evident, using wider debates from sound studies and cultural studies to throw light onto nascent tendencies palpable in comments made by archaeoacoustics researchers. Rather than being direct criticisms of the valuable work that is being carried out and pursued by archaeoacoustics, drawing in related discussions from wider humanities discourses is aimed at highlighting potential shortfalls which might impede the field’s sonic knowledge production. These are often social, cultural and political, but similarly ethico-onto-epistemological issues.

In closing this chapter, I return to the question: “who is listening for whom in archaeoacoustics?” Thinking through the normatively male, white, European able-bodied subject of research, and acknowledging through Wynter how this constitutes just one “genre of human” which has come to over-represent all genres of human (Wynter, 2003), archaeoacoustics faces a number of challenges in not properly situating its knowledge production, and perpetuating “epistemic laziness” (Rizvi, 2015) arising in gestures of innocent listening identified. Greater interrogation of how issues such as gender and race carry epistemological implications for the field of archaeoacoustics is essential for the discipline moving forward. The politicized dimension of time demonstrated by the dangers of sonic allocentrism, the exotifying projections of sonic alterity, and the often speculative statements which have emerged regarding the past are not in any way “innocent.” The necessity of situated knowledge and the politics of academic knowledge production itself can be found be open to Haraway’s instruction: “it matters what stories tell stories. It matters what thoughts think thoughts. It matters what worlds make worlds.”

In closing this section of the thesis which has elucidated the field’s sonic knowledge production as a whole, the greater aim as described in the introduction is to challenge the Eurocentric epistemological trappings of traditional academic knowledge

production and ask what a turn to the sonic can enact. Whilst some of the potential dangers of the ambitions of sonic knowledge production have been examined, the problem remains of how to negotiate with the fact that archaeoacoustics necessarily inherits from a Eurocentric intellectual history. This problem is not solved by appeals to a romanticized and radical outside. This would mean not heeding the warnings of innocent listening and sounding situated knowledges. A key obstacle in this is how to contend with the universalising tendencies of European epistemologies, as described in the brief history of a sonic materiality offered above. Here, the temptation to ameliorate universalisms with relativism is acknowledged, however for a Harawayan project which genuinely seeks a political-philosophical “elsewhere” which refuses the very dichotomy of universalism and relativism, along with the plethora of other binaries of Western thought, another tact is needed. Instead then, of arriving in a place of endless relativism, anthropologists and cultural theorists have argued for the necessity to explore specificities of historical, sociocultural, political and economic contexts in order to be able to theorize. Rather than these being relegated to merely parochial concerns of a locality, an in-depth examination of a local context provides extremely valuable insights into a problematic, such as archaeoacoustics, in order to genuinely push towards a political-philosophical “elsewhere” of sonic knowledge production.

PART 2: CASE STUDY CHAVÍN

Chapter 4 - Archaeoacoustics at Chavín de Huántar, Peru

4.1 Introduction

I found myself standing in the thin, crisp air under piercing sunlight, surrounded by a cloudless blue sky and imposing mountains, 3180m high up in the Callejón de Conchucos valley in the Áncash region of the central Peruvian Andes.⁵³ It had been almost exactly eight months to the day since I had conducted my first interview with archaeoacoustics researcher Miriam Kolar on a video-conferencing call, whom I now stood next to. We formed part of a circle of around fifty members of the archaeological team present at the three-thousand-year-old ceremonial temple complex of Chavín de Huántar,⁵⁴ one of Peru's most famous archaeological sites. The early morning proceedings began as the lead archaeologist of the research programme, an American named Professor John Rick of Stanford University, and his wife the Peruvian archaeologist Rosa Mendoza Rick, marked the opening of the archaeological season with a few words about the history of their work there, switching between Spanish and English. We then each in turn introduced ourselves to the group. The team members this season consisted of several long-standing on-site local workers, archaeologists and students from various Peruvian universities (Pontifical Catholic University of Peru, Lima; Huaraz University; San Marcos University), students from Stanford university, two archaeologists from France, the Peruvian archaeologist and site manager Maria Mendoza, sister of Rosa Rick. The atmosphere was friendly with decades-long familiarity between many participants evident, and laughter breaking out occasionally as introductions were made. Rosa Rick gave a brief history of archaeology at the site, which at the time was in its twenty-fifth season, referring to the famous Peruvian archaeologist Luis Lumbreras' work there beginning

⁵³ My fieldwork trip took place between 29th June and 8th July 2018, with work on the Chavín de Huántar site taking place between 1st and 5th July 2018.

⁵⁴ The town in which the archaeological site is situated is called Chavín de Huántar, which will be referred to interchangeably as "Chavín" as a shorthand. In archaeological literature, however, it is noteworthy that "Chavín" is also used to denote a particular style of complex polymorphic art (in the form of ceramics, stone relief engravings, carved objects, and in some cases, architecture) commonly associated with the site. See for instance (Tello, 2009b, 2009c).

in the 1960s, discussed further below.

The gathering that morning, as I was told prior to it, centred around the *Pachamama* ceremony and giving thanks to Mother Earth and the Indigenous community at the start of the archaeological season.⁵⁵ After we had all introduced ourselves, two older male members of the group led a ritual which summoned the four cardinal points and the traditional principles of Andean cosmology – Water, Earth, Sun, and Moon – making reference to the colossal mountains which impressively flank the site. Each member of the circle was offered coca leaves, a plant used in traditional Andean cultures as a light stimulant from a small plastic bag. Some participants moistened a few of the leaves in their mouths, before they walked to a designated stone in the centre of the circle and placed one or more leaves on each of the four cardinal points which had been marked out by the two ceremony leaders. Offerings of alcohol and cigarettes were also handed around, and the two men took swigs from the bottle and forcefully sprayed the liquid from their mouths high into the air, attending to the North, South, East and West directions in turn. They also smoked a cigarette each and laid the still-lit cigarette butts on top of the stone. Some other members of the group followed suit in doing the same.

I was about to embark on a week-long project, observing and participating in Kolar's archaeoacoustics work at Chavín.⁵⁶ This experience was embedded in the bureaucratic and legislative structures, being a recognized site of national and international heritage as a National Monument of the Peruvian Ministry of Culture and a UNESCO World Heritage Centre, and simultaneously within the institutional structures of the universities and academics currently permitted to work at the site. The Chavín de Huántar Archaeological Research and Conservation Program (Programa de Investigación Arqueológica y Conservación Chavín de Huántar, hereafter referred to as *PIACCdH*), authorized by the Ministerio de Cultura, Perú is currently directed by Rick who began undertaking excavations with his team at Chavín in 1995. They have

⁵⁵ “Pachamama” is a term derived from the Andean and Amazonian indigenous cultures which loosely translates to Mother Earth or Mother Nature (Álvarez, 2015).

⁵⁶ Kolar has undertaken archaeoacoustics work at various other sites such as the Inca site Huánaco Pampa, also situated in the Central Andes (Kolar, Covey, & Cruzado Coronel, 2018). However, the work she has undertaken at Chavín de Huántar has been her most extensive archaeoacoustical project to date.

continued annually almost without exception every summer since. My work there with Kolar happened to take place at the opening week of this year's archaeological season.

This chapter presents my experiences as a participant-observer in Kolar's archaeoacoustics work at the site of Chavín and situates these within the site's larger historical-archaeological context. Building on the analysis of sonic knowledge production in archaeoacoustics in the first part of the thesis in chapters one, two and three, this chapter takes Chavín as a case study to explore this specific site and the research around it in some depth. Chavín provides an extremely rich example of an archaeological site with many intriguing potentials for archaeoacoustical research which will be detailed below. Contemporary anthropological work is often involved in pursuing the particular local dynamics of cultural modes of understanding, activities and communication. Where archaeology relies on material remains to attempt interpretations and offer contributions of knowledge about past human behaviour, a highly speculative endeavour usually results. The tendency to falsely universalize emerges from generalized cultural statements where more specificity and exactitude is needed to examine a particular conjuncture. Therefore, using Chavín as a case study is done so with a gesture of pursuing "partial connections" (Strathern, 2004) which emphasizes the futility of attempting to depict totalities, this chapter aims to draw on the specifics of this one site to contribute to critical academic reflection on sonic knowledge production.

This focus on Kolar's acoustic research is situated in a much larger context of archaeological work at the site, of which sound and listening play just a marginal part. The complex architecture of Chavín's megalithic stone buildings, monuments, staircases and terraces, labyrinth-like indoor chambers, intricately carved monoliths such as the Tello Obelisk, Raimondi Stela, the columns of the Falcon Portal and the 4.5 metre Lanzón monolith, the plethora of artefacts – stone, metalwork, pottery, textiles - which reveal a distinct Chavín style, the iconic anthropomorphic tenon heads which were pegged into its walls, as well as its dramatic setting in the valley of steep Andean mountains and relation to other contemporaneous archaeological sites in the area have all preoccupied academic archaeologists for around a century.

A site such as Chavín, whether one visits once as a tourist, annually as an archaeologist, or daily as an on-site worker, is fundamentally formed by the social and political histories of place. The earliest written references believed to be of Chavín de Huántar are found in the writings of Spanish chronicler Pedro de Cieza de Leon in 1549 who described 'a mighty fortress with sculptures of faces and human figures built into its walls' (Mesía Montenegro 2013, 119). In 1593, Archbishop Toribio Alfonso de Mogrovejo came to Chavín and explored the ceremonial complex, mentioning a burial site with passageways inside it in his account (Mogrovejo, 1920) in (Mesía Montenegro 2013, 119). From 1613 onwards, scholarly opinions of Chavín were shaped by the Jesuit order and in 1840, Mariano E. de Reviero y Ustariz (1798-1857), the first director of the National Museum of Peru, described the site of Chavín and its buildings constructed from cut-stone blocks with ventilation ducts in relation to the nearby site of Pojoq in substantial depth in a landmark work of Peruvian archaeology (Mesía Montenegro, 2013, p. 119). The violent histories of colonialism, symbolised in the ancient Peruvian artefacts held in museums around the world, have left Peruvians well aware of the long-lasting negative consequences of colonialism in contemporary political, economical and cultural relations under global Euro-American hegemony. For archaeology, this has meant Peru's conflicted history as a site of archaeological interest has been constituted by a myriad of influences, or as contemporary Peruvian historian Tantaleán expresses, it has been 'criss-crossed' by many different archaeologists and archaeological traditions (Tantaleán, 2016, p. 18); the interaction between Peruvians and foreign influences has been a constant feature of Peruvian archaeology since its inception (Tantaleán, 2016, p. 152). This criss-crossed nature of Peruvian archaeology has practical, material and structural as well as epistemological consequences of relevance when surveying sonic knowledge production at Chavín.

The chapter has four parts. Using a combination of fieldwork observations, interview comments and insights from personal interactions with her, a review of Kolar's published work including her PhD thesis as well as a review of archaeological research on Chavín, I present some of its most crucial aspects relevant for the present examination of sonic knowledge production. Firstly, I will describe the context of archaeoacoustic research at Chavín, which Kolar's work has played a central role in developing, and recount my experiences of it during the fieldwork taken in 2018. This

section introduces background information about the site of Chavín and outlines its relevance as a sonic site. Secondly, a brief survey of the history of Chavín's archaeology sketches out central political and epistemological dynamics as a tension between positivistic and Indigenous knowledge systems in Peruvian history, relevant for further exploration of sonic knowledges in the next chapter. Thirdly, I analyse Kolar's sonic knowledge production and evaluate her methodology of an "integrative anthropological" approach as one of sonic post-positivism. I demonstrate that Kolar's approach broadly encapsulates a method of "robust" post-positivism similar to that proposed by Sandra Harding's "standpoint" method of feminist epistemological work (Harding, 2005) and I evaluate to what extent it fulfils this. Fourthly, I explore how sonic supernaturalism manifests itself at the site of Chavín. Taking these into consideration I ask, in relation to the potential limitations of sonic alterity outlined in the previous chapter, whether a critique of innocent listening could provide any productive insights into an investigation into sonic knowledge production.

4.2 Archaeoacoustics at Chavín

4.2.1 Chavín as a sonic site



Figure 3 Photographs from Chavín de Huántar, Peru.

Left: the outer *Plaza Mayor* at Chavín de Huántar, Peru. Right: an engraved *pututu* on display at the Chavín museum. Photo credit: the author

In 2007, Kolar was a doctoral student at the Center for Computer Research in Music and Acoustics (CCRMA) at Stanford University when she was asked to join the project forming out of discussions between the computer music pioneer and composer

Professor John Chowning and the Stanford archaeologist Professor John Rick. Chowning had read about Rick's team's 2001 excavation of twenty "conch" shell-horns *Strombus Lobatus galeatus*,⁵⁷ known locally as *pututus*, in a Stanford university newspaper and had made contact to offer the acoustics expertise of his department. Meetings between the two professors were set up and graduate students – including Kolar – were recruited for the project. Kolar began working in the project in both managerial and research roles, organizing the team's first site visit taking place in Autumn 2008.

Although debates still continue to contest Chavín's chronological development (Burger, 2008, p. 693, 2019), Rick and his former doctoral student, archaeologist Silvia Kembel, have proposed the construction sequences and phases based on archaeometric data such as radiocarbon dating which are broadly adhered to today (Fux, 2013, pp. 16–19; Mesía Montenegro, 2013, p. 124). The early construction phase at Chavín occurred in the Middle Formative period (1200-800BC), where the ceremonial centre acquired its large sphere of influence, with its greatest influence occurring in the Late Formative period (800-400BC), before the cessation of activities at the ceremonial centre (400-200BC) in the Final Formative period. Rick's overall argument about Chavín focuses on its rituals and the development of authority at the site. Rick suggests that, "most authorities agree that monumental Chavín was primarily a temple complex and thus can supposed to have been the scene of important religious ritual activity" in the form of processions as depicted in elaborate engravings (Rick, 2008, p. 20) and he proposes that one of its main purposes could have been to reinforce beliefs and devotional attachments and build the credibility of emerging authorities (2008, p. 33). Rick's summary of geo-archaeological studies highlights Chavín's location in the mountainous valley at the conjunction of two rivers, with astronomical alignment of the summer solstice, as a point of "unusual features of potential ritual and strategic importance" (Rick, 2008, p. 8). It is broadly defined by a social archaeological approach, which departs from previous archaeologists' focus on

⁵⁷ Further information provided by Dr Kolar details: The current macological term for these animals is *Strombus Lobatus galeatus*, and there have been confusions about the nomenclature, reproduced through archaeological and archaeoacoustical literature, including previous work by Kolar's own team and publications. In 2018 Kolar began using the current term *Strombus Lobatus galeatus* which follows the format [Family Genus species]. More generally, they are *Strombus* shell horns (colloquially "trumpets").

recording and theorizing patterns within the site's art and architecture as per the approach of visual archaeology (such as (Burger, 1995)). More recent work has moved away from social theorizing and shifted towards analysing architectural and artefact distribution (Rick, 2017).⁵⁸

Rick's work points to evidence for "shamanistic" practices (2008, p. 33) as part of ritual activity,⁵⁹ with indications of processional movements from iconography and the pathways and architecture of the complex (2008, pp. 20–23), linked to the depictions of psycho-active drug use in art and paraphernalia at Chavín (Rick, 2008, p. 33).⁶⁰ He suggests that highly planned rituals took place which manipulated human minds through landscape, architecture, images, sound, light, the use of psychoactive drugs and other behaviours. These he interprets to be part of the evolution of power and authority and convincing populations to accept the dominance of a "priestly" leadership based in Chavín (Rick, 2005). Rick points to the existing consensus of a long transition from relatively egalitarian societies to states and empires, beginning as early as the third millennium BCE (Shady & Levya, 2003) in (Rick, 2005, p. 71). This is contextualized within a cross-regional trend of an increasing concentration of power in the hands of relatively few people in this timeframe, which he comments has particular characteristics in the Andes relative to the rest of the world (Isbell & Silverman, 2002) in (Rick, 2005, p. 71). Rick puts forward a sociopolitical argument which links Chavín's monumental architecture and other material remnants to the establishment of authority, which appears to be largely accepted, as corroborated by

⁵⁸ Thank you to Miriam Kolar for pointing this change in direction in Rick's work.

⁵⁹ Although Rick does not specify the meaning of "shamanism" further, his comments could either concur with a broad definition of activities of those who enter altered states of consciousness to perceivably communicate between human beings in the material world and other spirits in the supernatural world, or as in Neil Price's *The Archaeology of Shamanism*, which frames shamanism as a religious phenomenon differentiated from more complex religions (Price, 2001, p. 6). As Price notes, there is considerable debate in shamanic studies about the misuse of the term "shamanism" beyond certain regions of Siberia, where the term was coined through outsiders engagements and observations of various cultures, and whether it can and should be extended to refer to cultural practices found across the world (2001, p. 6).

⁶⁰ Specifically, there are prominent displays of imagery which indicate transition and psychoactive drug use at Chavín. There are representations of the San Pedro cactus, which contains psychoactive substances on ceramic and textile objects from the Early Horizon period thought to be related to Chavín (Rick 2006, 103); a stone engraving showing an individual carrying a similar-shaped cactus from the Circular Plaza; oversized sculptures of human and humanoid heads known as "tenon heads" which appear to depict the side-effects of drug use such as large pupils, nasal mucus emissions, furrowed cheeks and other facial distortions (Rick 2006, 104); the excavation of a number of tube and spatula objects suggested to be for the preparation and ingestion of drugs (Rick 2006, 105).

Burger's descriptions of Chavín's "ceremonial" architecture (Burger, 2008, p. 688) and as a "pan-regional centre of worship and interaction" (Burger, 2008, p. 693) although there remain many areas of disagreement between Burger and Rick on chronology among other aspects of their respective interpretations (Burger, 2019).

Research questions around sound and acoustics, in a substantial sense, appeared relatively late at Chavín, which it has in common with many archaeological sites of acoustic interest. As reflected in the interview responses of many archaeoacoustics researchers across the field described in Chapters 1 and 2, visuocentrism is often cited as the reason for the prior neglect of auditory aspects of sites. Yet, despite this, Chavín's history had been relatively unusual in that the work of the influential Peruvian archaeologist Luis Lumbreras had – to some extent – addressed sound and listening in his work since the late 1960s. Lumbreras excavated *Galeria de las Ofrendas* (Gallery of Offerings) and *Galeria de las Caracolas* (Gallery of Sea-snails) beginning in 1966 and found many ceramic vessels, often apparently deliberately smashed into pieces and from diverse cultural styles, human skeletal remains and other objects. In a 1976 publication, Lumbreras theorised the use of the subterranean canal network at Chavín to have acoustic-hydraulic functions as well as ventilator channels (Lumbreras et al., 1976).

Archaeoacoustics, music archaeological or sonic archaeological work was dramatically propelled at the site since 2001 when Rick's team excavated twenty *Strombus* shell "trumpets" (see images in Appendix G) in the so-called *Galería de las Caracolas*. The discovery of these intact *pututu* horns, most of them engraved (some of which extremely elaborately), "highly use-polished" and showing extensive handling and use-wear patterns (such as worn-down mouthpieces) and found deposited in a room – thus suggesting it was be a storage location specifically for the horns – all contributed to an understanding that the horns played an important ceremonial role (Rick, 2008, pp. 24–27). Fragments of other shells were also found there, indicating that a minimum of nine more shells were present at the time of publication in 2008 (Lumbreras, 2007; Lumbreras & Amat, 1966; Rick, 2008, p. 25). This was significant in the history of excavations at Chavín, being only the second time that substantial and intact objects had been recovered on site (Rick, 2008, p. 24). Therefore, even prior to

the collaboration with CCRMA and with it Kolar's involvement in the project, Rick and his team were well aware of the possible powerful use of the *pututus* as sound-producing devices in the ritual context:

When played together, the shells not only produce an immense volume of noise, but their tones interact to produce a cyclical, attention-commanding beat. If they were played in performances with 20 or more shells within the sound-reflecting walls of galleries or the Circular Plaza, the sound may have had major, even physical impact on the listeners and may represent an important technique for creating an ambiance for rituals related to religion, power, and authority. (Rick, 2008, p. 26)

Rick cites Lumbreras' aforementioned research and suggests that the shell horns were used as musical or sound-producing instruments as part of rituals potentially involved in the development of an elite authority at Chavín.

Whilst Rick and his team had certainly incorporated the experiential sonic effect of the shell horns in publications prior to the collaboration with CCRMA and Kolar, the introduction of a team of experts in the fields of acoustics and audio engineering brought new perspectives in audio digital signal processing analyses amongst other specialist techniques and more in-depth explorations of these research questions. For Rick and his team, the discovery of the *pututus* was significant, but represented just one aspect amongst many which would lead to further knowledge being generated about the site and in recent years attention has focused on other aspects of the site's archaeology.⁶¹ However, CCRMA's considerations of acoustics at Chavín stretched beyond the immediate and conjectural ideas of how the sounds of the shells may have been used and perceived during ritual activity on the site and undertook a thorough examination of its larger acoustic and psychoacoustic characteristics. The *Strombus* shell horns continued to play a central role in Kolar's research questions, along with the complex cultural conundrums which accompanied considerations of acoustics.

4.2.2 Sonic experiments at Chavín

Kolar (shouting at a distance): So I'll talk from here cos everyone can hear me

⁶¹ For example, another of Rick's former doctoral students Daniel Contreras has published work on landscape setting and its implications for communication (Contreras, 2015). Thank you to Miriam Kolar for this reference.

from here right?

[B.W.], a student (shouting back): Yes!

Me (shouting back): Yes!

Kolar (still shouting at a distance): Okay, so when we start each take, for each source I'll say, "source 1, go!". Then we'll go through the whole pututu sequence.

[B.W.] (still shouting): What's the order again?

Kolar (still shouting): First it's the Peruvian, the little one, twice, then it's resin mouth-piece one, – those are the two we used yesterday – and then the Chavín mouth-piece one. So we'll go through that sequence each played twice, then we'll move to the next position. You guys in receiver positions just stay in the same place.... Pututu players, if you don't make a sound at the first go, just keep going until you make a full sound...So each pututu will have two takes, with additional ones if necessary...

[...]

Humidity reading is 38%, 15.8 degrees at 9.42am. Did anybody get that?

(laughs) I need to take a picture... I'll get a picture of everyone in their positions actually

[walks off to take pictures of each person in position]

[...]

Okay! Is everyone ready?

I stood in the dark, stone-walled chambers of Chavín's *Laberintos* gallery, with my back towards a wall at the end of narrow corridor around a metre wide and a dozen or so metres in length. I could see [A.R.], a student from the working group, a few metres directly ahead of me in the dim artificial light. Next to me was a stand which my microphone was affixed to, set at around head height. I carefully balanced my smartphone, which had a small electret microphone coming from its audio jack and was running the decibel metering app "Decibel Pro X", along with my notepad in one hand, illuminated with the light from my headlamp. My pen was poised to take decibel readings in my notepad.

This was the third day of working with Kolar and the student group at Chavín. Including Kolar and myself there were twelve individuals, some of whom interchanged research activities with the main archaeological project during the week.⁶² In the previous days

⁶² The funded summer programme ran from the end of June through until September and consisted of students and recent graduates of various degree programmes selected to spend the season at Chavín working as part of the archaeological team. The students and alumni involved in the archaeoacoustics group came from the disciplines of: archaeology, anthropology, computer science, industrial design, and engineering. The students had gone through an application process and been selected by the Ricks (Rosa Rick manages fieldwork personnel and organizes student involvement supervised by John Rick), some of them had come in previous years and many were there for the first time.

we had held discussions about Kolar's prior work at the site, as a group we had designed and undertaken experiments on the large outside space of Plaza Mayor. One of these was a pilot acoustic study in and around the sunken terrace flanked by staircases, facing the temple's famous elaborately engraved "Black and White" pillars. By now we had established a relatively smooth workflow as a group and were able to efficiently record acoustic measurements within an experimental set-up. Whereas in previous days experiments had been collaboratively designed and undertaken by the group, for this experiment it had been decided that we would build on Kolar's previous work on auditory localization from her PhD research. During those experiments, she had invited volunteers to serve as human subjective research participants whom she led through a sequence of listening locations inside darkened *Laberintos* and *Doble Ménsula Galleries* (See Figure 4 & Figure 5). From there, participants evaluated the directionality and distance of a recorded Chavín *pututu* sound played from loudspeakers hidden in various locations around the galleries. In those experiments, Kolar had placed loudspeakers in a number of carefully chosen "source positions" and she led each participant through a series of seven or eight "listener" positions in each darkened gallery, to systematically enact an evaluation of the same sound stimulus tests for all 45 experiment participants. These locations had been chosen by Kolar either as, "realistic (plausible in terms of a real person playing *pututu* or occupying gallery space), and also where notable sound effects or transformations seemed apparent" (Kolar, 2013b, p. 31). Replicating the source and listener positions of Kolar's dissertation work, the new experiment we were undertaking on this day, rather than using loudspeakers, employed three real *pututus* of varying types of replica to produce sound, performed by members of our research team.⁶³

⁶³ These horns were given the shorthand names "Chavín", "Peruvian" and "Resin" to denote the type of replica horn they were, described in further detail below.

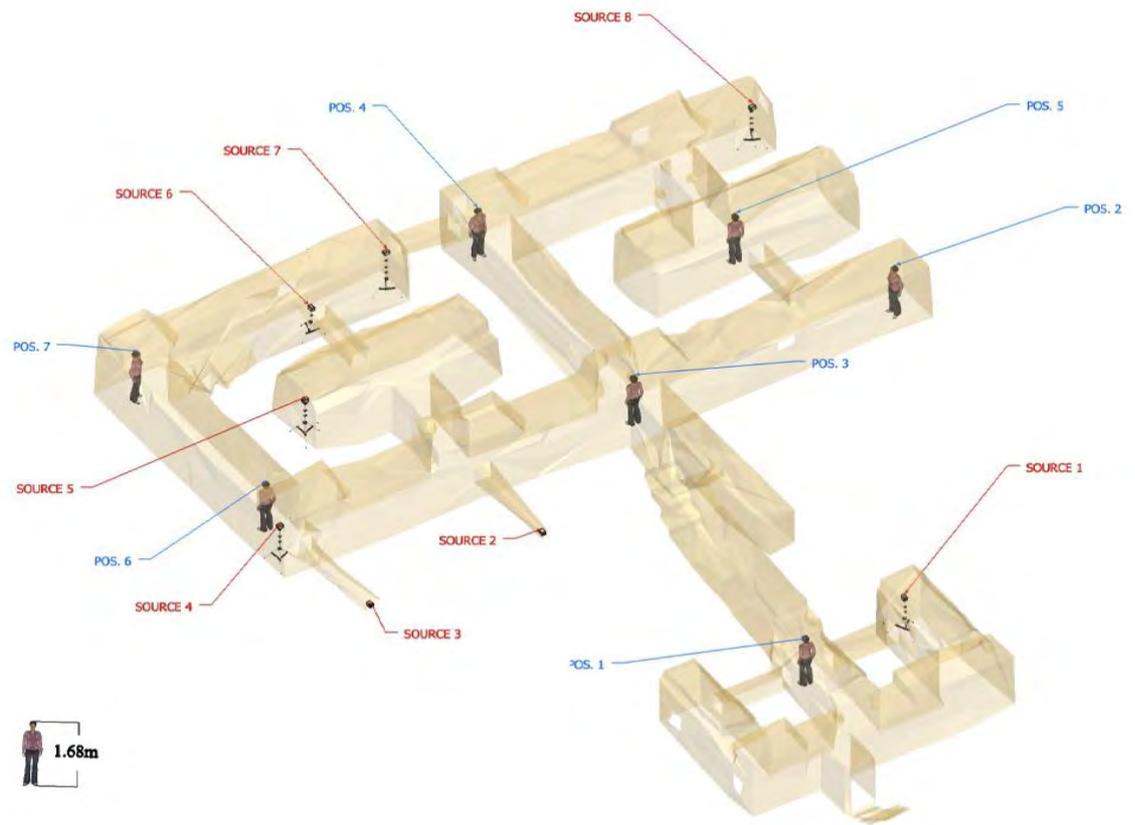


Figure 4 Laberintos Gallery, Auditory Localization Experiment Source and Listener Positions.

From Miriam Kolar's PhD Dissertation "Archaeological Psychoacoustics at Chavín de Huántar, Perú" 2013. (Kolar, 2013b, pp. 23–24). Reproduced with kind permission of the author.⁶⁴

One of the foremost concerns of archaeoacoustical work at Chavín, which the team began working on before and during its first visits in 2008, was to take accurate acoustical measurements of both the *pututu* horns and the interior architecture of the Chavín site. The complex galleries of the site's internal architecture – composed of long, narrow corridors barely more than one metre in width, with pathways connecting different architectural layers via staircases and long horizontal ducts allowing air, light and sound to flow between spaces – provide areas of strong acoustical resonance. As an early paper by the initial CCRMA archaeological acoustics team describes:

⁶⁴ Additional notes from Kolar's PhD Dissertation regarding this image: "3D model and illustration by José Cruzado, adapted from data points by Silvia Kembel (2001, pers. comm. 2012); note that non-gallery-interior transmitting ducts (and some niches) are approximate, with some ducts to the exterior not indicated, or represented only by apertures. All positions for source (blue labels) and listener-participant (red labels) are simultaneously indicated, though tested in location pairs. Scale is given for the illustrated perspectives using participant = 1.68 meters tall, the average height for participants in the experiment sample" (Kolar, 2013b, pp. 23–24).

Preliminary acoustic measurements at Chavín show a short reverberation time, dense and energetic early reflections, and a large lateral energy fraction. The short reverberation time would enable rhythmically articulated group performance using Strombus shell trumpets found onsite. The early reflections would provide strong acoustic reinforcement and consistent resonances for participants in gallery alcoves. (Abel et al., 2008)

Creating computational acoustic models of both the site's interior spaces (Abel et al., 2008), and the *pututu* horns (Cook et al., 2010) was set as an initial goal for the CCRMA team's project. Acoustical measurements of both instruments and architecture would both enable modelling, and also produce a comprehensive understanding of the interactions between sound and space at the site (Collecchia, Kolar, & Abel, 2012; Kolar, 2012).

The central importance of *pututus* is evident at the site in forms such as: the figure of a *pututu* adorned with an eye and mouth found engraved on the "Tello Obelisk" monolith in a central position (Tello, 1960) in (Kolar, 2012, p. 27) (see Appendix H); the fragments of cornice stone depicting two figures in procession, with one blowing a *pututu* horn (see Appendix H); in related artefacts, such as an object described as "spoon" or "rattle" made of gold and silver, thought to possibly originate from the Chavín site, which clearly shows a seated or squatting figure holding a *pututu* horn up to the player's lips (see Appendix H); as well as the aforementioned excavated cache of twenty intact *pututus*.⁶⁵ During their 2008 *pututu* characterization research, the team recorded and studied the *pututus* as performed by Cook in measurement sessions, from which they reported their "sounding tones" within a range of 272-340Hz, corresponding to the contemporary Western art musical scale at around approximately "middle" C#4 to F4 (Kolar, 2012, pp. 29–30). During the CCRMA team's 2008 fieldwork, they also had the opportunity to observe the *pututus* in a research performance by Andean instrumentalist and scholar Tito La Rosa.⁶⁶

⁶⁵ The *pututu* measurement work was initially led by Kolar's colleagues Jonathan Abel and Perry Cook, who along with Kolar, undertook a large amount of detailed research to characterize the frequency response and radiation pattern of 19 of the 20 Chavín *pututus* housed in the Chavín Museum.

⁶⁶ This research on measurement procedure and analyses of the *pututu* data was published by Cook (Cook et al., 2010). Kolar explained this in a more thoroughly from a functional and archaeological perspective in (Collecchia, Kolar, & Abel, 2012) and continued to work with *pututus* at the site and characterized their performance acoustics (Kolar, 2014a, 2014b).

When aligning this data with the acoustic data collected of the well-preserved interior spaces of Chavín, audible modal resonances were found in the corridors and alcoves in the frequency range of the *pututus* and the human voice (Kolar, 2012, p. 38). Pursuing ideas given forth in Lumbreras's work from the 1970s conceiving Chavín as a "sounding oracle", Kolar undertook detailed measurement and analyses of the "Lanzón ducts", three parallel ducts which link the Circular Plaza outdoors to the internal chamber where the Lanzón monolith is positioned (Kolar, 2012, pp. 39–40). Although the three ducts in their current state all filter sound differently, frequencies important to human voice are not well transmitted through those ducts; whilst all three ducts "transmit and emphasize" frequencies produced by the *pututus* found on site, the central duct "further emphasize[s] the articulatory range of the shell horns" (2012, p. 42). Thus, Kolar surmises, "the architectural acoustic filtering properties of these three ducts constitute a specialized sound transmission system" (2012, p. 42), although the article does not explicitly theorize an intentionality of architectural acoustical design. This work further demonstrates how Kolar and her team use acoustic measurements and computational models to make empirically-testable conjectures about the potential use of the *pututus* within the site.

Kolar's PhD thesis located extensive psychoacoustic experiments within the site's architecture in order to directly engage human auditory perception in experimental research rather than only estimate it from acoustical measurements.⁶⁷ Kolar's dissertation study demonstrates how the results of extensive testing of participants' ability to localize sound sources suggest that the disruption of one's usual auditory localization in Chavín's galleries could have palpably played a role in the direction of and influence on human experience of the site:

overt manipulation of the physical world is a clear demonstration of power, whereas the manipulation of unseen experiential effects via architectural forms

⁶⁷ Kolar continued and expanded the CCRMA project's September 2008 fieldwork at Chavín starting with a solo trip in November 2008, then continuing year-round from 2009 through the end of the 2012 field season. She completed her doctoral dissertation in March 2013, which focused only on the auditory localization research, rather than the diverse archaeoacoustical techniques and research she conducted from 2008-2012. Several co-authored and single authored articles and book chapters, popular journal articles, and conference presentations were also completed in this period or soon thereafter (Kolar, 2012, 2013b, 2013c, 2013d, 2017). Living near to the site year-round over this period enabled Kolar to undertake extensive on-site experimentation which had resulted in experiments such as that outlined above (Kolar, Interview 2017).

that create distinct acoustic experiences is a subversive tool that can be used to influence individuals through sensory means...Individual focus is structured into gallery architecture not only by its dimensional characteristics, but by acoustics that can be manipulated to project desired impressions of the proximity or distance of others. (Kolar, 2013b, p. 58)

Linking this manipulation of the effects of acoustical proximity as a tool of power in crafting individual human sensory experience, Kolar's work harmonizes with Rick's in providing evidence for understanding Chavín's architecture and theorising ritual processes there as part of a "'highly conscious and strategized" belief system" (Rick in (Kolar, 2013b, p. 59). Here, with reference to a prevalent debate in archaeoacoustics around intentionality (Scarre & Lawson, 2006b) in (Kolar, 2013b, p. 60), Kolar makes a convincing case with her extensive psychoacoustic experimental research, that the builders of Chavín *may* have constructed the architecture with knowledge of "perceptually salient architectural acoustic properties...for specific experiential effects including the sensory manipulation of others who lacked experience with this environment or knowledge of its features" (Kolar, 2013b, p. 62). Kolar carefully links the material remains of the architecture and its acoustic space with its potential social implications, "An appeal to the senses is a strong convincing tool to influence beliefs on a personal level, and such empirically generated individual perspectives can translate to broader social significance" (2013b, p. 62). Sonic experimentation using psychoacoustic testing have been applied to cultural-anthropological theories about the site's ceremonial and ritual use.

The day after the 2018 field experiment in which I participated, I underwent a striking sensory experience. On this day, we were located in the *Doble Mensula* gallery (Figure 3). It was the last full day of acoustical experimentation which I would take part in and observe on the site. The *Laberintos* gallery we had experimented in the previous day was substantially smaller than the *Doble Mensula*, but both had a similar architecture of narrow rectilinear corridors linking small chambers with long ducts around waist-height which cross-linked the spaces. Unlike *Laberintos* where the chambers were all situated on a level terrain with one another, *Doble Mensula* linked two levels of elevation via a staircase. In both cases one had to descend a staircase to enter the rooms, *Doble Mensula*'s staircase was substantially longer.

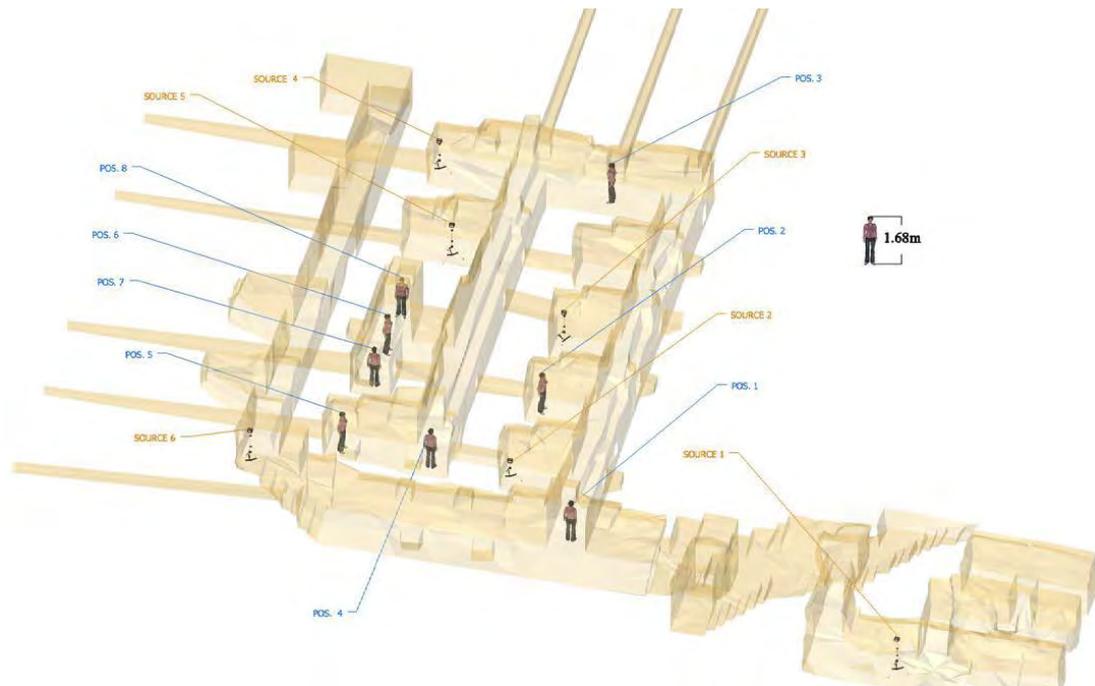


Figure 5 Doble Ménsula Gallery, Auditory Localization Experiment Source and Listener Positions.

From Miriam Kolar's PhD Dissertation "Archaeological Psychoacoustics at Chavín de Huántar, Perú" 2013. (Kolar, 2013b, pp. 23–24). Reproduced with kind permission of the author.⁶⁸

After the sounding and measurement part of the experiment had been completed, I and some of the other project team members who were in the listener locations recording decibel levels began to discuss the experience of listening to the *pututu* horns in the spaces, particularly the effects of being visually isolated from each other in the dark, rectilinear passages of the gallery yet acoustically connected in usual ways. Hitherto the experiment had demanded each *pututu* player individually sound one note each at a time, after which we fastidiously noted down decibel measurements. In conversation, the idea emerged for us to request the three *pututu* players to play simultaneously and walk in a procession through the corridor of the inter-connected rooms which forms a pathway of some dozen metres from the furthestmost point to the gallery staircase and entrance. This impetus came from conversations of previous days where discussions had circled around Rick's theorisations of processions at Chavín, and ideas of experimental and performance archaeology, particularly during the time we spent doing tests outside on the Plaza Mayor. As a group we had discussed the performativity of such rituals and how a manipulation of sensory

⁶⁸ The same comments from footnote 64 apply to this figure.

experience as theorized by Rick would perhaps have played on dynamics of presence and absence, disappearance and re-appearance with the movement of human bodies through the galleries from the open spaces of the Plaza Mayor and Plaza Menor for the purposes of creating a spectacle.

The result of the moving sonic improvisation was an extremely powerful bodily experience. The volume of the three *pututus* sounded at once reached in excess of 110dB at places according to measurements. Being visually isolated from other members of the group in the darkness created a fairly claustrophobic atmosphere. However, the gallery's chambers contrasted this acoustically, transmitting sound fairly well along the long, narrow horizontal ducts which connect certain rooms to one another, and in some cases stretch several meters and lead through a small window-like openings to the outside. The players of the two larger *pututu* played long tones as they walked through the gallery, whilst the player of the smaller *pututu* played shorter, rhythmic bursts of sound. The long tones, similar in pitch, of the two larger *pututus* created an acoustic interference pattern known as a "beating-tones effect" (detailed in (Kolar, 2014a)), whilst the shorter tones aimed against different elements of the architecture had a disorientating effect, as the perceived direction of it was constantly shifting unusually in space. The drone-effect of the improvised procession of the three *pututus* created a thick, numbing intensity on my body and ears. Unwittingly, we had recreated a situation similar to a previous conjecture by Rick, who had previously theorised that, "If they were played in performances with 20 or more shells within the sound-reflecting walls of galleries...the sound may have had major, even physical impact" (Rick, 2008, p. 26). Although we as experimenters had not framed the exercise in any explicitly religious or spiritual way, the experience of the strong sensory impressions was certainly remarkable. With regards to the types of sonic knowledge production laid out previously, this was certainly an experience which challenges easy categorisation.

The type of *pututus* themselves play an additional role in the formulation of Kolar's research questions. Whereas her previous experiments had focused on the site-excavated *pututu* horns and the precise recordings of them made with the CCRMA team, this set of experiments used live *pututus* and live players with a set of *pututus* of

varying kinds. Most experiments took place with three *pututus* which were given the shorthand names “Chavín”, “Peruvian” and “Resin”. The Chavín *pututu* was a replica of a site-excavated *Strombus Lobatus galeatus* *pututu*, the “Peruvian” one, *Strombus peruvians*, was a smaller conch shell horn, and the “Resin” horn was similar to the Chavín *pututu* but had an additional resin mouth-piece built up around the cut-off spire to aid players blowing the horn. The significance of this variety of *pututu* horns, is that part of the mystery in that the *Strombus Lobatus galeatus*, the specific species which makes up all of the site-excavated conch shell horns, are known to have been transported for hundreds of miles from the North East coast of South America (today’s Ecuador) to the ceremonial site. This is despite other *pututus* being perhaps more geographically available, such as the “Peruvian” type. In my own observations, there were times during experiments when the “Chavín” *pututu*’s tone seemed to produce much more pronounced resonance inside the chambers, especially when directly compared to the “Peruvian” and “Resin” ones.

This detailed description of archaeoacoustical work at Chavín demonstrates how the site evidences a fascinating case study for investigating sonic knowledge production. Kolar’s research reveals its many intriguing and compelling aspects for archaeoacoustical research. My experiences within the archaeoacoustics research group contributed to my embodied understanding of sound in the space, and the questions which were raised and pursued enriched the relationship to the site I developed during my time there. Overall, Kolar’s work builds and expands on aspects of Rick’s social archaeological interpretation of the site, particularly in the way Rick proposed the site to have been used for the establishment of an elite authority who undertook rituals using the site’s architectural features. Kolar’s archaeoacoustic work reinforces this proposed understanding by identifying acoustical characteristics of spatial sound pertaining to the symbolically and materially evidenced importance of the *pututus* as its main reference point. The combination of a high degree of extant architecture, evidence for sonic practices and intact archaeological remains of sound-producing objects, which Kolar’s work capably and skilfully incorporates into her research, provides a convincing example of an archaeological site with distinct potential for significant sounding cultural practices.

4.3 Positivism and Indigeneity in Peruvian archaeology

Kolar's work on Chavín takes place within the multifarious social structures which enabled academic knowledge production to take place there, beginning with the development of the academic discipline of archaeology in Peru at the turn of the twentieth century under the German archaeologist Max Uhle (1856-1944). In order to understand and contextualize Kolar's sonic knowledge production, this section undertakes a brief digression into the history of Peruvian archaeology. As Tantaleán reflects on the aforementioned long exchange between Peruvians and foreigners through archaeology in Peru, "for better or for worse...this interaction is one of the greatest legacies of archaeology in Peru" (Tantaleán, 2016, p. 152). Kolar's work – as part of Rick's US-led team and as co-director of the archaeological and conservation program at Chavín – and the joint presence of Americans and Peruvians on site, mirrors the situation which Tantaleán wistfully muses over in the concluding pages to his history of Peruvian archaeology.⁶⁹ Tantaleán voices concern at the lack of representation of Indigenous groups in the contemporary politics of archaeological projects. Understanding Chavín's history can be considered key in understanding broader cultural changes in Peru, particularly in long-standing questions of national identity.

Within historical, social and political struggles since Peru's independence in 1821, Chavín has, at different times, been brandished proudly as an anticolonial symbol of a sophisticated pre-Columbian civilisation, although contemporary understandings have since tempered this in a more sober language. Correspondingly, understanding Chavín as a site of archaeoacoustic importance – its functioning as a *sonic site* – it becomes meaningful to theories of sonic knowledge. Examining Chavín's central role in Peru's archaeological history reveals some of the key tensions of their epistemological consequences. This brief survey of Peruvian archaeology helps to outline the complex relationship between foreign influence and Peruvian national cultural identity.

A towering figure of Peruvian archaeology and a well-known name across Peru, Julio C.

⁶⁹ It is relevant to note here that although Rick is the current research programme director, the programme has seen various Peruvian co-directors over its time.

Tello (1880-1947) was a native Quechua speaker raised in an autochthonous community in the Andes who is today celebrated as the first Indigenous archaeologist of the Americas. Tello's successful (if tumultuous) career idiosyncratically combined archaeological research and politics. He led the first institutional archaeological expedition to Chavín in 1919 with the Universidad Nacional Mayor de San Marcos, at the same time he was a member of Congress for the Huarochirí Province (1917-1929). Through Tello's work, Chavín's importance became cemented as a central site in the pre-Hispanic Andes. Tello's work sought to establish Chavín as a kind of 'mother culture' or *cultura matriz* of Peru, and the source from which Andean civilization diffused or spread in the region (Burger, 2008, p. 683; Murra, 2009, p. 58; Tantaleán, 2016, p. 51; Tello, 1960), although this "diffusion" theory was largely abandoned after Tello's death in 1947 (Tantaleán, 2016, p. 103). Tello, in an article entitled *The Discovery of the Chavín Culture* published in 1943 in *American Antiquity*, enthusiastically and triumphantly describes Chavín as, "a civilization of such peculiarity and originality that it has no equal in other South American prehistoric cultures" (Tello [1943] 2009, 155). Chavín is not merely to be considered *an* important early centre, but *the* centre of the pre-Hispanic Central Andes (Burger, 2008, p. 682).

Decades before Tello was working, however, Max Uhle had theorized that Chavín culture had originated in Mesoamerica and spread within Peru from the Chavín de Huantar site; this idea was influential at around the turn of the twentieth century (Burger, 2009b, p. 23; Rowe, 1954, p. 21; Salomon & Schwartz, 1999, p. 295). Tello's career began as a battle to refute the premise – widely accepted by many at the time – that Peruvian civilization was merely a derivative of central American civilization (Rowe, 1954, p. 21) in (Burger, 2009a, p. 67; Daggett, 2009, pp. 23, 34–35). He became a key protagonist of a Peruvian national identity later called 'nationalistic *indigenismo*' (Tantaleán, 2016, p. 49). American archaeologist John Burger writes, "That Tello was disproving the prevailing views of foreigners such as Max Uhle or members of the Hispanicized coastal elites such as Emilio Gutiérrez de Quintanilla (Valcárcel 1981) only added to the heroic character of his academic struggle" (Burger, 2009a, p. 68). Writing before the introduction of radiocarbon dating, Tello's approximate dating of Chavín was later shown to be remarkably accurate, and some of his other claims were also proven prescient in contrast to his contemporaries, even if some of those were indeed

later disproven (Burger, 2009a, p. 76).

Tello's political activities, which took place concurrent to his archaeological research, are inseparable from his ideological agenda of Indigenous nationalism, some aspects of which will be further contextualized in the next chapter. In an introduction to the history of Peruvian antiquity, Tello describes a *Collision of Two Civilisations* in which the Spanish colonisers brought, "completely different manners, customs, habits, illnesses, religion, language, ideals, and, in general, civilization, from that of the indigenous Peruvian peoples. The Conquest produced something like a great cataclysm which demolished, almost from its foundations, the national structure shaped by the indigenous spirit during many centuries" (Tello, 2009a).⁷⁰ As Burger explains, "Tello's championing of the autochthonous position was linked to his critique of Peru's modern problems, which he believed began with the Spanish Conquest and deepened with the continuing oppression of indigenous peoples during the ensuing four centuries" (Burger, 2009a, p. 67). For Tello, the destruction of Indigenous Peruvian cultures over centuries has resulted in the situation in early twentieth century Peru where the domination of European ideals of civilisations have left Indigenous Peruvian culture marginalised, a threat his work hoped to ameliorate, "without using the knowledge and methods of science as they should be used, which would permit us to know our soil and our history, to... thus secure our nationality (Tello, 2009a, p. 110)." Therefore, Chavín has undoubtedly played a distinct symbolic role in the history of Peruvian archaeology as a whole. Within Tello's work there are marked suggestions that colonial domination had not only deep-reaching historical, political and cultural consequences, but irrevocably came to shape epistemological frameworks too.

The tension between Tello and Uhle marks out a key tension in Peruvian archaeology. This question of decoloniality will be mapped more closely in the next chapter. For now it is sufficient to note that whilst some, such as Burger and Tantaleán, name Tello

⁷⁰ It is additionally significant that Tello describes a Peruvian *civilisation*, to be read as a rebuke to V. Gordon Childe's (1892-1957) influential civilization theory at the time which deigned Peru to have failed the criteria of having fostered a "true" civilization, possessing some criteria (clearly structured society, full-time division of labour, controlling class, urbanised centres) but not others (mastery of metalwork, use of wheeled vehicles and a writing system). This framework reflected typical colonialist, racist, social Darwinistic theories of progressive Aryan civilizations as superior to "barbaric" non-European cultures. See (Fux, 2013, pp. 13–14; Tantaleán, 2016, p. 47)

'the father of Peruvian archaeology' (Burger, 2008, p. 682, 2009b, p. 3; Tantaleán, 2016), others point to Uhle's introduction of scientific archaeology to Peru to name *him* the 'the father of Peruvian archaeology' albeit emphasizing the Western hegemonic origins of its disciplinary framework (Gänger, 2006; Tantaleán, 2016, p. 29). This question of paternalism presides over the embattled epistemological foundations of Peruvian archaeology, of Western positivistic science against Indigenous cultural belief systems, which takes on new significances in analysing sonic knowledge production at Chavín. On the one hand, Uhle represents the positivist tradition of the philosophy of science - a powerful force at the end of the nineteenth century - which he imported into Peru as an epistemological framework for Andean archaeology (2016, pp. 29–30). Although Uhle adapted this to fit the Peruvian context, contemporary Peruvian scholar Tantaleán describes his approach as an "unquestionabl[y] hegemonic" imposition of Western science (2016, p. 31). As Tantaleán comments, the enthusiastic embrace of positivism from European models was underpinned by racist social Darwinism which served to explain 'backwardness' of 'inferior races' in non-European cultures (2016, p. 30). On the other hand, as described above, Tello was the product of a greater push for native Peruvians to be more closely incorporated into the national framework compounded by the Chilean occupation 1881-84 contemporaneous with Tello's early childhood (Daggett, 2009, p. 8). As such, Tello represents the Indigenous struggle for self-determination within Peruvian national identity which runs in contradistinction to the white supremacist, eugenicist ideas of racial inferiority of indigenous people; Tello's methodology sought to explain changes in culture "in a more particularistic and local manner" (Tantaleán, 2016, p. 47). Thus, Tello's position, whilst by no means a simplistic anti-positivism, was oppositional to Western influences which had reigned over archaeological work before him. His epistemology, which sits within his politically motivated work that sought to valorize Indigenous cultures, is multi-faceted vis-à-vis the role of positivism, with scholars in disagreement how much to emphasize the "social" and "scientific" priorities of his work (Burger, 2009a, pp. 77–78). These debates in archaeology, however, perpetuate prevalent cultural tendencies to occlude the Afro-Peruvian population (Dixon & Burdick, 2012; Falcón, 2008).

Given Chavín's important position in the larger epistemological struggles in the history of Peruvian archaeology, attention to the key tension between positivism and

Indigenous knowledge systems is significant for the present investigation of sonic knowledge production. It ought to be noted that a presumed incompatibility between Indigenous agendas and science continues to haunt contemporary debates, with some positively valorizing Tello's intellectual legacy as part of a wider Indigenous movement (Burger, 2009b, p. 3), whilst others interpret this as a problematic tendency towards political bias (Mesía Montenegro, 2013, p. 125). Arguments within Peruvian archaeology around national identity and foreign influence take place on a terrain where ideas of scientificity and presumed political, nationalistic bias are seen to compete. These competing systems of knowledge in Peruvian archaeology are reflected, too, in the history of the site of Chavín, although there is no reason to presume Indigeneity and positivism must be conceived as wholly incompatible, this tension is nevertheless evident in academic debates. It is to Kolar's handling of this conjuncture which this chapter now turns, situated as it in late-twentieth and early twenty-first century Peru, which Rick's site research programme takes place within.⁷¹ The tensions between these positivistic and non-positivistic epistemological mechanisms, and their impact on analysing sonic knowledge production at Chavín, will now be traced.

4.4 Sonic post-positivism at Chavín

4.4.1 An "integrative anthropological" approach

Kolar describes her approach of doing archaeoacoustics as "integrative anthropological" which "explores the interrelationships among instrumental and environmental acoustic dynamics, and considers their auditory perceptual implications" (Kolar, 2012, p. 23) and as that, "in which the physical dynamics of anthropogenic spaces and musical/sound-producing instruments are comparatively studied and anthropologically considered with respect to an archaeological context" (Kolar, 2013a, p. 147). Driven by a "cultural acoustics" (Kolar, 2013c) agenda, in the field of acoustics where cultural considerations are often neglected in preference of the measurements and modelling techniques inherited from positivist traditions, Kolar's interdisciplinary background – which incorporates arts and humanities as well

⁷¹ A more precise examination of the cultural, political and economic dynamics of the long-standing Stanford University presence at the Chavín de Huántar site lies beyond the focus of this thesis.⁷¹

as audio-technical training – has been fundamental to the body of work she has produced. Her research objectives are most clearly pronounced in a question she poses: "How would acoustics findings meld with anthropological considerations to bolster the archaeological story?" (Kolar, 2013c). The "integrative anthropological" approach which incorporates "cultural acoustics" is key to understanding Kolar's feat of interdisciplinarity which combines positivistic and non-positivistic forms of knowledge in particularly productive ways. It is clear that it is an archaeological context which intellectually grounds the terms of the investigation, and scientific-acoustic measurements are used in combination with anthropological considerations to produce knowledge. This is a key characteristic of Kolar's sonic knowledge production which exemplifies it as a version of sonic post-positivism, as described in Chapter 2.

Building on the identification of sonic (post)positivism as a general term to characterize sonic knowledge production in archaeoacoustics, I deem Kolar's work to be a grounded and methodologically advanced version of the sonic post-positivism observed similarly as a tendency across other researchers. Similar to the methodological considerations described by interviewees Fazenda, Cross and Black, Till, Díaz-Andreu, Scarre and others, sonic post-positivism describes a combination of quantitative measurement and experiment with cultural or anthropological research questions. In such approaches, the archaeological context is considered and acoustical tools and methods are used to ascertain what research questions can be viably and usefully pursued. Kolar's extensive body of work explicates this to a high degree of sophistication, with research drawing on her comprehensive knowledge of Chavín's archaeology and isolating research questions which can contribute archaeoacoustical knowledges to existing archaeological debates. Concurrently, Kolar can be found to exhibit only the general onto-epistemological position of weak sonic naturalism, which relates to the scientific-realist conception of sonic materiality described in Chapter 3. However, as sonic post-positivism is more complexly manifested in her work, this section predominantly deals with this trend.

Within the vast and rich array of possible archaeoacoustical research questions at Chavín, Kolar's sonic knowledge production addresses the questions of "*what is*

"testable" or "scientifically knowable"? Kolar's work has largely focused on scientific knowledge production and the production of testable evidence. However, this has not only entailed repeatable, verifiable quantitative experiments which might relate to proving or disproving falsifiable statements, which closely adhere to doctrines of positivism. It has also used systematic observation and descriptive testing, which do not belong to the strict hypothesis-testing of positivistic models but are closely associated with scientific practice derived from positivism. As these questions have been carefully framed within an interpretative archaeological context, this characterizes it as sonic post-positivism. As described in Chapter 2, sonic post-positivism is defined not by a total and uncritical embrace of positivistic models, but rather it denotes a mixed methodology which draws substantially on some forms of systematized experimentation. Kolar thoughtfully negotiates the problematic I identified in the thesis introduction as the *retrievability of sonicity paired with the irretrievability of aurality*. She speaks precisely to this epistemological challenge when she surmises that: "hearing a sequence of replica *pututu* echoes circling around Chavín's valley can't transmit cultural meanings from the past, but through this experience, one better appreciates the dynamics of setting that would have influenced ancient human activity" (Kolar, 2013c). Kolar's research pursues with great accuracy the material-acoustic conditions of a sounding event – its sonicity – and in the case of Chavín uses acoustic modelling tools and precise measurements as well as human participants to survey sound localization and directionality; however, she does so without importing present-day socio-cultural assumptions about listening – aurality – into her interpretations.

Following Sandra Harding's approach to questions of scientific objectivity, which draws on feminist standpoint theory and a re-appraisal of positivism's legacies in formulating a "robust" post-positivism (Harding, 1986, 2005), I suggest Kolar's work to encapsulate at core this approach of robust post-positivism. In comparison to an earlier article co-authored with CCRMA colleagues and Rick which is multi-faceted but dominated by audio signal processing analyses which can extract acoustical features from measurements (Kolar, 2012), her doctoral dissertation methodology suggests a clearer

weighting towards psychological and anthropological methods (Kolar, 2013b).⁷² Kolar's PhD thesis illustrates how, through extensive in-situ psychoacoustic experimentation with human participants in the internal gallery spaces of Chavín, evidence can be provided that Chavín's ancient sound environment could have been used as a tool for intentional and strategic manipulation of human experience (Kolar, 2013b, p. v). Further publications exemplify Kolar's "integrative anthropological" approach (Kolar, 2012, 2013a, 2017) which departs from a more traditional positivistic acoustical science approach insofar that stringent acoustic tests and measurements have been conducted, compliant with accepted acoustical science norms and practices, but in consultation with and extensive consideration of contextual archaeological evidence.⁷³

Kolar's use of psychology, in particular experimental perceptual psychology, further exemplifies this aspect of her robust sonic post-positivist approach. Psychophysics⁷⁴ - defined by Kolar as the interplay of stimuli and sensation, a sub-field of psychoacoustics, are important for the reason she lays out in her description of choosing to examine auditory localization in the thesis. Auditory localization, the sound-responsive mechanism which enables one's understanding of location in respect to physical space and other objects or beings, is taken to be one of "many aspects of

⁷² Of the six investigatory approaches listed in the 2012 co-authored article, some of which are measurement-based (e.g. "physical and acoustic analyses of the artifact shell horns"; "acoustic analyses of associated spatial contexts"; "observational tests in associated contexts using modern replica shell horns also made from *Strombus galeatus*"), some are interpretative ("interpretation of graphical/iconographic representations"), some are ethnographic ("comparative-ethnographic surveys of similar aerophones") and others involve experiential data of humans in the space ("contextualized psychoacoustic experimentation with recorded artifact or replica shell horn sound stimuli") (Kolar, 2012, p. 26). In Kolar's doctoral dissertation research, she describes three premises which relate sound and human experience she explored ((1) acoustic dynamics have predictable auditory perceptual correlates; (2) acoustic features of physical spaces can be perceptually identified and manipulated by humans; (3) auditory effects can influence the beliefs), which led to her focus in her PhD research on auditory localization - defined as "spatial orientation mechanism that informs a hearer about his or her relationship to surroundings, including objects, beings, and events" (Kolar, 2013b, p. 157)

⁷³ Kolar notes in personal correspondence that after the initial 2008 field visit, her work continued to generate data for a modelling technique envisioned by her and Abel (Collecchia et al., 2012; Kolar et al., 2010). However, her individual research focus changed substantially following the experience of the site and her realization that acoustical measurements must be grounded in archaeological research, rather than merely being a case study for acoustics, leading to her continued research at this site.

⁷⁴ The term "psychophysics" was first coined by Gustav Fechner in *Elements of Psychophysics* in 1860, in which principles for determining relations between physiological and physical events were laid out. Psychophysics, considered a subfield of psychology, has been defined as "the study of the relationship between the physical properties of sensory stimuli and the behavior this stimulation evokes." (Yost, Popper, & Fay, 1993, p. 1). The field notably introduced the notion of JND, Just Noticeable Difference, to denote the smallest perceivable difference discriminable by a human subject (Kingdom & Prins, 2010, p. 263).

auditory perception [which] are influenced by cultural context," but simultaneously one of the "sensory mechanisms that serve corporeal orientation functions for the human organism [which] can be assumed uniform in the species over time" (Kolar, 2013b, p. v). This also speaks to the retrievability-irretrievability problematic identified previously. The epistemological uncertainty which haunts archaeoacoustics as a field, particularly where "ancient" or so-called "prehistoric" cultures are concerned, is being carefully negotiated in Kolar's research design. Kolar presents how the scientific methods of acoustical and psychoacoustical science – inherited from positivism - can be used to form evidence of particular experiences of acoustic phenomena and how interpretations related to anthropological methods within the archaeological contexts can potentially be applied. Insofar as psychophysics and psychoacoustics have inherited the positivist traditions of the natural sciences, Kolar's sonic post-positivism utilises positivistic methods in a socially and culturally contextualised way. This demonstrates further how Kolar's "integrative anthropological" approach is used to reinforce the research questions in a manner that obtains compelling findings.

4.4.2 A robust sonic post-positivism

Feminist epistemologies have debated how to negotiate the inheritances of the notions of scientific objectivity given its complicated histories within Western science borne of hierarchical traditions which have excluded women (Haraway, 1997, pp. 23–40; Harding, 1986). Feminist standpoint theorists have argued for the epistemological advantage of those in marginalized positions, such as women (Harding, 1986, 1991, 2004; Hartsock, 1983; D. E. Smith, 1974, 1987). Scholars such as Sandra Harding and Donna Haraway have discussed how to *do* science given its manifold epistemological trappings and tendencies towards hegemonic modes. Harding in particular has explicitly addressed the role of positivism. Harding has pursued feminist standpoint theory as a method which could support a "robust post-positivism" that renegotiates the problematic but powerful legacies of positivism. These, in Harding's formulation can be aligned with ideas of social justice to ensure they do not perpetuate existing oppressions (Harding, 2005, p. 350). This robust post-positivism is strongly rooted in the awareness of often hidden forms of epistemological oppression and domination of politically disempowered groups, and nevertheless pursues the aims of realizing a

more just world through better practices within science. Given how central positivism has been in the development of science as a whole, Harding points out, “one can’t “just say no” to this legacy” (Harding, 2005, p. 349). For this school of feminist epistemologies, the enemy of social justice is not science itself, it is the social and political practices of science which exacerbate inequalities; positivism as part of scientific knowledge production can be negotiated using standpoint methodologies towards the purposes of social progress, thus conceived.

This feminist epistemological intervention can be considered vital for archaeoacoustics, particularly where it might pursue a methodology of *sounding situated knowledges* as outlined in the thesis introduction. Harding’s intervention resists a prevalent presumption that science can or should be free of considerations of social justice. Harding puts forward an argument which reveals a futility of many hard-fought battles of positivism. She demonstrates that the two camps of neo-positivists and anti-positivists actually have more shared assumptions than they would like to admit; they share “excessively restricted notions of ‘real science,’ good method, and social progress” and within their resistance to engaging productively with positivism lies a reticence to do the harder political and ethical work of thinking from the lives of groups disempowered by industrialized societies (Harding, 2005, p. 349). Instead of a simplistic dichotomy which reinforces an oft-implied opposition between the two, Harding’s robust, feminist standpoint post-positivism advocates for a power-sensitive use of the important legacies of positivism.

Kolar’s post-positivism exhibits the characteristics of the version of robust post-positivism Harding endorses. Not only does Kolar’s work carefully negotiate the epistemological problems inherent in archaeoacoustics to produce meaningful contributions to archaeological knowledge, she also demonstrates a sensitivity to power-knowledge dynamics in her work. For example, she alludes to historical debates around designations of Chavín as an “oracle” centre since accounts from the seventeenth century and warns of the danger of using “culturally inappropriate concepts” (Kolar, 2013a, p. 153), demonstrating the risks of projecting European concepts on pre-colonial contexts. Similarly, where technical descriptions of the *pututus’* acoustics appear as measured in Hertz (cycles per second), Kolar provides

their correspondence with musical notes clarifying in a footnote that she deems this use of Hertz as the absolute acoustic unit of measurement “archaeologically appropriate” whilst the musical designation as notes are “extrinsic to the Chavín context” (2013a, p. 152) and thus merely to enable the reader to relate through the framework of “present-day Western common practice musical notes” (2013a, p. 152). Kolar demonstrates active sensitivity in the power-knowledge dynamics of epistemological and classificatory frameworks derived from European systems of knowledge and their manner of implementation in her research, in a non-European, non-colonial context.

Gender archaeologists have similarly applied notions of feminist epistemology to the field as a counter to interpretative androcentrism in archaeology. Similarly to Harding, Alyson Wylie argues that “we must break the grip of the presupposition (held by objectivists and relativists alike) that objectivity is an all-or-nothing affair” (Wylie, 1997, p. 98). Wylie pleads for the “need for analyses of science that are at once empirically grounded (historically, sociologically, and in the sciences themselves) and epistemically sophisticated” (Wylie, 1997, p. 99). Kolar’s work exhibits both of these factors by way of its grounding in contemporary archaeological context and acoustical science, which is enacted in an epistemically thoroughly considered manner. Instead of bold and often ungrounded conjectures about “prehistoric” peoples’ habits and perceptions found in the work I characterized as strong sonic naturalism in Chapter 3, Kolar’s approach is robustly post-positivist in how it seeks out scientifically testable situations, uses quantitative measurements, and systematic observations where necessary, to meaningfully relate to the archaeological context and in how it pursues this within accepted scientific norms. Kolar’s approach, in line with Harding’s assessment, has renegotiated core tenets of positivism in declaring commitment to “good” method, the relative value of quantitative measurements to pursue particular questions and implicitly, a conviction to contribute in careful ways to scientific progress.

Nevertheless, not every aspect of Kolar’s approach fulfils the premises laid out in Harding’s characterization of robust post-positivism. The cultural and epistemological sensitivity evident above, as in Kolar’s earlier cited comments around the “cultural

inappropriateness” of certain conceptual and taxonomical frameworks, indicate that in her work as a researcher such issues are important. Yet it remains implicit rather than explicit in her published research to what degree Kolar would prioritize using post-positivism towards goals Harding refers to as “useful for the new social justice movements” (Harding, 2005, p. 347). As mentioned in the conclusion to the previous chapter, this is likely a question of research objectives which applies across the board to archaeoacoustics researchers who are engaged in sonic knowledge production. Contrasted with the nested character of this thesis’ examination of archaeoacoustics within the field of sound studies, this highlights a different set of research aims and foci which the field of archaeoacoustics and its related academic fields typically covers.

In summary, I propose that the modest references to methodological “innovations” of her project in Kolar's PhD thesis (Kolar, 2013b, pp. vi, 53) in fact demonstrate a distinctive approach to sonic knowledge production which has admirably negotiated the epistemological challenges of archaeoacoustics. Her work incorporates a carefully considered negotiation of the knowable with the unknowable in the context of Chavín. Following Harding (2005), this can be designated a robust sonic post-positivism which demonstrates exemplarily how the problematic of retrievability-irretrievability can be addressed: it avoids any conflation between the present day sonicity and the aurality of the past. This is a substantial intellectual feat which not all other researchers in the field have tackled so thoroughly and rigorously. As a version of sonic post-positivism, Kolar has negotiated the epistemological affordances, including those of positivism, within the various disciplinary fields her research faces – archaeology, acoustics, anthropology, psychology, sound studies, which coalesce as archaeoacoustics – in a highly sophisticated manner. There are however, nevertheless some epistemological restrictions of the specific set of disciplinary formations which archaeoacoustics exists within. These mean that Kolar's processes of sonic knowledge production, whilst an extremely reasonable negotiation of the field’s complex epistemological demands, does not position it to take up the potentially epistemologically ambitious challenges of the field with regards to the demands of politicized scholarship and feminist epistemologies and theories of decoloniality. This will be explored in the next chapter.

4.5 Sonic supernaturalism at Chavín

A further dimension of Chavín's sonic knowledge production for consideration was illuminated on one of the days working outside on the Plaza Mayor at Chavín, when a curious encounter interrupted our archaeoacoustics group's work. The experiment, which had been designed by one of the student participants, had been set-up and the first iteration was underway. I watched as the two students – one the instigator of the experiment, the other the first test subject – stood facing each other several metres apart on the main square, clapping in attempted synchrony at varying tempos. The procedure was being filmed by a video camera set a few metres away. A group of people led by a man appeared around the corner and approached the square, whilst the experiment was still underway. The group's leader was a slim white male in his early 60s dressed in blue jeans, a checked shirt and a cowboy hat. Members of the tourist group who were guided by him took a seat on the steps surrounding the sunken square of the main plaza. One of the women was laughing loudly, and the group sat and gazed as the proceedings unfolded. Soon after the man conversed with Kolar and the experiment leader [H.E.], the two researchers abruptly began packing up the equipment and markers for the experiment. This broke up the afternoon's work, somewhat acrimoniously for the student who had designed the experiment. As our group's experiment could no longer take place, I walked to the far end of the main square to observe the new group from a distance. Some members of the group sat in a circle around the middle of the plaza facing inwards, and one of them, a man dressed in traditional Indigenous clothes of the region including a headdress, played cane panpipes as the other members closed their eyes in a meditative focus. Group members swapped positions, taking turns sitting at the centre of the square, some in pairs or alone, and after around 45 minutes the group departed.

I found out later that this man, whom people on site referred to as "Cactus Jack," was an American citizen called Jack who owned a piece of land opposite the Chavín site. This man was known to lead guided spiritual tours; according to various blogs which referred to these tours, Jack is considered by some to be a "shaman" (Flusberg, 2017; "Shamanic Archaeology at Chavín de Huántar," 2017; Tindall, 2017). The blogs described an organized tour centred around the preparation and distribution of

wachuma "medicine," the name for the San Pedro cactus native to the region which contains mescaline, known for producing hallucinogenic effects. According to these blogs, a ceremony takes place with tour group participants, in which prayers are led in the four cardinal directions with coca leaves tasted and conch shells sounded (Flusberg, 2017). The description had similarities to the *Pachamama* ceremony I had witnessed myself on the first day of the season at the site. After consuming the liquid preparation on Jack's land, the group are driven to the archaeological site where they purchase tickets and enter the site where their tour leader speaks about the "spiritual dimensions of the temple" and the group spend time on the site, undergoing the hallucinogenic effects of the mescaline drug, with a musician guiding them throughout ("Shamanic Archaeology at Chavín de Huántar," 2017). Presumably, what I had witnessed on the site that day was one such group.⁷⁵

The appearance of the group of tourists and Cactus Jack was a reminder of the spiritual significance of the site of Chavín to many people. Cactus Jack's presence seemed to be an issue of contention amongst some members of the archaeological team; in response to my enquiries, a few individuals relayed information about Cactus Jack and spoke with some disapproval about the manner in which he entered the site and commanded access for his groups, as well as the apparent high cost of these spiritual tours. Implied within this was an allusion towards a disagreement between Cactus Jack's usage, or manner of usage of the site, set in opposition to the work of the archaeological team. Nevertheless, the group's appearance illuminated a significant aspect of the site, which may have otherwise have gone unnoticed, namely its meaning within so-called "alternative" or spiritual belief systems. These might be considered by some as oppositional to national and international administrative systems such as UNESCO and the Peruvian Ministry of Culture and contest their conceptions of land ownership, and their institutional preservation and excavation practices on the archaeological site. For these spirituality-seeking groups, the site

⁷⁵ The aforementioned academic study *The Archaeology of Shamanism* by Neil Price acknowledges a diversity of definitions and understandings of the term "shaman" and differentiates between his approach to the study of shamanism as being keenly aware of the implications on and for indigenous cultures from whom academic archaeology's understanding of shamanism is based, from the "growing popular interest in shamanism in the context of alternative spiritual philosophies" (Price, 2001, p. 10). The latter category, towards which some disdain is implied by Price, seems to resemble the practices described in the blogpost accounts of the guided spiritual tours.

experienced under the influence of hallucinogenic drugs can be a “gateway” to access levels of consciousness and in that altered state, the embodied experience of the architecture of the temple complex can for some visitors produce unique experiences of alternative worldviews (“Shamanic Archaeology at Chavín de Huántar,” 2017). In contrast to the archaeological knowledge production which I had been party to – the institutional framework with which I had gained access to the site – the spiritual tourism group demonstrates how widely cultural meanings of a site such as Chavín can vary to different groups. Indeed, the dimensions of power and knowledge play out in such tours in a markedly different way to the formal structures of archaeological study at the site.

In contrast to the spiritual tours, it is notable to examine how Kolar’s sonic knowledge production relates to these heterodox ideas. Whilst sonic (post)positivism has been identified at Chavín, Kolar’s sonic knowledge production additionally relates to a weak version of sonic naturalism. The tendency of sonic supernaturalism was identified as constitutive of the trend of sonic naturalism in Chapter 2. Insofar as sonic materiality was traced to form the shared epistemological roots of both sonic positivism and sonic naturalism in Chapter 3, weak sonic naturalism can be seen to share a similar onto-epistemological framework to sonic (post)positivism. As described previously, non-positivist knowledge, refers to all that which falls outside of the verifiable, falsifiable statements which positivism adheres to, whilst anti-positivism describes positions which deny the overall value of positivism or at least strongly refute its hegemony. The role of spiritualism or religious beliefs can be ordered under the many non-positivistic and perhaps even anti-positivistic forms of knowledge which might take place at a site, whilst also overlapping with the tendency described as sonic supernaturalism, as part of sonic naturalism.⁷⁶ As part of characterizing Kolar’s work as sonic post-positivistic, part of its groundedness, akin to that of feminist standpoint epistemologies, is acknowledging the existence and importance of non-positivist, non-falsifiable forms of knowledge, which create the context for the archaeologically grounded research questions which are pursued.

⁷⁶ Comte’s original *Course of Positive Philosophy* reads a “progression” between different types of knowledge that begins with “theological” beliefs before progressing to metaphysical, before settling on the empirical, positivistic knowledge Comte ordains is superior.

It is notable that connections between drug-induced altered states and sound are found frequently in popular press articles about Chavín which bear headlines such as "The Sound of History: Mescaline, Music, and Terror" (Solomon, 2012).⁷⁷ As I described of the field of archaeoacoustics at large, it is similarly evident that popular interest in archaeoacoustics at Chavín played some role in driving the popular interest of the site, which has in turn contributed to the growth and development of the academic research. Yet the journalistic pieces, although considered likely "unserious" by some, are not completely without grounding in the academic literature and indeed reflect ideas within Rick's published academic work on "shamanic" practices at Chavín (Rick, 2005; Sharon, 2006). The architecture, the depiction of anthropomorphic figures apparently under the influence of narcotics, the iconography representing processions involving San Pedro cacti, the excavation of tools and utensils for drug preparation and ingestion suggest to Rick that "shamanistic" practices were likely at the site (Rick, 2005). This content of blogposts from spiritualist enthusiasts is not dissimilar to Rick's conjectures about the site: "the recreation of a different physical world, in which the participant is divorced from this world reality, and immersed in an intentionally-constructed alternative reality.... When complemented with ingestion of psychoactive substances, with manipulation of sound, light, and probably action and effects we are not able to detect archaeologically, this setting of context could be extremely effective" (Rick, 2006, p. 110). Evidence-based conjectures such as these, whilst fulfilling certain stereotypical ideas about ritual cultures commonly found in anthropology, do have archaeological grounding within the context of Chavín. The connection between sound and the magical or mystical, found in archaeoacoustics work more largely (and which I described as a tendency of sonic supernaturalism in

⁷⁷ The full title of this article was "THE SOUND OF HISTORY: MESCALINE, MUSIC, AND TERROR - How the ancient priests of Peru's Chavín de Huántar may have manipulated sound—and drugs—to manipulate their followers — and how we found out about it through the new field of "archaeoacoustics."" (Solomon, 2012). In another article entitled "Was sound the secret weapon of the Andean elites?" the author begins with an account of a hallucinogenic experience induced by the San Pedro cactus before proceeding on to a description of the archaeoacoustics research work being done on the site (Brooks, 2008). Another article chooses to foreground this aspect of the site too - In an article in the *National Geographic* about archaeoacoustics, the author writes, "The effect [of dense early acoustic reflections], as well as the complicated floor plan, can be so disconcerting and disorienting that the team speculates the labyrinth was intentionally designed to confuse people inside. Psychoactive drugs may also have been used to heighten the effect, based on evidence at Chavín. For example, stone sculptures seem to show people in the maze transforming into animal-like deities with the aid of drugs" (Than, 2008).

Chapter 2) are also found in the research at Chavín.

In contexts such as Chavín's, spiritual belief systems are often denigrated or relegated to a lower level of cultural hierarchy in comparison to scientific-positivistic ones. Some of the popular press articles about the archaeoacoustic research at Chavín approaches from similar angles to those described in Chapters 1 and 2, where relations between sound and spirituality were enthusiastically affirmed. In a sociological study of so-called "paranormal" experiences, Wooffitt reminds us of the "powerful cultural scepticism" which surrounds people who claim to have had these paranormal experiences, partly attributable to the way these often appear to "undermine...scientific orthodoxy" (Wooffitt, 1992, p. 1). A similar cultural scepticism is found where spirituality and scientificity appear to come into confrontation with one another. Whilst these endeavours are more often aimed at ascertaining the "truths" of a site and cultural practices within it, an approach of *sounding situated knowledges* might instead examine the truth-effects which considers not only the inferior role placed upon spiritual belief systems compared to academic knowledges, but also the potential fetishization and instrumentalization of these for individual gain. Some of these spiritual practices regarding a three-thousand-year-old site such as Chavín, for example, might not fully acknowledge the suggestions in archaeological research such as Rick's which alongside suggestions of the use of hallucinogenic drugs, music, sound, light effects in ritual scenarios, neglect the larger context which he proposes to be connected to, namely the formation of elite hierarchies, authority and power (Rick, 2005). Such a selective understanding of certain "supernatural" aspects of a site evidence the need for a more situated and sensitive cultural understanding of archaeological sites, within their present cultural and political contexts, as post-processual archaeologists remind us, the past is never separable from the present.

Kolar's approach to sonic supernaturalism resembles those which foregrounded the sonic-affective curiosities within scientific-rationalistic prisms rather than those which more affirmatively embraced an uncritical relation between sound and the supernatural. Kolar's framing of sound and the supernatural ties directly with socio-cultural hypotheses around the site's uses, "[t]he sensory landscape of Chavín matters because there is evidence that cult leaders used it to establish and enhance their

religious authority" (Kolar, 2013d). Kolar's reference to religious authority is grounded in archaeological context and evaluates it in terms of the manipulation of sensory perception for the purposes of establishment of elite authority. Kolar's sonic knowledge production acknowledges heterodox knowledge paradigms such as the religious or "spiritual" dimension of sonic practices, while neither negating the notion of experiences involving sound being powerful and transformative as part of ritual activity in the context of Chavín, nor partaking in uncritical affirmation around the spiritual power of sound. As such, Kolar's sonic knowledge production relates to the "unknowable" in a contextually-founded and conceptually and methodologically reflexive manner. It allows space for, the existence of and potential importance of non-positivistic knowledges.

4.6 Conclusion

My week as observer-researcher in Chavín archaeoacoustics enabled me to examine Kolar's sonic knowledge production as it related to the *in situ* experience of the site closely. Kolar's characterisation of her method as "integrative anthropological" describes how her methodology seeks to address archaeoacoustic research questions, which is by fusing disciplinary norms from acoustics and psychoacoustic experiments with archaeological research of the site of Chavín. My characterisation of her sonic knowledge production as sonic post-positivism, as one of a variety of possible approaches to sounding situated knowledge, helps to identify Kolar's practice in comparison to other archaeoacoustic researchers (as analysed in Chapter 2) who evidenced a less reflexive and multi-faceted approach. The practices at the more "ungrounded" side of the spectrum (analysed in Chapter 2 as strong sonic naturalism) might use quantitative measurements, but might not be sufficiently situated to designate it post-positivist in the way Kolar's practice exemplifies. In closely observing and describing Kolar's processes of sonic knowledge production, whilst it remains implicit in her own articulations of her methodological and epistemological framings, I have characterized her approach as a careful negotiation of the legacy of positivism as a robust sonic post-positivism. Within this characterization there are other facets of her sonic knowledge production: her precise audio technical and acoustic measurement techniques, systematic observations, close adherence to accepted

protocols of scientific procedure, isolation of the “knowable” within the “unknowable”, embeddedness within academic archaeological knowledge production structures and debates, epistemological groundedness vis-à-vis the challenges of ancient or “prehistoric” cultures, careful negotiation of the spiritual or religious dimension of sonic experiences.

These characterizations inform my description of Kolar’s sonic knowledge production as “situated” in a Harawayan sense, as outlined in the introduction to this thesis. This stands in contrast to the more ungrounded tendencies within strong sonic naturalism I observed in some archaeoacoustics researchers, as described in Chapter 3. The situatedness of Kolar’s sounding knowledge production processes correlates to the robustness prescribed by Harding’s standpoint methodology of post-positivism in science studies. Whilst Kolar’s work shares many of the broad tendencies I observed in the field of archaeoacoustics overall – in the way it decentres visuocentrism, acknowledges heterodox knowledge paradigms and negotiates conceptions of a sonic supernaturalism. The strong sonic naturalism which perpetuate “innocent listening”, in which sound and auditory experiences are often associated with vague ideas of a “better”, “more natural” and “less artificial” sounding past (a limitation I identified in the epistemological ambitions of archaeoacoustics), are not found in Kolar’s work. However, regarding the degree of political-ethical engagements as Harding’s standpoint methodology proposes, there are no explicit commitments to politicized or social-justice-oriented scholarship found in Kolar’s work. As described above, this is ascribable to the larger field of archaeoacoustics, rather than a neglect in her already multi-faceted research.

Where Haraway describes how scientific knowledge production should entail situatedness and embodiedness, as well as accountability and responsibility (Haraway, 1988), I have argued that overall the field of archaeoacoustics has the tendency to lack this form of “situatedness” (Goh, 2017). As I demonstrated, it is often the case in archaeoacoustics that the knowledge being produced is embodied in the sense of entailing physical fieldwork research processes and bodily experiences of listening, but some of this research and its collection of data has methodological and analytical shortcomings. Kolar’s approach of sonic post-positivism demonstrates the strongest

example in the field so far of sounding situated knowledges – a research methodology which foregrounds accountability and responsibility on many complex levels. According to this understanding, sounding situated knowledges is a broader umbrella term for reflexive and accountable processes of sonic knowledge production which can be undertaken in various manners, of which sonic post-positivism is one possible methodology. Kolar's sonic knowledge production perpetuates neither strong sonic naturalism nor does it abuse its sonic positivistic methods. The use, typically, of quantitative measurements to use towards the evaluation of propositional statements, is undertaken by Kolar in her method of sonic post-positivism, however, the use of quantitative measurements alone does not ensure that a study is well grounded in archaeological context, or that it reasonably produces sonic knowledge about a site.

Within Kolar's sonic post-positivism there is a sensitivity to negotiating the epistemological grey-areas of archaeoacoustics. This has been termed variously throughout this chapter as the "untestable", the "unverifiable", the "unqualifiable", which amounts to an uncertainty and an unknowability in archaeoacoustics, as acknowledged in Kolar's approach. Indeed, it is the non-positivistic knowledges which are excluded from the domain of "science", which have repeatedly occurred, often implicitly rather than explicitly, throughout this chapter. In the next chapter, I will examine how sonic knowledge might go beyond sonic (post) positivism, using the case of Chavín specifically. In addition to the interventions of feminist epistemology to critique and build upon masculinist traditions of modern Western science, the "criss-crossed" nature of Peruvian archaeology and Chavín's specific place within that history, it will be examined for the implications of *decolonising* sonic knowledge production.

Chapter 5 - Chavín's Sonic Knowledge: Towards an aural gnoseology

5.1 Introduction

Sitting at my desk in the British Library, I peer with fascination at a photograph of an intricately engraved *pututu* conch shell horn excavated at the Chavín de Huántar site. Etched onto its surface towards the mouth-end are several rectangular faces in profile, positioned in alternate up-down rotation along a thick zig-zagging line, with other complementary geometric embellishments making up a maze-like motif on the body of the shell. Each face possesses one comically large eye and a set of gritted teeth, which look back at me with mischievous cartoonish effect. Viewing the picture in detail, one sees that the majority of the engraving is etched widely and deeply, whilst a few of the lines are only scratched lightly as a single line onto the surface, as if the artist meant to return at some point to deepen the lines into thicker ruts, but then never did. I had seen this very *pututu* horn during my visit to the Chavín museum in July 2018. I had stood in front of it amongst the eighteen other *pututus* displayed behind the glass cabinet windows. Yet the extremely high-resolution photograph gives me much more visual detail and greater proximity than I had had standing in the museum.

Some of the horns which Kolar had acquired for the acoustic tests at the site during the 2018 fieldwork were versions of conch shell of the same species of the engraved *Strombus Lobatus galeatus pututus* such as the one I was now staring at.⁷⁸ Thousands of miles away from Chavín in the hushed silence of the British Library reading room in London, several months on from my trip to Peru, I could still conjure the sound of the horns in my head, a piercing sensorial memory from the lengthy experiments we had

⁷⁸ Kolar and colleagues associated with the Chavín de Huántar Archaeological Acoustics project formed at Stanford University's Center for Computer Research in Music and Acoustics (CCRMA) had undertaken extremely precise acoustical testing of the site-excavated Chavín *pututus* in 2008. During their September 2008 Chavín research visit, archaeologist John Rick had invited expert Andean instrumentalist Tito La Rosa to join the Stanford group to perform on the actual Chavín *pututus*; for the research I observed in 2018, a mixture of *Strombus Lobatus galeatus* replicas were used, and for comparison a *Strombus Lobatus peruvians*, with amateur players from our collaborative team performing them. Throughout Kolar's site research during 2008-2012, and more recently in 2017-19 fieldwork, Kolar and collaborators performed replica *pututus* as sound sources in various forms of archaeoacoustics research at the site (e.g., (Kolar, 2014a, 2014b; Kolar et al., 2019)).

undertaken there. Yet from this vantage point at my desk, experience and knowledge of Chavín has transformed into something else. Examining Chavín's sonic knowledge in this setting was far removed from the embodied experience of the site, its cold but bright outdoor spaces, and its dark and narrow indoor stone-walled spaces, and the sights, sounds, and smells of the Andes highlands were now bodily memories. The *pututus* have transformed from being physical, sounding objects with cold, hard surfaces, resonating in the indoor and outdoor spaces in sonic experiments at Chavín, into being images on the pages of a book, objects of academic archaeological interest and incorporated into the historically Eurocentric institutionalisation of scholarship.⁷⁹

The *pututus*, as approached by archaeologists centuries or millenia after they were initially made or used by ancient cultures, exist within the longstanding problematic of "reading the past" through material remains which archaeologists face. Whilst contemporary post-processualist archaeologists⁸⁰ acknowledge the challenges of creeping assumptions about agency and cultural meaning often inadvertently made in archaeological research, they nevertheless strive towards understanding the remains of material cultures from their archaeological contexts and how they might have related to human behaviour, "artifacts do speak (or perhaps faintly whisper), but they speak only a part of a dialogue in which the interpreter is an active participant" (Hodder & Hutson, 2003, p. 172). The *pututus* are actively engaged in dialogue when used in Kolar's research; addressing how they are used, understood and theorised as sonic objects is crucial to how they function within Kolar's sonic knowledge production. Kolar's archaeoacoustic research encompasses not only advanced acoustical understandings of the *pututus* as sound-making devices, but incorporates all elements of communication which might involve sound and listening, including the *pututus'* acoustic interaction with architectural space and other acoustic phenomena

⁷⁹ The book *Chavín: Peru's enigmatic temple in the Andes* which the photograph appears in is part of long-standing international collaboration between the Museum Rietberg in Zürich, Switzerland and the Peruvian Ministry of Culture, occasioned by an archaeological exhibition on Chavín at the Museum Rietberg in 2012-13.

⁸⁰ Processual archaeology, or "new archaeology" came to prominence in the 1960s and 1970s and embraced positivist epistemologies and sought to derive methodologies from physical sciences to study observable phenomena and explain archaeology as a science. Post-processual archaeology, since the late 1970s and 1980s emerged as a criticism of the positivistic approach which downplays the importance of culture, particularly the cultural meanings of the observers (Trigger, 2007, pp. 29–30). Broadly speaking, processual and post-processual archaeology can be likened to structuralism and post-structuralism respectively.

at the site as grounded in archaeological context.⁸¹

As described in the previous chapter, the challenges Kolar deals with is how to better understand sound and listening at Chavín through acoustical studies. Her sonic knowledge production at the site is aimed at characterizing material-environmental acoustical dynamics, which enables the theorisation of a range of potential sound-related behaviours at the 3000-year-old Central Andean ceremonial temple complex. Kolar's approach to sonic knowledge production at Chavín has been one of a careful handling of the complex questions which underpin the potential uses of sound and listening at the site, described in her own words as "cultural acoustics", part of a broader holistic 'integrative anthropological' approach. In addressing the question of "*what is considered "testable" or "scientifically knowable"*" in a methodologically and epistemologically sophisticated manner, Kolar's approach was characterized as a particularly robust form of sonic post-positivism. As I traced, Kolar's process carefully derives from positivist and post-positivist traditions and uses hypothesis testing, systematic observation and measurement (as defined in the previous chapter) incorporated within relevant contextual-cultural archaeological questions. I defined her knowledge production in line with Sandra Harding's proposal of a "robust post-positivism" referring to standpoint methodologies' careful and nuanced ways of negotiating positivism with the social, political and cultural dynamics of power-knowledge production and related ethical concerns (Harding, 2005). Kolar's work, executed to high degrees of accuracy and professional-intellectual competency is epistemologically grounded, which, true to standpoint epistemologies, carefully relativises the potential gains made by scientific methods according to larger socio-cultural questions. Kolar's project is an intellectually indispensable project for the site of Chavín, illuminating potentials for sonic practices and uses of the spaces which other non-sonic archaeological methods have been unable to access.

This chapter enacts a shift from an archaeoacoustician's focus on objects and material cultures, such as the *pututus* themselves, the sonic spaces of Chavín and potential uses

⁸¹ For example, in her 2017 article, Kolar describes experiments around systematic auditory localization at Chavín de Huántar to understand the acoustic features of ancient built architecture, including relevant visual iconography depicting sonic phenomena (Kolar, 2017).

of them millennia ago, to focus instead on the larger social, cultural and political contexts of sonic knowledge production. This can be understood as a move from understanding the term “archaeology” as an academic discipline, to methodological Foucaultian archaeology which studies *discourses* as the formation of knowledges. Excavating discourses instead of materials themselves, a description of the larger order of institutions, knowledges, discourses and practices which organise the “episteme” (Foucault, 2001), I aim to trace the material-discursive knowledge histories which have led to the emergence of Kolar’s sonic (post)positivism at Chavín as the predominant form of sonic knowledge production at the site. This refers back to the *nested* character of sonic knowledge production described in the thesis introduction. Archaeoacousticians’ own pursuit of knowledge is nested within my observation of their processes. Although these are not entirely separate domains, theorizing *from* them corresponds to a different set of research questions. Whilst I do not produce knowledge which directly aids archaeological understanding of Chavín, by exercising a mode of cultural critique, I hope instead that through the dialogic character of critical reflection to nevertheless contribute expansively to the notion of sonic knowledge production as a whole.

The analysis of the previous chapter foregrounded the ways that archaeoacoustics remained largely within the conventions of academic knowledge production and the corresponding “here” of European epistemological paradigms which is hegemonically shaped by historical-intellectual structures of post-Enlightenment late industrial Western cultures. As yet, questions which push beyond, into a potential political-philosophical “elsewhere” of sonic knowledges have not been addressed. In this chapter I use the case study of Chavín to offer several avenues that could be taken to pursue a sonic alterity which sits in some opposition to the hegemonic “here”. Kolar’s robust sonic post-positivism as it adheres to conventions of scientific practices and asks reasoned contextual questions about the acoustics of Chavín, nevertheless necessarily exists and thrives in the academic archaeological cultures which validate the work. Yet whilst honouring the breadth and depth of her research, this chapter probes deeper into the epistemological structure of the Chavín episteme and seeks what could be beyond the conventional onto-epistemological frameworks.

In the first section of this chapter, an episteme corresponding to the scientific practices currently used in contemporary Chavín will be formulated, in order to articulate and understand the emergence of sonic post-positivism as the predominant mode of sonic knowledge production at the site. Similar to the characterisation of the hegemonic “here” of Eurocentric knowledge paradigms outlined in the thesis introduction, this episteme will be explicated as a set of relations which subjugates certain knowledges (Foucault, 1980, p. 82) specific to its cultural and historical context in Peru. Following Boaventura de Sousa Santos, the epistemic conditions of Chavín form “on the abyss” in that they maintain a visibilisation and concurrent invisibilisation of certain forms of knowledges. As a hegemonic manifestation of Eurocentric epistemologies, Chavín’s epistemic conditions will be characterized by traits such as: representationalism, androcentrism, positivism, visuocentrism, Cartesianism, biocentrism and individualism. Archaeoacoustics work at the site has already challenged the visuocentric bias of the Chavín episteme. However, as this section addresses, if left uninterrogated, other aspects of sonic knowledge production may continue to perpetuate the visibility of “qualified” knowledges and the invisibility of “subjugated” knowledges.

In the second part of the chapter, I introduce a theory of *aural gnosis* to address the areas of knowledge neglected by sonic (post)positivism. Aural gnosis is proposed as a notion which can navigate beyond the hegemonic “here” of sonic knowledge production. Drawing on decolonial theorists and theorists of Latin America who have written on the marginalisation of Indigenous intellectual and philosophical knowledge traditions (Mignolo, 2000; Quijano, 2000; Santos, 2014), alternative ‘sonic ways of knowing’ (Henriques, 2011) are explicated which can be considered as part of these counter-epistemological endeavours. Attention is shifted to etymological roots to justify the shift to “aural gnosis” as a term – instead of drawing on the Greek *episteme* as a scientific form of knowledge, following Mudimbe (1988) and Mignolo (2000), the Greek word *gnosis* is used to propose aural gnosis as a way of theorizing sonic knowledges disqualified by the hegemonic epistemic conditions of Chavín. Using Eduardo Viveiros de Castro’s anthropological-philosophical theory of “perspectivism” (Viveiros de Castro, 1998, 2014) and Mary Weismantel’s reading of perspectivism at Chavín (Weismantel, 2015), a “diffractive” methodology (Haraway 1997) will be

advanced as a heuristic to negotiate sonic alterity in the context of aural gnosis.

In the third part of the chapter, this theory of aural gnoseology is tentatively applied to Chavín to probe how sonic knowledge production, beyond sonic positivism, might manifest. Sonic knowledges are proposed as being capable of rupturing conventional ways of thinking and doing archaeology. Sensorial regimes are culturally specific and so, the *pututus*, the sounds they make and their physical usages are part of cultural relationships which archaeologists seek to interpret. Following multi-sensory archaeologist Hamilakis, we can resist regarding the *pututus* as part of a drive to accurately *represent* the past through sound or the other senses, but instead start to re-conceive the *pututus* as part of entangled affective relationalities between materials, bodies and things (Hamilakis, 2013, pp. 1–15). Valuing sensorial experiences in a manner contrary to Western philosophical traditions' dismissal of the body, open up possibilities for alternative knowledge paradigms which dismantle or dislodge hegemonic dualisms such as those of nature-culture, mind-body and so on. Illuminating the known characteristics which constitute the limitations of Chavín's hegemonic episteme, speculative probes are sent into Chavín's sonic "possibility space"⁸² to enquire into whether these modes might provoke reconceptualisations of notions of "knowledge". Archaeoacoustical encounters are entangled affective relationalities which, when understood according to situated political and ethical responsibilities, may begin to open up to larger range of possibilities for knowledge. Although the knowledges of Chavín will likely remain substantially opaque (Glissant, 1997), identifying the limitations of the epistemic regime which currently conditions how knowledge is produced there will help gesture towards some ways that aural gnosis could potentially open up sonic knowledges to previously neglected areas.

5.2 The Chavín episteme

5.2.1 The idea of Chavín - Tracing the Abyss

To recapitulate the present epistemological challenge: Chavín culture was thought to

⁸² This term is a reference to Kodwo Eshun's *More Brilliant Than The Sun: Adventures in Sonic Fiction*, a highly inventive work on sound and music oriented "theory-fiction", which proposes to "drill[] into new levels of possibility space" (Eshun, 1998).

have reached its height around 3,000 years ago, at around 800 BCE, no written records remain from the site's original builders; written records document its existence from the colonial era from the sixteenth century onwards, academic archaeologists have been excavating and theorising about Chavín culture since around the turn of the twentieth century and archaeoacoustics testing in the site began after decades of academic archaeological work.⁸³ Archaeoacoustics faces the substantial epistemological challenge of emerging in a post-colonial condition while at the same time seeking to produce knowledge about a pre-colonial context. The Spanish conquest, often marked by Columbus's 1492 arrival in America – and referred to in Indigenous Latin American thought as *Pachakuti* (“pacha”, meaning time, space or the world, and “kuti”, meaning reversal, upheaval, revolution in Quechua), as a turning upside down of civilization – has indelibly changed the history of Chavín, Peru and Latin America more largely. The ensuing complex political, economic and cultural histories of Spanish colonialism since the sixteenth century up until the present day – including the end of the Inca Empire in around 1532, the Spanish establishment of the Viceroyalty of Peru, the wars of independence leading to Peru's declaration of independence in 1821, the foundation of the Republic of Peru and the cultural and political histories that followed – have shaped the conditions of academic knowledge production including archaeology and archaeoacoustics in the Central Andes where Chavín is located. The Chavín episteme is proposed as a term which encapsulates the present set of relations between systems of knowledge which operate hegemonically to condition knowledge production at and around the site.

The Chavín episteme must be understood as having arisen within Peruvian and Latin American history as part of the “invention” of “the idea of Chavín” as an epistemological construction. This leans upon work by scholars such as Mexican historian and philosopher Edmundo O’Gorman who has criticized the Eurocentric terminology of the Columbus’s or Vespucci’s “discovery” of America which disregards the cultures and civilisations of indigenous societies on the lands now referred to as “America”. O’Gorman refers instead to the “*invention* of Latin America” to foreground its construction as a product of the universalistic worldview of Western thought [1958]

⁸³ 1919 was the date of the first institutional archaeological expedition to Chavín led by Julio C. Tello with the Universidad Nacional Mayor de San Marcos.

(O’Gorman, 1972).⁸⁴ Argentinian philosopher Rudolfo Kusch, who resisted using the term “Latin America” and instead referred only to “América” (Mignolo, 2010, p. xiii), wrote on the opposition which “indigenous logic” and “popular thinking” can pose to European colonising forces (Kusch, 2010, pp. 70–80; 115–123). Mignolo has suggested the phrase the “*idea* of Latin America”, reminding us that “Latin America” does not exist without European colonizers’ division of “Latin” and “Anglo” America and historical imperial battles between European powers (Mignolo, 2005, pp. xiii, 3). Therefore, the idea of Chavín as it has been constructed historically and as it is constructed today is inseparable from the coloniality of power⁸⁵ and the Eurocentric histories which have produced it.

Five hundred years since the colonisation of Latin America by Spain, the diverse historico-structural processes that have enfolded power and knowledge have manifested themselves complexly in the Chavín episteme. As Peruvian historian Henry Tantaleán notes, Peruvian archaeology came into existence in the nineteenth century due to European and North American economic and academic interest (Tantaleán, 2016, p. 152). The accounts of Spanish chroniclers of Chavín mentioned in the previous chapter, from 1549 (Pedro de Cieza de Leon), 1593 (Archbishop Toribio Alfonso de Mogrovejo), and from 1613 by Jesuit scholars, took place within a knowledge formation of “colonial mercantile philosophy” (Dussel, 1985, p. 10) in Latin America and developed in the image of European institutions.⁸⁶ Peruvian independence preceded the second colonial age, led by France and England in the second half of the nineteenth century, when racial classifications and dynamics shifted to further cement white European superiority over Amerindian and Black populations, an ethno-racial paradigm emerged which Mignolo describes in the following way, “Creoles in ‘Latin’

⁸⁴ Similarly, Stuart Hall’s *The West and the Rest* demonstrated the differing discourses constituting the “West” and its other and that neither “the west” nor “the rest” can be flattened to a unified, homogenous geographical location (Hall, 1992b). Concomitantly, Eric Wolf’s 1982 *Europe and the People Without History* (2010) mocked the conceited idea that only Europeans can make history and traced centuries of globally connected labour relations from 1400 onwards showing how non-Europeans have not lived in a timeless past as anthropologists had previously often conceived of.

⁸⁵ Quijano distinguishes “colonialism” as the colonial period and contemporaneous processes from the broader, deep-reaching effects of “coloniality” which describes the diverse manifestations of colonialism’s aftermath which persist until the present day.

⁸⁶ The San Marcos University founded in Lima in 1551 had a famous centre of philosophy, drawing from European traditions (Dussel, 1985, p. 10). Later in the eighteenth century, the Jesuit order led so-called “Indian reductions”, settlements for indigenous Amerindians converted to Christianity, which became important centres of knowledge production.

America had to rearticulate the colonial difference in a new format: to become the internal colonizers vis-à-vis the Indians and Blacks while living an illusion of independence from the logic of coloniality” (Mignolo, 2005, p. 86). The occlusion of populations descended from African slaves in the archaeological debates between Indigenous and European actors mentioned in the previous chapter can be understood to be a result of this dynamic.⁸⁷ Therefore whilst accounts of archaeology are partial and incomplete as a result of wider cultural and political issues in Peru, some of the complexities specific to this region shape the Chavín episteme.

The predominance of positivistic forms of knowledge is a key characteristic of the Chavín episteme. In the previous chapter I traced the battle that took place within Chavín’s archaeological history between positivism and Indigenous thought from the nineteenth century onward. This came to a head in the debate between German archaeologist Max Uhle and Peruvian archaeologist Julio C. Tello.⁸⁸ The dynamic nature of Peruvian archaeology (Tantaleán, 2016, p. 18), with its movement across the two poles of positivism and Indigeneity, reflects how these two categories are not separate but have been historically entangled from the late nineteenth century onward. Understanding modernity as inextricable from the material processes of European colonialism (drawing on the coupling modernity/coloniality) (Dussel, 1985; Escobar, 1995; Mignolo, 2000; Quijano, 1971) and Enlightenment rationality and its concurrent preference for rationalistic, positivistic science (Santos, 2007), Chavín’s archaeology can also be understood as a struggle existing within colonising and decolonising intellectual forces. All knowledge production at the site, including Kolar’s, is marked by this intellectual inheritance.

The Chavín episteme inherits many of the characteristics of the hegemonic “here” of

⁸⁷ One of Sylvia Wynter’s contributions with regards to South America is confronting the colonial project’s reliance on labour force and foregrounding its provision by both by indigenous people *and* African slaves, thus breaking the oft-narrated dichotomy between “Indians” and “Europeans” (Mignolo, 2005, pp. 103–104). The higher “ethno-class” subordinates the lower ethno-class (Wynter, 2000, p. 201) and the power relations between various ethnic groups in South America broadly designated those of European heritage, Indigenous people or “Indians” and Afro-descendent Blacks plays out along “pigmentocratic” lines (Telles, 2014).

⁸⁸ The criss-crossed nature of Peruvian archaeology as described by historian Henry Tantaleán (Tantaleán, 2016, p. 18) is represented by the two opposing poles of Max Uhle’s positivistic legacy in the foundation of archaeological science in Peru and Julio C Tello’s “nationalistic *indigenismo*” (Tantaleán, 2016, p. 49), as described in the previous chapter.

European knowledge paradigms. These include: Eurocentrism, capitalistic modes, androcentrism, visuocentrism, representationalism, positivism, Cartesianism, biocentrism, individualism *and positivism*. This non-exhaustive list indicates the key elements under consideration for this investigation. For Santos, cognitive injustices caused by the hegemony of Eurocentric critical intellectual traditions have led to the “abyssal thinking” of Western thought. Modern Western science represents the archetype of abyssal thinking: a historically dominant approach to knowledge production which has divided knowledge into ‘visible and invisible’ domains (Santos, 2014, p. 118). The hierarchisation of the “scientific” over the “non-scientific” has led to explicit and implicit universalisations of European ‘scientific’ knowledges over presumed traditional, local and particular “non scientific” knowledges (Santos, 2014, p. 200). This has been the case for positivistic and non-positivistic knowledges at Chavín.

The process of domination, ordering and organization of knowledge in the context of archaeoacoustics’ interventions in Chavín, has prioritised positivistic sonic knowledge production and neglected non-positivist knowledges. According to Santos, logical positivism and scientific rationality inherited from the Enlightenment have created the “abyssal thought” of Western modernity. Conceiving of knowledge production around Chavín as an “abyss” is useful insofar as it serves to make tangible the structural production of discursive formations which, although haphazard, follow logics of knowledge-power which have enabled the qualification of some knowledges and the subjugation of others. Some knowledges sit “above” the visible line, whilst others have been lost to the abyss. Not only have they been subjugated, however. The concept of the abyss foregrounds how the historical-structural forces of colonialism deny the existence of certain forms and practices of knowledge, whilst other types of knowledge production have become the locus of knowledge as such.

The domination of Eurocentric knowledge has had the effect of totalising the range of possible knowledges available thereby making certain knowledges inaccessible. Santos terms this process as a tragic loss; it is a “minimal knowledge that closes the door to many other ways of knowing the world [...] a sad and disenchanting knowledge”(Santos, 1992, p. 27). “Unqualified” knowledges which are subjugated might be those which are non-positivistic, unknowable, tacit or otherwise beyond the

conventional framework of knowledge production. Santos proposes “epistemologies of the south” or a “teoría povera” as a political-philosophical theory of marginalization and resistance against the limitations of Western-centric political imaginations (Santos, 2014, p. ix). How these epistemologies of the South manifest in sonic knowledge production at Chavín will be addressed below.

The role of gendered and capitalist relations play significantly into the construction of the Chavín episteme and accordingly shape sonic knowledge production at the site. Feminist scholars such as Catherine Walsh (2016), Gloria Anzaldúa (1987) and María Lugones (2007) have refuted androcentric accounts of coloniality/modernity and demonstrated the inextricability of gender and sexuality from processes of colonialism and capitalism in Latin America. The subjugation of non-European people which has been fundamental to the modern/colonial economic and ideological project has had particular effects on non-European women and gendered relations consequently. Lugones describes how the modern/colonial gender system worked to solidify European ideas of heterosexism in Latin America (Lugones, 2007, p. 189, 2010, p. 743). Sexual dimorphism and heterosexism exemplify how the colonial/modern gender system imposed European gender relations onto colonized peoples: “global, Eurocentered capitalism is heterosexualist” (Lugones, 2007, p. 201). Ann Laura Stoler has shown that despite Foucault’s own analytical omissions regarding race, a critical re-reading of eighteenth and nineteenth century European discourses of sexuality cannot be read separately from projects of imperialism and the subjugation of racialized bodies (Stoler, 1995).

In the formation of the Chavín episteme, however, Manichean conceptions of “bad” colonising against “good” decolonising forces must be resisted. Regarding the example above of how gendered relations relate to capitalism and coloniality, it would be a mistake to imply that the pre-colonial Andes was a utopian “non-patriarchal” and egalitarian system. Decolonial feminists have instead identified different forms of patriarchal relations in the pre-Columbian Americas and argued for a framework which acknowledges the historically distinct formation of gendered relations which ensued as a result of European colonial domination of the region, rather than as an absence of patriarchal domination (Walsh, 2015). Likewise, although archaeologists and

anthropologists have theorised at length the development of social inequality in various ways (Paynter, 1989; Sanderson, 1995), there is no reason to believe that pointing to “pre-capitalist” systems implies that social inequality did not exist. It follows that we must conceive of capitalism, colonialism and patriarchy as macro socio-economic structural forces which in their *specific* modern/colonial manifestations have penetrated knowledge production in Chavín, Peru and Latin America in particular ways. It is perhaps more useful to speak of “non-patriarchal”, “non-capitalist” and “non-modern”, aware of the implied progressivist teleology which the “pre” supposes.⁸⁹

As mentioned previously, the dangerous propensity to universalize from a Eurocentric subject position can be traced within colonial histories. Wynter’s theory on the over-representation of “Man,” and its historic conflation with “human” has been brought to bear over the notion of sonic materiality in order to understand how this might have become prevalent in archaeoacoustics. The “Coloniality of Being/Power/Truth/Freedom” (Wynter, 2003) pervades knowledge production at Chavín, in that, subjectivities and the existence of “genres of human” have been lost to an abyssal analytical framework. The effects of five hundred years of colonialism and its aftermath have precipitated the equation of Western, European ‘Man’ with the ‘human’ as such; “the *history* of Man, therefore, narrated and existentially lived as if it were the *history-for* the human itself” (Wynter, 2000, p. 198). Wynter proposes the idea of “genres of humans” as an historical prism to counter this Eurocentric narrative. Such a prism would account for the inferiorisation of Black and other non-white humans (Wynter, 2000, pp. 199–200) in the processes of coloniality and the epistemological consequences that followed; namely the subsuming of genres of human to the dominant epistemological paradigms of European Man. Thus, it follows that within the Chavín episteme “genres of knowledge” have been lost with the conflation of Man with the human as such. With regards to knowledge production at the site, this plays out in the dominant status accorded to positivistic science in

⁸⁹ This draws from Lugones’ statement: “I call such ways of organizing the social, the cosmological, the ecological, the economic and the spiritual *non-modern*. With Aparicio and Blaser and others, I use non-modern to express that these ways are not premodern. The modern apparatus reduces them to premodern ways” (Lugones, 2010, pp. 742–743). The decision to use “pre-colonial” or “non-colonial” at various points in this thesis is context dependent and to aid the readers’ clarity and is not intended to uncritically reimpose a progressive historical teleology.

arbitrating truth and knowledge. At Chavín, the epistemological conditions which subordinate certain genres of sonic knowledge are hidden from site because they fundamentally totalise the field of knowability. Sonic positivism, as the dominant form of sonic knowledge has thus come to dominate the ecology of sonic knowledges at Chavín.

5.2.2 Sonic post-positivism

Kolar's approach to sonic knowledge production at Chavín, defined as sonic post-positivism is necessarily situated within these complex entanglements of knowledge and power which make up the Chavín episteme. However, this is not to characterise her approach as an uncritical regurgitation of the epistemologies of the hegemonic "here". This section analyses how Kolar's work in some respects departs from the "here" whilst simultaneously staying within it. In reference to the Kuhnian framework around the 'essential tension' in science, Kolar exhibits both characteristics of the "traditionalist" as well as the "innovator" (Kuhn, 1991). I characterise Kolar's approach as robustly post-positivistic where certain facets of her method demonstrate its situatedness as sounding situated knowledges. Undertaken in this grounded manner, feminist standpoint theorists such as Sandra Harding suggest that a "strong objectivity" is possible, which can provide even stronger claims to objectivity than procedures where accountability and situatedness is not acknowledged (Harding, 1986, 1992).

I propose that Kolar's archaeoacoustic research output necessarily exists within the dominant epistemological framework that qualifies and disqualifies particular knowledges. It would be difficult to make her vital contributions legible to the larger academic community if she did not follow sufficient conventions. The practices of sonic knowledge production which are positivistic are central to the field's further development. When conducted according to a post-positivistic approach, which carefully identifies how and what might be "scientifically testable" or "scientifically knowable", new contributions to to this field of knowledge can be made. As traced in Chapter 2 the legacies of positivism have been central in the development of archaeoacoustics. They have similarly been crucial in Chavín's archaeological history as

described in Chapter 4. Moving beyond some variation of post-positivism would risk conceding academic legitimacy and thereby disqualify the authority of the knowledge produced. This reflects the balance that the successful scientist must strike in showing both qualities of “traditionalist” and “innovator” (Kuhn (1991) – a balance which Kolar has been unwittingly negotiating throughout her work at Chavín.

Most obviously, Kolar’s sonic knowledge production tackles the visuocentric bias of the hegemonic “here”. By focusing on producing sonic knowledges at the site, she contributes to possible understandings of human behaviour related to sound and listening, as part of a multi-sensory archaeological endeavour. Sensory scholars have sought to correct the lack of attention that has been paid to sensorial experiences and the role of the body in academic scholarship. As mentioned in the introduction, body studies scholars have located in Descartes’s famous “*cogito ergo sum*” the splitting of body and mind, and the privileging of the thinking mind over the machine-like fleshy body, as that which defines individual humans as social beings (Shilling, 2003, p. 8) as well as exacerbating a binary divide between interior/exterior and self/other (Blackman & Walkerdine, 2001; Turner, 2008). The Chavín episteme, dominated as it is by Eurocentric epistemological traditions, similarly downgrades knowledges that derive from the sensory and embodied experiences. The dominance of visuocentrism has led to the devaluation of the sonic aspects Chavín. Meanwhile aspects of the site pertaining to other senses are paid even less attention. Kolar’s archaeoacoustic work has challenged this substantially.

In the way that it deals necessarily with the visible or “qualified” knowledges of Western thought, sonic post-positivism is then conditioned as a whole to be legible to the Chavín episteme. Within the ecology of possible sonic knowledges, Kolar’s research highlights those which *can* be made visible in order to demonstrate how important acoustical studies can be to the site. This identifies how Kolar’s careful negotiation of positivistic and post-positivistic modes is pragmatically aligned with the hegemonic epistemological structures it is located within. Kolar’s research avoids the pitfalls of strong sonic naturalism which makes appeals to romanticised imaginaries of “more sonic”, “more natural” pasts. However, insofar as philosophical naturalism refers to the broader scientific-realist-material conception of sonic matter, Kolar’s

work is consistent with the large majority of researchers who adhere to the weak sonic naturalism described in Chapter 2. Apart from visuocentrism and some aspects of Eurocentrism, the characteristics of the Chavín episteme listed above (Eurocentrism, capitalistic modes, androcentrism, representationalism, positivism, Cartesianism, biocentrism and individualism) are not directly or extensively addressed in Kolar's research. Indeed it is difficult to ascertain to what extent her epistemological approach does or does not actively reflect on these dominant intellectual modes. Although a researchers' reflexive considerations are never entirely discernible in a written piece of research, it can be deduced that within the overall characterization of her work as robustly post-positivistic, sonic (post)positivism *as a whole* comes with its limitations. Addressing these limitations is the aim of this chapter.

Reflecting back on my experiences of archaeoacoustic work at Chavín; from partaking in the *Pachamama* ceremony at the beginning of the archaeological season, participating in sonic experiments with Kolar's group, to the unexpected arrival of Cactus Jack and his spiritual tour group on the site, each of these moments play a role in my understanding of the construction of the "idea of Chavín" as a co-constituted construction between European colonizers and Indigenous, Creole, Black or other groupings within Peru who have a stake at the site. The *Pachamama* ceremony demonstrated how a relation of respect is pursued by the American-led archaeological team at Chavín, with regards to the Indigenous cultures and practices of the area and in relation to the revered temple complex site. Although further work would be required to critically examine how and to what extent the voices of Indigenous cultures are foregrounded in the totality of institutionalized national cultural initiatives at Chavín. Sonic experiments with Kolar's group, as described in the previous chapter, show how the legacies of positivism within archaeology are complexly entangled in contemporary sonic knowledge production at the site. In interview and in observation, Kolar exhibited a high degree of cultural sensitivity to the site of Chavín, including much self-reflexivity around her own role as an American researcher there. Her engagement with the notion of sonic supernaturalism at Chavín demonstrated her epistemological openness and tolerance towards alternative belief systems. Nevertheless, as expansive and sophisticated as her research methods have proven to be, there is as yet little indication of a move to a political-philosophical "elsewhere"

beyond the existing hegemonic “here” of academic knowledge production.⁹⁰ Without actively engaging with some of the more philosophical questions that pertain to knowledge production or the epistemological issues raised by feminist theory, critical race studies or decolonial theory in the case of Chavín, her findings may remain without critical interrogation. The research questions are firmly and reasonably grounded in archaeological context and the experiments are carried out to a consistently precise degree. Nevertheless, whilst Kolar’s sonic knowledge production represents one of the most critically informed research practices across the whole field of archaeoacoustics, questions concerning the onto-epistemological frameworks that underpin the field are not sufficiently interrogated.

Sonic knowledges lost to the abyss may, in fact, resemble Edouard Glissant’s notion of ‘opacity’. In response to articulations of difference, and against an imagined transparency of “relation” (Glissant, 1997, pp. 189, 192), ‘opacity’ refers to an epistemological resistance taken up by the colonised subject to an often hubristic expectation of clarity or tangibility palpable in histories of colonialism. Writing of the multiplicities which complicate the ‘Francophone’ world, particularly the Creolization of French and the problems of translation, Glissant maintains, “opacities must be preserved; and appetite for opportune obscurity in translation must be created; and falsely convenient vehicular sabirs must be relentlessly refuted” (Glissant, 1997, p.

⁹⁰ Regarding this, correspondence between Kolar and myself during the drafting of this chapter have resulted in a few conflicts of presentation of ideas to arise, which I recount here for reasons of accountability and transparency whilst concurrently asking the reader to acknowledge the partiality of my own account. As a result of Kolar’s comments on a first draft of this chapter, I have further developed an initial potentially mis-interpretable definition of sonic post-positivism in the previous chapter and clarified this to not only include hypothesis testing, but also all systematic observational and descriptive work. This was adapted in order not to appear to be conflating post-positivism with hypothesis-testing. Kolar’s work, as she highlighted in comments, is not reducible to this. The ascription of sonic post-positivism was always however more than an identification of hypothesis testing (which would correspond to the “ideal-type” of sonic positivism laid out in Chapter 2), and already in earlier drafts depicted the close relationship between scientific, positivistic methods of research *and* contextual, culturally and anthropologically relevant research questions and methods. Whilst Kolar expressed discomfort at the implication that her work is only represented by her dissertation study (which I have endeavoured not to do in citing her various publications beyond the PhD thesis), it is not *just* hypothesis-testing which this chapter critiques. Rather, whilst experiments conducted by Kolar are certainly open-ended and may not *necessarily* be tied to the conventional positivist-driven norms of academic knowledge production, there is as yet little indication of it addressing the questions the philosophical and cultural critical work which this project specifies, namely active engagement with feminist and decolonial critiques of knowledge production. Therefore, I have maintained this framing of her work, however I do accord that in her words she occupies “a complicated ‘alternative space’” in her work (Email correspondence with Kolar, 7 Aug 2019) and accept that it continues to develop and evolve as each researcher’s work does.

120). The practice of translation, particularly across historically dissimilar linguistic cultures, means that opacities may plausibly persist in attempts to understand them. In extra-linguistic terms too, the prospect of potential untranslatability must be contended with. The strand of history of science and technology which deals with the production of “ignorance”, or the socially constructed lack of knowledges, “agnotology”, serves as a useful reminder of the attendant relations of power which have structured knowledge and ignorance historically (Proctor & Schiebinger, 2008). When attempting to examine Chavin’s subjugated sonic knowledges, conventional epistemological frameworks which enforce a particular interpretation or value-system on to a particular phenomenon or auditory situation must be resisted.

5.3 Towards Aural Gnoseology

5.3.1 On “Gnosis”

This section proposes a theory of aural gnosis. The term “gnosis” derives from Mignolo’s critique of Eurocentric epistemological models and attempt to encapsulate a set of meanings located beyond them (Mignolo, 2012, pp. 4–14). “Gnosis” is informed by the idea of “border thinking” put forward in Gloria Anzaldúa’s conceptualisation of thinking of/from the “border” towards a “*mestiza* consciousness” (Anzaldúa, 1987). Anzaldúa’s conceptualisation of thinking of/from the “border”, is shaped by lived experiences of alterity on “physical borderlands” through which cultural and philosophical traditions and practices are shaped (Anzaldúa, 1987, p. preface). The concept “gnosis” and the theory “gnoseology” are terms which attempt to open up the conception of “knowledge” beyond written, scholarly traditions, where the more familiar terms “epistemology” and “hermeneutics” structure the predominant “two cultures” of scholarship: science and the humanities (Mignolo, 2012, p. 9). “Gnosis” is posited, then, as a conception of knowledge not dependent upon Eurocentric scholarly traditions of writing, even as it is predicated on the same language and intellectual systems in order to communicate it.

The terminological shift from *sonic* knowledge to *aural* gnosis is underpinned by an attempt to transform a conceptual focus over the “object” of knowledge as “sound” or “the sonic” and move it towards an idea of the “aural” as a modality which

foregrounds a processual idea of hearing and listening. The stabilisation of the relation between subject and object implied in the terms “sound” and “sonic” is intended to be disrupted by this change to “aural”.⁹¹ The characteristics of the hegemonic “here” of Eurocentric knowledge production have been its visuocentrism, representationalism, Cartesianism and individualism. Aural gnosis can be understood as a concept which resists these deep-reaching onto-epistemological structures and pushes beyond into a political-philosophical “elsewhere”.

There have been numerous post- and decolonial scholars and philosophers who have addressed the dilemma of being situated within the dominant Eurocentric philosophical and linguistic paradigms of academic or intellectual cultures whilst aiming to describe something outside of it. Some have addressed the incommensurability of some Western and non-Western precepts as a problem of translation. Santos refers to Ghanaian philosopher Kwasi Wiredu, who writes that in the philosophy and language of the Akan, it is “not possible to translate the Cartesian precept cogito, ergo sum... there are no words to express this idea” (Wiredu, 1996) in (Santos, 2014, pp. 203–204).⁹² Mignolo uses Robert Bernasconi’s depiction of the “double bind” of African philosophy in which either African philosophy is so similar to Western philosophy that it appears to make no sufficient contribution or it is so different that it is not even acknowledged as philosophy (Bernasconi, 1997) in (Mignolo, 2002, p. 70). Where Edward Said’s “Orientalism” [1978] (1985) remained *within* dominant European frameworks in order to examine the phenomenon of “Oriental culture”, Ngũgĩ Wa Thiong’o’s 1981 work “Decolonising the Mind” (1986) took another tact in choosing to foreground the politics of language to such an extent that writing in English itself was abandoned. A theory of aural gnosis accepts and

⁹¹ A note on terminology: this distinction between “sonic” and “aural” is comparable but not directly reducible to the terms invoked in the introduction and throughout this thesis regarding the retrievability of sonicity and the irretrievability of aurality. Whilst “sonicity” addresses the material oscillatory understanding of sound as matter, and “aurality” pertains to the socio-cultural conditions under which phenomena are considered audible, the usage of “sonic” and “aural” here enacts a shift in focus from an idea of sound as object – also evident in “sonicity,” to an idea of sound as a process – also found in “aurality”.

⁹² Santos elaborates: “Thinking,” in Akan, means “measuring something,” which does not make sense coupled with the idea of being. Moreover, the “being” of sum is also very difficult to explain because the closest equivalent is something like “I am there.” According to Wiredu, the locative “there” “would be suicidal from the point of view of both the epistemology and the metaphysics of the cogito.” (Santos, 2014, pp. 203–204)

attempts to address the potentially insurmountable challenges of untranslatability.⁹³

Some attention to the etymological roots of “gnosis” helps to elucidate its affordances for this endeavour. Mignolo sketches out the diverse and unstable definitions of knowledge within Ancient Greek philosophy. Plato’s famous distinction between *doxa* and *episteme*, where the former indicates a common-sense knowledge and the latter a systematic logical knowledge; the verb *gignosko* meaning “to know, to recognize” compared with the verb *epistemai* “to know, to be acquainted with”; and the apparent emergence of “gnosis” to indicate a “secret or hidden kind of knowledge” (Mignolo, 2012, pp. 9–10). It is Mignolo’s conceptualisation of “gnosis”, which takes its cues from Valentin Mudimbe (1988) that is relevant for a conception of aural gnosis. Mudimbe’s investigation of African gnosis is borne out of questions pursued by Mignolo – how to conceive of a knowledge which conveys things which fall outside of traditional Eurocentric modes of knowledge production and transmission from within the knowledge producing institutions and systems created and developed in the West (Mudimbe 1988, 9). Mudimbe elaborates upon “African gnosis” as “by definition a kind of secret knowledge” (1988, p. 199) which ultimately functions as a kind of deconstructive device, which allows for a constant reflection on African knowledges’ own historicity, as an insistent “question mark” which disturbs the Eurocentric accounts given by anthropologists of African cultures, philosophies and practices.

In using the term “gnosis,” the resonances with Hellenistic Gnosticism can be noted. The Gnostics, a disunified religious movement which contained various elements of Christianity and Judaism and emerged in the first two centuries CE in Europe, were ultimately rejected by the increasingly orthodox Church as a kind of dissident “cult” (Brakke, 2011, p. ix). Often referred to as mystics harbouring secretive knowledges, or

⁹³ In correspondence with Kolar she writes regarding this point: “These challenges are inherent, yet ideally could be acknowledged. At the same time, as you so carefully disentangle work carries and performs its disciplinary legacy; yet, it must speak to particular audiences. I have chosen to try to communicate with the audiences who have enabled my work (Stanford, Rick et al., MINCU and the Peruvian archaeological community, Andean locals, sound studies and music archaeology peers, among others). The work therefore not only represents its methodological roots, but also its requisite communication spheres.” Kolar is entirely correct that work must adapt its translatability to the communities involved. I very much appreciate what motivates this approach. Nevertheless, the philosophical politics of translatability I am addressing in this section are not necessarily acknowledged by Kolar’s comment in the sense I am expressing, namely the coloniality of knowledge and the potential for its decolonisation.

as an indication of some kind of spiritual insight, the huge diversity of historic meanings of gnosticism contribute to its common understanding as a covert or hidden form of knowledge. Aural gnosis, following Mudimbe and Mignolo's discourse, sits in critical opposition to hegemonic Western – i.e. inclusive of Ancient Greek – epistemologies. Although some overlapping ideas are identifiable, such as the conception of sonic supernaturalism, aural gnosis is conceived as a historically separate tradition to Western Gnostics insofar as its aims are contemporary and decolonial and it resists any simple acceptance of hegemonic European cultural and epistemological frameworks.

In summary, it is a deep-reaching seismic re-thinking of difference, contained within the very theorisation of knowledge itself, which a notion of "aural gnosis" is attempting to address for sonic knowledge production. As Mudimbe and Mignolo use "gnosis" in an attempt "to capture a wide range of forms of knowledge that philosophy and epistemology contributed to cast away" (Mignolo, 2012, p. 10), aural gnosis likewise aims towards thinking beyond the "abyss" which invisibilizes certain forms of knowledge. Aural gnosis, as a gesture of "border thinking" and as a persistent "question mark" can enact a continual reflection and questioning of the idea of knowledge, which has hitherto been constrained by the historical-structural conditions of the hegemonic "here". The processual, dialogic and deconstructive character of aural gnosis makes it a critically useful method with which to reconceptualize sonic knowledge production.

5.3.2. Sonic positivism and the Chavín episteme

Currently, sonic (post)positivism has been the predominant conception of how knowledge can be conceived through sound and listening at Chavín. Kolar's work serves to demonstrate the necessity of adhering to norms and conventions of knowledge production and how far best practice can further knowledge within an academic framework. Yet necessarily such work can only be primarily concerned with legible, visible knowledges within the hegemonic Chavín episteme. Those sonic knowledges lost to the abyss will remain so. The notion of *aural gnosis* enables other sonic knowledges such as embodied, tacit or experiential knowledges, which hitherto

remained intangible, to become increasingly conceivable if new frameworks are opened up.

Aural gnosis, however, is not simply a concept which aims to replace the hegemonic “here” of Eurocentric sonic knowledge production. It is proposed as a term which describes the larger ecology of sonic knowledges. Mignolo uses “gnoseology” as the discourse about gnosis and following his survey of these various terms relating to knowing, he understands “gnosis” as “knowledge *in general*, including doxa and episteme” (Mignolo, 2012, p. 11) (my emphasis). This conception of gnosis as a *general* term for knowledge, of which episteme and doxa are two forms, is useful in addressing the diverse and open facets of knowledge vis-à-vis sound and listening which the term aural gnosis is aimed towards. It covers a vast range of different *genres* of sonic knowledge, many of which will remain necessarily opaque. Referring to the “genres of sonic knowledge” with reference to Sylvia Wynter, I suggest that the situation can be described as an ecology of diverse sonic knowledges (aural gnosis), in which one overemphasized strand has come to dominate larger understandings (sonic positivism/naturalism/materiality). Where Wynter’s term “genre” designates a plurality, which colonial power dynamics have historically folded into an implied univocality (the conflation of *genre* of European modern Man with humans as a whole), an understanding of aural gnosis as a new conception for the larger ecology of sonic knowledges helps to open up conceptions of knowledge to new pluralities.

Aural gnosis might be understood as an “assemblage” in Deleuzo-Guattarian terms, as a “rhizomatic” entity of multiplicity (Deleuze & Guattari, 1987, p. 4) which proposes the potential of a radical break from the hegemonic domain of signs and objects (1987, p. 7) and capable of articulating conceptual movements or flows rather than tending towards stasis (1987, p. 23). Against an oft-deployed notion of “assemblage” as disconnected from power relations, scholars such as Jasbir Puar and Alexander G. Weheliye have used the assemblage as a conceptual heuristic to hold multiplicities of ontological inter-relations intrinsically as power relations, to understand racialization as historico-political processes (Puar, 2007; Weheliye, 2014). In relation to the Chavín episteme, one could argue that the influence of European schools of positivist thinking have *territorialized* a potential wide range of forces, arrangements and relations of

sonic knowledge. Knowledge has been subject to a process of ordering, organizing and stabilizing. Aural gnosis denotes how this assemblage can produce a new set of relations, a “coming undone” (Deleuze & Guattari, 1983, p. 322), and a *detritorialization* leading to new potentialities and new means of expression.

Aural gnosis emphasizes notions of becoming, of process and transformation over those of being, of essences and of origins. It moves away from the notion of the traditionally conceived “object of research” and towards an idea of relational encounters in which both subject and object of research are implicated. Indeed they are co-constituted by these relations. Applied to sonic knowledge production at Chavín, aural gnosis refuses hegemonic dualisms. This takes multi-faceted forms which resist a nature-culture binary which understands sonic materiality as inert, passive matter through which “man” or culture can examine, interrogate and understand. It refuses the very dichotomies between scientific and non-scientific, positivistic and non-positivistic, naturalistic or unnatural knowledges, acknowledging that *these too are in themselves European inventions*. As a conception of the larger overall ecology of sonic knowledges, aural gnosis both acknowledges and valorizes the models of positivism which can contribute meaningfully to expanding on certain visible forms of knowledge, whilst it “provincialises” Eurocentrism by foregrounding that these do not represent the entirety of knowledges available. Different onto-epistemological frameworks which do not rely on the deeply entrenched nature-culture binaries of European thought form the basis for an ecology of sonic knowledges reconceived as aural gnosis.

5.3.3 Perspectivism/diffraction

Philosophical anthropologists have addressed the ontoepistemological trappings of Eurocentrism and attempted to move beyond some of its key considerations. For the proposed theory of aural gnosis, a few pivotal ideas can help to highlight the avenues such a non-dualistic notion might attempt to take. Eduardo Viveiros de Castro’s work strives towards using anthropology as a “permanent exercise in the decolonization of thought” (2014, p. 48) and resisting the “narcissistic” tendency of an inward-looking reflexive European anthropological research of recent decades (2014, pp. 42–43). His

method of “perspectivism” to explicate differences in worldviews from Indigenous perspectives to European thought can be applied to examine Chavín’s ecology of sonic knowledges. Viveiros de Castro’s study of the Amerindian Tupinamba in the Brazilian Amazon describes a metaphysics in which cannibalism - a deplored practice in the West - is reconsidered as the basis of an ontoepistemology more to do with transformation, bodily metamorphosis, kinship and reproduction than it has to do with a simple conception of predation (2011, 2014). However, this is not to be confused with a cultural relativism or praise for simplistic notions of cultural diversity or “multiculturalism”, instead, perspectivism is a “multinaturalism, since perspective is not a representation” and “representations are properties of the mind, whereas a point of view is in the body” (Viveiros de Castro, 2014, p. 72). Viveiros de Castro’s work usefully serves as a critical explication of the shortcomings of Eurocentric nature-culture dualisms when examining non-Western cultures and ways of being. Drawing on Phillippe Descola, who has extensively demonstrated the redundancy of the nature/culture binary beyond Western thought (Descola, 2013), Viveiros de Castro refutes the universalism of a Western naturalist ontology in order to move away from the paradigm of representationalism, which he deems a relic of Cartesian mind-body dualisms. It is a transformation which “signals the crossing of a historico-semiotic threshold of translatability and equivocation” (2014, p. 75). As such, Viveiros de Castro’s perspectivism attempts to “think an Outside” of hegemonic European epistemologies and metaphysics (2014, p. 93). It is a theory which contributes towards a conception of a political-philosophical “elsewhere” of *sounding situated knowledges*.

Such an endeavour of ontoepistemological upheaval might manifest itself at Chavín in particular ways. Anthropologist Mary Weismantel deploys Viveiros de Castro’s “multinatural” Amerindian perspectivism and imagines how his theories might best be applied to interpretation of Chavín’s material remains, particularly with regards to human/nonhuman and human/animal relations (Weismantel, 2015). Providing sobering correctives to Viveiros de Castro’s often overly generalistic theories, Weismantel appeals for a perspectivism which is instead “deeply grounded in archaeological data, methods and questions” including a better political engagement with indigenous cultures of the Americas (Weismantel, 2015, pp. 142–143). Re-thinking human-animal relations, outside of the often uncritically applied relation of

predation and domination, Weismantel draws on Tim Ingold's work to propose "relations of respect" in an alternative history of relations between humans and animals (Ingold, 2000) in (Weismantel, 2015, p. 144). Weismantel pursues a different kind of seeing akin to a Harawayan "embodied vision" (Haraway, 1988) claiming its significance for Chavín. This is based on the evidence provided by research around Chavín on Andean and Amerindian cosmologies and ethnographically grounded perspectives which probe in an open-ended way the historically specific power relations that lie behind material remains. These methods therefore account for societal changes over time and allow for the dynamism of these complex cultures to remain intact. (Weismantel, 2015, p. 155). As such, this endeavour resonates strongly with a theory of aural gnosis and a methodology of sounding situated knowledges.

A concurrent argument might be made with regards to sonic knowledge production and how relational, accountable modes of knowing can be pursued in practices of listening at the site. Drawing on Harawayan insights into human-animal relations, Weismantel takes the opportunity to move away from simply "looking at" the artefacts of anthropomorphic figures as representations of things, and instead conceives of the relation of looking itself as part of a more complex assemblage which incorporates the "seeing" human body (Weismantel, 2015, p. 141). The embodied and situated knowledge production of Kolar's method, combined with the already primarily spatial and embodied research approach — of both site-situated sound sensing (Kolar, 2017) and auditory localisation (Kolar, 2013b) — paves the way for the kind of ontoepistemological reconfiguration which Viveiros de Castro's thought aims towards, taking up as it does Weismantel's caveat of groundedness and specificity. Yet to what extent this type of reflexivity is being pursued is not yet clear.

Here, some comments regarding such an approach might be heeded. Weismantel refers to auditory research at the site and warns, "before we assume that something looked or sounded strange, we should pause to consider how Pre-Columbian people experienced perception in ordinary life. Their quotidian sensory experiences might differ substantially from our own taken-for-granted perceptual worlds" (Weismantel, 2015, p. 148). Given how central a role transformation plays in perspectivism, and the tendency of anthropologists and archaeologists to suppose a "primitive figure outside

of Western modernity” as undynamic and “frozen,” Weismantel pushes for complications to a “picture of homogeneous unilineal evolution” (2015, p. 152). This is another formulation of the possible problem of sonic allocentrism outlined in the previous chapter and also alludes to the pitfalls of deploying an “innocent listening” of sonic naturalism.

Understanding what Mignolo’s “colonial difference”, Santos’ “abyssal thinking” and feminist epistemologies can do, leads to the proposition of “aural gnosis” as “border thinking” as put forward above. This method can be construed as a kind of “diffractive thinking” which incorporates Viveiros de Castro’s ideas of perspectivism. Trinh T Minh-Ha’s term of the “in/appropriated Other” as taken up by Haraway places it in a critical, deconstructive relationality, in a diffracting rather than reflecting (ratio)nality – as the means of making potent connection that exceeds domination” (Haraway, 2004b, p. 69). The gesture of diffraction, with its Derridean whisper of *différance* - as simultaneous difference and deferral - encapsulates the premise of thinking diffractively from Chavín. In one of potentially many recursive attempts to understand sonic knowledge at Chavín, thinking diffractively helps to move towards a critical, deconstructive relationality which underlies the research structures in the Chavín archaeology program which have necessarily circumscribed sonic knowledge production at the site. This will be addressed in more depth in the theorisation of echo in Chapter 6.

A decolonial, feminist, anti-capitalist theory of sonic knowledge production at Chavín will have to acknowledge its genesis from within “the belly of the monster” (Haraway, 1988, p. 581) of visuocentric Eurocentric masculinist scientific traditions and its concurrent ontoepistemological limitations, as this is where centuries of Western academic knowledge production - where archaeology and archaeoacoustics are situated - have taken place. Haraway sought to deepen feminist standpoint theory’s critique of Western masculinist science in theorising not only “reflection” on how subjectivity and objectivity relate, but further towards “diffraction” (Haraway, 1997, p. 268) as the production of difference. A *diffractive* methodology applied to Chavín

could therefore continue the challenge posed by indigenous and decolonial thought.⁹⁴ This methodology foregrounds difference in insisting that, “unlike reflections, diffractions do not displace the same elsewhere... Rather, diffraction can be a metaphor for another kind of critical consciousness...one committed to making a difference.” (Haraway, 1997, p. 273). This gesture of diffraction, as part of an aural gnoseology, should heed the insights of Viveiros de Castro’s perspectivism and its emphasis on multinatural perspectivism as a dynamic tool of transformation. Understanding the deep past of Chavín as a “contested zone” (Haraway, 1978), a diffractive method has much to offer sonic knowledge beyond the limitations of the Chavín episteme.

5.4 Re-listening to and re-thinking Chavín

5.4.1 Re-listening to Chavín’s sonics

Applying a theory of aural gnoseology to Chavín as a speculative endeavour aims to acknowledge the constraints outlined above which might limit the ontoepistemological framing of Chavín’s sonic knowledges. In this final section, drawing on the acoustic archaeological work which has been undertaken so far at the site and using post-abysal thinking, I seek to theorise beyond sonic positivism and attempt a tentative aural gnoseology of Chavín’s sonic knowledge. As described above, the Chavín episteme is structured by the many dualisms of Western thought: man/woman, nature/culture, mind/body, self/other, interior/exterior, religion-spirituality/secularism, human/animal, seeing/hearing. The task of undoing these broad-reaching and infinitely complex dualisms for sonic knowledge at Chavín is nearly impossible. Nevertheless, in attending to some of them, and attempting to theorise an outside of sonic positivism as aural gnosis whilst remaining grounded in archaeological context, a few speculative remarks can be made.

Although a Chavín culture should not be presumed to be similar in every aspect with the Inca Empire, given the two and a half thousand years between the height of Chavín

⁹⁴ As described in the previous chapter, the work of pioneering indigenous Peruvian archaeologist Julio C. Tello pursued a “decolonial” agenda in the context of European influence of positivistic doctrines within archaeology, associated with German archaeologist Max Uhle.

and the fall of the Incas, scholars of South America do suggest that there are likely some aspects of continuity in Andean cosmology which remain across the cultures named Chavín, Paracas, Nazca, Moche, Recuay, Huari, Chimú and the Inca, sometimes referred to in Quechua as *Tawantinsuyu* “the four regions.” In this regard, Classen’s work on *Inca Cosmology and the Human Body* can be useful for developing an aural gnosis of Chavín, especially given Classen’s attention to sensory regimes and the visuocentric constraints of Western epistemological models. Classen reads the available historic documents (predominantly using Andean chroniclers Garcilaso de la Vega and Guaman Poma de Ayala’s accounts) to describe the human body to be a basic organizing metaphor of Inca cosmology, with the dualities of right/left, high/low, male/female, external/internal, forming fundamental structures, while processes of the cosmos were modelled on the processes of the body – for example, the intake and outflow of air and fluids, reproduction, digestion of food, circulation of blood, aging and death (Classen, 1993a, p. 3).

5.4.2 Speculations on: water, fluidity, life, sound

Using Classen’s account, and those of other Andeanists, aspects of Chavín’s archaeology can be drawn upon in relation to how Andean cosmology may have played a role. As mentioned in the previous chapter, Luis Lumbreras’s archaeological work at Chavín in the 1970s was significantly preoccupied with sound and water. Lumbreras and his colleagues undertook an experiment in which 200 litres of water was poured through the underlying canals of the Circular Plaza. The potential to engineer water flow from the nearby Mosna and Wacheqsa rivers into the chambers and channels which underlie the temple was theorised (Lumbreras et al., 1976). Lumbreras commented upon the potential “acoustic-hydraulic system” at Chavín as follows: “a stream of water passing at high speed in a gallery with staircases, right angles and openings would produce a resounding, continuous noise of a relatively low tone, especially in specific “knots”[nodes] where it would produce the strongest noise... These resonance rooms could be connected by other sound-distributing tubes toward the Lanzón, or in other strategic points inside the pyramid and towards the exterior... This basic noise could be additionally amplified by resonance, and include modulation (change in tone) by a simple control mechanism” and manners for

modulating the sound are theorised in the paper (1976).⁹⁵

As mentioned previously, other scholars have commented on the significance of water in Andean cosmology as a “vitalizing life force” (Bray, 2013; Malville, 2009). Classen writes on the significance of sound and fluidity in Incan rituals and institutions, “in Inca ritual, as in Inca myth, fluidity and sound were often related. When the ritual involved extraordinary fluidity, either actual or metaphorical, an extraordinary outburst of sound would accompany it. In the Inca rain ritual, for example, rain would be invoked by a public outcry in which even dogs and llamas were made to participate” (Classen 1993, 70). Elsewhere Classen comments that “sound can serve as a vehicle for transition in the Andes” (Classen, 1993a, p. 18), “if speech is life, silence is death” (1993a, p. 36) which seem to support ideas of sound and fluidity as symbolic of life. Lumbreras’s decision to undertake the experiment pursues, as Weismantel suggests via Viveiros de Castro, a grounding in context, method and questions which is specific to the indigenous cultures of the surrounding area.

The twenty intact *pututu* conch shell horns found at the site in 2001, although discovered after Lumbreras’s work there had concluded, plays a central role in his later reflection on Chavín as a sonic site (Lumbreras, 2013). As mentioned in the previous chapter, John Rick inquires into the use of the *pututus* and highlights the powerful physical and psychological effect of hearing many *pututus* played together during rituals as part of his larger theory about the creation of power, authority and hierarchy at the Chavín site (Rick, 2008, p. 26). This aligns with Classen’s work on Inca rituals, which “are usually rich in both auditory and visual phenomena. Music and recitations were essential parts of most rituals, as was a colourful display of costume and orientation. ...The uniting of the auditory and the visual was fundamental to Inca ritual. One example of such a union was the use of *runa tinya*, human drums made out of the bodies of traitors” (Classen, 1993a, p. 72). If water, sound and fluidity evoked transformation or transition, and symbolised life as opposed to the silence of death, the *pututus* as conch shell horns reinforce this idea: as archaeologists have proven, these specific *strombus lobatus galeatus pututus* were transported thousands of miles

⁹⁵ Translation by Miriam Kolar, with kind permission.

from the North West coast of South America although local *strombus Peruvians* would have been available. The incorporation of the conch shell as a symbol of the sea may have played an important ritual role in symbolising transitions of life and death. This could harmonize with existing theories about the site, such as Rick's about the use of the ceremonial temple complex to manipulate human minds and behaviours amidst a larger objective of an ascending priestly leadership (Rick, 2005). The intense physical-sonic experiences caused by playing several *pututus* horns at the same time, especially in the enclosed narrow stone spaces of the inner chambers, theorised by Rick and enacted by Kolar's archaeoacoustics working group, may have existed within these symbolic webs of meaning. Kolar's work tests the potential use of sound and spatial hearing through psychoacoustic experiments which can contribute to theorisations of how the site could have been used as part of the "strategic manipulation of human experience" (Kolar, 2013b, p. v).

Lumbreras's aforementioned speculations about the gender of *pututu* trumpeteers as depicted in the engraved anthropomorphic figures in the stone reliefs of the Circular Plaza, suggest that men and women took part in ritual processions "and, possibly, that they could both assume the role of shaman or priest" (Lumbreras, 2013, p. 178). As noted by Peter Fux, at a burial ground site in the Andes related to Chavín called "Kuntur Wasi," a body of a woman with a conch shell was excavated and presumed to be part of a ceremonial burial. On the alignment of sensory and sexual dualisms in Andean thought, Classen comments, "of sight, as male, and hearing, as female, have contrary associations in Inca thought, however, in Inca myth and ritual they are often intimately linked....This sensory integration seems to be the perceptual equivalent of *karihuarmi* (man-woman): sight-hearing, expressing a basic complementary unity of the contrasting senses" (Classen, 1993a, p. 19). Taken together, these researchers' statements might suggest an alignment between the symbolic "female", sound and hearing, and the ritual playing of the *pututu* horns.

Gender relations, as many feminist theorists have demonstrated, are culturally constructed and such statements must therefore be addressed with some caution. As Catherine Walsh writes of Andean cosmology and gender, "Gender constructions in both Mesoamerica and the Andes were understood as dynamic, fluid, open and non-

hierarchical” (Walsh, 2015, p. 106). This is supported by Classen’s understanding of Incan gender relations which are culturally determined, rather than based on “biological sex” (Classen, 1993b, p. 3).⁹⁶ Going beyond binary ideas of gender, Michael Horswell’s work excavating queerness and “third-gendered subjects” in colonial Andean culture, suggests that the Andean third gendered subjectivity has been lost to colonial sexual dimorphism and heterosexual regimes, and Horswell pushes towards an understanding of a third-space of alterity in gendered and sexual relations of Andean cultures (Horswell, 2005). Therefore, one might conceive that in ritual processions where *pututus* were used, people of all genders could have played the horns, and perhaps even that gendered transitions related to the “third-gender” were part of the rituals of transformation which may have taken place at the site (Horswell, 2005).⁹⁷

However, this attention to the sounding aspects of Inca cosmology in Classen’s research is not intended to suggest an overarching oral/aural/sonic mode of Incan culture. Sight and light played a sacred role for the Incas although sound and hearing were a fundamental subject of symbolic attention, and the senses of taste, smell, touch, as well as a range of bodily functions which complexly involve the senses are commented upon in her study. Classen touches upon the problem of translatability of sensory experiences, commenting upon the Spanish chronicler Gonzalez Holguin’s transcription which gives Quechua terms for sight, hearing, smell, taste, touch, and intelligence, which she comments may have been influenced by the Western model of the senses (1993a, p. 17).

5.4.3 Disinheriting epistemic habits: Towards an aural gnosis

Enacting a diffractive method of aural gnosis for Chavín’s sonic knowledge must

⁹⁶ According to Classen in Inca cosmology, males were deemed to be dominant and females subordinate. Thus, a man in position of subordination, such as a defeated warrior, was symbolically female (Classen, 1993a, pp. 3–4).

⁹⁷ Horswell draws on ethnographic reports of cross-dressing during Andean festivals to theorise these as “third-gender” ritual participation: “Thinking from an Andean paradigm in which both male and female genders struggle for harmonious union, achieved through symbolic ritual same-sex pairing, leads us to explore third-gender subjectivity in the pre- Hispanic and colonial record from a perspective that considers the performance of feminine or androgynous characteristics and passive same-sex sexuality in culture-producing terms” (Horswell, 2005, p. 150).

therefore actively engage with the epistemic conditions that qualify knowledge production within the modern/Chavín. This brief and speculative foray into the sounding aspects of Andean cosmology as they relate to Chavín's archaeological history may be useful for providing analytical insight into sonic knowledge up to a point. Conceptual schemas and cosmologies may have transformed drastically over the two and half thousand years between the Spanish chroniclers' accounts of the Incas, and the high-point of Chavín culture. Reading against the grain of the colonial archive throws up further problems to accessing sonic and other sensory knowledges from this material too. Nevertheless, in tracing the known limitations of what has been identified as the Chavín episteme, some progress can be made in disinheriting the stubborn habits of Western thought, including its known dualisms.

Whereas sonic positivism tests for what is scientifically knowable in a given situation, aural gnosis can explore non-positivistic, non-verifiable knowledges which are akin to "border thinking". Drawing on the Andean cosmology and archaeological work at Chavín so far by Lumbreras, Rick and Kolar, one could imagine that sonic practices may have taken place at Chavín were linked to water, fluidity, and ideas of a life force. Gnosis as a "secretive knowledge" as theorised by Mudimbe and Mignolo may open up conceptions of sonic ways of knowing which transcend the commonly conceived of "five senses" model. Scholarship in gender studies and sound studies provides some important impetuses to the undoing of these binaries, regarding an analytical focus on seeing/hearing and man/woman. Scholars who have sought to transcend dualisms have pointed to the historically specific power relations which accompany the hierarchical ordering of one over the other, in order to explore how this might be otherwise conceived. Thus, we can see that Judith Butler's famous notion of gender performativity which troubles the stability of naturalised conceptions of gender (Butler, 1989), reveals the artificiality of social constructions of sex and gender. In a corresponding fashion, sound studies work such as Sterne's criticism of an "audiovisual litany" attacks a notion of essences which inhere in listening and seeing (objectifying and distancing, versus subjective and immersive, for instance) (Sterne, 2003) in order to advance more sophisticated and specific accounts of hearing and seeing. The solution to binaries is not necessarily to abolish them (although this is often desirable), but to develop more nuanced models of power-knowledge relations within

predominant binaries and begin to dismantle or subvert them.

As outlined above, positivism's avowed rejection of transcendentalism and metaphysics in order to ground scientific knowledge in empirical experience is part of a larger facet of the modern Chavín episteme, situated within a particular post-secular formation of Eurocentric knowledge histories inherited from Judeo-Christian intellectual frameworks. Sonic positivism too sits within this inheritance. However, aural gnoseology might be linked to the "secretive knowledge" of gnosis invoked by Mudimbe and Mignolo, as knowledges which are perhaps necessarily "opaque" to an expectation of a transparency of relations (Glissant, 1997). The areas of uncertainty and unknowability left untested by sonic positivism are perhaps inherently resistant towards the command for transparency and the full extension of rationalist Enlightenment tenets into knowledge production. Chavín's sonic knowledges might be better represented by an idea of aural gnosis, of unknowable, secretive sonic knowledges.

Taking impetus from Weismantel's reading of Viveiros de Castro at Chavín, and the embodied seeing of anthropomorphic figures as akin to a Harawayan "multi-species cosmopolitics"⁹⁸ she proposes that thinking through perspectivism might even lead us, "in time... to see Pre-Columbian representations as more accurate approximations of our biological selves than the conventional modernist body" (Weismantel, 2015, p. 140). Using Viveiros de Castro's relational ontology, Weismantel theorises a "becoming animal" which sits at odds to the Cartesian-Darwinian separation between "man" and "beast," and refers instead to Amerindian notions of human/non-human relations as fluid and unfixed. According to Weismantel, seeing Chavín's carvings of human-animal figures relates to Amerindian ontologies of trans-specific beings such as "shamans" who are conceived of as possessing two bodies simultaneously: one human, one

⁹⁸ In *Staying With The Trouble*, Haraway makes reference to Isabelle Stengers' multi-volume set of works on "cosmopolitics" (Vol I-VII) (Stengers, 2010, 2011) in (Haraway, 2016, p. 12) to designate a conception of politics beyond its usually conceived parameters - in Stengers' case, guided by lessons from the history of science inflected by physics, it conveys a relational human-nonhuman politics, and in Haraway's case it has a biological intonation of human-animal relations. For an example of a Stengersian framework as applied to Andean indigenous thought and practices as they overlap with contemporary anti-mining environmentalist movements, in which mountains constitute "earth-beings" and play a role as political actors, see (De La Cadena, 2010).

animal, alternating their points of view by manipulating their vision (Weismantel, 2015, pp. 146–147). Weismantel moves on to theorise vision within ethnographically grounded perspectives from hunting and predation, “For [the people of Chavín], as for Amazonians, the act of hunting was an important way to think about the world—and to be in it. The stones do not just portray predators; they portray the experience of animal predation itself. Of the multiple perspectives on the body, one is a predator’s perspective on its prey—a perspective that positions the viewer, too, as a predator” (Weismantel, 2015, p. 149). The engraved stones at Chavín embody “the oscillation between predator and prey” (Weismantel, 2015, p. 150), and for contemporary viewers of these anthropomorphic figures today, some form of mutual transformation might still be possible. Following Weismantel, how might one conceive of the relation of listening as part of a complex assemblage which more fully incorporates the sensing body as part of processes of transformation?

Making speculations about embodied practices of listening, following Weismantel’s comments on seeing, might traverse the predator-prey relation, or equally they might play out along other dynamics. Conceiving of sound, fluidity, life and water as part of these acts of transformation may further support some of the ideas Weismantel puts forward in her innovative and provocative theorization of Chavín. As an anthropologist, she draws on archaeological research, much of which has been positivistic at core, but pushes at the boundaries of questions about Chavín’s culture, whilst staying grounded in relevant ethnographic and archaeological research. What might this mean for Chavín? It may mean building on Kolar’s use of contextual archaeological findings to guide her analysis of the site’s acoustics but heeding Weismantel’s warning that representing Pre-Columbian Andean cultures as violent elites risks providing a “naturalized” reason for excluding Indigenous people from contemporary democratic politics. A relational listening practice which is open to non-positivistic, non-verifiable, non-scientific knowledges, which a theory of aural gnosis at Chavín opens up, might enable a conceptual shift away from dualistic models of representationality and individualism. It may also enable open-ended understandings guided by non-representational and non-dualistic modes of being.

5.4.4 Conclusion

Following Hamilakis's archaeology of the senses, resisting a Eurocentric tendency towards representationalism of "autonomous vision", and pushing past the Cartesian dualisms which trap Western conceptions of the individual, a multi-sensory archaeology is "not a representation of the past but an evocation of its presence, its palpable, living materiality, its flesh" which connects to affect, memory and "flows" over "things" (Hamilakis, 2013, p. 199). A sensorial approach can help re-animate the past and re-think prior categorisations and collected data. Instead of an objectivist archaeology, in which "the affective investment and feeling of the scholar herself are missing" (2013, p. 202), an archaeology of the senses aims to foreground the entanglement between people and things, and shift the focus towards sensorial flows which defy the subject-object binary.

Kolar's sonic *post*-positivism escapes the rigidity of positivism's narrow conception of knowledges in that it includes other types of sonic knowledges, which constitute a larger idea of aural gnosis as an assemblage of sonic knowledges. Kolar's positivism is "robust" and is thus characterised as "post" in its ability to acknowledge the limitations of positivistic knowledges and leave space for non-positivistic knowledges. Her approach is respectful to the possibilities of sonic knowledges at play at Chavín, whilst remaining focused on the testable and scientifically knowable in its approach to producing sonic knowledge. Nevertheless, drawing on the impetuses of post and decolonial thinkers, remaining within this Eurocentric framework has epistemological limitations. Theorising Chavín culture of three thousand years ago through a Eurocentric episteme, without attempting to dismantle the constraints we know it to bear, is unlikely to contribute to the project of decolonial thought.⁹⁹ For this, a move beyond conventional modes of sonic knowledge production is needed, and the

⁹⁹ In personal correspondence, Kolar disagreed with this viewpoint. Kolar puts forward that many aspects of her work done at Chavín with sonic performance falls outside the realm of accepted science, particularly the more recent 2018 work. This, she proposes, "offers the possibility of not only addressing through fieldwork, but producing archaeological engagements for other ways of knowing." She refers to work-in-progress which is "in the process of contributing to a new knowledge production space, despite its colonial heritage" (Kolar, 5 Aug 2019). Whilst I welcome this remark and interpret this as evidence of a development in the framing of research, I have respectfully maintained my position and interpretation here. As this thesis proposes throughout, a critical engagement with the processes of sonic knowledge production involves an active incorporation of feminist and decolonial critiques.

framework of aural gnosis provides a space of possibility which allows for open-ended questioning to take place. This is a project which asks more questions than it can satisfactorily answer. Yet in gesturing towards the epistemological horizons that are opened by bringing the critical resources of sound studies, post- and decolonial thought and feminist theory to archaeoacoustics, I hope to have expanded slightly on what sonic knowledges might mean for Chavín.

In my multiple encounters with the *pututu* horns, firstly at Chavín through the sound of replica horns played within the confined inner spaces of the temple complex, then as I observed them through the glass cabinet of Chavín museum, then later on as photographs on the pages of a book, I have been engaged in dialogue with the *pututus* in manifold ways. We are both active participants as they circulate within archaeological knowledge production of Chavín. Whilst their sounds and touch have become bodily memories for me, and objects of knowledge, as well as the discursive formations around them, I conceive of my objects of knowledge not as passive inert objects from thousands of years ago, but instead live, present participants of my current sonic knowledge production, which connect to my own affective memories and sensory experiences in particular ways.¹⁰⁰ Encountering them through a modality of aural gnosis, I am invited to begin to deconstruct some of the dualisms I necessarily re-produce within my own European educational and social background. I am invited to reflect on the political and ethical responsibility that I have as an individual, but also in my scholarship, and how it is complicit within the hegemonic capitalistic, patriarchal and colonial structures of academic knowledge production more broadly. I am invited to reflect on the hegemonic forms of knowledge I reproduce as well as the possibilities of dismantling or resisting them, both visible knowledges which I recognise and invisible ones lost to the abyss.

¹⁰⁰ On this point, Kolar points to a forthcoming publication emerging from the collaborative research project which is described in this chapter. In this article, Kolar et al. present research as part of a new fieldwork method whose process enact “a material connection between today’s “site-present” humans and those who experienced ancient Chavín, via its extant built environment and replica *pututus*” (Kolar et al., 2019). Whilst this article, in which I also appear along with other group participants as co-author, does indeed enact precisely this, I still maintain the positioning as it is laid out. As arguments laid out in the next chapter demonstrate, this thesis aims towards a fundamental onto-epistemological re-consideration of the notion of (sonic) knowledges.

Pursuing a diffractive approach of listening to Chavín, beyond its implications for knowledge, open up the site to a metaphysical re-appraisal as part of a move towards a decolonial imagination, “A decolonial, sociological project concerned with the politics of reality must therefore cultivate a speculative, pluralist, alter-realism that risks thinking and acting on what is not-yet, on realities to be constructed, on futures to be attained” (Savransky, 2017, p. 23). Both ancestry and futurity are philosophical-political “elsewheres” in Harawayan terms, the narratives we form around these stories of the deep past can tell us much about the agendas and imaginaries possible for the present.

PART 3: ECHOES RECONCEIVED

Chapter 6 – Echoes of Elsewhere?

6.1 Introduction

Miriam Kolar (speaking loudly across a distance): “Now let’s have the large ones together. This’ll be take 20, the large pututus on the terraces...

(pause)

MK: “There was a bit of wind then...let’s try 21 again.”

Student [B.M.]: “Both?”

MK: “Yes.”

(Pause. Sound of donkeys in the background)

MK: “There was a bit of wind, let’s try 21 again.”

(pututus play)

MK: “Take 22 will be the same again.”

(pututus play)

MK – “That had a spectacularly long echo, didn’t it? ...let’s do one more with the large one, are we at 23?”

Student [B.M.]: “Which one are we doing?”

MK: “The large one together with the small one...

(pututus play)

MK: “Was that a donkey? At the end of that take? (laughs) Was it a donkey or was that an echo?”

Student [W.P.]: “I think it was an echo”

...

MK: “Let’s wait for this caravan to go through, it’s super noisy...”

(rumble of engines thundering past)

MK: “okay, so take 25”

(pututus sound)

[The experiment continues...]

In this scene, I stood with Dr. Kolar and the other members of our archaeoacoustics group on the *Plaza Mayor* of Chavín de Huántar, Peru. It was shortly before lunch-time on the second day of fieldwork of this trip. The archaeoacoustics group, led by Kolar, had created a short pilot test in which selected sound sources – a wooden clapper, a large *pututu*, and a small *pututu* – were played live by group members at certain positions on the main square, whilst decibel measurements were recorded by other group members, including myself, from pre-ordained, collectively-decided-upon “listener positions”. The sun was powerful as usual at the altitude of over 3000m and the perpetual rush of the nearby rivers was audible. The wind blew especially strongly

at times and both the wind as well as sound of traffic passing on the nearby road occasionally interrupted the measurements of our experiment. By this point in time, after twenty “takes” of the experiments, we’d heard each of the sounds many times. To our amusement, donkeys in the nearby fields had begun braying back, “in answer” to the *pututus* being blown. In fact, prior to the experiment, some of the students had already been playing around with exploring the sounds of the *pututus*, blowing forcefully and making “animal-like” noises into them. In passing, and referring to the donkeys’ noises in previous years of experience experimenting at the site, Kolar had commented once that “sometimes they think we’re trying to talk to them!”

Kolar’s question in the dialogue above, whether the sound was a donkey or an echo, was a genuine – if knowingly amusing – one. The sound of the donkeys braying was indeed perceptually fairly similar at times in pitch, tone and timbre to the *pututus*. Along with all the other background noises, at times it was a challenge to discern them. As Kolar remarked, some of the echoes were extraordinarily long; a powerful sustained burst of the *pututu* horn could produce an echo whose “tail” seemed to glide off gracefully from the temple complex outwards into the valley, ricocheting off the mountains in a snake-like motion. In this chapter, I seek to take stock of various kinds of echoes encountered throughout this thesis. As proposed in the introduction, I mobilize echo as a material-semiotic actor, using it to survey and summarise how I have observed it being employed in the archaeoacoustic practices analysed throughout this thesis and to theorize how it can develop our understanding of sonic knowledge production through human and nonhuman, including human-animal, relations.

In the introduction, I posed echo to be a material-semiotic articulation, a potential feminist and decolonial figuration and an arbiter of sonic knowledge production. I asked, what is it that echoes *do*, by way of explicating the complex relations between materiality and signification involved in the production of sonic knowledge in a given context? For archaeoacoustics, I proposed echoes to be a way of opening up the epistemological strictures of the hegemonic “here”, of the dominant patriarchal, colonial and capitalist contemporary, and I asked how echoes might indicate a political-philosophical “elsewhere”, of the kind Haraway recurrently mentions as a

quasi-utopic – but not wishful or ungrounded – alternative imagining of the present, as well as the past and future. It is perhaps befitting, then, that where I began the thesis describing a situation in a cave, listening to two male archaeoacoustics researchers producing sounds and listening whilst arguing over the definition and existence of an “echo,” that I bring the thesis to a close with a female archaeoacoustics researcher and a group of student experimenters listening to the “spectacularly long echo” of a *pututu* horn at Chavín de Huántar, Peru, and musing over whether a sound was “an echo” or “a donkey”.¹⁰¹ I propose echoes to be a productive site at which to reconfigure traditional knowledge production. This chapter takes up the challenge of describing how echoes have so far appeared as figurations of sonic knowledge production, including their limitations, before asking how thinking echo might help push our considerations beyond them.

Echo has repeatedly occurred throughout this thesis, often implicitly. In accordance to the initial definition of echo outlined in the introduction, I maintain that echoes are omnipresent and may appear as spectacular or mundane. In archaeoacoustics, it is usually spectacular-sounding echoes which are commented upon in research, as in the anecdote above. Other notable research has investigated questions based around unusual sounding echoes – such as the “chirped echo” at the Mayan-built Chichén Itza Pyramids in Yucatan, Mexico, which resembles the sound of the Quetzal bird (Lubman, 1998a, 2002) – which I address in relation to Chavín below. However, the attention to more spectacular echoes does not mean that mundane echoes do not play an important role in the auditory experiences which have been depicted in this thesis. Where archaeoacoustics researchers speak of resonant or reverberant acoustics, or perhaps comment on surprisingly “dry” or unreverberant spaces, I conceive of these as commentaries on unspectacular, mundane “echoes” within their simpler definition as

¹⁰¹ In naming the gender of the archaeoacoustics researchers here, I do of course not intend to advocate any essentialist positions arising from potential misreadings of what the project of feminist epistemologies has sought out to establish. Given that core tenets of gender archaeology have assumed the gesture of feminist critiques of androcentric archaeological interpretations, practices and research questions so far (Conkey & Spector, 1984; Gero & Conkey, 1991; Wylie, 1997), I name genders of researchers here to indicate a “minoritarian” position in a Deleuzo-guattarian sense in which minority positions (or marginalized groups) can embody an idea of “becoming minor”, a creative and open process of possibilities which begins with difference and deviation from “majoritarian” configurations, “the majoritarian as a constant and homogeneous system...the minoritarian as a potential, creative and created, becoming” (Deleuze & Guattari, 1987, pp. 105–106).

“reflected sound”. As previously declared, although they often do not meet the technical description of an echo, reverberations and resonances form part of the spectrum of echoes I am describing. As such, regardless of how noteworthy a sonic phenomenon is, I maintain that all types of echoes, defined as articulations of sounds in space, are arbiters of sonic knowledge production in archaeoacoustics.

In this chapter, I create a typology of echoes which have featured in this thesis. This typology does not seek to be exhaustive for all sonic encounters – it is specific to the questions being raised with regards to sonic knowledge production in archaeoacoustics, although it may well have import elsewhere. In naming and describing these types of echoes, I seek to consolidate the argument that I have been developing throughout this thesis: that sonic knowledge production in archaeoacoustics poses grand and profound challenges to traditional visuocentric Eurocentric epistemologies. Yet the opportunities to critique and expand the theorisation of knowledge production beyond its conventional norms have yet to be fully exploited.

The structure of this chapter mirrors the structure of this thesis. The typology I introduce first presents a positivistic echo, or a scientifically-bound definition of echo – its most common, everyday understanding as an acoustic reflection off a surface. This type of echo relates to verifiable, falsifiable knowledges which delineates between “science” and “non-science.” The positivistic echo is part of a framework of a formalized, rational-scientific activity which relies on systematic observation and reasoning. The second type of echo in the typology is a naturalistic echo. Drawing on my analysis of the second prevalent trend in archaeoacoustics – of sonic naturalism – I will show that concurrent to its sonic positivistic aims, echo is often constructed simultaneously as a “natural” and “supernatural” phenomenon. I argue that a naturalistic echo manifests itself in archaeoacoustics in two discernible ways. These relate to the trends I identified as “strong” and “weak” sonic naturalism. Strong and weak sonic naturalistic echoes come with different risks pertaining to the sonic knowledge production of archaeoacoustics. Third, the typology further develops my theorisation of aural gnosis put forward in Chapter 5. In proposing a “gnostic” echo, I seek to further explicate an alternative knowledge paradigm beyond the predominant

“episteme” of Western science, following Valentin Mudimbe’s (1988) and Walter D. Mignolo’s (2012) theorisations of gnosis. As a figuration of “border thinking” (Anzaldúa, 1987), I suggest that echo, understood as a material-semiotic articulation of sonic knowledge production, can lead us towards exploring and exploiting the full challenges archaeoacoustics poses to traditional Eurocentric epistemologies as part of a political-philosophical “elsewhere”, notwithstanding its necessary opacities (Glissant, 1997).

Kolar’s bemused comment in the dialogue above can be read as a genuine question about the sound source which was then re-phrased in a humorous yet succinct way: “was it a donkey or was that an echo?” This comment provides occasion in this chapter to re-think echo as a material-semiotic articulation within a larger ecology of sonic knowledges. Readers will recall my reflection on the slightly absurd situation at the beginning of Chapter 1 involving Igor Reznikoff exuberantly making animal noises into a niche in the cave of Arcy-sur-Cure in France. Understood in these ways, the human-animal relation indicates the fluidity of the boundaries which distinguish between humans and non-humans, and the biopolitical hierarchies which rule over animate and inanimate matter as “humans, animals and things in between” (Chen, 2012, p. 23). As described in the introduction to the thesis, to reconceive a Harawayan cyborgian echo is to probe beyond the Western binaries, such as nature-culture, and to foreground its possibilities as an acoustic phenomenon and as a fortuitously slippery and ambiguous figuration. Conceived as such, a plethora of questions arise: What is the “it” which is reflected when we hear an echo? What is the expectation of an echo in instances such as these? When and how do we conceive of this reflection as “same” and when as “other”? How does this align with ideas of “self” and “other”? What, in turn, do these assumptions and expectations reveal about the onto-epistemological frameworks we usually take for granted? In this chapter, I ask how conceiving of a cyborgian echo might be to enact a “diffractive” echo, in which the echo is not a reflection which merely “displac[es] the same elsewhere”, but a phenomenon which can be used to “mak[e] a difference” and to raise “another kind of critical consciousness” (Haraway, 1997, p. 273). In closing, I explore how Haraway’s understanding of “companion species” as a cyborgian figure which aids a deconstructive relationship to human and nonhuman relations, in turn specifically related to human-animal relations, pushes this

understanding of echo to a multi-species, ecological – or echo-logical –¹⁰² story of “human and more-than-human critters” (Haraway, 2016, p. 43).

6.2 Genres of echo

To frame this chapter’s typology of echoes, this section draws on Sylvia Wynter’s aforementioned concept of “genres of humans” to propose what I call “genres of echoes”. Wynter’s thought enables us to understand the widespread conflation of the conceptions and intellectual histories of European Enlightenment Man with those of all other human cultures. Just as Man has come to eclipse the different genres of human, as Wynter’s work describes (Wynter, 1997, 2003), this thesis has demonstrated how multiple genres of knowledge have become eclipsed by the prominence of Eurocentric knowledge paradigms. This approach draws on the discussion on sonic materiality of Chapter 3 and the corresponding “genres of knowledge” described in Chapter 5’s theory of aural gnoseology to develop a Wynterian approach which helps to provincialize Eurocentric conceptions on weighty and pivotal matters such as what it means to be “human” and what counts as “knowledge.”

Just as Eurocentric sonic knowledges have come to overrepresent the diverse genres of knowledges in a larger ecology of sonic knowledges, so have these hegemonic conceptions of echo come to dominate all other possible genres of echo. Due to their universalising impetuses, they are often taken to speak transhistorically and transculturally. The concept of genres of echo foregrounds the existence of a multitude of echoes which knowledge-power dynamics have valorised or disregarded, despite this predisposition for one type to occlude others. As material-semiotic actors, echoes are to be considered as neither purely acoustic, material and “real” nor entirely symbolic, metaphorical and figurative. As material-semiotic phenomena, they are entangled in nature *and* culture as *natureculture*, to follow Haraway’s formulation. Some are more prized and valorised in the hegemonic “here”, some less; some wield more power, some less. This is the context in which I situate this typology of echoes.

¹⁰² Here, I am reminded of Frances Dyson’s thought-provoking work *The Tone of Our Times*, in particular the connections she draws between “echo” as a sonic and a semiotic-cultural phenomenon, and the “eco” of the *oikos* of “economy” and “ecology” to theorize the “eco-echo” as a dynamic system that encompasses natural phenomena and cultural production” (Dyson, 2014, p. 113).

6.2.1 Positivist Echo

Archaeoacoustics' establishment as a legitimate field has been underpinned by what I have called the "positivist echo". Across the board, researchers acknowledged positivism's authority in legitimising their work. As a material-semiotic arbiter of sonic knowledge production within this strand of archaeoacoustics research, the positivist echo placed emphasis on quantitative measurements, verifiable statements, systematic observations or research questions designed around the principle of falsifiability. To reiterate my aforementioned declaration about the definition of "echo" here, this is not to suggest that archaeoacoustics are always *literally* studying echoes (however defined); rather, it is to suggest that, with regards to their investigations of sounds in space, archaeoacousticians frame their acoustic studies of archaeological sites positivistically.

To expand upon the positivist echo, I revisit the anecdote I used to introduce this thesis, which began with Reznikoff and Rupert Till in the cave of Oxocelhaya, France. In this scene, Reznikoff explicitly refers to his ability to hear echoes – at least what *he* defines as echoes – reflecting back in the cave. Till, however, attempted to invoke definitions taken from standards of measurement in acoustical science to dispute Reznikoff's definition. Reznikoff's position represents a "weak" position of sonic positivism whilst Till's represents a "strong" sonic positivism. Correspondingly, I identified a weakly positivist echo and a strongly positivist echo in their respective material-semiotic configurations. What echo "does" in Reznikoff's position is give him sensorial information which informs his proposed correlation between the acoustics and the positions of paintings he is studying in the cave. This is weakly positivist, as he is not reliant upon those positivist models; he can *hear* a correlation and would like it to be verified, but primarily he attests to *know with his own ears* that these "echoes" are present and relate to the location of the paintings. Till, by contrast, requires and insists upon scientific verification of this of proposed correlation. For Till, what echo "does" is *possibly* demonstrate a correlation between acoustics and the location of paintings; but this is still yet to be proven. Till emphasizes that "echo" (or reverberations and the standardized acoustical measurements he mentions, such as

Early Decay Time) must be examined by means of repeatable scientific experiment if Reznikoff's hypothesis is to be proven true. His position exemplifies a reliance on a strongly positivistic echo. Despite these divergences, I found that there was an overall consensus about the importance of positivism across the whole range of researchers I reviewed: hence my diagnosis that sonic positivism is a predominant trend in the field. Therefore, echo is first and foremost invoked with a scientific meaning amongst archaeoacousticians.

The prevalence of positivism in archaeoacoustics researcher's sonic knowledge production has constituted echoes, or as acoustic phenomena understood as material-semiotic configurations, in a particular hegemonic way. A positivistic echo is conceived of as using repeatable, verifiable and perhaps falsifiable experimentation, according to the procedures of scientific convention. This conception re-affirms the authority of scientific methods in academic knowledge production. As a material-semiotic actor, positivistic echoes remain within the forms of knowledge which Foucault describes as "institutionalized... systematized... qualified" (1980, pp. 78–84) and constitute what Santos calls the "abyssal thought" of "northern epistemologies" (2014, pp. x, 118). Naming a positivistic echo helps not only to illuminate a dominant framework of sonic knowledge production in archaeoacoustics, but also to draw out its fundamental basis within, and connection to, scientific conceptual frameworks. A positivistic echo is therefore the mechanism which divides between "science" and "non-science." Rooting echo in a history of positivism, although hardly a unified field, nevertheless serves to explain some of the limitations of sonic positivism in the larger ecology of sonic knowledges.

This thesis has demonstrated that positivistic echoes are undeniably of great importance within archaeoacoustics. Sonic positivistic knowledges form the core of much of the valuable academic archaeological work which has taken place in this field. However, as part of a dynamic of acknowledging various genres of echo, it is necessary to bear in mind the dynamic of "provincializing" European modes of thought and to thus accept the highly specific, culturally- and historically-grounded notions which constitute a positivistic echo, rather than presuming its universality or automatically affirming the ontoepistemological frameworks which have produced it.

6.2.2 Naturalistic Echo

The naturalistic echo is more complex, and therefore more difficult to describe, than the positivistic echo. As with sonic positivism, the concept and history of the term “naturalism” is multifariously entangled in various philosophical, scientific and other intellectual strands of Western thought. Earlier in the thesis, I characterised sonic positivism and sonic naturalism as existing alongside one another in archaeoacoustics’ sonic knowledge production and demonstrated that they share epistemological histories of sonic materiality. The naturalistic echo is therefore ideologically aligned with positivistic echo, even if its manifestations are substantially different. I also argued that sonic naturalism follows a delineation between strong and weak forms. In what follows, I describe strongly and weakly naturalistic echoes.

The weakly naturalistic echo overlaps conceptually with the positivistic echo. This is rooted in the shared epistemic heritage of sonic materiality I described in Chapter 3. In this chapter, I argued that the conception of sonic matter as inert and passive constitutes the scientific world-view that imbues both philosophical naturalism and positivism. Taking the same example of Reznikoff and Till discussing the existence or non-existence of echoes in the cave of Oxocelhaya, one can note a sonic naturalistic conception of echo can often be found alongside both weak and strong positivistic echoes. Sonic naturalism, in particular in its “weak” form, exhibits substantial similarities to positivistic models because it invokes an understanding of sonic matter as natural, in the sense of a philosophical naturalism I described in Chapters 2 and 3. As a material-semiotic figure, this genre of a weak naturalistic echo is grounded in a conception of sonic matter. However, it differs to a positivistic echo in that it alludes to a pre-civilisational, pre-industrial conception of “nature” as the environmental circumstances which the research subject matter investigates. This mirrors the characterisation of weak sonic naturalism.

The strong naturalistic echo can be characterised as a conception of the echo as conjuring a “better”, “more natural”, “more sonic” past. Archaeoacoustics researchers who subscribe to this conception of the echo argue that it can be used to better

understand sound in human behaviour in past cultures. This conception of the echo provides occasion to diagnose potential pitfalls related both to archaeoacoustics' own aims of sonic knowledge production *and* the critical analysis of sonic knowledge production which this thesis undertakes. Firstly, it could be argued that such a position risks the problems of "innocent listening" that I previously identified, which suggests a romanticisation of "prehistoric" societies in the form of a "sonic allocentrism". Therefore, a strongly naturalistic echo can be construed as a potential hindrance to archaeoacousticians' own proclaimed objectives of sonic knowledge production articulated in sonic positivism. As a material-semiotic actor, the strongly naturalistic echo can help precisely articulate some of the risks posed by strong sonic naturalism.

The strong naturalistic echo encapsulates an idea of a "more natural" "more sonic" and "better" past. In this sense, it has the potential of reinforcing an "aesthetic moralism", in which modern urban people have purportedly lost the ability to listen "properly" and which coincides with a perceived moral decline, as detailed in Chapter 3 (Thompson, 2017a). In Thompson's terms, therefore, such a strong formulation of the naturalistic echo might come to represent the "good" in contemporary noisiness's "bad". The risk is that this generalising moralistic impetus could come to dominate sonic knowledge production and deter more nuanced and careful investigations. The projection of ancestry associated with such a strongly naturalistic echo might submit too easily to the "innocent listening" of many traditional Euro-American historical narratives, such as those warned against in Chapter 3. The strong naturalistic echo risks reinforcing a romanticized use of sound and listening to describe a sonic alterity which aligns with hegemonic imaginary of the "here", which is the same but projected onto the past.

Most perniciously, some guises of the naturalistic echo – particularly those of a strong sonic naturalism – appears at times to offer a *mediation* to the past. This is perhaps the most crucial potential risk of the naturalistic echo. As evident in the positions which foreground a purportedly sullied and alienating visuocentric modern world, proponents of this conception propose that sound – and archaeoacoustics – might help connect "us modern people" back to a "better" "more sonic" and "more natural" past. This is where some responses to the epistemological problematic identified in the

introduction to this thesis, the potential *retrievability of sonicity and the irretrievability of aurality*, are revealed to be particularly contentious. A naturalistic echo, which might be an accurate acoustical representation of a sound in space ten thousand years ago, might *appear* to connect the listener to a distant culture of the past. This is sustained by an idea of an eternal, unchanging and universal phenomenon of “nature”. However, this is conceptually imprudent; an inert unchanging conception of nature reinforces nature-culture dualisms which pit the European Man as the creator of “culture” out of “nature’s” raw material. This is constitutive of the archetypal hegemonic “here” which powerful cultural criticisms, such as those from feminist and decolonial theory, have sought to dismantle. The speculative space opened up by the ancestral time frame of archaeoacoustics leaves it vulnerable to potential epistemological distortion. Such propositions are not grounded, embodied or situated in the way advocated by my methodology of *sounding situated knowledges*.

To reiterate this point in another way: not only can a naturalistic echo be a problem in that it embodies ideologies of sonic naturalism, which can unintentionally lead researchers to reaffirm predominant hegemonic cultural tropes in their questions and interpretations of a site; more alarmingly, it risks letting a *contemporarily* meaningful material-semiotic articulation of a space be mistaken for an implied meaning of its *past* articulation. I acknowledge that it is this epistemological yearning for an “elsewhere” that is one of archaeoacoustics’ most intriguing and attractive premises. Yet as I have argued, where these imaginations remain hegemonic and mirror the “here” and more of “the same” than they depict an “elsewhere”, they miss the opportunity to acknowledge difference and to create political-philosophical elsewheres. Presently, the naturalistic echo remains a crucial obstacle in archaeoacoustic’s sonic knowledge production. Such slippages are important to note, particularly when there are sceptical voices who rightly raise concerns about our ability to historicise sonic experiences when we lack written documents to verify the cultural meanings of sounds (M. M. Smith, 2015, pp. 61–62). Yet conjectures about the uses and meanings of sounds are often being made by archaeoacoustics researchers.

One final problem posed by naturalistic echoes is the tendency of sonic supernaturalism, which I identified in Chapter 2. There are plentiful archaeoacoustic

examples of supernaturalistic echoes, or those which “go beyond” a naturalistic conception of the echo. In Steven J. Waller’s work, for example, we see extensive experiments producing sounds in front of decorated cliffs with rock-art in various locations in North America combined with concurrent surveys anthropological and ethnographic material in order to synthesize acoustic tests with possible connections to local echo myths. One of the key ideas that can be found across Waller’s work is that pre-scientific understandings of sound as echoes and reverberations would have led to supernatural, animistic, and mythical interpretations of echoes (Waller, 1993b, 2002b, 2006). As mentioned in Chapter 2, Waller theorizes that the phenomenon of reflected sound may have appeared “magical” and “numinous” to “ancient cultures” and that these cultures may have considered echoing-surfaces “sacred” (Waller 2002, 12). Moreover, Waller argues that the wide variety of ethnographic research shows how echoes could have been “emanating from spirits” and “were considered spiritually important” (Waller, 2002a, p. 11). Similar ideas are found in Paul Devereux’s work. In his discussion of acoustic reflections on decorated rock faces, for example, Devereux draws on anthropology and archaeology of “shamanic” practices to suggest, “[e]choes reflect from rock-faces, and the sounds were once almost certainly taken as being spirits issuing from beyond the veil of the rock-surface” (Devereux, 2001a, p. 20).

Such theorisations, particularly those which overlap with the tendency of imagining pre-modern and “pre-scientific” mentalities, are engaged in some form of epistemological reflection and re-evaluation of the prominent role of European scientific paradigms. In some senses this is not so dissimilar to the pursuit of this thesis in seeking to challenge and push beyond the conventional constraints of a hegemonic epistemological “here” of Eurocentric thought. These studies conceive echoes as material-semiotic agents, acknowledging the restrictions of contemporary Western models; they are epistemologically inquisitive and are, in some senses, oppositional in character. The potential radicality of the sound-oriented paradigm-shift these studies advocate invokes a substantial socio-cognitive discontinuity and proposes to appeal to the theatrical otherness of a “sonic alterity”; such propositions provide a vital life force for the compelling stories they tell. However, whilst these theories may be valuable in their ability to challenge the constraints of academic disciplines which have hitherto

neglected pursuing such alternative lines of thought, there is an all-the-more-urgent need for such speculations to remain as grounded as possible in specific cultural-anthropological contexts and their respective political-ethical considerations. The speculative potential of archaeoacoustics is one of its most intriguing and powerful capacities. This needs to be negotiated with due care and attention.

Nevertheless, by naming and describing the naturalistic echo and highlighting its potential shortcomings I do not mean to advocate a simplistic “anti-naturalism.” The figure of a cyborgian echo that I proposed as an alternative in the introduction to this thesis follows Haraway’s insistence on the term *natureculture* to depict the inextricability of the oft-presented dichotomy of nature and culture. The *naturecultural* echo that I proposed can be conceived of, in Harawayan terms, as a phenomenon which foregrounds the constant interpellation of nature and culture throughout history, as co-constructed by humans and non-humans, and in the past and present. Contemporary researchers might fantasise that listening to a specific site with sound-producing devices thought to be archaeologically accurate for a time period gives them some form of “access” to an experience of the site as it was, “naturally”. However, this denies the *naturecultural* relations of the present in which they and their processes of sonic knowledge production are situated and all of the epistemological structures which they inherit and perpetuate.

Once more, then, a gesture of “provincializing” echo is needed. Similar to that suggested for the positivistic echo above, the epistemological ambitions of the naturalistic echo must, too, be re-positioned and recalibrated. The naturalistic echo can be used to explain the limitations of the echo as a form of sonic knowledge production *within* Eurocentric traditions of thought; at the same time, it can be used to point to the echo’s shortcomings when applied outside of modern European contexts. The nature-culture dichotomy of Western traditions of thought cannot simply be mapped on to social life outside of the modern West without acknowledging its ideological baggage, which often contains cultural assumptions such as gendered and racialized stereotyping. Marisol de la Cadena’s work on Indigenous anti-mining movements in Peru, Ecuador and Bolivia powerfully demonstrates how these recent events challenge the nature-culture binary which conventional politics is

fundamentally based upon (De La Cadena, 2010). Indigenous conceptions, for example in which mountains are “earth-beings,” expose the insufficiency of Eurocentric nature-culture binaries when applied to Andean cosmologies in which “modern scientific paradigms banned earth-beings from politics and this in turn disrupts the very locus of enunciation of what politics is about (2010, p. 344). Thus, “Indigenous politics may exceed politics as we know them” (2010, p. 335). Understood in this light, the naturalistic echo serves well to illuminate how – particular to the modern West – certain engrained ideas about nature and culture are constructed as dichotomous, oppositional forces within sonic knowledge production. Provincialising the naturalistic echo of the modern West to an understanding of sonic knowledge production exemplifies it and enables a better recognition of its limitations.

6.2.3 Gnostic Echo

Whilst a positivistic echo and a naturalistic echo are grounded within the hegemonic “here” of conventional European thought, a gnostic echo is that which seeks to move beyond it. A gnostic echo proposes a move towards a political-philosophical “elsewhere” in the sense I invoked in the introduction to this thesis. This “elsewhere” is as ambitious as the radical paradigm shifts which archaeoacoustics researchers sometimes imply, however its invocation of speculative potential are situated and grounded.

In Chapter 5, I put forward a theory of aural gnosis that drew on theorisations by Valentin Mudimbe and Walter D. Mignolo. This work signifies a divergence from dominant European epistemological frameworks which favoured the “episteme” of scientific-positivistic knowledge (Mignolo, 2012; Mudimbe, 1988). In that chapter, I switched terminology from describing *sonic* positivism and *sonic* naturalism to a terminology of *aural* gnosis in order to emphasise a move away from the subject-object binary, which grasps sound as an object to be perceived by an assumed sovereign listener-subject who is separate from the world. Aural gnosis aims to encapsulate a gesture of constant questioning, akin to Mudimbe’s conceptualisation of gnosis as a perpetual “question mark” and a “thinking of/from the border” (Anzaldúa, 1987), which constantly acts in opposition to and which challenges pervasive

knowledge paradigms. A gnostic echo thrives in habitations illuminated here so far, such as indigenous knowledges of infinite kinds (Chilisa, 2012; Kusch, 2010; L. T. Smith, 2012; Todd, 2016) and decolonial knowledges (Kusch, 2010; Lugones, 2010; Mignolo, 2011, 2012; Quijano, 2007), and many more. In this sense, echo as a figuration of “border thinking” (Anzaldúa, 1987) reminds us of echo’s situatedness within geopolitical reality, within the complex dynamics of coloniser/colonised, including its gendered dynamics and embeddedness within contemporary global capitalist relations. This dynamic of persistent questioning and resistance of staid stabilities characterises the affordances of a gnostic echo.

A gnostic echo can also be upheld as a supernatural echo throughout the various stories I have examined in this thesis, where the supernatural echo is defined as that which exceeds Western scientific explanation. A gnostic echo might embody knowledges which Foucault calls “subjugated” and those which Santos describes as “epistemologies of the South” (Foucault, 1980; Santos, 2014). In the nineteenth century, in the Wynterian terms I introduced above, a purely secular, de-godded and de-supernaturalized version of sonic matter emerged. Yet, if in the era of Man¹ the hierarchy of the Christian theological God was explicit, it became occluded and recognisable as a hybrid religio-secular in the era of Man². To transfer this analysis to a consideration of echo, this means that a supernatural echo, conceived only within hegemonic European frameworks, became “naturalised” within the paradigm of Western science; it became a “natural” phenomenon of physics. In the process, the numerous belief systems which were oppositional to this were occluded.

As described earlier, a gnostic echo shares terminological overlaps with The Gnostics, the early Christian religious groups denounced as dangerous cults by the increasingly orthodox Church, and with the supernatural resonances of sonic knowledge production implied by archaeoacoustic researchers. The concept of a gnostic echo carefully filters these multi-faceted implications of “gnosis”. In considering how scholars describe secularism not just as the separation of church and state but as the “rearticulation of religion in a manner that is commensurate with modern sensibilities and modes of governance” (Mahmood, 2009, p. 837) and as “closely connected with the rise of a system of capitalist nation-states” (Asad, 2003, p. 7), we can read that

modern European religions established a particular paradigm through which “supernatural” ideas were deemed acceptable or unacceptable as the history of Gnosticism. Thus understood, a gnostic echo represents the huge variety of ideas which are not ordained by the hybrid religio-secular episteme of hegemonic Eurocentric thought, including those of the so-called “occult” in the modern West as well as those beliefs of the non-modern West which fall outside of its frameworks.

As a material-semiotic figuration, a gnostic echo is therefore one defined by its elasticity and its openness. Its speculative potential is powerful. Nevertheless, in its acknowledgement of the role of political and ethical accountability and responsibility in knowledge production, a gnostic echo harnesses this vast realm of unknowns for its pursuits of epistemic and social justice. In naming a gnostic echo, I aim to instantiate the aims of this multi-pronged move towards onto-epistemological alterity which the challenge of the sonic proposes to knowledge production. A gnostic echo is the closest I come in this thesis to offering a method away from the hegemonic “here” of patriarchal, colonialist, capitalist Western episteme and towards a political-philosophical “elsewhere” which is determined *to exist with* the necessary contradictions which constitute it. A gnostic echo, then, may enable a move beyond the common definition of echo as a reflected sound and, following Haraway, propose a constant recognition of difference aimed at raising “critical consciousness”.

Where Gnosticism maintains its connotations of secretive knowledge in everyday parlance, I understand this secrecy in terms of a Glissantian “opacity.” Pushing back at an often-automatic desire for a transparency of relations (Glissant, 1997, pp. 189, 192), this reflex of logic must be critically considered and the hunger for absolute and complete translatability must be relinquished. A gnostic echo reminds us of the ultimately-finite nature of archaeoacoustics’ epistemological pursuits, which is implicit in the problematic I identified as the retrievability of sonicity and the irretrievability of aurality. This can be conceived as within a Glissantian poetics of relation (Glissant, 1997); one is not always entitled to “know everything.” If one of the problems of a positivistic echo is that it only focuses on one particular type of scientific knowledge, and one of the problems of a naturalistic echo is how it risks letting contemporary listeners think they can gain unmediated access to the past, then a gnostic echo can

act is a reminder of the irretrievability of aurality and the epistemological humility which accompanies this problematic. Without denying the valuable pursuit of sonic knowledge production of archaeoacoustics hitherto and whilst giving due credit to the vast amount which can be known and established through its practices, particularly the best forms of each of those practices, a gnostic echo serves as a humble reminder of the elements of unknowability, of opacity, and of subjugated knowledges that archaeoacoustics consigns to the abyss, but which nevertheless persist.¹⁰³

A gnostic echo, understood as a Harawayan feminist decolonial figuration, remains grounded to the tenets of *sounding situated knowledges* as outlined in the introduction to this thesis. The situatedness of sonic knowledge production must be foregrounded within the flights towards the fantasy of “elsewhere” encompassed within the endeavour of a gnostic echo. Where Haraway demands the centrality of accountability and responsibility in knowledge production (Haraway, 1988), a gnostic echo should understand and negotiate the multi-faceted dynamics of knowledge and power as it encounters them. Its political commitments, as with Haraway’s figure of the cyborg, are to the anti-racist, anti-capitalist, anti-patriarchal struggle against the historico-structural conditions which constitute late modernity as described as the hegemonic “here” throughout this thesis. In response to these conditions, a gnostic echo persistently asks the question of how we might formulate and practice an ethics of sonic knowledge production.

6.3 The staircase chirp

(Sound of clapping at regular intervals moving at regular pace and chirping echo of varying clarity)

Miriam Kolar: “That’s nice! There’s your staircase chirp. Our staircases chirp a little bit too!”

Me: “When I walked towards it, you could hear there were two parts of the chirp.

[H.E.] (a student): “Yeah, when you got above the small stairs it started becoming more a tone than just a chirp.

Me (to MK): “[H.E.] was asking how much the bottom staircase is part of the chirp. When you walk and clap you can feel that there’s two parts to it which

¹⁰³ In this sense, a gnostic echo appears to be an *agnostic* echo. However, due to the impracticalities of this word-play this is not pursued further.

kind of come apart...

MK: "That's so interesting...I wish we had more time to work on all these other things..."

Listening to echoes at Chavín did not play a central role in our archaeoacoustics experiments there. Nevertheless, echoes sometimes intervened, as the opening anecdote of the chapter indicated; at times, echoes inadvertently became our focus. The scene above took place during the third day of archaeoacoustic testing with the group at Chavín, after I had conducted my own mini-experiment trying to capture the sound of the "staircase chirp": the echo from the staircase which makes a chirping noise when one claps in front of it.

The phenomenon of the chirping staircase is well known within archaeoacoustics, with one of the most famous examples being from the acoustic measurements that David Lubman (Lubman, 1998a, 2002), a colleague of Kolar's, made at the aforementioned Chichén Itza Pyramids in Yucatan, Mexico. At Chavín, one of the students from the archaeoacoustics group had designed an outdoor experiment which involved two people standing facing one another at various distances. The lead person clapped twenty times in sequence and the partner subject attempting to clap along synchronously for the final ten times. This became harder as the distance between the two people increased and or as the tempo increased, each of which were intensified in each round of the experiment. As the experiment only required two people at a time, whilst waiting for my turn I observed and made audio recordings from different positions. I had noticed how some claps scattered widely in the plaza, depending on who was clapping and where they were standing. The claps – and it was particularly noticeable when it was just a single and particularly clear clap – had the capacity to multiply and flutter rapidly around the space, as if shattered into several distinct fast-moving shards. Occasionally, a chirp echo was heard bouncing back from the staircases.

Directly prior to the dialogue above, I had placed my audio recorder by the smaller staircase leading down to the sunken square of the plaza. Starting from its centre of the square, I walked and clapped at a steady pace towards this small staircase, up and over it and then proceeding the remaining few metres towards the larger staircase.

Doing this, I was able to isolate the chirped echo very clearly and hear it with different strengths and levels of clarity. Listening back to the recording, it was audible that when I walked towards the base of the larger staircase the chirping echoes became increasingly prominent, making a sound – according to my associations – rather like a quacking duck. However, as I commented upon afterwards after reflecting on the experience of listening whilst clapping and walking, I noted two “parts” to the staircase chirp, as there were two “parts” of the staircase – one larger and one smaller – which each reflected back the clap distinctly.

The typology of genres of echoes outlined above can be roughly applied to the scenario described here. A positivistic echo can be found through processes of conventional scientific knowledge production, similar to Lubman’s research at Chichén Itza. Although currently no formal research to my knowledge exists at Chavín, an experiment investigating the chirping effect specific to Chavín’s architecture could include measurements which fit within the agenda of a positivistic echo, given how its acoustic characteristics are informed to its sunken plaza and the wall-like structures which flank it. Additionally, as we had noticed during our observations of the space, the larger staircases each had one anomalously broad step in the top third of the steps whose function was unclear. As Kolar intimates in the dialogue above, there are so many aspects of Chavín’s acoustics which there have not yet been time or resources to explore. The creation of experiments along the lines of statements which could be verified, falsified or observed through repeatable systematic experiment would constitute a positivistic echo in this scenario.

A naturalistic echo, in the scene described above, might be observed if one were to romanticize the echo as evidence of a more sonic, “more natural” past. In this particular instance, this might mean to exacerbate the idea of ancient cultures, or so-called “prehistoric” people, as “closer to nature” and to project ideas of their purported closeness to sound. In this scenario, then, a strongly naturalistic echo might link contemporary listeners of the echo to an imagined past community. In its more extreme version, a naturalistic echo might even be seen as somehow imaginatively transporting the listener into a past sonic experience; the material-semiotic agent of an echo might be taken to mediate access to a long-gone past culture. The

architectural design of the staircase – whether or not the acoustic effect was part of the design – is undeniable, but attaching certain ideas to it without sufficient grounding in archaeological context is risky. These formulations of naturalistic echoes, which draw on tendencies previously identified within archaeoacoustics researchers, might detract from the research questions that these researchers have identified themselves.

A gnostic echo, in this scenario, might be the material-semiotic articulation which acknowledges the limitations of a positivistic echo and probes beyond a pre-given nature-culture paradigm, allowing it to be predominantly characterized strictly as a scientific phenomenon or as a “force of nature.” A gnostic echo is open to the multitude of ontoepistemological possibilities and is not limited by the premises of measurability or verifiability, yet neither does it re-affirm and re-centre its own normative philosophical values. Listening to the chirped echo of my claps above, this might mean attempting to push beyond what I know about the laws of physical sciences to open up the ontological status of the reflected sound to a wider variety of understandings. This might involve relations between human, nonhuman, organic, inorganic, material and/or immaterial beings or things. Nevertheless, this should not be carelessly undertaken endeavour; rather it should be embodied and situated. Understanding the entanglement and unequal power dynamics of the coloniser-colonised relationship, a gnostic echo attempts to embody an ethics of care in “more-than-human worlds” (Puig de la Bellacasa, 2017). This might be enacted by attending to known oppressive vectors of the political historical “here”, respectfully incorporating aspects of local, particular knowledge traditions whilst remaining keenly aware of the very power dynamics which structure the hierarchy of one over the other.

A gnostic echo can be fundamentally differentiated from a positivistic and/or naturalistic echo. In its diffractive nature, it is not merely “reflective”, which might otherwise serve to reify traditional notions of objectivity and presume a stable ground upon which knowledge is produced. A diffractive gnostic echo foregrounds difference and indicates the pathway to an ontoepistemological elsewhere. It is an agent of border thinking and a being “of the border” (Anzaldúa, 1987) and its boundary-blurring

capabilities. A gnostic echo opposes the very paradigm of nature and culture, of science and non-science, as well as that of naturalism and supernaturalism; it allows for opacity and the unknowns to persist and does not demand full transparency in the framework it was borne within. Asking where this difference arises and asking simultaneously where my conception of “same” arises might be a first step in reigniting considerations of difference within a sonic alterity. A gnostic echo attempts not to indulge in a hegemonic imagination, although it is deeply aware of the direction this will lead. Instead, it uses feminist modes of speculation, attending to the accountability and responsibility of situated knowledge production, to tentatively seek out new terrains of an ontoepistemological elsewhere.

6.4 One or many

As a Harawayan decolonial, feminist and anti-capitalist figuration, a gnostic echo alludes to a quasi-utopian space. A gnostic echo can be conceived of as non-dualistic, as transcending the many binaries known to persist in Western thought: man/woman, nature/culture, mind/body, self/other, interior/exterior, religion-spirituality/secularism, human/animal, seeing/hearing. A gnostic echo is not a simple and wishful denial of these binaries, but a serious acknowledgement of their respective ramifications and an earnest attempt to move beyond the most damaging, most conceptually- and politically-limiting consequences of these stubborn dualisms. Where I have touched upon nature-culture, mind-body, religious-secular, seeing-hearing binaries at various points throughout this thesis, I turn now to focus on the self-other binary in these considerations of what a gnostic echo can offer.

If, following Mudimbe, we construe gnosis as a persistent relation of questioning, deconstruction, or perpetual “différance” – in a Derridean sense of simultaneous differing and deferral – then we can further interrogate the question of what establishes difference in an echo. If an echo is commonly regarded as a reflection of a sound and can therefore be identified as a separate sound event, a number of questions arise with regards to what constitutes the establishment of difference. Most often, echoes are identified in relation to an original sound. If one hears the reflected sound and can identify it as a version of the same sound, re-occurring with a temporal

delay (usually this has to be more than a tenth of a second), it is “different” only due to its temporal delay. It is “the same” sound, yet delayed. However, there are instances in which the echo of a sound gives the aesthetic appearance of a completely “different” sound, for example the “chirping echo” effect described in the anecdote above and recorded in archaeoacoustics research by Lubman at the Mayan pyramids of Chichén Itza. In this sonic experience, the original sound, here the sound of a clap, bounces back with a noticeably different frequency spectrum, changing the frequency and timbre of the expected “reflected” ordinary sound. In instances such as these, in which the reflected sound deviates enough from the known, “original” sound, the question of difference becomes ontological; it could well be attributed to an “other” being rather than the original sound event which it was supposedly the consequence of. Even if a causal relation can be determined phenomenologically – the clap is needed in order for this “other being” to emerge – there is still a palpable ontological “difference” discernible in comparison to the echo understood as a repeated sound. Whether the echoed sound is considered “same” or “other” is one potentially significant way in which echoes in archaeoacoustics are constructed.

Returning to Kolar’s amused but genuine question in the dialogue at the beginning of this chapter, “was that a donkey or was it an echo?”, allows us to bring the status of the echo’s ontological being completely into question. Here, it is unclear what has emitted this sound – was it a reflection of a known originating sonic event? Or was it the response of another, nonhuman, animal being, who was responding to this human-produced original sonic event? Or was it a coincidental sonic event with no causal relation to the sounds we, on-site humans, were producing? A gnostic echo, shrouded as it is in opacity and secrecy, sits in this ontological in-betweenness of what constitutes “same” and what constitutes “other”. Maintaining this space of unknowing or establishing this space of the unknown constitutes part of the precepts of a gnostic echo. Gnostic echo does not presume a sovereign, contained, enclosed individual unit of the liberal humanist subject; rather, it is a figuration which opens up beyond this well-known and mistakenly all-too-easily transferred notion of subjectivity. The gnostic echo brings self and other into question.

As I suggested in the introduction, construing the echo as a material-semiotic actor is

premised on an understanding of the role affect plays in sensorial experiences, including acknowledging the Cartesian bias of Eurocentric epistemology and its tendency to occlude non-visual sensory and affective experiences. Within the framework of creating a gnostic echo, the role of affect comes to the fore. Affect theorists have powerfully proposed that affect it can get closer to different and perhaps better understandings of experiences of memory, trauma, haunting, the imaginary, within and beyond its common association with emotion, between human bodies, as well as in relation to non-human bodies and things – that is, in relation to both organic and inorganic life (Clough, 2007, pp. 1–13). As Thompson and Biddle outline, encounters with sound and music which are “so frequently resistant to semantic or semiotic interpretation” (2013, p. 10) provide ample opportunities to demonstrate the under-articulated in-betweenness of affective forces. Yet away from a tendency to risk fetishizing affect “in-itself”, we can frame the task of conceptualising the gnostic echo affectively in terms of asking “how different models of agency and non-agency, of the conscious, the pre-conscious and the post-conscious, are thinkable in relation to sound” and how sound and music “manifest affect” in different ways (Thompson & Biddle, 2013, p. 16). Insofar as affect enables a theorisation of under-theorised, often unarticulated forces of “in-betweenness” (Gregg & Seigworth, 2010, p. 1) and insofar as it can help transcend the staid tendencies towards mind-body and other dualisms as a Spinozan-Deleuzian “philosophy of force, becoming, potential, encounter and difference” (Wetherell, 2012, p. 3), conceiving of a gnostic echo can mediate some of this affective power both materially and semiotically. A gnostic echo, then, is well-placed to take up the challenge of how the sonic manifests affect in archaeoacoustics if it, “when employed strategically, can represent a radically different structure of political and social connectivity and distribution that queries and interrogates [...] older forms of political allegiance” (Thompson & Biddle, 2013, p. 16).

Construing a gnostic echo affectively and embodying it as a perpetual question mark of differential relations serves to blur the boundaries set by the previous hegemonic order. Oscillating between all conceivable “bodies” in human, animal, organic, inorganic conceptualizations of a “body”, a gnostic echo proposes a potential reconfiguration of the power-knowledge hierarchies we know to have become deeply ingrained in archaeoacoustic research: what I have identified as the positivistic echo

and the naturalistic echo. As a figuration of difference and as a figuration of potential ontoepistemological upheaval, through its appearance as a material-semiotic actor which relates to pasts – as “elsewhere” to our present “here” – in contemporary archaeoacoustics, a gnostic echo enables this constant push of reconfiguration as it reminds us, constantly, of what kind of elsewhere one might want to deploy it for.

6.5 Echoes of elsewhere and “elsewhen”

In closing, I propose a gnostic echo to be understood alongside the Harawayan, cyborgian echo outlined in the introduction to this thesis. Yet where the cyborg constitutes Haraway’s best known feminist figuration and has been subjected to multiple mis-interpretations,¹⁰⁴ one can name many other lesser known figurations she turns to in order to express a similar set of ideas, including the coyote, the vampire, the monster, and the companion species. I propose a gnostic echo to be understood in similar terms to the Harawayan companion species. As she puts it:

Companion species” thinking inquires into the projects that construct us as a species, philosophical or otherwise. “Species” is about category work. The term is simultaneously about several strands of meaning – logical type, taxa characterized through evolutionary biology, and the relentless specificity of meanings. (Haraway & Gane, 2006, p. 140)

Conceiving of echo as a companion species is a way to foreground human-nonhuman relationality in its multi-faceted richness. It enables us to purposefully blur the boundaries of what has hitherto been their dominant construction and to call into question what both the verb to *companion*, as in “to consort, to keep company,” and *species*, as in “the dance linking kin and kind” (Haraway, 2008, pp. 17–18), bring into being – that is to say, how something relates to what; in this case, how echo relates to species of its own “kin and kind” and to others. Similarly, Haraway speaks of “critters”, which refers “promiscuously to microbes, plants, animals, humans and nonhumans, and sometimes even to machines” (Haraway, 2016, p. 169), as a way of dislodging the

¹⁰⁴ In an interview with Nicholas Gane, Haraway describes some of these misinterpretations and misreadings of the infamous *Cyborg Manifesto*, and her preference for the alternative “companion species” metaphor as one way of creating distance to the problematic discourses around posthumanism, particularly where the techno-centric debates bring them close to “transhuman techno-enhancement” (Haraway & Gane, 2006, p. 140).

hegemony of traditional subjectivities without becoming ungrounded from real-existing political stakes which shape the contemporary. Thinking of echo as a material-semiotic articulation at the level of critters engages a micro-level of sonic materiality, enabling us to conceive of it taking form into various like and unlike “species”. Species of echoes, similar to the aforementioned Wynterian schema of genres of echoes, help further elucidate both the affordances and misgivings of such taxonomical work. Rather than dividing between those of a similar “kin and kind” and those dissimilar, then, genres of echoes and a gnostic echo within these can help to persistently question the very boundaries of belonging and exclusion which structure the sociality of knowledge production.

Thus conceived, I propose echoes to enable critical reflection not only on conceptions of “self” and “other” or such weighty notions of “being” “knowledge” and “human”, but furthermore to ideas of place and time inherent in the archaeoacoustical work I have analysed so far in this thesis. As elaborated upon in the introduction and in Chapter 3, the construction of the temporal Other (Fabian, 2014) of sonic alterity demonstrated that time is not an apolitical construct. This has been evidenced in archaeoacoustics, too, where the dangers of sonic allocentrism projected onto “prehistoric men” have been shown to reinforce practices of “innocent listening”. Archaeoacoustic research often takes thousands of years of human culture as its subject matter and works across global locations. It demands that echoes, understood as material-semiotic arbiters of sonic knowledge production, are deployed as part of a critical reflection on the notions of place and time inherent within this subject matter and these locations. Whilst I chose the term “elsewhere” to oppose the hegemonic “here” of Eurocentric knowledge paradigms, we can simultaneously acknowledge this “elsewhere’s” joint temporal-alterity, which is not distinct from its geolocational position – its “elsewhen”. Paradoxically, then, a gnostic echo is simultaneously bound-and-not-bound to its situated, located, grounded and embodied presence in the “here”. It is both a yearning for a political—philosophical “elsewhere” and “elsewhen” at the same time that it is contradictorily rooted in the “here” and “now” of sonic knowledge production. This internal set of contradictions and its persistent boundary-pushing questioning defines how echo can help to reconfigure the horizons of sonic knowledge production in archaeoacoustics.

Conclusion

This thesis posed the question of whether the sonic knowledge production of the emerging field of archaeoacoustics can challenge the visuocentric traditions of Western epistemologies. As put forward in the introduction, the research it presented is located within many complex epistemological problems. Some of them, such as the relationship between the bodily senses and knowledge production, remain just as difficult to navigate as they were at the beginning. This is the ongoing challenge that “the sonic” presents to researchers. However, other problems, such as the epistemological limitations of visuocentric knowledge production for archaeoacoustics and how its speculative potential is being harnessed by notions of “the sonic”, have become distinctly clearer. Through my fieldwork, analyses, and theoretical reflection, I have argued that whilst archaeoacoustics proposes distinct epistemological challenges to the conventions of Eurocentric knowledge production, the potential radicality of such an endeavour has not yet been fully exploited.

This thesis detailed the geographical journeys I undertook to France and Peru and the observations I made of archaeoacousticians at work. It used these physical journeys as the basis of analytical journeys into the intricacies of sonic knowledge production that feeds the formation and current status of archaeoacoustics. I traced epistemological journeys of sonic knowledge production between an idea of a hegemonic “here” of European knowledge production and a political-philosophical “elsewhere” – and “*elsewhen*” – that lies beyond this mode of knowledge. I used these analytical journeys to explore a potential for a theory of *aural gnosis* to challenge the very notions of what sonic knowledge can mean. I argued that this concept calls into question the very meaning of “knowledge” itself as it is conventionally conceived. Throughout, I have sought to foreground the unavoidable *situatedness* of knowledge production, for both the researchers whose work I have examined and for myself. The nested character of sonic knowledge production that I presented in this thesis distinguished between the aims and objectives of the archaeoacoustics researchers and mine and between the disciplines of archaeoacoustics and sound studies, although some overlaps were observable. Whilst researchers in the field are engaged in producing sonic knowledges pertaining to archaeological questions, my project has approached the field with the

aims of critical reflection in the hope of contributing to notions of sonic knowledge production in its broadest sense.

In pursuit of an expansive, situated conception of sonic knowledges produced in archaeoacoustics, I proposed the concept of echo. I formulated echo as a material-semiotic figuration and proposed that it acts as a mediator between the hegemonic “here” of Eurocentric, capitalist, patriarchal intellectual frameworks, and an imaginable political-philosophical “elsewhere”, reflecting many of these Eurocentric ideas back and making them palpable in new ways. By emphasizing the capability of echo as difference, in reflecting and diffracting, I posed echo to be a figuration for the method of *sounding situated knowledges* which sought to foreground accountability and responsibility in sonic knowledge production. Adopting this concept revealed key dynamics of the knowledge producing systems we operate within.

My analyses and reflections showed that the tendency to depict a sonic alterity without a deeper reflection on “difference” results in some archaeoacoustics researchers manifesting a commonly found and pernicious cultural tropes: modernity has fallen, morally, from an imagined “golden age” of culture at some point in the distant past, but it can be recovered or “sounded”. Whilst such utopic projects can be politically powerful and remain of vital importance, the concurrent danger that such gestures often perpetuate is to avoid addressing the difficult and sustained political and ethical work required to produce knowledge about past cultures in the present. Revealing the complex conundrums of sonic knowledge production which echo partakes in, I have argued that there is a tendency within archaeoacoustics to denounce the present and call vociferously for an empirically-inaccessible past, rather than negotiating the more difficult political-ethical work of the contemporary. Because sound is situated within the sensory and the ephemeral, affective dimensions of human experience, it can be rightfully considered a disruption of the visuocentric Western ontoepistemological framework of academic knowledge production. Yet, the extent and character of this disruption cannot be overstated.

What the sonic *does*, I would concur with the majority of archaeoacoustics researchers, is to provide a significant challenge to previously visuocentric

understandings of archaeological sites. Researching acoustics and sounding experiences *can* force us to re-think human behaviour at these sites and perhaps lead us to profound insights into sites as we know them. Yet rarely does sound offer a magic solution either in solving the “mysteries” of a site; nor does it ameliorate wider social problems. Pandering to such conjectures can indeed inhibit the self-proclaimed (and often scientific-positivistic) goals of sonic knowledge production. Following Jonathan Sterne’s characterisation, what the sonic does provide, however, is a different map to the territory (2003, p. 15). Exploring this territory with renewed ontoepistemological curiosity has been the endeavour of this thesis. A different set of questions, and a different set of demands, are located within the very configuration of difference which the echo provoked in this study. Echo allows us to overlay these questions and demands on the sites of sonic knowledge production.

In the introduction, I laid out the key cornerstones for the investigation and identified how the “turn to the sonic”, in both sound studies and archaeoacoustics, exhibit similar yet divergent characteristics. I introduced echo as a material-semiotic figuration which could be used as a part of feminist and decolonial critiques of and within sonic knowledge production. Importantly, I identified a crucial problematic which faces the field: the *potential retrievability of sonicity* which is paired with *irretrievability of aurality*. This contrasts the empirical accessibility of an acoustically reconstructable scenario for present-day researchers in cases of sufficient extant architectural formation, with the inaccessibility of the cultural and intellectual contexts in which sonic experiences took place within. The varying ways researchers approach this problem was proposed to be a decisive feature of their epistemological method.

In Part 1, Chapter 1, I described the formation of the field of archaeoacoustics in terms of its institutionalisation and its journey towards establishment as a legitimate field of study. This was shown to share characteristics of the emergence of an “invention,” in which there was a sense of competition around the ingenuity of an idea. According to typical accounts of social studies of sciences, the field was shown to develop a “core-set” of actors who wield the most intellectual power and prestige in their given field. Alongside a description of its two contrasting phases – prior to the 2003 Cambridge meeting, which saw the naming of the field as *Archaeoacoustics*, and after 2003, when

various approaches and positions of researchers developed, I built an overall picture of the field's history, narrating how, amongst substantial influence and impetus from "popular" or "non-academic" actors and interests, it struggled to obtain legitimacy before establishing itself as a viable "epistemic culture" (Knorr-Cetina, 1999).

In Chapter 2, I undertook an in-depth analysis of sonic knowledge production in the field. I identified its two overarching characteristics to be sonic positivism and sonic naturalism. I proposed that sonic positivism, tied to the intellectual proximity of archaeology and acoustics to positivistic models, indicated a general consensus for methods which concern systematic observations, hypothesis testing of falsifiable statements and quantitative and qualitative measurements. I identified epistemological mechanisms of sonic positivism as an "ideal-type", as well as sonic anti-positivism and sonic non-positivism. I proposed a characterisation of sonic post-positivism of the field's sonic knowledge production overall. I additionally divided sonic positivism into "strong" and "weak" modes in order to designate the degree to which individual researchers adhere to its core tenets. Alongside this, I identified sonic naturalism as a further overarching trend of sonic knowledge production in the field. Given the multiple meanings and discourses around "naturalism," this was more complex to identify. I argued that sonic naturalism is constituted by three main tendencies of thought: anti-visuocentrism, imaginations of pre-modern mentalities and conceptions of sound as supernatural. Within each tendency, I described various positions which detailed the differing ways which researchers expressed them. Once again, I observed "strong" and "weak" versions of sonic naturalism. Whilst weak sonic naturalism was shown to overlap with ideas of sonic positivism, strong sonic naturalism was characterized as a tendency within researchers to imagine a "better," "more sonic" and "more natural" past which they situated their archaeoacoustics research within. Finally, I identified a tendency of heterodox knowledge paradigms within researchers' epistemological framings.

In Chapter 3, I proposed the key theoretical argument of this thesis: namely, that whilst archaeoacoustics inhabits radical epistemological ambitions, it currently remains rooted in the hegemonic "here" of Eurocentric knowledge paradigms. I demonstrated this in three parts. Firstly, I identified a notion of sonic alterity in which "differences" of

various kinds are being ambiguously mobilized in the field. I proposed that these differences exude an idea of socio-cognitive and ontoepistemological discontinuity which could be considered epistemologically radical. However, I also warned against the pitfalls of romanticising a sonic other within what I conceived of as “sonic allocentrism.” Secondly, I traced the shared epistemological heritage of sonic materiality to demonstrate how sonic positivism and sonic naturalism are intellectually rooted together. I argued that these two trends reinforce Eurocentric nature-culture dualisms and have the potential to perpetuate dangerous universalising tendencies of thought. Thirdly, I outlined potential dangers to the field’s sonic knowledge production by naming a risk of “innocent listening.” I described currently existing indications in the field of a hegemonic, rather than oppositional, imagination. I used three areas – a notion of “acoustic space”, gendered assumptions and conceptions of sound as supernatural – to exemplify how following conventional Eurocentric models can inhibit sonic knowledge production.

In Part 2, Chapter 4, I move to my case study of Chavín de Huántar, Peru, where I described Miriam Kolar’s exemplary archaeoacoustic research in depth. I contextualised this within Peruvian archaeology’s academic and cultural heritage institutional structures and identified the key tension between positivism and Indigeneity within it. I then analysed Kolar’s processes of sonic knowledge production, which she describes as “integrative anthropological” as a “robustly post-positivistic,” approach, to show how its combined acoustical-technical and sophisticated intellectual reasoning make it possibly the most refined and compelling body of work within the field. I describe how it represents many characteristics of Sandra Harding’s proposal of a feminist standpoint theory approach to the legacies of positivism, which foregrounds responsible uses of it amidst social-justice-oriented agendas (Harding, 2005). I then outlined how conceptions of the supernatural related to sound and listening were evident at the site, before returning again to why practices of *sounding situated knowledges* are necessary in processes of sonic knowledge production.

In Chapter 5, I situated sonic knowledge production at Chavín within a larger construct, which I described as the Chavín episteme to designate the hegemonic patterns of Eurocentric thought which pervade all knowledge production there. I traced how sonic

positivism is situated partly “on the abyss” of Western thought (Santos, 2014), in that some knowledges become “qualified” whilst others are “subjugated” (Foucault, 1980). I proposed sonic post-positivism as pertaining to only that which *can* be made visible by the hegemonic “here” of academic knowledge production. I then theorised how the “beyond” of non-hegemonic sonic knowledge production might manifest as “aural gnosis.” To propose this concept, I drew on theorisations from Mudimbe (1988), Mignolo (2000) and Anzaldúa (1987) to describe how a theory of aural gnosis encapsulates persistent questions of staid Western dualisms and pushes towards processual, non-dualistic and “difference”-centred notions of sonic knowledges. In a final speculative part, I sketched out how current research might rise to such a challenge in theorising how the understanding of water, fluidity, life and sound as acts of transformation within Andean cosmologies might in turn help enable a conceptual shift away to non-hegemonic modes of understanding.

In Part 3, Chapter 6, I summarized the thesis’ core ideas by returning to the concept of echo I proposed in the introduction and re-mobilizing it as a material-semiotic actor. I identified three types of echo and placed them into a typology of “genres of echo”. These include a positivistic echo, a naturalistic echo, and a gnostic echo. I elaborated upon each of these genres to explicate how the various conceptual tools developed in this thesis, including strong and weak sonic positivism, strong and weak sonic naturalism and aural gnosis, consolidate this thesis’ study of the archaeoacoustics’ processes of sonic knowledge production. Following on from this, I drew upon Donna Haraway’s ideas to explore how conceiving of echo as a material-semiotic articulation might help to deconstruct the binary of self/other that pervades conceptions of listening to echoes at Chavín. By revealing the boundary areas which echo’s liminal character inhabits, I proposed that foregrounding a notion of “difference” allows a new awareness of the limitations of current ontoepistemological frameworks to be acknowledged.

In summary, this thesis has undertaken the first in-depth analysis of the field of archaeoacoustics and incorporated it within sound studies. It has mobilised feminist and decolonial critiques of knowledge within its analysis of sonic knowledge production in archaeoacoustics. It has sought to give an account of how researchers

understand their work within the field whilst simultaneously theorising from these knowledge production procedures to ask what these practices mean for the culturally-critical questions which sound studies might ask. Whilst there are some clear limitations of a such study – it contends with my own individual subjectivity as a researcher and my experiences as of this particular moment in time – it was nevertheless pursued as a generative set of activities and ideas through which sonic knowledge production could be theorised, especially at a time where pressing issues about archaeoacoustics’ future direction remain unresolved.

By bringing together the fields of archaeoacoustics, sound studies and feminist and decolonial theories, this thesis has shown how each may benefit in some way from the other. My engagements with archaeoacoustics have been primarily through participant-observation; yet the analyses I present within this thesis form the basis of a typology that allows archaeoacoustics researchers to articulate the similarities and differences between their individual approaches. As a participant-observer who has become increasingly embedded in the field and developed personal relationships with many of its researchers, it would not be truthful to say that I am not somehow invested in its continued activity. Nevertheless, I remain an outsider to the field insofar as I remain more interested in the material-semiotic function of the sonic rather than producing sonic knowledges within archaeology itself.

In analysing archaeoacoustics within the framework of sound studies, this thesis has illuminated how certain aspects of archaeology’s “sonic turn” are reflected in sound studies. In particular, it identified some key pitfalls, such as the trends to overwhelmingly embrace either sonic positivistic or sonic naturalistic positions. It isolated some key gestures, particularly around the occlusion of some sonic knowledges in preference of others and the false universalisation of Eurocentric models across transhistorical and transcultural contexts. I hope that the critiques mobilized from feminist epistemologies and post- and decolonial studies regarding sound and listening may find further resonance in sound studies, where the unacknowledged subjectivity of predominantly white, middle-class, European, cis-gendered, able-bodied, heterosexual men is frequently and uncritically reproduced. By scrutinising archaeoacoustics’ sonic knowledge production in this thesis, I have

provided avenues for interrogating sound studies' sonic knowledge production in a wider sense. Whilst the method of *sounding situated knowledges* I developed in this thesis was formulated for the study of archaeoacoustics, it has a wider application across sound studies, particularly in the way it foregrounds notions of difference in reflection and "diffraction" and the politics and ethics of accountability and responsibility in sonic knowledge production.

Perhaps, too, there is some small way in which the rich and expansive fields of feminist theory and post- and decolonial studies may benefit from closer attention to the role that the sonic might afford, given the close association between sound and "South," or racialized Other, and sound and femininity that I have referred to in this thesis. Rather than the sonic representing a convenient opposite to visuality's hegemonic normativity, as it often does for many oft-cited sound studies theorists, or even as utilised by Haraway herself (Haraway, 1988), the understanding of the role the sonic proposed in this thesis heuristically furthers a more multi-faceted approach to how sound and listening are currently theorised (or not theorised) within feminist theory and decolonial studies. As Sterne's audiovisual litany, cited many times throughout this thesis, so poignantly demonstrates, ascribing dominance or marginality to notions of seeing and hearing in particular cultures can often inhibit more nuanced analyses when they are required. A renegotiation of visuality's historic dominance in Eurocentric paradigms in the framework of a decentring and non-essentialising acknowledgement of the complex relationship between the bodily senses and knowledge production can reinforce the important work of feminist theory and decolonial thought.

Overall, this thesis has mobilised critiques of Eurocentric knowledge paradigms to demonstrate some its limitations regarding visuocentrism whilst simultaneously warning against the potential risks of romanticising the sonic. The concept of knowledge itself is often utilised and theorized as one unified unit which can be transferred endlessly from one person or thing to another – particularly in the Tayloristic paradigms of knowledge management. In contrast, this thesis has proposed a more thorough analysis of the diverse types of knowledges which might exist and might be accessible by different means – sensory or otherwise – or which might even

remain inaccessible. Whilst contemporary academic knowledge production remains focused on “productive” knowledges which continue to fuel educational policy’s “knowledge economies,” this analysis of sonic knowledge production helps to illuminate how and why some knowledges should resist being assimilated to such hegemonic economic systems. By posing the conception of “knowledge” as a site of contestation within a notion of sonic knowledge production, this thesis invites further avenues of investigation which dismantle the hierarchies established by Eurocentric epistemological traditions as they are reinforced by the capitalistic modes of knowledge economies.

This thesis has pursued the question: how can echo as a material-semiotic articulation make good on the challenge archaeoacoustics poses to traditional Eurocentric modes of knowledge production, and thus to knowledge itself? The ancestry of archaeoacoustics, the political-philosophical “elsewhere” which it conjures and projects into, has been – for all of the dominance and deeply entrenched nature of Eurocentric paradigms of the “here” –neglected. The universalising and self-evident nature of the hegemonic “here,” which is to say, of capitalism, patriarchy and coloniality, in all of its post- and neo- forms, and with all of its attendant characteristics – positivism, naturalism, visuocentrism, Cartesianism, representationalism, individualism, biocentrism, to name just a few – makes clear the sheer magnitude of the challenge confronting those who wish to explore the extent of a political-philosophical “elsewhere,” understood as an earnest means of moving beyond “here.” Moving to an “elsewhere,” which is simultaneously an “elsewhen” of archaeoacoustics’ ancestry and its concurrent entanglement with futurity, will mean relinquishing the all-too-pervasive hegemonic imaginary which constrains not only our political-philosophical reality, but our political-philosophical fantasy.

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Appendices

Appendix A: Details of interviews with archaeoacoustics researchers 2015-2017

Names, dates and location of interviews. Listed chronologically.

1. Professor Emeritus Igor Reznikoff. 31st March 2015. Isturitz, France & 1st April 2015. Arcy-sur-Cure, France.
Conducted in guest-house during excursion as part of radio programme on Archaeoacoustics for Deutschlandradio Kultur.
2. Dr. Rupert Till. 10th October 2016. Huddersfield, UK.
Conducted in a café near Huddersfield Railway Station.
3. Paul Devereux. 28th October 2016. Cotswolds, UK.
Conducted at the interviewee's house in the Cotswolds region.
4. Dr. Nektarios Yioutsos. 31st October 2016 & 17th June 2017.
Conducted via voice call online.
5. Professor Chris Scarre. 2nd November 2016. Durham, UK.
Conducted in Scarre's office at the University of Durham, UK.
6. Victor Reijs. 3rd November 2016. Voice-call, online.
Conducted via voice call online.
7. Dr. Braxton Boren. 17th October 2016-15th November 2016.
Conducted via email online.
8. Dr. Pablo Padilla. 20th June 2017. London, UK.
Conducted in a café near Kings Cross station, London, UK.
9. Professor Margarita Díaz-Andreu. 4th July 2017.
Conducted via video call online.
10. Dr. Bruno Fazenda. 6th July 2017.
Conducted via video call online.
11. Dr. Aaron Watson. 17th October 2017. Durham, UK.
Conducted in a café near Durham Railway Station, UK.
12. Dr. Graeme Lawson. 20th July 2017. Cambridge, UK.
Conducted in a meeting room at the Institute of Archaeology, University of Cambridge, UK.
13. Professor Ian Cross. 25th July 2017. Cambridge, UK.

Conducted in Cross's office at the Music Department, University of Cambridge, UK.

14. Dr. Steven J. Waller. 26th July 2017.

Conducted via voice call online.

15. Dr. Riitta Rainio. 27th July 2017.

Conducted via video call online.

16. Dr. Damian Murphy. 8th August 2017.

Conducted via video call online.

17. Linda Eneix. 8th August 2017.

Conducted via voice call online.

18. Dr. Paolo Debortolis. 7th October 2017. Tomar, Portugal.

Conducted in the foyer of the Hotel dos Templarios, location of the Archaeoacoustics III conference (organised by the Old Temples Study Foundation). Present as mediator/research assistant to help with English language problems, Nina Earl, UK.

19. Dr. Miriam Kolar. 3rd November 2017. Video-call, online.

Conducted via video call online.

20. David Lubman. 14th November 2017. Voice-call.

Conducted via telephone.

Requested for interview but no response received:

Peter Holmes

Dr. Steve Mills

John Was

Professor Ezra Zubrow

Appendix B: Timeline of fieldwork with Iegor Reznikoff and Rupert Till

Events taking place between Professor Iegor Reznikoff (IR), Dr. Rupert Till (RT) and myself (AG) to caves in France in March 2015 leading up to production of radio documentary on archaeoacoustics broadcast in June 2015.

July 2014 – Application for commissioned radio piece on Deutschlandradio Kultur on the topic of archaeoacoustics.

August 2014 – Application approved.

October 2014 – Production planning begins.

March 2015 – Fieldwork trip to France:

29th March 2015 - Iegor Reznikoff, Rupert Till, Annie Goh & Anna Frederike Potengowski arrive in Biarritz.

30th -31st March 2015 – Fieldwork in Isturitz cave.

1st April 2015 – Iegor Reznikoff, Rupert Till & Annie Goh arrive in Paris. Drive to Arcy-sur-Cure.

2nd April 2015 – Fieldwork in Arcy-sur-Cure cave.

3rd April 2015 – Depart.

May - June 2015 – Writing and editing of final piece. Production.

26th June 2015 – First broadcast of radio piece with the title “Archäoakustik: Auf der Suche nach Echo” (Archaeoacoustics: In Search of Echo) on *Deutschlandradio Kultur*. Running time 49’14 minutes.

Appendix C: List of prompt interview questions

Part 1:

- What archaeoacoustics work have you undertaken? What locations and when did this research take place? (List)
- How did you come to do research in this field and when? What or who influenced you?
- Can you describe your methods of fieldwork? What equipment do you use? How were sites located/chosen? What tests were undertaken? How was data evaluated? How does your research stand in relation to conventional scientific methods?
- How, if at all, was your research funded? How much effort went into procuring funding? How essential was this for the work to take place?

Part 2:

- What do you see as the main contribution of your research? How successful do you think this has been? What did you intend for your research to fulfil? Were the outcomes of the research different to how you had expected?
- What do you see as the main challenges in the field?
- Whose work do you make reference to/admire in the field? Are there any positions with which you do not agree in the field/do not find productive or useful?
- How do you see the present state of the field in relation to its challenges? Where do you see the field heading and where would you like to see the field heading? What are the most important elements of the field for you?
- What do you think your research/archaeoacoustics contributes on a larger scale? How urgent and useful do you see archaeoacoustics? What does this attention to sound and listening of archaeoacoustics challenge more broadly (in archaeology or otherwise)? Are these related to broader social/political concerns?
- Does your research involve imagining the “worldview” or way-of-being of the makers of the buildings/structures/paintings of the sites as different to our own? In what ways? Are there forms of knowledge produced through listening which archaeoacoustics reveals?
- How do you deal with the limitations of archaeoacoustic research, in particular the inability to prove unequivocally that the sound/acoustics of a site played a role there? How important is proving a truth of archaeoacoustics for you? How much of this is dependent on obtaining scientific legitimacy for your work/the field?

Appendix D: Template consent form

Ms Annie (Su-Ann) Goh
PhD Student
Department of Media and Communications
Goldsmiths College, University of London
8 Lewisham Way, London SE14 6NW

Permissions Form for Academic Research

Dear _____,

Thank you for agreeing to take part in my academic research for PhD examination with the working title "Sonic Knowledge and Archaeoacoustics: A Genealogy of Echo" as of 1st September 2016. You will find a copy of my abstract on the following page.

Following on from the interviews/participant-observation I am planning to undertake with you, I am seeking permission to use your material/work/quotation/image/contribution for:

- my PhD thesis/dissertation submitted for examination and copied for however many times to achieve this purpose, and published for cataloguing and public access in the libraries of Goldsmiths and the University of London, and hard-copy/micro-fiche inter-library loan and/or electronic distribution of academic theses world-wide for the purposes of scholarship and academic research.
- oral conference papers/presentations and written articles/publications for the purposes of scholarship and academic research related to the PhD thesis/dissertation.

Data collected will remain confidential. Regarding the written dissertation/articles/publications, participants will be sent sections of the text in which their quotations/material/work/images are used and offered the opportunity to alter the content, withdraw statements, provide additional information or to add glosses on interpretations. These changes will remain documented by me and this process can be freely detailed in the research. Participants will either be asked for consent for the use of quotations with their names, else consent will be sought to use the quotations anonymously.

I am happy to provide an electronic copy of my final thesis at your request.

By signing your name, you agree to these conditions stated here.

Name (PRINT): _____

Signature: _____

Date: _____

PhD title (working): Sonic Knowledge and Archaeoacoustics: A Genealogy of Echo
by Annie Goh

Abstract:

My PhD project aims to develop a unique theory of sonic knowledge, using research from the field of acoustic archaeology. The dominance of vision (ocularcentrism) of traditional forms of knowledge production has been challenged in sound studies, but sonic modes of knowing from ancient human past have not yet been thoroughly investigated. The recently emerged field of archaeoacoustics suggests rich and diverse uses of sound evident in ancient architecture, which current ocularcentric models of knowledge production are unfit to explain, exposing an important shortcoming of contemporary epistemology. Focusing on the “echo”, I will advance theories of sonic knowledge along historical lines. Echo, as a figure of the material and symbolic mediation of sonic knowledge will be traced genealogically along two dominant strands – the scientific and the mythological. Furthermore, I will investigate via fieldwork how alternative understandings of echo are constructed in case studies of archaeoacoustics. My research aims to deepen understandings of acoustic communication in order to expand the auditory dimension of media and communication studies.

Appendix E: Timeline of research with Miriam Kolar

Events taking place between Dr Miriam Kolar (MK) and myself (AG) leading up to and following on from Chavín field work in July 2018.

21st June 2017 – First email to MK from AG, introducing research theme and requesting interview as part of AG's PhD research

21st June 2017 (same day) – Response from MK, confirming acceptance of interview. Suggestion for date in early August due to a busy schedule. Request for questions/topics of discussion in advance per email.

22nd June 2017 – AG responds to MK's request and sends set of interview questions (the same set which had been asked to all other archaeoacoustic researcher interviewees), permissions form including PhD abstract (same as for other interviewees). AG requests from MK any published articles on archaeoacoustics to read ahead of the interview.

22nd June 2017 – MK responds with links and attachments to various publications.

23rd June – 27th September – Follow up emails and correspondence to coordinate video conferencing interview, amidst MK's busy schedule.

3rd November 2017 – Video conferencing interview with MK, unexpectedly lasting 2.5 hours (much longer than the average 1hr conversations with other researchers).

8th November 2017 – AG emails MK with proposal to get funding to travel together to Peru in 2018.

9th November 2017 – MK responds positively, expressing enthusiasm about the project.

10th November 2017 – 23rd January 2018 – Email correspondence between AG and MK coordinating letter of support from MK, funding application, budgeting and practical details.

23rd January 2018 – Submission of funding application.

9th March 2018 – AG emails MK to confirm funding application has been successful.

9th March 2018 – 6th April 2018 – Email correspondence coordinating details of Peru trip together. MK requests permission to do fieldwork from archaeology colleagues at the site Chavín de Huántar, Peru.

6th April 2018 – MK requests to read AG's work on archaeoacoustics, in particular: Goh 2017 "Sounding Situated Knowledges: Echo in Archaeoacoustics." *Parallax* 23: 283–304, which AG sends to MK.

3rd May 2018 – MK confirms permission from archaeology director of the Chavín de Huántar site. This procedure includes the filing of summary reports following each field season which our presence will be noted in.

3rd May 2018 – 21st May 2018 – Email correspondence around flight, accommodation and travel bookings to Peru for both MK and AG.

29th May 2018 – Second video-conference call with MK, to discuss both research trip and practicalities, lasting approximately 3.5 hours. In this conversation, MK airs concerns around my participant-observer fieldwork, including any work from me which emerges from our trip to Peru. We discuss how to work together in a collaborative, collegial and professional manner and agree to have a written agreement about the ethics of our work together which we are both happy with.

8th June 2018 – AG sends MK the first draft of the letter of agreement, entitled a “Memorandum of Understanding”.

24th June 2018 - MK thanks AG for reflecting the concerns discussed in the recent video-conferencing call and expresses appreciation and ease at the agreement reached in written form. See appendix E.

30th May 2018 – 25th June 2018 – Further email correspondence clarifying final travel details and swapping documents, such as requesting MK’s PhD dissertation.

28th June 2018 – AG arrives in Lima, Peru from London, UK.

29th June 2018 – MK arrives in Lima, Peru from Boston, MA, USA.

30th June 2018 – AG and MK arrive at Huaraz, Peru.

1st – 6th July 2018 – Arrival and intensive work every day at the Chavín de Huántar archaeological site.

6th July 2018 – AG and MK return to Huaraz.

8th July 2018 – AG and MK return to Lima.

9th July 2018 – MK departure to USA.

15th July 2018 – AG departure to UK.

23rd July – ongoing – Email correspondence, including requests from MK to AG to contribute to journal and book publications, resulting from the fieldwork at Chavín but also independent publications regarding AG’s work on archaeoacoustics.

11th Feb 2019 – Further video-conference call between MK and AG to discuss progress of Chavín fieldwork results.

10th June 2019 – Email correspondence between MK and members of the collaborative

fieldwork study (predominantly Stanford University students), including myself regarding a co-authored journal article (Forthcoming 2019). MK requests inclusion of AG's observations from PhD draft chapters (after receiving them). AG responds affirmatively and with feedback on draft version of journal article.

14th June 2019 – AG sends MK draft chapters of PhD with working titles “Archaeoacoustics at Chavín de Huántar, Peru” and “Chavín’s Sonic Knowledge – Towards an Aural Gnoseology” for feedback and commentary.

7th August 2019. MK sends AG feedback on two PhD chapter drafts with amendments (in particular technical clarifications and extra academic references to published work) and comments on content for consideration.

Appendix F: Memorandum of understanding between Annie Goh and Miriam Kolar

Annie Goh
66 Northiam Street
London
E9 7HX
United Kingdom

Re: Memorandum of understanding between Annie Goh and Dr. Miriam Kolar for fieldwork in Peru at Chavin de Huantar - period of trip together 27th June - 8th July 2018

5th June 2018

Dear Miriam,

Further to our discussion on Skype last week, I would like to articulate our discussion about the nature of my PhD research, your participation in my PhD project, as well as our larger collegial relationship. I hope this letter can serve as a memorandum of understanding, or as a dialogue between us constituting a form of agreement. As the upcoming fieldwork in Peru will be both the first time I will be acting as a participant-observer with a live subject as part of scholarly research, as well as the first time you will be being observed in your work, we agreed it would be useful to have a few words in writing about the expectations of our collaboration as well as its expected outcomes.

It is my intention to observe (and take part where appropriate) in the acoustic archaeological research you will be undertaking at Chavin de Huantar. My PhD project, on archaeoacoustics and sonic knowledge production, involves both a narration and interpretation of issues surrounding sound, listening, and knowledge production stemming from interviews with archeoacoustics researchers (approximately 20 have been conducted including yourself), as well as the *in situ* observation of a live research project which will take place in the form of the upcoming trip together to Chavin. The primary focus of my PhD project is an analysis of knowledge production in archaeoacoustics, with attention to the notion of "sonic knowledge". I acknowledge that as a participant-observer, my own presence in the role as observer is necessarily participatory and I will endeavour to reflect upon this in my written interpretations of the fieldwork trip.

My motivation to observe your working process and be able to understand in detail the intricacies of your research practice such as the decisions you make, is driven by my respect for your work which I have familiarized myself with through my reading of your published articles and book chapters, in addition to the interview I conducted with you in November 2017. Indeed, I cannot emphasize enough how honoured I am that we are able to travel together to the site in Chavin with you as part of your own research, which of course also gives me the opportunity to visit and experience the site myself - a vital experience in my PhD research on archaeoacoustics. The unique

characteristics of the site itself, as well as the archaeological knowledge developed around it, in conjunction with your research as part of the CCRMA group's work there, make it of intense interest to my theorisation of sonic knowledge production and I anticipate these to be ideal conditions from which my theoretical interests can draw richly from.

From our collaboration, I hope we can develop a mutually enriching dialogue about archaeoacoustics. I am keen to learn from you the specifics of your research processes, and about the site itself as relevant to archaeoacoustics as a whole. In my analysis of knowledge production in the field of archaeoacoustics, this will mean that I am necessarily closely observing your practice (and theorising) with a sense of scholarly criticality which I hold central to sound studies work. I am thinking here of Jonathan Sterne's reflections on "sound students" as those engaging in some broad aspect of critique, rather than embellishing the imperative to critique simplistically as "the uncritical use of the critical", which he discusses in the introduction to the Sound Studies Reader (Sterne 2012, 3-5). Although I wish, as I am sure you will understand, to maintain my authorial control over the final interpretation of events, I hope to be able to ensure you through our conversations so far that any such "critiques" will be made in good faith, with the aim of "constructive" and not "destructive" criticisms, and in a manner which does your work and its intentions and aims justice.

Admittedly, there is an area of ambiguity here, where two people can have personal or intellectual disagreements from a period of engagement with one another, so that my final interpretation of events may differ from yours in the written outcomes constituting my PhD. However, I hope to ensure you that by committing to a "good faith" engagement within our collaboration, there will be no ill will in my depictions and commentary about you and your work. I suggest the following process, with your understanding, to avoid any such possible conflicts which may arise:

- Upon returning from our trip in Peru, I will begin drafting the material into chapters (1-2 chapters) based upon the material gathered and my reflections upon the trip and work together. This could take several months. I hope to have drafts of this by the end of December 2018, but it could take longer than this. (My final PhD submission is due September 2019).
- When I am happy with the draft chapters, I would be happy to share these with you and receive any comments on these including disputations of events/interpretations of events
- I will make any changes you suggest which I deem fair and within accordance to my own judgement
- I will omit any details or adapt emphases of the written accounts which you do not wish to have detailed, provided they are not of key importance to my theorisations of sonic knowledge production in archaeoacoustics
- I will endeavour in the final draft to convey both sides of a potential dispute, making clear the partiality of my own final interpretation if there is a conflict

Of course, as mentioned above, this is an area of ambiguity as to what two people can consider "fair" or "of key importance to my theorisations of XYZ", and at this stage it is not possible to foresee what the trip together will entail, however I remain confident that by foregrounding open communication about all concerns or disagreements - both personal and intellectual - the nature of the collaboration will be one of

productive exchange and fruitful dialogue with one another.

I hope to have articulated here an interpretation of our conversations thus far which you broadly agree with. I would be very happy to hear back from you about any questions or concerns you might have about what I have put down in writing about our upcoming trip together, and the material which will be produced as an outcome of it. In closing, I'd like to thank you once again for your openness to this endeavour, which I hope to be mutually beneficial to both of us, and for all of your organizational work in facilitating the trip and my presence on it. It's truly my pleasure and honour to be embarking on this trip with you to Chavin de Huantar and I foresee it being an invaluable experience within my PhD research and beyond.

Yours warmly,
Annie Goh

Appendix G: Selected images of pututu horns evcavated from Chavín de Huántar, Peru

Images taken from:

Fux, Peter, ed. 2013. *Chavín: Peru's Enigmatic Temple in the Andes*. Zurich: Scheidegger & Spiess.

IMAGE REDACTED

Figure 6 Pututu with Carved Decoration

Caption: Conch shell, carved cut, drilled. 23.5 cm long, 20cm wide, 19.9cm high. Ca. 900-550BC (Fux, 2013, pp. 336–337)

IMAGE REDACTED

Figure 7 Pututu with Carved Decoration

Same caption as above. (Fux, 2013, pp. 336–337)

IMAGE REDACTED

IMAGE REDACTED

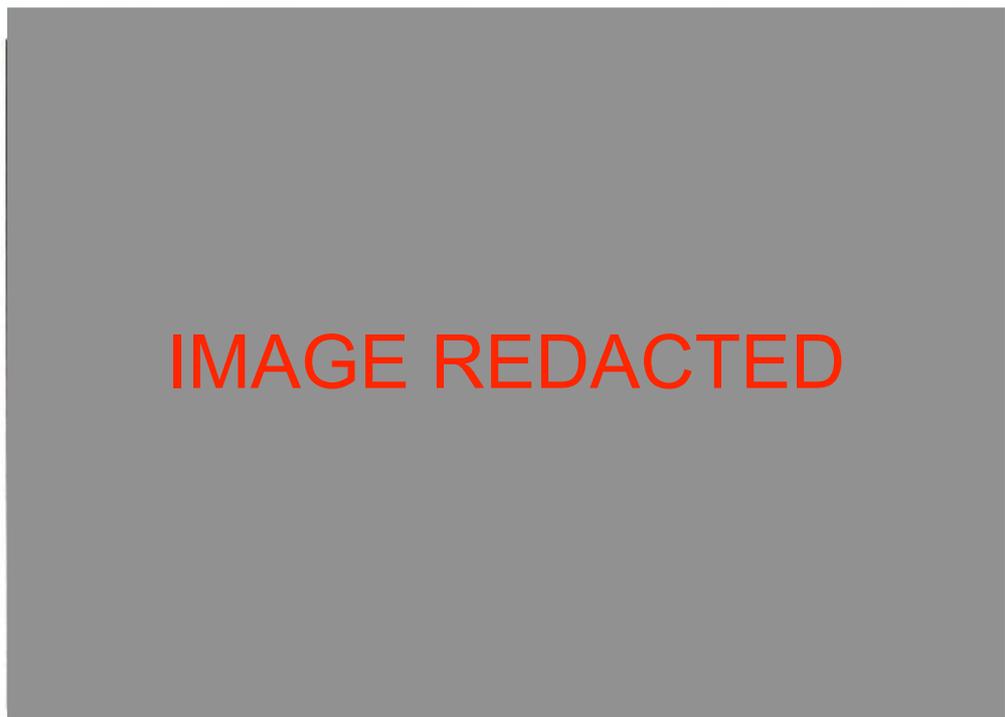
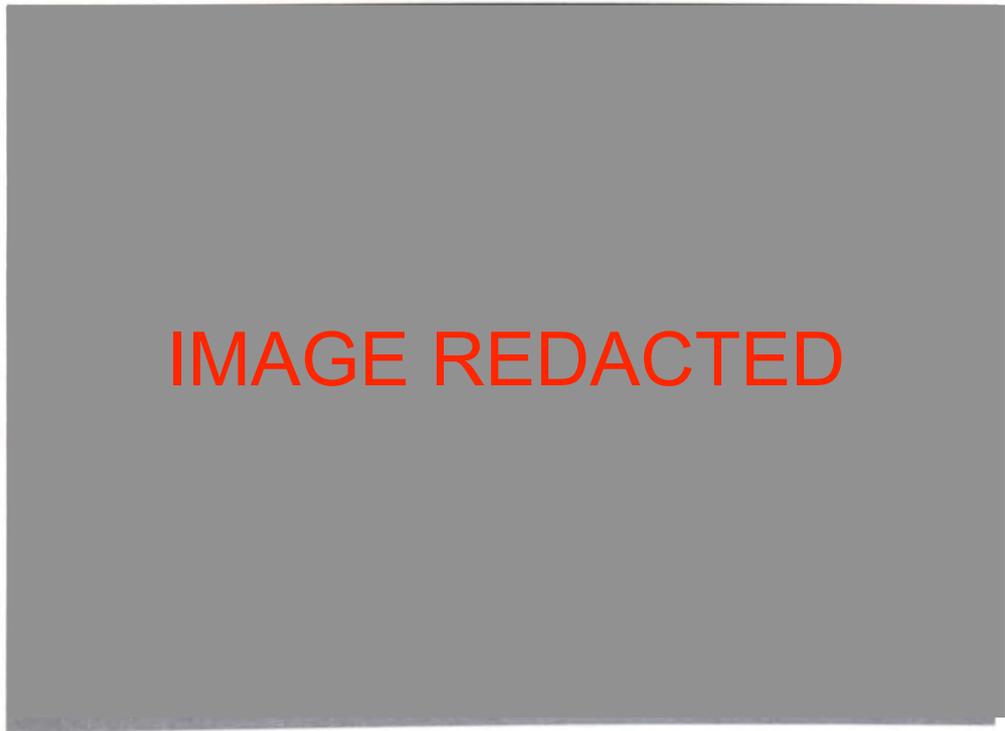
Figure 8 Excavation view of *pututus* at Chavín

Images taken from: (Fux, 2013, pp. 334–335)

IMAGE REDACTED

Figure 9 Pututu with Carved Decoration

Caption: Conch shell, carved cut, drilled. 22 cm long, 16cm wide, 21cm high. Ca. 900-550BC (Fux, 2013, pp. 338–339)



The British Library

Figure 10 Pututu with Carved Decoration

Caption: Conch shell, carved cut, drilled. 26 cm long, 20cm wide, 23.5cm high. Ca. 900-550BC (Fux, 2013, pp. 338–339)



Figure 11 Image of pututu horns on display at the Chavín Museum, Chavín, July 2018

Credit: The Author

Appendix H: Representations of pututu horns at Chavín

IMAGE REDACTED

IMAGE REDACTED

Figure 12 Tello Obelisk - digital 3D model with illustrations

Image and caption from (Fux, 2013, pp. 182–183):

“The narrative of the Tello Obelisk. Two views of the digital 3D model (shown in the middle) are illustrated. The view on the left is an accurate rendering of the relief, that on the right is a schematic and colored interpretation. The head with the protruding fangs in its jaw and the large eccentric eye can be seen at the top, the fish-like tail fins at the bottom, the paws at the top and bottom right. The dragon-like creature on the left seems to be female, that on the right male. The obelisk probably depicts a mythical creature couple. Surrounding the couple are the most important symbols of Chavín art such as jaguar, the *Spondylus* mollusc, the *Strombus* snail, and the *chakana* (“Inca Cross”). The illustration was generated from a digital 3D model based on data from a structured-light scan and a laser scan.” (my emphasis)

Figure 13 Powder Spoon with Figure Blowing a pututu

Gold, silver, hammered and formed, embossed, soldered. 11.1cm long, 2.6cm wide, 3.6cm deep. Ca. 1200-500BC.

Image and caption from (Fux, 2013, p. 236)

IMAGE REDACTED

IMAGE REDACTED

Figure 14 Cornice Fragments with Procession Scene

Cornice Fragments with Procession Scene. Stone (limestone), sculpted, incised, 128cm long, 100cm high, 21.2cm thick. Ca. 900-550BC.

Image and caption from (Fux, 2013, p. 320):

“The...fragment was unearthed by John W. Rick and his team in 1998 to the west of the façade of buildings A, B, and C. Depicted on the front, probably the underside of the cornice originally, are two figures wearing festive clothing, processing one behind the other. Both seem to be wearing extravagant feathered ornaments on their backs and large ear pendants; the second figure is wearing a diadem on its forehead. The figure leading the way is blowing a *pututu*, while the one following it, already transformed with fangs, is bearing a *Spondylus* shell. The top of the fragments, which is only partially preserved, shows a row of three procession participants who are like-wise festively clad and appear to be bearing insignia or spears.”

Appendix I: Annie Goh - "Sounding Situated Knowledges: Echo in Archaeoacoustics" peer-reviewed article

This peer-reviewed article was published during the PhD research.

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Sounding Situated Knowledges: Echo in Archaeoacoustics

Annie Goh

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Sounding Situated Knowledges: Echo in Archaeoacoustics

Annie Goh

1. Introduction

What is at stake in considering how sound and listening produce knowledge? This article proposes that sound studies, largely occupied with theorizing how knowledge is produced through sound and listening, requires a greater interrogation of the subject-object relation via feminist epistemologies. I draw on the language of science studies to understand all sound studies scholarship as some form of *sonic knowledge production*. Feminist epistemologies, positioned against a presumed neutrality in science and philosophy, have demonstrated the uncritical continuation of a traditional subject-object dualism to be a crude limitation on knowledge practices. Much of this work has taken the gesture of ‘opening up’ and asking how re-thinking commonly held notions can lead to new insights into existing paradigms.¹ In examining the subject-object relation in sonic knowledge production, most often theorized through listening, the majority of sound studies work leaves both the subject and object implicit.² I contend that this seemingly innocent oversight, read through feminist epistemologies, is in fact an integral shortcoming in theories of sonic knowledge production. By bringing together affordances of ‘sounding’ to Donna Haraway’s ethico-onto-epistemological³ project of ‘Situated Knowledges’,⁴ *sounding situated knowledges* is suggested as a method which re-negotiates the dominant dualisms of traditional nature-culture and subject-object relations for sound studies. I suggest revisiting debates around the ‘nature of sound’ with the alternative Harawayan concept of the ‘natureculture of sound’.

The sounding past provides particular problems for theorizing sonic knowledge production. The emerging field of archaeoacoustics (acoustic archaeology) proposes that investigating the acoustic properties of archaeological sites could provide crucial clues in understanding past human behaviour there. Research beginning in the 1980s has suggested that the acoustics of caves with Paleolithic rock art may explain the ‘mysterious’ positioning of paintings.⁵ Acoustic archaeology, driven as much by non-professional archaeologists as by formally trained archaeologists, was established as a field in the mid-2000s.⁶ Since then, a practice of acoustic tests has been developed which help to inform archaeological theories around specific sites. As part of a movement towards multi-sensory archaeology, these investigations defy the

heavy reliance on visual methods and take seriously the multi-modal experiences of past cultures to think through possible meanings of the material remains of archaeological sites. Whilst there are fascinating implications about how knowledge can be produced through sound and listening, given the small (but growing) number of researchers in the field, the valuable challenges proposed by gender archaeology and post-colonial archaeology have not yet been applied to archaeoacoustics. This article addresses some of the issues arising when feminist epistemologies are engaged in archaeoacoustics.

On gendered narratives in the history of the primate studies Haraway asserted 'The Past is the Contested Zone', a statement which will be shifted from the biological sciences and applied to archaeological sonic knowledge production in this article.⁷ Haraway's feminist, anti-capitalist, anti-racist critiques of white Western, masculinist technoscience across her work enact a deconstructive intervention to defy accusations of naturalism-essentialism and social constructivism to offer 'a serious historical effort to get elsewhere'.⁸ Given the contested nature of 'the past', this article re-examines the subject-object relation in sonic knowledge production and posits archaeoacoustics as a site of a potential political-philosophical 'elsewhere' described by Haraway.⁹ Haraway's situated knowledges are taken as a key methodological project in opening up this elsewhere. As part of this argument I demonstrate that without this intervention of feminist sound studies, the emerging field of archaeoacoustics cannot realize the potential epistemological opportunities within it.

I propose the figure of echo, which mediates subject-object relationships in sound, as a material-semiotic¹⁰ figuration akin to Haraway's infamous cyborg.¹¹ From the echoes and reverberations theorized in archaeoacoustic research so far,¹² to the everyday echoes theorized in auditory architecture,¹³ the proposed cyborgian figure of echo in sounding situated knowledges is tasked with a critical re-navigation of notions of subjectivity and objectivity in sound studies. I argue that the dominant sonic naturalism which prevails in sound studies can be countered by a feminist methodology of sounding situated knowledges. A diffractive methodology for sound is proposed via the cyborgian figure of echo which can enact a disturbance within traditional sonic thinking. Drawing on Steven Feld's notion of 'acoustemology' and Julian Henriques' 'sonic logos', I will suggest what the specific affordances of 'sounding' in sounding situated knowledges could contribute. A cyborgian 'non-innocent' listening of sounding situated knowledges could enable archaeoacoustics to exploit the 'elsewhere' of sonic knowledge production. More broadly, it aims to centre the pressing critical re-negotiation of the subject-object relation in sound studies by arguing for the importance of both embodiedness *and* situatedness in sonic knowledge production.

2. Against Sonic Naturalism

Debates around 'the nature of sound' are rife in sound studies. For the purposes of this argument, the ambiguity between nature with a small "n" and a

capital “N” is proposed to belie a dominant tendency in the field I will term sonic naturalism. Most palpable in R. Murray Schafer’s work on ‘soundscapes’, a naturalistic thinking about sound has perpetuated throughout the field, taking on new forms within more recent new materialism debates. Whether in speaking about nature sounds, naturalized notions of the sonic or ‘the nature of sound’, sonic naturalism is propagated by a traditional subject-object relation in sonic knowledge production founded upon the stable dualisms of Western science and philosophy (e.g. culture-nature, subject-object, mind-matter). It is necessary to address how a neglect to critically reassess the subject-object relation in sound has led to this continuation of a persistent sonic naturalism.

Schafer’s work on soundscapes in the acoustic ecology movement has played an influential role in sound studies. I consider his work to constitute an archetypal account of sonic naturalism. Schafer’s widely read treatise on ‘the soundscape’ admonishes the ‘unnatural’ sounds of the ‘loud’ industrialized world since modernity in favour of ‘natural’ ones of a ‘quieter’, pre-industrial past.¹⁴ The origin myth of ‘the natural soundscape’ located by Schafer is clearly gendered. In his description of the sea at the start of the book he describes, ‘the ocean of our ancestors is reproduced in the watery womb of our mother [...] the relentless masses of water pushed past the first sonar ear’.¹⁵ The sonic expression of a white, masculinist patriotism which reminisces with nostalgia about a quieter, ‘more natural’ past has been critiqued by Marie Thompson as part of a Schaferian ‘aesthetic moralism’ which valorizes silence over noise.¹⁶ In terms of the subject-object relation in sound, Schafer’s figure of the ‘earwitness’ as the attentive, ‘authentic’ listener is typical of the oft-implied ahistorical masculinist subject, who produces knowledge about ‘the soundscape’, its feminized object of closer study.¹⁷ Feminist science studies has long demonstrated scientific knowledge production vis-à-vis nature as inherently gendered. Evelyn Fox Keller’s analysis of the notion of nature in Plato and Francis Bacon demonstrates how the invention of (modern) science is expressed as a masculinist mastery and domination over overtly feminized depictions of nature, evidenced by the use of graphic sexualized language.¹⁸ Although there are considerable dissimilarities between scientific and philosophical knowledge production, feminist epistemologies have dealt with all forms of knowledge production as gendered.¹⁹ Therefore, the subject-object relation has comparable implications for both scientific and sonic knowledge production: patriarchal ideas structure sonic naturalism in theories of sound, and Schafer’s account quite directly mirrors Keller’s analysis in its gendered dialectic of control by the masculine ‘subject’ over the feminine ‘object’ of nature in science.

It would be unfair and incorrect to relegate the diverse and growing body of scholarship of sound studies to a crude binary of masculinist domination over feminized sonic natures based on Schafer’s enthusiastic endorsement of so-called natural soundscapes. However, taking the gendered subject-object relation as the site of sonic knowledge production, feminist epistemologies requires us to understand in more detail *how* knowledge is produced. Keller’s

analysis, which proposes a dialectic of simultaneous ‘appropriation and denial’ of the feminine, suggests the complexity of these relations.²⁰ Borrowing from Foucauldian power-knowledge relations may help to explain why any clear cut attempts to map feminine/masculine, object/subject, nature/culture dualisms directly onto one another are unsuccessful. In another key sound studies text, Jean-Luc Nancy’s *Listening*, a different facet of sonic naturalism is expressed. Nancy’s philosopher-listener is focused on a sensual subjectivity aimed towards resonance, a practice of philosophical understanding. This resonance, perhaps not coincidentally, is also gendered in its comparison to ‘the womb [...] of a pregnant woman’.²¹ Here, however, the feminine – alluded to as the natural – can be construed as a philosophical mode which challenges traditional notions of subjectivity. Yet Robin James critiques Nancy’s notion of listening or ‘to be listening’ for its reassertion of a presumed masculine listener-subject. This maintains normalized masculinist attributes of agency and authority whilst appropriating the characteristics of affect from stereotypically feminized experiences: ‘Nancy’s approach to affect is one version of the well-worn notion of aesthetic receptivity, a concept that values femininity only when it appears in males, only when it dons the trappings of whiteness, and thus continues to marginalize women and non-whites as listeners [... it] reinforce[s] an underlying patriarchal, Orientalist value structure’.²² Although feminized ideas of sound are explored through affect by Nancy in a manner which does not simply celebrate ‘the natural’ as Schafer does, the listening subject is nevertheless reinforced as normatively white, European and masculine. Through resonance, the ‘self’ encounters the ‘form, structure, and movement of an infinite referral [*renvoi*]’ which purports to dissolve the subject-object division, yet deceptively and contrary to its intentions, the continued persistence of these dualisms serves to reify the stability of the binary of subject and object.²³

More recent debates under the broad banner of new materialism reveal how a renewed interest in discussing ‘the nature of sound’ allow sonic naturalism to persist in new forms. Christoph Cox, using theories of music in Schopenhauer, Nietzsche, and Deleuze, proposes a sonic philosophy to counter the idea of ‘reality’ being reduced to a representation of it. Cox aims to forge an anti-representational theory which aims to ‘grasp the nature of sound’. This is a ‘material, realist’ account of sound as an ‘asignifying material flux’.²⁴ His conflation of realism and materialism will be addressed later. Although it purports to overcome dualistic thought of the Kantian divide between phenomenon and noumenon as part of the speculative realism school of thought,²⁵ Cox perpetuates more troubling dualisms which demand greater attention. Firstly, Cox’s sonic philosophy comes from a disembodied rationality which engages neither with the problem of the body nor with the processes of knowledge production. The legacy of the disembodied rationality of the philosopher can be traced through a Kantian masculinist separation of emotions, feelings and desires from the faculty of reason, well into post-Kantian anti-correlationist thought.²⁶ The persistence of the unlocatable, disembodied knower perpetuates the unaccountability of its knowledge production. Iris Van der Tuin and others have criticized object-oriented

ontologies, which share this post-Kantian preposition with speculative realism, on the grounds that the rational subject who can supposedly access the ontology of objects is ultimately always informed by embodied encounters which remain unaccounted for.²⁷ As Van der Tuin articulates, the 'ontological turn, bereft of human subjectivity, provides for the capital-S Subject to come back with a vengeance'.²⁸ Cox speaks disdainfully of contemporary cultural theory as falling prey to 'provincial and chauvinistic anthropocentrism', without accounting for the anthropogenic nature of knowledge production itself, including his own.²⁹ Therefore despite Cox's post-Kantian aspirations, the reification of the masculinist, white European subject is a resurgence of the Cartesian subject. This complete failure to address subjectivity in such a foray exposes a new form of posthuman sonic naturalism.

Secondly, Cox's attempt to think as sound-in-itself, or sonic matter, furthermore consolidates this posthuman sonic naturalism by perpetuating the division between language and matter. Cox speaks about the shortcomings of theories of signification and representation being unable to grasp the 'nature of sound'. In the former, 'Nature [sic]', Cox asserts, 'is either cast aside as insignificant or deemed a cultural projection, a social construction', which his theory of sonic realism/sonic materialism aims to 'grasp'.³⁰ His naturalism, via Nietzsche, is a supposed anti-essentialist naturalism which describes matter as unstable and eternally 'in flux', which support a sonic ontology based on events and becomings. Aside from this emphasis on change and flux not necessarily exempting the model from charges of essentialism, its premise on Nietzschean naturalism which presents nature as an 'extravagantly creative [...] power' upholds stereotypically feminized notions of nature as 'mysterious' matter, and most significantly as separate from the philosophical subject. Criticisms of new materialisms such as Sara Ahmed's have noted a general tendency or 'gesture' in new materialism,³¹ in which Cox along with many others set up a false dichotomy between 'realist' new materialism, and 'anti-realist' postmodernism and poststructuralism.³² Contrary to their intended aim in absolving the language-matter dichotomy, these theories actually often re-enact the tendency they are attempting to overcome.³³ Cox's sonic philosophy/ontology, which insists on a 'sound-in-itself', i.e. sound as a 'mind-independent reality', rehearses precisely this problematic gesture of new materialism in which matter is a thing-in-itself.³⁴ It presumes the very separation of language/culture and matter/nature it aims to overcome.³⁵ The preservation of this duality, rests upon a continuation of the traditional subject-object relation in which the masculinist subject gives meaning to the feminized object of nature.

As disparate as these three accounts by Schafer, Nancy, and Cox are, they share in common a neglect to address the traditional subject-object relation in how they produce knowledge through sound and listening. As Cox's account demonstrates with clarity, there is a problematic division between matter and culture which belies a division between the ontology of the object and the epistemology of the subject in sonic naturalism. In building on Haraway's work, Karen Barad's onto-epistemology describes the co-constitution of knowledge

through material phenomena, apparatuses, and discursive practices between human and non-human actors. Barad refuses a separation between ontology and epistemology and foregrounds the intertwinement of knowing and being (as well as ethics) within the approach of 'agential realism'. Traditional notions of nature/matter are in need of revision as 'materiality is an active factor in processes of materialization. Nature is neither a passive surface awaiting the mark of culture nor the end product of cultural performances [...] the separation of epistemology from ontology is a reverberation of a metaphysics that assumes an inherent difference between human and nonhuman, subject and object, mind and body, matter and discourse'.³⁶ In their various forms, sonic naturalisms mutually reinforce these damaging dualisms: the re-stabilization of the subject-object binary supports the relation between the masculinist subject/mind/culture and the feminized object/matter/nature.

3. Sounding Situated Knowledges

Sounding situated knowledges is positioned against the prevalence of sonic naturalism in sound studies which has left the traditional subject-object relation undisturbed. If the main aim of feminist critiques of science is the opening up of alternative frameworks in knowledge production, then it is through greater attention to the subject-object relation that its careful renegotiation can be attempted. As outlined above, the tendency of simultaneous appropriation and denial of the feminine of Keller's analysis reveals the dialectical nature of nature-culture dualism and its implications for the subject-object relation. Therefore a Harawayan gesture which rejects the nature-culture dualism and shifts it towards a notion of 'natureculture' is a deconstructive approach that challenges nature-culture, subject-object, and mind-matter dualisms. A move from debates on the so-called nature of sound towards those around the *natureculture of sound* can counter the tendency towards sonic naturalism in sonic knowledge production.

The role of the body as the site of knowledge production is central in Haraway's 'Situated Knowledges,' however its role is complex and multi-faceted:

I am arguing for a politics and epistemology of location, positioning, and situating, where partiality and not universality is the condition of being heard to make rational knowledge claims. These are claims on people's lives. I am arguing for the view from a body, always a complex, contradictory, structuring, and structured body, versus the view from above, from nowhere, from simplicity. Only the god trick is forbidden.³⁷

Haraway's version of feminist embodiment is not a simple or merely literal foregrounding of the physical essentialized body.³⁸ Notably, the infamous figure of the cyborg was an ardently anti-essentialist redress towards previous feminisms which prized the feminine as an innate or natural, biologically given quality. Situated knowledges requires not only a complex embodied

vision, but also the politics of situatedness – positioning, partiality, and an anti-universalism. Above all, the ‘god-trick’ as the view from above is most vehemently rejected. In making the case for sounding situated knowledges, I argue that *both* Haraway’s specific notions of embodiedness and situatedness are necessary in this feminist intervention in contemporary sound studies.

Where Haraway identifies vision as a ‘maligned’ and ‘perverse’ sensory system, there is, I argue, an opening for sounding to bring its affordances into the project of situated knowledges.³⁹ Instead of turning to other sensory modes, Haraway undertakes a re-examination of the metaphor of vision and argues for an embodied vision, ‘(at least) double-vision’.⁴⁰ Haraway’s purposeful return to visual metaphors is worth closer attention, for vision presents *both* problem and solution i.e. the dangerous ‘god-trick’ or ‘view from above’ can feasibly be countered by the embodied ‘view from the body’.⁴¹ Haraway explains her decision to persist with vision as follows: ‘Visual metaphors are quite interesting I am not about to give them up anymore than I am about to give up democracy, sovereignty, and agency and all such polluted inheritances’.⁴² Interestingly, Haraway even makes hints to auditory metaphors, ‘feminist accountability requires a knowledge *tuned to resonant* [sic], not to dichotomy’, ‘*tones* of extreme localization’ and ‘vibrat[ions]’.⁴³ The complex and contradictory view from the body foregrounds both situatedness and embodiedness for Haraway. One could argue that sound studies’ central positioning of the body and embodiedness positions sounding as predisposed to the political-philosophical project of situated knowledges. The notion of situatedness pertains to more complex demands in which the positionality of knowledge production requires acknowledgement of its partiality, including but more than just physical embodiedness. Situatedness refers to the specific political-ethical accountability surrounding the material-semiotic production of knowledge and a Harawayan push to re-think commonly-held notions of traditional dualisms.

It is significant that situated knowledges being about ‘feminist accountability within the context of scientific objectivity as requiring a knowledge *tuned to resonant, not to dichotomy*’, uses auditory metaphors to counter dualistic thought.⁴⁴ Taking Nancy’s ‘*Listening*’, we can recall his concept of ‘resonance’ as overcoming the subject-object dualism, which despite its ultimate reinforcement of a traditional masculinist subjectivity, nevertheless provides useful provocations in the renegotiation of the subject-object relation. Yet the commonality of embodiedness in sounding and situated knowledges does not guarantee their coalescence. In Harawayan situated knowledges, we can read Nancy’s position as one which, through its centring of the body, reveals the reemergence of masculinist agency as embodiedness *without* situatedness. Thinking through the body which is commonplace in sonic knowledge production does not necessarily bring about the partiality, anti-universalism, and political-ethical demands of situatedness.

I wish to emphasize that sounding situated knowledges should not, however, be read as a gesture of simple inversion to reverse the hierarchy of the

senses and replace the eye with the ear. Rather, it heeds the warning of Jonathan Sterne's audiovisual litany and instead follows an approach to tracing histories along different sensorial modes as tracing different maps to a territory;⁴⁵ theorizing sounding in this model of knowledge production can produce different conceptions of knowledge. It understands the complexity of multi-sensoriality as intermingled variegated bodily experiences.

There have been two notable studies which have theorized thinking through sound where it is useful to examine Harawayan notions of embodiedness and situatedness for sounding situated knowledges: Steven Feld's notion of *acoustemology* (a neologism of acoustics and epistemology)⁴⁶ and Julian Henriques' *sonic ways of knowing* (or alternatively *sonic logos*).⁴⁷ Both Feld's and Henriques' work suggests powerful and profound alternative ways of thinking via sounding.⁴⁸ Henriques' research stems from an ethnography of reggae sound system culture in Jamaica. Far from a 'culture of no culture',⁴⁹ dancehall sessions are proposed as sites of subaltern knowledge production.⁵⁰ Henriques' sonic ways of knowing theorizes from material auditory propagation of soundwaves to propose a dynamic model of thinking which foregrounds processes, inherently open to fluctuations and change.⁵¹ This leads Henriques to theorize a profound challenge to the very notion of knowledge itself: instead of 'scientific skills' of the *epistème* appearing in a hierarchy above other ways of knowing, alternative Greek works for knowledge such as *techné* (indicating skilfulness and proficiency) and *phronēsis* (indicating wisdom and judgement) are suggested by Henriques.⁵² These sonic ways of knowing are emphasized as corporeal, bodily modes of producing knowledge. Sounding, in Henriques' model, brings forth these affordances in a way which supports the embodiedness, partiality and challenge to dualistic modes of thought which Haraway's situated knowledges propose.

Feld's theory of 'acoustemology' emerged from his fieldwork which inquired into the relations between sense of place, knowledge, and acoustic communication amongst the Kaluli people in the Bosavi rainforest in Papua New Guinea. In an updated explanation of the term, similar to Henriques' claim above, Feld positions acoustemology against the metaphysical or transcendental enquiry suggested by epistemology with a capital 'E'.⁵³ Feld draws on Haraway and Bruno Latour's actor-network-theory to propose acoustemology as a theoretical model which deals with 'relational practices of listening and sounding and their reflexive productions of feedback'.⁵⁴ Acoustemology's foregrounding of relational epistemology is likened by Feld to indigenous research methodologies in which philosophical assumptions around reality, knowledge, and values are recognized as paradigmatic and culturally specific.⁵⁵ Feld also positions acoustemology within ethical debates, particularly in accounting for ethnomusicology's colonial past and refers to relationality as key to understanding accountability in human and nonhuman relations.

In both Feld's and Henriques' models of sonic knowledge production, specific affordances from their ethnographic fieldwork appear to provide rich

provocations for sounding situated knowledges. They make strong allusions to potentially profound epistemological openings, particularly where the very definition of what constitutes knowledge is brought into question.⁵⁶ Drawing on Haraway's specific notions of embodiedness and situatedness, these debates need not revert back to conceptions of the body which propagate an uncritical anthropocentrism or a conservative humanism. Both Feld and Henriques describe alternative affordances of sounding which lend themselves towards positioning, partiality, and anti-universalism of sounding situated knowledges in ways which certain new materialist debates can successfully negotiate. Whilst both accounts foreground embodiedness, particularly Henriques', the question of to what extent a Harawayan situatedness is explicitly addressed remains to be answered. I suggest that whilst Feld's and Henriques' accounts do not re-centre whiteness and masculinity in the way the listening subject of sonic naturalism does, further work is required to ensure that 'acoustemology' and 'sonic logos' can facilitate a critical renegotiation of the subject-object relation in sonic knowledge production.

It is useful to delineate how Haraway's work on situated knowledges departs from debates of feminist standpoint theory to indicate the complexity of the subject-object relation at stake in sounding situated knowledges. Whilst feminist standpoint theory has typically engaged in the discussions of whether women as oppressed subjects are epistemically advantaged,⁵⁷ Haraway's essay on situated knowledges instead sought to foreground an instability of notions of objectivity in knowledge production. Where standpoint theory has tended to invert power-knowledge dynamics, Haraway's situated knowledges and diffractive methodology (developed further in later work) refuses the sharp division between subject and object of knowledge. The embattled discussion of whether a feminist 'objectivity' can exist is 'simply' replaced by the notion of *situated knowledges*.⁵⁸ Against accusations of social constructionist relativism which some readings of her anti-essentialist feminism suggested, Haraway additionally had to fight against an anti-biology antiessentialist interpretation of her work; in other words, Haraway juggles a seemingly impossible contradictory commitment to both positivism and relativism in '*simultaneously* [having] an account of radical historical contingency for all knowledge claims [...] and a no-nonsense commitment to faithful accounts of a "real" world'.⁵⁹ It is after all, necessary for feminist scientists to contribute knowledge to the masculinist scientific traditions – the 'polluted inheritance'⁶⁰ – they have inherited and in which they work within. Within these polluted inheritances, notions of objectivity and subjectivity need to be critically interrogated.

Contra standpoint theory, Haraway's situated knowledges refuse to mirror traditional notions of objectivity which often rely on the metaphor of reflection: 'Reflexivity is a bad trope for escaping the false choice between realism and relativism'.⁶¹ She instead demands *diffraction* over reflection as a central metaphor to refuse the stable ground upon which knowledge production is premised: 'Diffraction patterns record the history of interaction, interference, reinforcement, difference [...] Unlike reflections, diffractions do not displace the same elsewhere [...] Rather, diffraction can be a metaphor for another

kind of critical consciousness[...] one committed to making a difference'.⁶² This insistence on difference rather than a reflection of the same, is central to the critical re-evaluation of the subject-object relation in knowledge production. Haraway's whole body of work can be understood as being underpinned by the desire to 'explode' the 'inherited dualisms that run deep in Western cultures'.⁶³ By foregrounding the role of the embodiedness in knowledge production and thereby the positionality of the knowing subject, Haraway aligns herself with some aspects of the project of standpoint theory. Yet, by insisting on the 'complex, contradictory, structuring, and structured body', it is Haraway's specific notion of 'situatedness' which underpins the project of situated knowledges. Against a flat-reading of 'mere' acknowledgment of place or positionality, 'situatedness' is about the 'situatedness of situated [...] multiple-modes of embedding', i.e. the political-ethical conditions of knowledge production and a commitment to dismantling traditionalist notions which constrain contemporary thought.⁶⁴

Haraway's insistence on the term 'material-semiotic' is how she attempts to surpass the division between matter/nature and language/culture. To speak of the material-semiotic refuses the dualistic divisions, between language/culture and matter/nature as well as the division between epistemology and ontology. Henriques' description of a 'sonic materialism' in which waves and auditory propagation offer metaphors for a dynamic model of thought bears similarities to Cox's model of sonic materiality, which pinpoints sound's capacity for change and flux; both are invested in the characteristics of sound as constantly fluctuating and as transmitting a notion of instability, and its corresponding epistemological metaphors. Both attest to a commitment to sonic materiality and theorizations from it, as a way of overcoming dualisms. However, there is a problematic conflation of sonic realism and sonic materialism in Cox's model. Cox's insistence on 'sound-in-itself' as a reality which is mind-independent is premised upon the separation of language/culture/signification and matter, and ontology from epistemology. Given the aforementioned unaccountability of such universalisms as critiqued by feminist epistemologies, the specific notion of a mind-independent realism put forward by Cox need not play a role in the model of sonic materialism which underpins sounding situated knowledges. Instead, a new materialism which attends to matter without denigrating the role of language or signification can account for the intra-actions between human and non-human actors. If realism must play a role, then only in the form suggested by Barad in agential realism, in which matter is inextricably entangled in material-discursive relations and not posited as passive stuff of a traditional causal relationship out of which science/knowledge is made. This cuts through the dichotomy of mind-independent or mind-dependent conceptions of materiality which Cox insists upon. This form of sonic materialism asserts the inseparability of ontology and epistemology, nature and culture, language and matter in sounding situated knowledges, to renegotiate the subject-object relation in sonic knowledge production.

If sonic naturalism is the result of the uncritical continuation of a traditional subject-object relation, sounding situated knowledges helps to counter the

‘god-trick’ or view from above warned against by Haraway. As feminist science studies has demonstrated the necessity of opening up formerly unquestioned paradigms to enrich previously masculinist scientific cultures, by grounding sonic knowledge production in both embodiedness and situatedness, a closer interrogation of the subject-object relation enables a crucial rethinking to begin. This can counter the tendencies towards universalizing, ahistorical, neutral subjects in sound studies. Whilst much further work remains to be done to outline the precise implications of these feminist interventions into theories of sonic knowledge production, a critical renegotiation of subjectivity and objectivity in sounding situated knowledges must form its basis.

4. Archaeoacoustics and Echo

The relatively recent emergence of archaeoacoustics means that there remains much room for further research in theorizing what the field means for sound studies. The sounding past reveals particular problems for theories of sonic knowledge production. Producing knowledge around past auralities in sound studies inevitably encounters the problematics of historical acoustemology,⁶⁵ namely that we should be aware of contemporary conceptions and attitudes about sound and listening which influence explanations about cultures and social relations of the past.⁶⁶ Accordingly, the matter becomes increasingly recondite once auralities which took place before the invention of the written word are theorized. This poses the problem of how to understand the subject-object relationship in sonic knowledge production in a context ultimately unknowable. For the purposes of this article, I propose this new field to be a critical juncture for theories of sonic knowledge production. I ask, what potential for a political-philosophical ‘elsewhere’ which Haraway gestures towards can be found in archaeoacoustics?

Archaeoacoustics’ positioning of its listener as living in a quieter ‘more natural’ past aligns it with ideas of sonic naturalism. Leading researcher Paul Devereux writes that ‘people in remote antiquity would probably have heard with greater acuity than we do, living as they did in a quieter world, a world in which listening for danger would have been a constant and more important activity than in modern times’.⁶⁷ These ideas about sound and listening are grounded in an origin narrative, similar to Schafer’s version of sonic naturalism. These ideas can be found to be intellectually rooted in Marshall McLuhan’s widely influential theory of media, which describes the historical progression from the ‘acoustic space’ of early pre-Euclidean and pre-literate cultures, to the ‘visual space’ of literate cultures, and returning back to an acoustic space of sorts in the advent of ‘electric culture’.⁶⁸ Sterne’s concept of the audiovisual litany mentioned above has critiqued the attribution of certain qualities to sensorial modes, particularly where these are posited as alternatively dominant or missing in particular historical eras. Yet whilst Sterne’s term forms a poignant and necessary corrective to widespread ideas around hearing and seeing, gendered ideas in the audiovisual litany suggest a complex dialectic of these widely pervasive notions which requires greater examination.

Acoustic archaeologists regard positionality and listening as core to their research methodologies. For example, Iegor Reznikoff, a trained singer and specialist in resonance, uses a primarily voice-led method.⁶⁹ Other researchers use state-of-the-art microphones, speakers, and computers, whilst other researchers use a mixture of noise- and tone-generators, hand-clapping and other instruments such as drums, bull-roarers or other objects.⁷⁰ Devereux, quoted above, speaks of the greater acuity to sound and listening which ancient people had and suggests that by listening 'better' we can somehow access how sound and listening were used in social relations of the past. Without doubt, greater attention to sound and listening in archaeological sites may well provide new insights into sites where the acoustics were ignored. Given the particular attention to sound-making and listening in their fieldwork, there is an inherent embodiedness and positionality within the researchers' methods. One could feasibly propose that this groundedness in the bodily experiences of researchers counters the god-trick Haraway warns against, and lends itself towards analytical reflexivity.

Yet in archaeoacoustics research so far, stereotypes of masculine and feminine characteristics and abilities are found plentifully in research results. For example, Reznikoff comments that it was certainly only men who explored the caves with their voices, as it was 'very dangerous' in the caves for women. Devereux claims that due to the resonant frequencies of Neolithic chamber Newgrange at pitches which fall within the male voice range, 'the potential implication is quite clear: *these "tombs" saw ritual activities, and they were conducted by men*'.⁷¹ Given the small size of the recently emerged field, the figure of ancient man being constructed in archaeoacoustics still remains to be critiqued by arguments from gender archaeology and postcolonial archaeology to demonstrate how gendered and racialized prejudices are prevalent in archaeoacoustics research.⁷² Currently, and perhaps unsurprisingly, the reification of the normative white, European masculine subject of listening takes place in a very direct way. Traditional subject-object relations are upheld in which the conditions of knowledge production are not subjected to critical questioning.

If we are to consider archaeoacoustics as a potential opening into an elsewhere of sonic knowledge production, the processes of knowledge production via sounding situated knowledges must be interrogated: the physical embodiedness of archaeoacoustics research methods does not combat the 'god-trick'. The aforementioned difference between embodiedness and situatedness is key: embodiedness alone does not prevent the traditional subject-object relations from persisting. A Harawayan situatedness would require not only a consideration of the body, but of the political-philosophical conditions in which knowledge production takes place. This includes a gendered, racialized, and material engagement with knowledge production. Furthermore, as part of this situatedness it remains to be explored not only reflectively, but diffractively, to ask to what extent archaeoacoustics can bring the traditional subject-object relation into question.

In archaeoacoustics research, 'unusual' sound qualities often play a central role – these can take the various forms of notable reverberation, resonance,

sound carrying unusually far and echoes. The field endeavours towards demonstrating an intentionality of acoustic design, or at least admissible evidence thereof.⁷³ Many researchers cite echoes as significant in their field-work.⁷⁴ Steven J. Waller's work in particular proposes a fundamental reconceptualization of what echoes mean. Simple acoustical tests undertaken by the author at Horseshoe Canyon (Utah, USA) and Hieroglyphic Canyon (Arizona, USA) aim to evince a positive correlation between presence of rock-art and the strength of echoes measured in decibels. Waller suggests that echoes, conceived outside of processes of scientific rationalization, can be understood as 'supernatural spirits'. He proposes that rock art could have been intentionally placed at echoing locations due to echoes being 'worshipped as divine' in certain cultural contexts.⁷⁵ Waller's work appears to be positioned against conceptions of echo which have been trivialized by the processes of modern scientific rationalization which Sterne terms the 'Ensoniment' in analogy to the Enlightenment.⁷⁶ Waller suggests a 'magical' pre-Ensoniment understanding of sound and echoes, a sentiment echoed by other significant protagonists of the field.⁷⁷ Although some of his ideas of these may well fall within what some scholars have critiqued as the exoticization of magic in anthropology,⁷⁸ his work nevertheless indicates how the echo outside of its Western scientific definitions can open up a wealth of understandings of sonic knowledge production novel to the field of sound studies.

I suggest the echo as a feminist figuration akin to Haraway's cyborg, through which to theorize the subject-object relationship in archaeoacoustics. As a hybrid material-semiotic figure, a *cyborgian* echo is not only a literary (semi-otic) motif but also a literal (material) heuristic for articulating the subject-object relation. A cyborgian echo denotes its simultaneous material-physical conceptions in acoustics and its symbolic-semiotic conceptions in mythology. Echo as an acoustic phenomenon (as a type of reverberation) foregrounds the relationality of the listener to the sound – the listener must recognize both the 'original' sound and its repetition as resembling one another, the positionality of the listener also determines how and what they hear of the original and its repetition.⁷⁹ Barry Blesser and Linda Ruth Salter describe in the context of aural architecture that echo is a 'rudimentary spatial ability [...] the aural means by which we become aware of the wall and its properties, such as size, location and surface materials', which gives listeners a sense of space.⁸⁰ As a mythical figure, Echo too foregrounds relationality. Ovid's *Metamorphoses* has dominated conceptions of the nymph Echo cursed to only repeat the words of others and who is rejected by Narcissus.⁸¹ Gayatri Spivak's essay on Echo reads Narcissus as representing the (masculinist) construction of self-knowledge whilst Echo's (feminine) (non)subjectivity lies outside this realm, as 'a tale of the aporia between self-knowledge and knowledge for others'.⁸² Thus, Echo as myth of audible repetition comes to signify a critical junction between self and other. A cyborgian echo in sonic knowledge production is a material-semiotic figure through which to think the various affordances which sounding brings to situated knowledges. Some characteristics of these have been suggested via the work of Feld and

Henriques above such as: embodiedness, dynamism, relationality, accountability, and a questioning of what knowledge is.

The potential opening which archaeoacoustics could bring to theories of sonic knowledge production can be further demonstrated by outlining the differences between standpoint feminism and Haraway's situated knowledges by the metaphors of reflection and diffraction respectively. On the one hand, insofar as some positions within standpoint feminism have argued for the social position of women as lending an epistemic privilege, the field of gender archaeology has shown that research questions on women and gender have contributed productively to archaeological knowledge with an analytical *reflexivity* according to how contemporary gendered relations affect the interpretation of archaeological data.⁸³ However, on the other hand, sounding situated knowledges provokes a deeper questioning of the subject-object relation as the site of knowledge production. Despite the embodiedness of their research methods, archaeoacoustics researchers remain predominantly self-invisible in their socio-cultural interpretations. The situatedness which Haraway describes as a feminist accountability, and a deeper interrogation of the multi-modal conditions of knowledge production, is not tangibly present in the results which archaeoacoustics have thus far produced. Therefore, not only is the *reflexivity* promoted by standpoint feminism required, but via sounding situated knowledges, a *diffractive* methodology is necessary which disturbs the traditional subject-object relation.

As described above, the phenomenon of diffraction is chosen as a metaphor by Haraway for its closeness to the phenomenon of reflection but this differs in its production of difference. Barad proposes that understanding how the physical diffraction of light is understood in physics, exposes the inseparability of epistemology and ontology.⁸⁴ The echo is an apt feminist figuration for the diffractive methodology in sound. Although echoes in acoustics are often commonly defined as reflected sound, echoes as sonic experiences on a physical-material level (for example taking the aforementioned definition by Blesser and Salter from aural architecture) are constituted by both *reflection and diffraction, as well as refraction*. Therefore, *diffraction* in sounding situated knowledges functions alongside *reflection* to suggest the validity of both metaphors in feminist epistemologies. Echo in archaeoacoustics is a material-semiotic figure through which its speculative potential can be thought. This suggests the reflective metaphor is mobilizing an awareness of heterogeneous subjectivities, which standpoint theories might also advocate, whilst simultaneously, the diffractive metaphor can be considered part of a conscious endeavour to get to a political and epistemological elsewhere. This elsewhere is one in which traditional dualisms are disturbed and diffracted. The co-constitution of knowledge in this model, following Barad, promotes the inseparability of epistemology and ontology.

Spivak's aforementioned essay on Echo serves as a useful allegory for the relations of knowing in archaeoacoustics and sounding situated knowledges. Whilst, as mentioned above, archaeoacoustics has a tendency to theorize

without being attentive to the insights brought about by postcolonial studies, Spivak deconstructs Ovid's dialogue to demonstrate how Echo's partial repetitions of Narcissus' words reveal her disruptive potential. Echo's responses produce a different meaning through their repetition, a fitting example of Derridean *différance* – difference and deferment at the same time.⁸⁵ For archaeoacoustics, echo – in the sense of *that which is reflected back* – can act as a disruption in what the knower knows, or believes to know, or be able to know. Furthermore, Echo is presented as a subaltern figure, thus alluding to the fraught question of postcolonialism famously formulated by Spivak as 'Can the Subaltern Speak?', that is, the representational difficulty of theorizing the subaltern within the epistemic violence enacted through colonialist, masculinist and capitalist relations.⁸⁶ Yet crucially, via Echo, Spivak finds the potential of *différance* and cautiously offers a glimmer of hope for the *agency* of the subaltern. Echo as 'a dubious reward quite outside of the borders of the self',⁸⁷ therefore bears resemblance to Haraway's cyborg: both are born within the 'belly of the monster'.⁸⁸ I suggest that echo has the potential – through its embodiment of difference and destabilization of the knowing subject – of re-negotiating the subject-object relation in sonic knowledge production.

5. Conclusion

Sounding situated knowledges forms the basis for future interventions of feminist epistemologies of thinking through sounding where a critical re-negotiation of the subject-object relationship in sonic knowledge production is centred. True to Haraway's essay on situated knowledges, it is a model which foregrounds both embodiedness and situatedness to avoid the risks of universalizing notions of subjectivity and objectivity which have limited traditional knowledge production. Sonic naturalism, premised upon the continued dualisms of nature-culture, subject-object, mind-matter, continues to form a dominant tendency in sound studies. Though sonic naturalism, as I have argued, takes on various divergent forms, its persistence indicates the pressing necessity of interrogating traditional subject-object relations in sonic knowledge production.

Archaeoacoustics demonstrates a particular case where the stakes of the political-philosophical elsewhere of sonic knowledge production are particularly high. The unknowability of its subject matter has hitherto led to interpretations which expose how sonic naturalism and a traditional subject-object relation have tended towards a reflection of the same. On the one hand, current research has proven rather limited in its interpretation of archaeoacoustic fieldwork – not only in its literal interpretations, for example in gender roles, but also in its epistemological potentials. As described above, in archaeoacoustics the evident sonic naturalism suggests a division between the ontology of the object of nature and the epistemology of the subject. On the other hand, the reorganization of conceptions of knowledge production around sounding indicates affordances which, drawing on Feld's acoustemology and Henriques' sonic logos, can facilitate the embodiedness, relationality, notions

of difference and dynamism and a questioning of the definition of what constitutes knowledge. Archaeoacoustics, if it insists upon the situatedness and embodiedness of sounding situated knowledges might be able to explore alternative frameworks of sonic knowledge production, in which rigid dualisms which separate nature and culture, epistemology and ontology, and traditional subject-object relations are no longer upheld.

The echo as a physical phenomenon which encapsulates reflection and diffraction is posited on a material level, but it can also act on a symbolic level as a sounding disturbance into traditional subject-object relations. The figure of echo as diffraction, which is both material and semiotic, posits the refusal of simply 'reflecting the same elsewhere' and insists upon the metaphor of 'making a difference'. Similar to the way that Spivak's Echo offers a glimmer of hope for disruptive agency, a Harawayan concept of echo draws on her usage of Trinh T. Minh Ha's 'inappropriate/d others', which suggests a 'critical, deconstructive relationality, in a diffracting rather than reflecting (ratio)nalit—as the means of making a potent connection that exceeds domination'.⁸⁹ Thus conceived, the echo offers multiple ways of not simply displacing the same elsewhere, but in producing non-self same versions of something (a sound), echo as diffraction embodies difference in a productive way for future examinations of sonic knowledge production. The speculative elsewhere which could be claimed in terrains such as archaeoacoustics or more broadly in sound studies, likely needs further companions of feminist figurations like the echo. Haraway has proposed many in feminist science studies: the cyborg, the coyote, the companion species amongst them. Sounding situated knowledges can produce more of them.

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Notes

¹ This has been articulated in Evelyn Fox Keller's hugely influential work on gender and science where notions of the masculinist objectivity in Western science are analysed. Keller writes of her investigation into how a 'different subjectivity [...] would affect our conception of science' and alludes to a goal of 'enabling us to glimpse what a science less constrained by such an ideology might look like'. See Keller, *Reflections on Gender and Science*, 70–71.

² Although 'listening' might seem to be a more straightforward term to address, I

choose to call this the 'subject-object relation in sound' in this article in keeping with the close relation of Haraway's work to science studies and science and technology studies (STS) and in an attempt to foreground this relation in processes of knowledge production.

³ Karen Barad's articulation of an 'ethico-onto-epistem-ology' is deeply influenced by Donna Haraway's work. As such, although this term was coined by Barad, I attribute it to Haraway's influential thought within and beyond science studies. See Barad, *Meeting the Universe Halfway*, 185.

⁴ Haraway, "Situating Knowledges."

⁵ Reznikoff and Dauvois, “La dimension sonore des grottes ornées”; Scarre, “Painting by Resonance.”

⁶ For example, the pioneering research of the field was undertaken by Iegor Reznikoff, a mathematics professor and specialist singer of early Christian chants. Another key figure since the 1990s has been Paul Devereux, an author of several books which investigate various ‘earth mysteries’ studies of sacred sites and unusual geophysical events.

⁷ Haraway, “Animal Sociology and a Natural Economy of the Body Politic, Part II.”

⁸ Haraway et al., “Cyborgs, Coyotes, and Dogs: A Kinship of Feminist Figurations and There Are Always More Things Going On Than You Thought! Methodologies as Thinking Technologies,” 330.

⁹ Various theorizations of the role of political-philosophical ‘elsewheres’ in recent new materialism, speculative realism and object-oriented ontology debates can be found variously addressed in Cecelia Åsberg, Kathrin Thiele, Iris Van der Tuin’s “Speculative *Before* the Turn” and Jord/ana Rosenberg’s “Molecularization of Sexuality.” Åsberg, Thiele, and Van der Tuin seek to reclaim the importance of feminist speculation amidst the contemporary flourishing of speculative realism and object-oriented ontologies. This speculation entails drawing on science fiction to imagine visionary past, futures and presents as a practice of Haraway-inspired feminist world-making. Rosenberg, on the other hand, addresses the contemporary evocation of an ‘ancestral realm’ in object-oriented ontologies, which simultaneously implies both the ancestral and futural. Rosenberg reads a capitalist commodity logic into the ontological turn, and undertakes a queer and postcolonial critique of OOO (object-oriented ontology) as a form of fanaticism which acts to marginalize the realm of the social. See Åsberg, Thiele, and van der Tuin, “Speculative *Before* the Turn;” Rosenberg, “The Molecularization of Sexuality.”

¹⁰ Haraway writes that this term, ‘is intended to portray the object of knowledge as an active, meaning-generating part of apparatus of bodily production, without ever implying the immediate presence of such objects or, what is the same thing, their final or unique determination of what can count as objective knowledge at a particular historical juncture’. The pairing of

‘material-semiotic’ emphasizes the inextricable link and co-configuration between meanings and objects of knowledge. Haraway, “Situated Knowledges,” 595.

¹¹ Haraway’s figure of the cyborg is the most well-known of a number of feminist figurations which she develops throughout her writing, for example the coyote, the vampire, and the companion species. These figures are aimed at subverting conventional political-philosophical thought acting as agents through which to think through and beyond the given conditions which Haraway’s feminism is positioned against (e.g. socialist, anti-racist, materialist feminisms). See Haraway, “A Cyborg Manifesto: Science, Technology, and Socialist-Feminism in the Late Twentieth Century.”

¹² Waller, “Intentionality of Rock-Art Placement Deduced from Acoustical Measurements and Echo Myths.”

¹³ Blesser and Salter, *Spaces Speak, Are You Listening?*

¹⁴ Schafer, *The Soundscape: Our Sonic Environment and the Tuning of the World*. Tara Rodgers draws on wave metaphors and maritime themes to examine using Luce Irigaray’s writings how the aesthetics and politics of the sound wave aligns with feminized notions of fluidity in audio-technical discourses. Reclaiming these notions back from stereotypically masculinist and colonialist histories into metaphors of interconnection, this essay presents powerful and useful ideas for feminist epistemologies of sound. See Rodgers, “Toward a Feminist Epistemology of Sound: Refiguring Waves in Audio-Technical Discourse.”

¹⁵ Schafer, *The Soundscape: Our Sonic Environment and the Tuning of the World*, 15.

¹⁶ Thompson, *Beyond Unwanted Sound*.

¹⁷ Schafer’s celebration of the ‘authenticity’ of soundscapes experienced by the earwitness is part of his distaste for unnatural sounds co-opting the ‘natural’ soundscape including the role of audio recording technology. See for example, his definition of ‘schizophonia’. Schafer, *The Soundscape: Our Sonic Environment and the Tuning of the World*, 8–9; 90–91.

¹⁸ Keller, *Reflections on Gender and Science*.

¹⁹ Though the projects of scientific and philosophical epistemologies cannot be posited as interchangeable, feminist critiques of masculinist knowledge production from within science studies and philosophy are often viewed as joint efforts. Most

commonly cited are the foundational texts by Evelyn Fox Keller, who investigates notions of masculine domination and control in science writings, and Susan Bordo, who describes the masculinization of philosophical thought in Cartesian objectivity. Later work specifically on feminist epistemologies reflects this joint inheritance. Keller, *Reflections on Gender and Science*; Bordo, *The Flight to Objectivity*; Alcoff and Potter, *Feminist Epistemologies*.

²⁰ Keller, *Reflections on Gender and Science*, 42.

²¹ Nancy, *Listening*, 37.

²² James, "Affective Resonance," 68.

²³ Nancy, *Listening*, 9.

²⁴ Cox, "Beyond Representation and Signification," 146, 157.

²⁵ *Ibid.*, 147.

²⁶ Seidler, *Rediscovering Masculinity*, 5–13; Haraway, *Modest_Witness@Second_Millennium.FemaleMan_Meets_OncoMouse*, 23.

²⁷ There are a variety of positions which are brought under the terms "Speculative Realism" and "Object-Oriented Ontology." My usage of the two here is not intended to conflate these philosophical movements but instead to point out the commonality to which a feminist critique of an invisibilized male subjectivity and separation of subject and object of knowledge remains highly pertinent.

²⁸ van der Tuin, 'Diffraction as a Methodology for Feminist Onto-Epistemology', 233.

²⁹ Cox, "Beyond Representation and Signification," 146–47.

³⁰ I have intentionally left the "N" of "Nature" capitalized here as I read it to refer to "Nature" as a proper noun, which reinforces my argument of Cox's slippage between "n/Nature" as common and proper noun. *Ibid.*, 147.

³¹ Ahmed, "Open Forum Imaginary Prohibitions."

³² Cox, "Beyond Representation and Signification," 146.

³³ Dennis Bruining elaborates in more detail on Ahmed's argument describes how even within feminist new materialisms, there is a tendency to perpetuate this misrepresentation of postmodernism and post-structuralism as caught in endless relativism and as an 'allergy to the real'. Bruining cites examples of this tendency in the editor introductions to Diana Coole and Samantha Frost *New Materialisms* and

Stacy Alaimo and Susan Hekman's *Material Feminisms*. See Bruining, "Interrogating the Founding Gestures of the New Materialism."

³⁴ Cox refers to Casey O'Callaghan's when asserting, 'Sounds are intangible, ephemeral and invisible; but, O'Callaghan shows, they are nonetheless real and mind-independent'. O'Callaghan, *Sounds*; Cox, 'Sonic Philosophy'.

³⁵ As Dennis Bruining suggests, one of the problems of new materialism is 'its highly problematic conception of matter as a thing in or of itself with its own identifiable agentic drives'. The founding gestures of new materialism are 'premised on the conceptual separation...of matter as a thing that is somehow separate from the background against which it emerges'. Bruining, "Interrogating the Founding Gestures of the New Materialism," 33; 37.

³⁶ Barad, *Meeting the Universe Halfway*, 183, 185.

³⁷ Haraway, "Situated Knowledges," 589.

³⁸ Due to limitations of space, I will not address in detail the large body of feminist theory and philosophy on embodiment and corporeality and their relation to subjectivity and identity. Insofar as Haraway's "Situated Knowledges" theorizes how embodiment and situatedness crucially underpins the subject-object relation of feminist epistemologies, I instead refer to Haraway's cyborgian reading of the body which advocates an anti-essentialist and political-ethical theory of embodiment. To distinguish the Haraway notion of the body from others, I use "embodiedness" over "embodiment."

³⁹ Haraway, 'Situated Knowledges', 581.

⁴⁰ *Ibid.*, 589.

⁴¹ *Ibid.*

⁴² Haraway, *How Like a Leaf*, 103.

⁴³ Haraway, "Situated Knowledges," 588.

⁴⁴ Haraway, *How Like a Leaf*, 71 (my emphasis).

⁴⁵ Jonathan Sterne notably criticizes the rigid separation of characteristics concerning seeing and hearing which are often presented in a factual manner as the 'audiovisual litany'. Sterne considers these to perpetuate unhelpful dualisms which do not need to be a starting point for cultural analyses of sound, furthermore suspicious for their theological underpinnings. Relevant for the present argument are ideas about hearing tending towards subjectivity

or being about affect, whilst seeing tending towards objectivity or being about intellect. Sterne, *The Audible Past*, 15.

⁴⁶ Feld, "Waterfalls of Song: An Acoustemology of Place Resounding in Bosavi, Papua New Guinea."

⁴⁷ Henriques, *Sonic Bodies*.

⁴⁸ Sounding as described by Henriques, leans on Christopher Small's concept of 'musicking' to emphasize the processes, activities, and multiple actors of a sonic sociality. Small, *Musicking*.

⁴⁹ Haraway uses Robert Boyle as the archetypal white, male and self-invisible (unmarked) subject of European technoscience. The 'modest witness' espouses a specific form of virtuous masculine modesty born in modernity during the so-called scientific revolution. The modern laboratory is the epistemological space which signifies a highly regulated 'culture of no culture'. See Haraway, *Modest_Witness@Second_Millennium.FemaleMan_Meets_OncoMouse*, 23.

⁵⁰ Henriques, *Sonic Bodies*, xxviii.

⁵¹ *Ibid.*, xvii.

⁵² Henriques, *Sonic Bodies*, 244–246.

⁵³ Feld, "Acoustemology," 12.

⁵⁴ *Ibid.*, 15.

⁵⁵ Chilisa, *Indigenous Research Methodologies*; Feld, "Acoustemology," 14.

⁵⁶ For example, Feld speaks of the 'potential of acoustic knowing' and his initial realisation of the Bosavi peoples' sophisticated communication through sound as 'bodily, powerful and gripping' and Henriques speaks of the process of 'sounding' as offering a 'different understanding of the nature of rationality itself' and of sonic logos as part of a 'criticism of representational meaning and linear causality'. Feld, *Jazz Cosmopolitanism in Accra*, 126; Henriques, *Sonic Bodies*, 246.

⁵⁷ Hartsock, "The Feminist Standpoint"; Harding, *The Science Question in Feminism*; Wylie, "Why Standpoint Matters."

⁵⁸ Although this 'simply' is to be understood with a deconstructionist playfulness typical of Haraway. Haraway, "Situated Knowledges," 581.

⁵⁹ *Ibid.*, 579.

⁶⁰ Haraway speaks of 'polluted inheritances' as the wide-reaching political, philosophical, ethical notions and values which one inherits from patriarchal, racist, capitalist, militaristic society which her work is pitted against. This position is also often referred to as working from 'within the

belly of the monster'. Haraway, "The Promises of Monsters: A Regenerative Politics for Inappropriate/D Others," 70.

⁶¹ Haraway, *Modest_Witness@Second_Millennium.FemaleMan_Meets_OncoMouse*, 16.

⁶² *Ibid.*, 273.

⁶³ Haraway, *The Haraway Reader*, 2.

⁶⁴ Haraway, *How Like a Leaf*, 71.

⁶⁵ Smith, *Hearing History*.

⁶⁶ Sterne, *The Audible Past*, 19. Some historians of sound insist upon the use of printed records to verify the meanings ascribed to sonic experiences. Smith, "Echo," 61–62.

⁶⁷ Devereux, *Stone-Age Soundtracks*, 12.

⁶⁸ Schafer's close affinity with McLuhan's theories is well documented, and his palpable influence can be noted in the direct resemblance of 'acoustic space' in Schafer's notion of the 'soundscape'. Paul Devereux makes direct reference to McLuhan's concept of acoustic space. See McLuhan, *Laws of media*; Schafer, *The Soundscape: Our Sonic Environment and the Tuning of the World*, 11; Devereux, *Stone-Age Soundtracks*, 25.

⁶⁹ Reznikoff, "On Primitive Elements of Musical Meaning."

⁷⁰ Some researchers use a variety of the methods mentioned. Till et al., "Songs of the Caves: Sound and Prehistoric Art in Caves Initial Report on a Study in the Cave of Tito Bustillo, Asturias, Spain."

⁷¹ Personal Communication with Iegor Reznikoff. March 2015; Devereux, *Stone-Age Soundtracks*, 89 (original italics).

⁷² See for example: Conkey and Spector, "Archaeology and the Study of Gender"; Moro-Abadía, "The History of Archaeology as a 'Colonial Discourse'."

⁷³ Scarre and Lawson, *Archaeoacoustics*, viii.

⁷⁴ Reznikoff and Dauvois, "La dimension sonore des grottes ornées"; Devereux, *Stone-Age Soundtracks*, 17–19, 20, 95, 120; Watson and Keating, "The Architecture of Sound in Neolithic Orkney," 259.

⁷⁵ Waller, "Intentionality of Rock-Art Placement Deduced from Acoustical Measurements and Echo Myths," 31.

⁷⁶ Sterne, *The Audible Past*, 2.

⁷⁷ Reznikoff, 'JMM'; Devereux, *Stone-Age Soundtracks*, 15.

⁷⁸ Sardan, "The Exoticizing of Magic from Durkheim to 'Postmodern' Anthropology."

⁷⁹ See for example, entries on "Echo," "Delay," and "Reverberation." Augoyard and Torgue, *Sonic Experience*, 47, 37, 111.

⁸⁰ Blesser and Salter, *Spaces Speak, Are You Listening?*, 1–2.

⁸¹ However it can be noted that other Greek poets such as Aristophanes, Philostratus, Callistratus, Apuleius, and Nonnus have alternatively described Echo by herself (in Greek myths Echo appears invariably as a female figure) or in relation to the god Pan.

⁸² Spivak, “Echo”, 19.

⁸³ Conkey and Spector, “Archaeology and the Study of Gender”; Wylie, “Doing Social Science as a Feminist: The Engendering of Archaeology.”

⁸⁴ Barad, *Meeting the Universe Halfway*, 89–90.

⁸⁵ Spivak, “Echo,” 26.

⁸⁶ Spivak, “Can the Subaltern Speak?”

⁸⁷ Spivak, “Echo,” 23.

⁸⁸ Haraway, “Situated Knowledges,” 581.

⁸⁹ Haraway, *The Haraway Reader*, 69.

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