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SEARCHING FOR ANCIENT SONIC EXPERIENCE IN PRESENT-DAY LANDSCAPES

1. Introduction

The mountaintop sanctuary to Zeus on Mount Lykaion in Arcadia, Greece hosted cult practice for centuries. An ash altar at the peak of the mountain evidences Neolithic origins and Mycenaean formalization, while a series of Hellenistic structures were built to support public, ritualized athletic competitions in a lower sanctuary (Romano 2014, 2015, 2019). Unusually, the buildings appear to have been built in one building campaign rather than appearing organically over time, suggesting a premeditated site plan. Little is known about the daily practices and rituals carried out in antiquity; the written record contains sparse references to the sanctuary and its famous games in honor of Zeus, with the most complete account of the physical environment made by Pausanias hundreds of years after it had fallen out of use (Pausanias, 8.30.2-3, 8.36.3, 8.38.5-6; Pindar, *Nemean Odes*, 10.45ff). The most significant source of evidence of ancient site use is the site itself. While the structures of the lower sanctuary sit in extensive ruin above ground level today, the hippodrome is still intact and visible, and the geological forms of the leeward mountainsides encircling the lower sanctuary have remained stable since ancient times (Davis 2017, 2018). One's imagination is necessary to envision the original architecture, but the greater landscape forms likely bear strong resemblance to past conditions.

This consistency is important to the greater sensory landscape. When traversing the lower sanctuary, startling acoustics are evident in the landscape. Communication over long distances (what will be referred to as soundlines) is possible in some positions, while moments of sonic isolation can be present in plain sight. Many of these dynamics coincide with structure footprints or prominent landscape features and are likely indicative of ancient conditions as well. Critically, the greater mountainous region surrounding the archaeological site holds promises of continuity as well. The area maintains a rural character, with low-density villages isolated from developments and major road systems. Shepherding and scattered chestnut farming continue to be the primary activities in the landscape, introducing few modern elements that might impact the archaeological area. Combined, these aspects render the landscape setting as a critical surviving site component and an experiential buffer between industry-heavy activities in the valley; the archaeological site's relative isolation affords the unusual opportunity to study the acoustic dynamics without significant outside sonic interference. What remains to be found, and which is the focus of the research described in what follows, is whether and how the acoustics could have determined the form and function of the lower sanctuary's Hellenistic layout.

2. Existing approaches to studying sound in an ancient landscape

Sound-based approaches to ancient experience have been an increasingly frequent contribution to historic site investigations. The sonic study of ancient architecture has been established through a variety of practices, including work from archaeoacoustics, sensory archaeology, affective heritage, and architectural phenomenology (Cavanaugh 1980; Mylonopoulos 2006; Scarre, Lawson 2006; Fahlander, Kjellström 2010; Skeates 2010; McMahon 2013; McBride 2014; Till 2014, 2017; Díaz-Andreu, Mattioli 2015; Hamilakis 2015; Suárez *et al.* 2016; Tronchin, Knight 2016; Sikora *et al.* 2018; Skeates, Day 2019).

Measurement-based studies often apply the tools and lessons of modern acoustic design to map the acoustics of an interior space or specific structures, for instance to recreate ancient theaters (Chourmouziadou, Kang 2008; Economou, Charalampous 2013; Witt, Primeau 2018; Barkas 2019). The focus of these studies is the architecture as designed vessels in which certain acoustical properties may have been designed. A less common perspective is to pursue measurement campaigns at larger exterior scales, such as ancient cultural landscapes or cityscapes, to understand their sonic contributions to ancient experience (Mlekuz 2004; Hamilton *et al.* 2006; Crow, Turner, Vionis 2011; King, Santiago 2011; Díaz-Andreu, García Benito 2012; Scullin, Boyd 2014; Contreras 2015; Kolar, Covey, Cruzado Coronel 2018; Primeau, Witt 2018; Rainio *et al.* 2018; Scullin 2018). Despite apparent changes to the landscapes during the intervening years, these studies demonstrate the potential and the diversity of approaches at larger scales.

One of the most recent introductions to the methodological toolkit of ancient sound study is psychoacoustic analysis (Jordan 2020; Valenzuela, Diaz-Andreu, Escera 2020). The field of psychoacoustics studies the human perception of sound in addition to the objective properties of sound energy in a space (Fastl, Zwicker 2007). Its application can effectively center human experience in sensory considerations rather than simply the affordances surrounding the human actor. When applied in historic or ancient settings, psychoacoustic analyses offer a more direct avenue for considering the daily experience of ancient users. Valenzuela, Diaz-Andreu, Escera (2020) present many of the challenges posed by this new approach and include various approaches being explored in different projects, including the introduction of predictive site modeling and lab-based sound quality assessment to determine possible ancient conditions. The investigation at Mount Lykaion is based

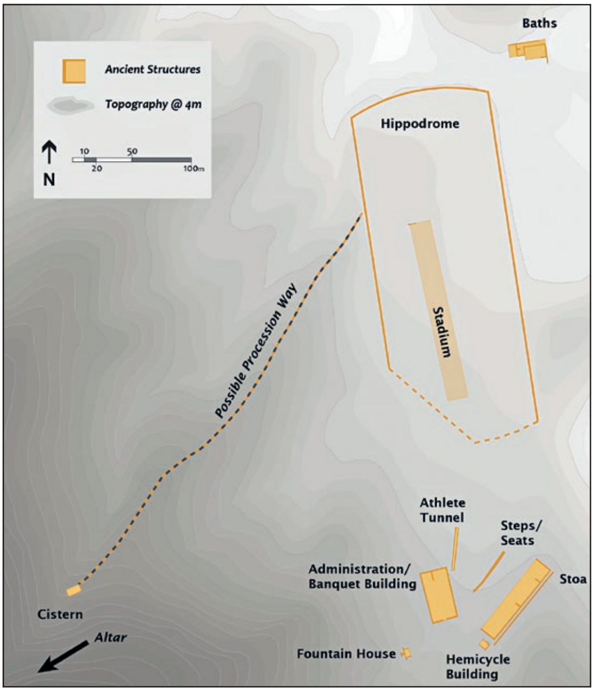

Fig. 1 – Site plan of Mount Lykaion's lower sanctuary with building remains outlined.

on observable field data gathered *in-situ* through binaural field recordings. These are then analyzed according to various psychoacoustic parameters and mapped for anomalous results, site alignments, and other patterns.

3. Site investigation approach on Mount Lykaion

Before any recordings are made, the site and its history – particularly elements related to sonic relationships and likely activities – must be understood. Details have been published previously on archaeological findings from the Mount Lykaion Excavation and Survey Project (Romano, Voyatzis 2014, 2015), as well as on the author's architectural and sound-based historical reviews (Jordan 2020, 2021). Fig. 1 depicts the visible building remains. In addition to an historical overview, direct experience of the sonic dynamics is of course essential; the author gathered this level of information over many years conducting architectural documentation, conversations with archaeological team members, observing usage dynamics during the regional Lykaion Games held on the site in 2017, and more recent field surveys (Jordan 2016, 2020).

Making binaural recordings of current conditions at Mount Lykaion fulfills three major aims. The first is to document the most accurate recorded representation of the soundscape in human experiential terms for archival purposes. A second is to enable true-to-life playback (audio fidelity), including the precise replication of sound directionality, for both analytical purposes and future archaeological interpretive potential. This includes gathering an acoustic signature to enable future convolution processing and playback should conditions on the mountain change. The third aim is to enable data analysis of the resulting recordings according to the particularities of human hearing and signal processing, which will be elaborated upon in Section 4.

3.1 *Choosing study positions*

With the above references in hand, positions and areas of research interest were identified for sonic study. Connectivity is a major theme for point selection, such as identifying whether two structures are connected by an unusual soundline or whether a structure or area surrounding the hippodrome is sonically isolated from the rest of the site. For instance, spectating was a major factor in the public ritual games held in honor of Zeus, yet no formal seating arrangements have survived – testing sought to determine what hillsides provided clear soundlines to activities taking place on the hippodrome. In a similar vein, a ridgeline running parallel to the stoa's long axis has been posited as a possible processional way between the baths and the Agno fountain (and possibly the altar). Given the sonic contributions of typical processions at the time in other sanctuaries (Pedley 2005; Mylonopoulos 2006; Connelly 2011), testing sought to identify the borders of sonic accessibility between the ridgeline and lower sanctuary. This would help identify the scope of inclusion from sonic practices along the processional way – whether the procession could be experienced throughout the lower sanctuary or only in certain nearby locales. Of particular interest were building entrances and unexplained features, such as a prominent but unexplained indentation positioned within the top tread of the ceremonial seats. Equally, sonic isolation can also determine what activities a building could host, either as co-participants in the ritual atmosphere of the games or as sonic environments unto themselves. So testing was conducted across the site at close-range and long-distance to determine site connectivity between structures as close as the stoa and adjacent semi-circular building, or as far apart as the Agno fountain and the baths.

Reciprocal recordings were made whenever possible between source and receiver positions. For example, if the speaker (source) was placed on the hippodrome and the microphones (receiver) on an adjacent hill for a cycle of recordings, the speaker and microphone positions were reversed and the recordings repeated so as to identify any directional differences in sonic experience between two points. So far, such pairings have only been recorded once; future field recording seasons will focus on repeating measurements to control for differences in weather and faunal activity and to determine baseline conditions.

3.2 *Sounds used for site testing*

In order to produce results from a wide range of possible physical conditions, communicative dynamics, and selected analysis methods, five control sounds have been employed so far: a popped balloon functioning as an impulse response for possible convolution processing; a sinusoidal sweep between 20 Hz and 20,000 Hz (the human hearing range) to observe any outlier or common characteristics at particular frequencies, and as a secondary recording for convolution processing; a series of pure tones within the human hearing range (at 498, 996, 1992, 4008, 7992 and 15360 Hz) randomized in terms of rising frequency and duration, in order to explore an abstracted version of pattern recognition inherent in music; and a series of ten sentences used in the Göttinger Sentence Test for audiometry to enable future explorations of pattern recognition, time-dependent adaptation, and speech clarity in open field conditions. The Göttinger Satztest, "Sentence Test", is a standardized series of 200 sentences that reflect the average phoneme distribution of German language speakers (Kollmeier 1990).

3.3 *Field equipment and calibration*

The equipment used for field testing was selected for stability in outdoor exposures and for extended use without a power source. Sounds had to be consistently replicable in varying conditions and at a distance, and equipment needed to be portable, long-lived, and easy to handle in rugged terrain. Recordings were made using the handheld SQobold II recording system (HEAD Acoustics, GmbH) paired with binaural headset (binaural microphones worn as headphones) with an attached GPS receiver that linked each recording with geo-locational data. The researcher wearing the binaural recording device always directed the speaker towards the receiver position. A portable, battery-powered Samson XP360 Expedition Express speaker projected the recorded sounds and was mounted at its base on a standard tripod at human height (the base was positioned at approximately 152 cm/5 feet from ground level).

The test sounds were loaded onto an iPhone SE with the iOS11.4 operating system and then played at maximum phone volume via the Google Drive app, which relayed them to the speaker via Bluetooth. The master volume on the speaker was set to a particular value for the recorded speech (resulting in an SPL of 65.4 dBA at one meter from the speaker's face), and at a higher value preset for the sweep and tones files. Two different balloons were chosen for impulse tests based on their consistency and capabilities at different frequency ranges (Pätynen, Katz, Lokki 2011): a standard G95 balloon with a 30 cm diameter was employed for short and medium-range tests (up to about 250 m/820 feet) and a larger G180 balloon with a 50 cm diameter for medium and long-range tests (from 200 up to 712 m/2337 feet). Balloons of each size were filled using a manual air pump in the field adjusted to a set pressure. Subsequently, these were held above the researcher's head directly adjacent to the speaker installation and popped with a small knife.

Meteorological data was noted at each point of signal recording using a TACKLife Anemometer (Model DA02) and a TACKLife Humidity Meter (Model HM01). As weather conditions may affect sound propagation and perception (Bohn 1988; Attenborough 2008), average value readings were taken during the period of time spent recording all five sounds at each location – a period of approximately five-to-ten minutes per placement. Any momentary sonic interference from the spinning mechanism of the wind velocity meter was found to be negligible. Generally, recordings are made when wind is at low or consistent levels – files with sudden audible gusts are rerecorded whenever possible.

Recording results were calibrated via a set of control tests that were conducted in the large anechoic chamber at the Technische Universität Berlin. Recording and speaker equipment were set up identically to field conditions and readings were taken with one meter and five meters (3.3 and 16.4 feet respectively) separating source and receiver. These measurements established a baseline for the sound propagation capabilities of the speaker.

4. Psychoacoustic analysis of field recordings

As mentioned, the goal of recording is both to gather acoustic signatures of the space through various test sounds and to create data for psychoacoustic analysis away from the field. Different analyses can be run with the same collected binaural files, homing in on key elements to human sound perception that are less frequently incorporated into other historical sound studies. These include filtering mechanisms (e.g. the ability to tune out wind interference), time-based perceptive shifts (e.g., one's immediate reaction versus one's perceptual adjustments after a few seconds), pattern recognition (e.g. language identification, birdsong identification, or merely the sorting of foreground or background sound sources), and the role of aspects such as perceived loudness, roughness, and sharpness of component sounds (Sottek, Genuit 2005; Genuit, Fiebig 2017). On Mount Lykaion, a few analyses have proven particularly useful so far that are detailed below.

4.1 *Software and file preparation*

ArtemiS Suite (HEAD Acoustics, GmbH) has been used to analyze the recorded data from Mount Lykaion by producing interactive spectrograms from which data points can be collected as needed. These images visualize each recording according to the analysis being run, providing a quick visual impression of the recording. The software package comes pre-loaded with customizable analysis functions to investigate objective and subjective components to sound perception. On Mount Lykaion, baseline sound pressure levels (dB SPL and A-weighted) provide conditions baselines. Accentuation of particular frequencies can be noted in the balloon or sweep recordings, which might hinder or favor human speech communication among many possibilities.

Other analysis functions enable the detailed comparison of contributing psychoacoustic elements; on Mount Lykaion, perceived loudness has proven a fruitful starting point for each sound source recording. Metrics such as speech clarity or intelligibility are also applicable when considering the spoken control sounds, though these were designed for and continue to be tested in interior space analysis or sonic environments prone to noisy conditions, such as busy streets and along airplane flight paths (Traer, McDermott 2016). As a result, their indicative bearing within the Mount Lykaion context is still to be determined.

Unique to ArtemiS Suite is the "Relative Approach" analysis (cp/cPa), which combines psychoacoustic elements with time and frequency pattern recognition, filter mechanisms, and adaptation over time into a single analytic of human perception of sound quality (Genuit 1996; Bray 2004). Though designed for sound quality assessments typically found in soundscape studies (Axelsson 2015; *ISO* 2018), it is a powerful tool for comparing overall impressions of sonic events on Mount Lykaion and has helped to convert anecdotal observations into consultable data. The time-based spectrograms that result have been found to be legible by a wide audience of acoustics specialists and non-specialists.

Prior to analysis, each sound recording is trimmed so that one-to-one comparisons can be made (for instance, the recordings of the pure tones are all trimmed to be seven seconds long). Averaged single values can then be derived as needed, such as the average A-weighted dB levels or average loudness of a speech file, though they are subject to significant interference when the recording includes faunal activity or wind gusts. These kinds of measurements are also useful for overall impressions before investigating certain frequency bands or other details.

4.2 *Sample analysis. Hippodrome and adjacent hills*

To illustrate how the psychoacoustic analyses described above can be applied to field observations, a few simple examples will be described. The first example is the use of the 'Relative Approach' analysis to compare the sonic experience of a sound played from two different positions. The basis of this example was anecdotal information from conversations with archaeologists and the author's site experience, which relayed that sounds from two different

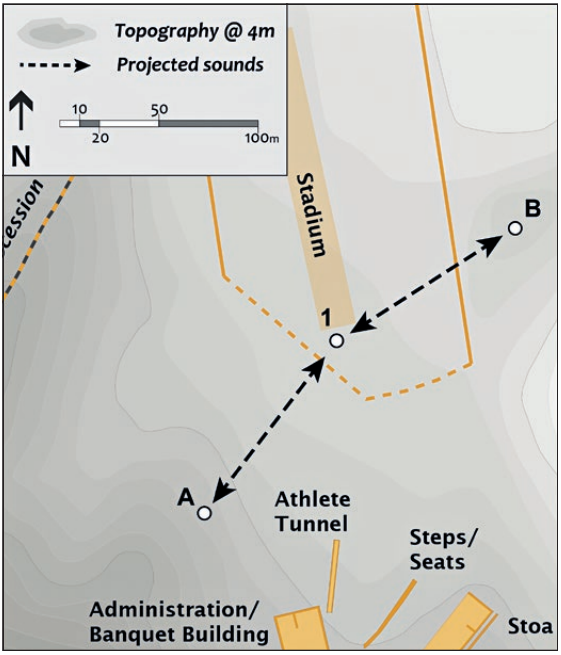

Fig. 2 – Partial site plan depicting the positions of sound sources (A and B) and microphone (1) used to compare sound quality impressions from the two hills.

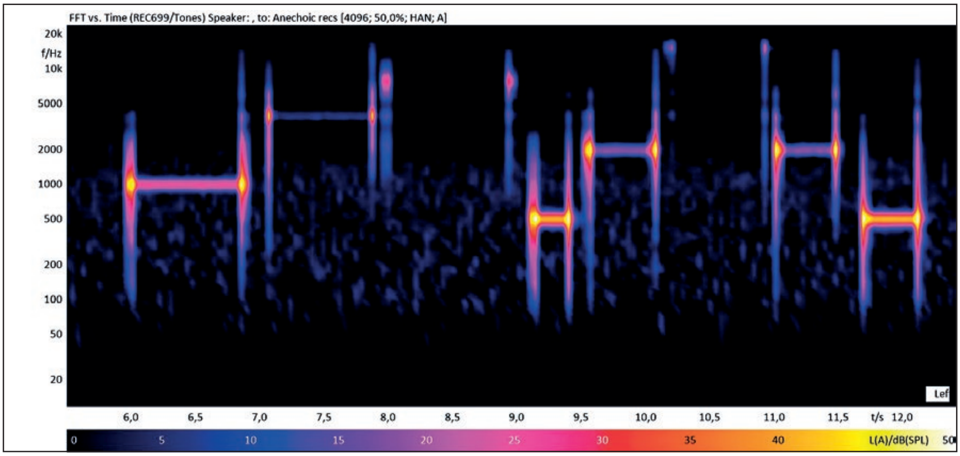

Fig. 3 – FFT vs Time analysis of tones file recorded in an anechoic chamber (A-weighted dB SPL); eight tones are visible at 996, 4008, 7992, 498, 1992, 15360, 1992, and 498 Hz, with the beginning and end of each tone particularly prominent.

hills could be heard clearly from the hippodrome surface. The intent was to determine from which hill the sound could be heard more strongly (Fig. 2).

A position was chosen on the hippodrome surface with clear sightlines to both hills and approximately equidistant from each (position 1 in Fig. 2). The leeward side of Mount Lykaion that overlooks the entire hippodrome was the first hillside for comparison (position A); a small outcrop on the eastern side of the hippodrome was the second hillside (position B). The elevation of position A is around 4 m higher than position B. The tones file described above was used to compare impressions; a baseline spectrogram of this tones file (produced in an anechoic chamber) is depicted in Fig. 3.

The recordings made on the hippodrome of the tones file projected from each hill were then compared to each other using the Relative Approach analysis with identical settings, as depicted in Fig. 4.

Comparing the two recordings, the tones under 1000 Hz can be distinguished from background noise by observing how clearly their duration stands out against background noise (straight blue and pink bars against a dark background). The analysis shows that the perception of sound from each hill seems to be very similar (repeated recordings will be needed to confirm the observation). Noting this, a new query was introduced that compared the inverse: what does the tones file played at point 1 sound like from position A and B? Fig. 5 depicts the corresponding spectrograms.

What is immediately apparent from Fig. 5 is how much stronger and clearer the tones file is perceived on the hills when played on the hippodrome surface (note that the color range for cp/cPa is identical between Figs. 4 and 5). Seven of the eight tones are clearly distinguishable against all background sound. Spot measurements taken at the points indicated in Figs. 4 and 5 give a more specific indication of the perceptual difference: the beginning of the 5^{th} tone is heard at 40 cPa on the hippodrome but is heard at 95 cPa at point B.

In this example, field observations highlighted two different hills that were known as good places to speak from; archaeologists have used them to help communicate across the site when their walkie-talkie batteries have run low. Before employing psychoacoustic analyses, there was no way to compare how well one could be heard from each hill compared to the other; furthermore, it was not possible to conclude that sound could be better heard on the hills than on the hippodrome because too much time would elapse between listening in one position and moving to the other to repeat the experiment. Average human hearing is comparative but only within a short timeframe; we do not possess an absolute scale against which we calibrate our impressions (Genuit 1996), and the specific impression from one hill would be lost while walking to the other. The Relative Approach analysis factors these inherent functional dynamics into its calculations to depict an aurally-accurate representation of perceived acoustic quality.

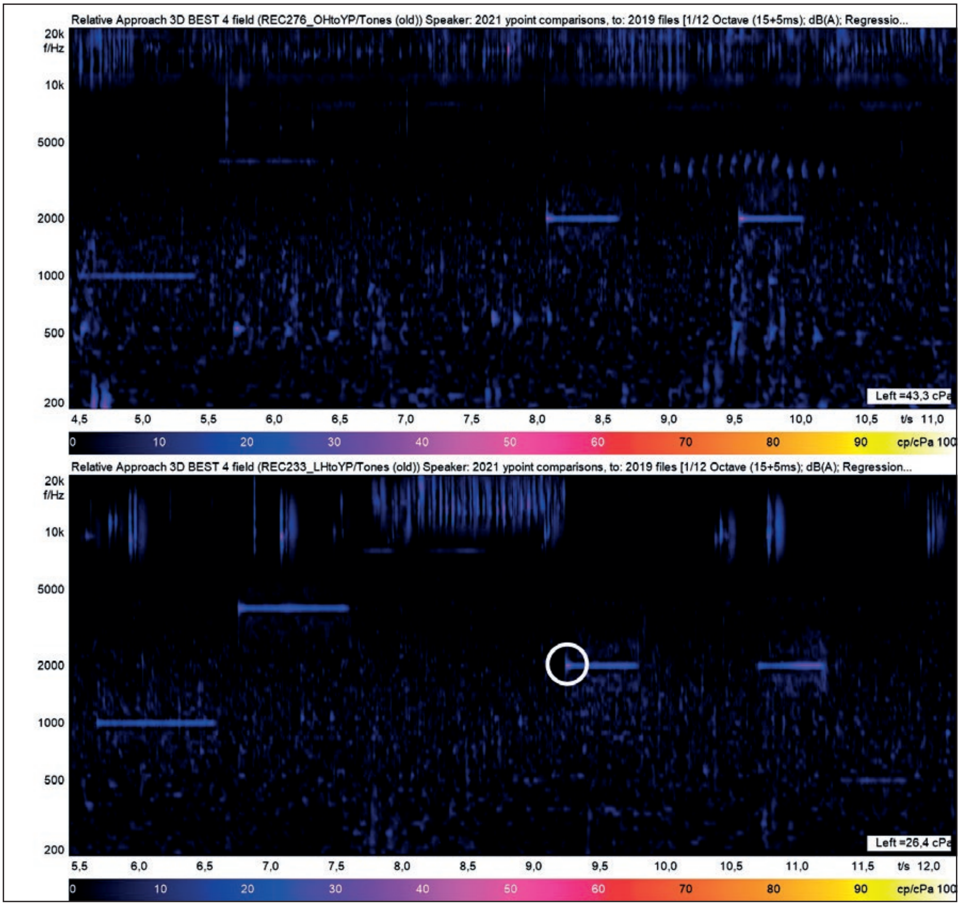

Fig. 4 – Relative Approach analyses of 1A (above) and 1B (below) recordings of the tones file projected from A and B respectively. The white circle indicates where a spot measurement was taken.

As a result, the data collected so far indicate that both hills (in the areas studied) would have made good positions from which to hear *and* see activities on the hippodrome, while those on the hippodrome might only perceive the louder activities taking place on the hillsides. This observation begins to give form to possible ancient site organization according to sound by demonstrating where the 'best' positions for spectating could have been and offering that sounds within lower frequency ranges could be better heard on the hippodrome. Does this offer insight into what sounds a crowd might have directed towards athletes or each other? Further study could identify where the relationship of hippodrome to surrounding hillsides are more evenly

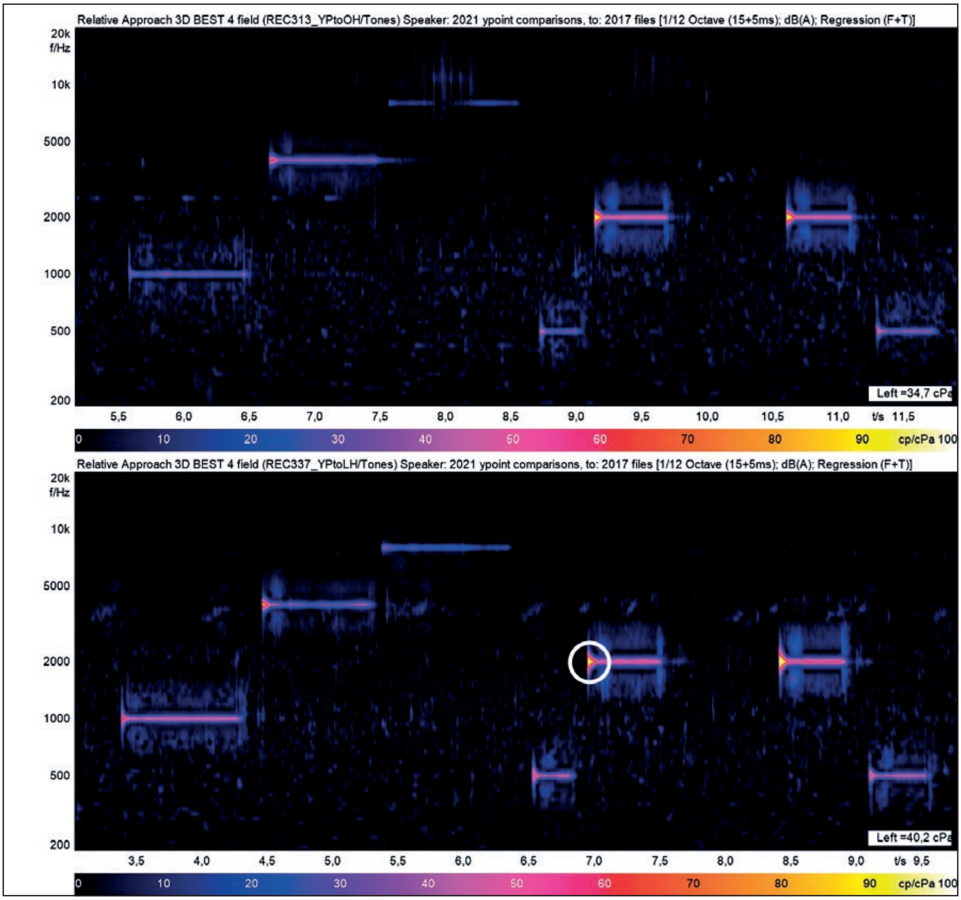

Fig. 5 – Relative Approach analyses of 1A (above) and 1B (below) recordings of the tones file projected from point 1. The white circle indicates where a spot measurement was taken.

mirrored acoustically, allowing for a dynamic exchange and participation in ritual activity between athletes and spectators.

4.3 *Sample analysis. Connectivity between a central point and two site features*

Another example can demonstrate the power of comparing specific measurements from analyses that might be more familiar. In this example, a central position within the lower sanctuary had been previously identified as a possible area for wrestling competitions, given its adjacency to the only structure thought to be for seating (see point 2 in Fig. 6 near the "Seats").

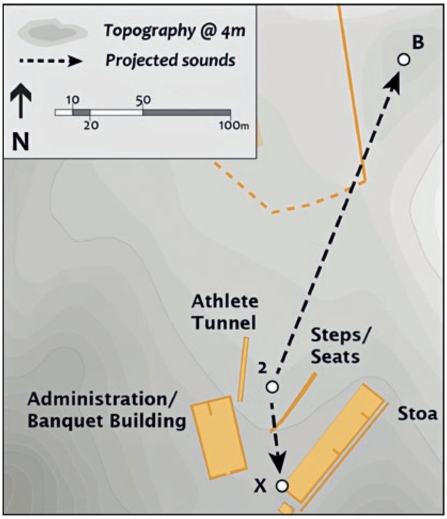

Fig. 6 – Partial site plan showing the central study position (2) and the recording positions on a hill (B) and the front of the stoa (X) used to determine inter-feature sonic connectivity. Point B is the same hill position depicted in Fig. 2.

A larger recording campaign was carried out to understand where sound projected from point 2 could be discerned throughout the lower sanctuary. Vast sonic connectivity would have rendered point 2 a potentially important component to overall sensory experience; limited connectivity would indicate that its role might have been more localized to immediate structures such as the Seats. Analyses examined the A-weighted dB SPL readings, perceived loudness (sone), and Relative Approach measurements (cp/cPa). The tones file from the previous example was examined; spot measurements were taken at the same instant across recordings for precise comparisons at the maximum reading of the individual tone and the mid-point of the tone (to account for variability and, in the case of the Relative Approach analysis, to account for adaptation over time). From the results, two positions stood out against what would be expected in an open field condition. For ease of discussion, results from the 996 Hz tone only are depicted in Tab. 1.

Noting the difference in distance between B and X to point 2, it is first surprising to note that the maximum and middle values of A-weighted dB SPL are relatively similar. On its own, this would suggest the unusual situation that sound is heard on the small hill almost as intensively as on the much closer western edge of the stoa. The perceived loudness calculation, which accounts much more specifically for human perception of loudness, shows

Projected from/to	Distance	Analysis	Tones Frequency Measurements (996 Hz)	
2 to B	160 m	FFT v Time (A-weighted dB SPL)	Max	8.98
			Mid	7.22
		Specific Loudness (soneGF/Bark)	Max	0.2651
			Mid	.2491
		Relative Approach (cp/cPa)	Max	42.18
			Mid	32.7
2 to X	56 m	FFT v Time (A-weighted dB SPL)	Max	12.76
			Mid	11.29
		Specific Loudness (soneGF/Bark)	Max	0.2124
			Mid	0.1931
		Relative Approach (cp/cPa)	Max	20.72
			Mid	19.98

Tab. 1 – Measurements and analysis of 996 Hz tones from field recordings, with dB and Relative Approach results highlighted at the small hill and western edge of the stoa.

that the sound reaching the small hill is actually louder than that reaching the western stoa, raising the possibility of an aspect of sonic accentuation at work on the way to the small hill. The Relative Approach analysis makes the difference even more apparent and depicts an entirely different experiential reality: the 996 Hz tones are heard with far more intensity on the small hill than the western stoa. The hill is three times farther away than the stoa and is hidden from view by a mature grove of walnut trees, while the western edge of the stoa is easily visible from point 2.

This example demonstrates that sightlines do not necessarily coincide with soundlines. There could be many contributing factors for why physical and acoustical proximity do not coincide in this case, but such a decisive divergence calls for repeated measurements. So far, it suggests that portions of the landscape may be more sonically present within the lower sanctuary core than between adjacent buildings. The zones of sonic participation, which could have enabled certain activities, provided privileged access, or demarcated private versus public activity, may not have been determined by the built structures or visual pathways alone. In fact, psychoacoustic study may be the best way to identify such zones.

This type of discovery underscores just how valuable psychoacoustic investigations can be in a complex outdoor environment. The measured dB level alone, even though A-weighted for human sensitivities, cannot describe emplaced human experience. Adding psychoacoustic investigation to studies of Mount Lykaion provides comparative evidence to substantiate the perceptive similarities and relationship potentials between landscape and architectural feature. These spaces are remarkably experientially connected and could have been in antiquity as well; activities at these locations could have been coordinated, directed, presided over and otherwise bound by sound, even without corresponding visual links or large architectural constructions providing hard surfaces for sound reflection. The findings can serve as the starting point for more detailed sound explorations and archaeological fieldwork in and between these areas.

5. Discussion

A number of challenges are encountered by the study of an ancient soundscape via a present one. Perhaps the biggest challenge on Mount Lykaion is that the landscape is the only artifact left to study directly – the architecture is mostly gone, plant growth patterns have changed, and the typical ancient practices and sonic participants are unknown. Yet enough of the landscape and historical references remain to act as entry-points into the experience of the ancient past. Together they provide a unique opportunity both to investigate what the site could have sounded like before the stone buildings were built and to determine if the buildings were purposefully placed to take advantage of latent acoustics in the landscape. The acoustic sophistication of contemporaneous theaters (designed for 20,000 spectators in the case of the Megalopolis theater in the adjacent valley) suggests that local builders knew how to harness acoustic properties towards public gathering. And without any evident construction for the approximately 200 years of games practices before monumental architecture was introduced, sonic study on Mount Lykaion may be the most direct way to research the early phase of the lower sanctuary and its use (Jordan 2020). Ongoing psychoacoustic analysis akin to the examples presented above are currently underway to examine connections between site and architecture in this manner.

Site-based research is an important first step to uncover what dynamics are present and what sound-facilitated relationships are possible. It does not factor in the influence of crowds, specific sound-based activities, or the influence of cultural or personal expectations; these are interpretive layers that must be added later to understand the full human experience. For this reason, effort has been made to make recordings that are robust in the information they gather and the research uses they can be put towards in the future. Yet despite the sophistication of the recording equipment and analysis software at this moment, the technologies are still under development. Debate between psychoacoustians continues as to how to apply them and what their results signify, and the field of psychoacoustics has a history derived from military development that should not be forgotten (Yost 2015; Ouzounian 2020). Psychoacoustic data can only offer conclusions based on the present moment in time in terms of understanding, especially in an outdoor context that attempts to transcend such a distant past. This is particularly true for newer metrics such as the Relative Approach analysis, but also for applications such as impulse response tests and speech clarity analyses that were developed and standardized for indoor applications.

6. Conclusion

Mount Lykaion presents a unique set of circumstances: few details about the ritual or daily practices that developed over many hundreds of years of use; evidence of a unified site plan implemented in antiquity; deteriorated architectural remains with still identifiable footprints; landforms that are greatly intact since before monumental architecture was introduced; sonic isolation from modern sound sources; and noticeably unusual acoustic properties. The application of psychoacoustics enables a comparative study of the current acoustic environment according to how people perceive it.

Psychoacoustics comes to archaeological investigation via more contemporary soundscape studies. Its introduction to historic investigations helps to bridge observations of sound behavior in a space with the way humans have found these behaviors to be meaningful through time. Between these two realms of understanding lies the consistent way humans receive and process sound, and tracing the dynamics of human sound experience can help to investigate what conditions in the past could facilitate sound-dependent activities – as they do today. Sonically meaningful spaces were not limited to theaters or public squares – Mount Lykaion was a place of such ritual interactions and meanings. It is emblematic of the need to find new ways of approaching archaeological sites as forms made to facilitate dynamic, sounded, meaningful activities.

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ABSTRACT

Research on ancient sensory experience has questioned ocular-centric research as the primary form of knowledge production in archaeological investigations. With enough information about the material composition of an ancient building, the acoustic properties of the interior spaces can be modeled for greater understanding of the daily experience of past users. Acoustics can reveal what people heard in the past, an experiential starting point to begin asking how someone heard in the past. Thus, acoustic study of place offers the potential to deepen understanding of the emplaced past experience as well as limitations to what conclusions can be drawn directly from gathered data. One area that remains underdeveloped is the research of sounded experience in ancient outdoor settings. This paper presents ongoing acoustic research at the ancient Greek sanctuary to Zeus on Mount Lykaion, applying psychoacoustic analysis to comprehensive recording efforts. Moments of sonic connectivity and isolation in this mountainous site align with past building outlines and prominent landscape features, suggesting that the sanctuary landscape likely played a key role in ritual experiences. The sonic dynamics of the landscape can still be experienced – and measured – today. The paper details the current approach to data collection and analysis on the mountain and includes some of the challenges afforded by applying acoustic study in the ancient built landscape.