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ARCHAEOACOUSTICS FOR ROCK ART STUDIES

Steven J. WALLER, *Rock art Acoustics, Lemon Grove, CA, USA*
Igor REZNIKOFF, *Département de Philosophie Université Paris-Nanterre X, France*

Contact email: wallersj@yahoo.com; dominiqueleconte@yahoo.fr

This “Archaeoacoustics for rock art studies” session will focus on multidisciplinary approaches to the study of sound relative to rock art. Topics will cover a wide range, including:

- theoretical frameworks of acoustical archaeology;
- the physics of various sound phenomena;
- quantitative methodologies for accurately documenting and presenting acoustical characteristics of rock art site soundscapes vs. surrounding non-decorated locations;
- psychoacoustics of sound perceptions and neurological processing;
- use of ethnography and mythology for comparing and contrasting cultural influences in ancient vs. modern scientific cultures;
- analysis of rock art iconography for evidence of response to sound, such as representations of musical instruments, dancing, mythical noise-making beings, thunder, and potential abstract symbols of sounds;
- Valcamonica rock art sites, as well as global archaeological sites.

Key questions and considerations to be addressed include:

- best practices for studying the interactions of the dimensions of sound and sight;
- how to address changes over time in the sonic qualities of archaeological sites, as well as changes in the culturally influenced cognitive perceptions of those sounds;
- the future role of rock art studies in archaeoacoustics, and how archaeoacoustics can inform rock art studies.

Rock Art Portraying the Sounds of the Site: iconography as an expression of auditory perceptions (and session introduction)

Steven J. WALLER, *Rock Art Acoustics*

Contact email:
wallersj@yahoo.com

Keywords: archaeoacoustics, sound, mythology, anthropophonic, zoophonic, geophonic

Since no instrument can definitively prove the artists' intended identity of rock art images, researchers relying on visual recognition use the convention of describing motifs as "Anthropomorphic" if they appear human-shaped, "Zoomorphic" if animal-shaped, and "Geomorphic" if inanimate or unrecognizably abstract. In a similar fashion, the author has noted that echoes are typical at rock art sites, and these auditory characteristics can be described as "Anthropophonic" for sounds duplicating human voices, "Zoophonic" for sounds mimicking animal noises such as hoofbeats, and "Geophonic" for sounds of inanimate objects or for unrecognizable sound effects. Superior pattern processing is considered a hallmark of the evolved human brain. However, visual and auditory recognition in humans is not a perfect process. Because we rarely experience the exact same sensory input twice, some degree of perceptual plasticity is evolutionarily advantageous to allow for this variability during cognitive interpretation of the environment. This involves relating new sensory input to prior experience. The recognition process comprises template, prototype, and feature matching. Case studies will be presented in which the sounds that can be heard at specific rock art sites correspond to the images the artists depicted. Ancient mythology of echo spirits and hoofed thunder gods support this connection.



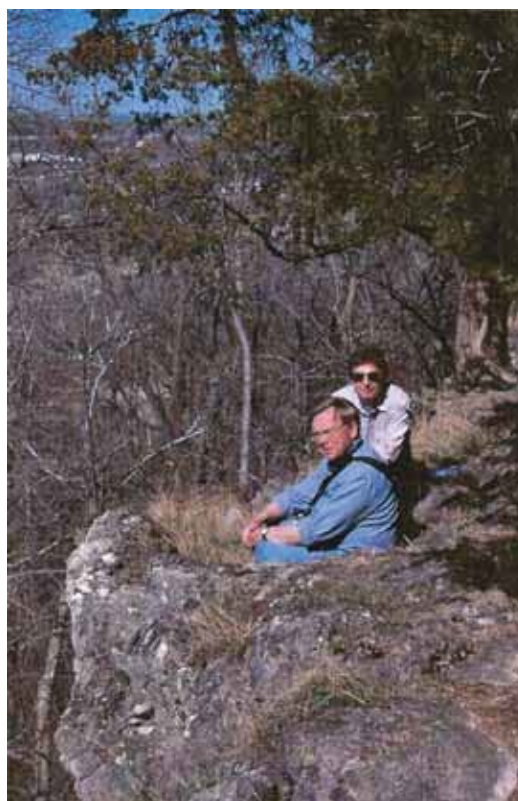
Sound as a Phenomenal Attribute at the Eagle's Nest Vision Quest and Rock Art Site

Herman E. BENDER, *Hanwakan Center for Prehistoric Astronomy, Cosmology and Cultural Landscape Studies, Inc.*

Contact email:
ashco@charter.net

Keywords: Eagle's nest, escarpment, sound amplification, whistling

The Eagle's nest is a vision quest and rock art site located on the extreme top edge of the Niagara escarpment in southern Fond du Lac, Wisconsin (USA). The vertical cliff face of the escarpment is approximately 35m (120 feet) in height. Sound at the base of the escarpment traveling up the rock face is amplified and can be heard coming from a distance, often times kilometers away. Other acoustic properties at the Eagle's nest site vary from the subtle sound of the wind whispering in the cedar trees that surround the pit/nest to whistling sounds heard as the wind blows through holes and a V-shaped notch in the rocks, the whistling perceived to be the sound of spirits as they enter and exit this reality and the next. In addition, the loud cries of birds such as hawks, turkey vultures and other birds riding the thermals produced by the up-sloping wind add to the phenomenal attribute that sound provides in this unique setting.



“Sound visions”: musical inferences in Serra da Capivara, Piauí, Brazil

Cristiane BUCO, *IPHAN -
Instituto do Patrimônio
Histórico e Artístico Nacional,
Brasil*

Contact email:
archeocris@icloud.com

Keywords: sound visions, rock
art, Serra da Capivara National
Park, musical archaeology,
interdisciplinary research

This paper will present the results of an interdisciplinary research in the archaeological context of 140 rock art sites located in Serra da Capivara National Park, Piauí, Brazil. The chosen theme was the pre-colonial musical practice in this region. The analysis of rock figures allowed us to infer the direct presence of music through objects coupled to human figures and, indirectly, by the assumption of the existence of music in scenes in which the gesturality of human figures represent dance movements. Also found was a wooden flute, with the air circulation tube filled with sediments. Effectively, there is no original sound; for this reason, we use the term “sound visions”. To accomplish this work, bibliographical research on the subject in related areas was undertaken as well as field research, including the photographic survey of the pictorial corpus of the archaeological sites and laboratory analysis of the associated archaeological material. Interdisciplinary research allowed us to infer the presence of pre-colonial music in this region, as well as to create a “sound vision” focused on the contemporary artistic-musical re-reading of rock art through the analogy of languages and the use of information technology, resulting in Musical Archeology.



Fig.1 - Toca da Entrada do Baixão
da Vaca archeological site - Serra da
Capivara National Park, Piauí, Brazil.
(photo Cristiane Buco)

Echoes and their rock-art context in the pitoti, the later prehistoric rock-engravings of Valcamonica (BS), Italy: a breakthrough discovery?

Christopher CHIPPINDALE,
*McDonald Institute for
Archaeology, University of
Cambridge, UK*

Frederick Baker, Christoph
Well, Astrid Drechsler, Hannes
Raffaseder

Contact email: cc43@cam.ac.uk

Keywords: archaeoacoustics,
Valcamonica, rock-art

A decade ago, during the prize-winning PITOTI project, we searched for acoustic effects at Valcamonica rock-art sites. Led by Well, a professional musician playing a vast wooden Alphorn – what else in the Alps!? – and high trumpet, we started at the most famous site, the Massi di Cemmo. Results were immediate, unambiguous, astounding: a strong echo rebounding from the high curving cliff behind the small boulders which carry the art. We found the same effect at the Massi's famous sister sites: the Capitello dei Dui Pini, near Paspardo; and the Cornii Freschii, near Boario Terme. Although they are at middle, high and low positions within the valley, respectively, all three are in similar acoustic positions. The art at each is similar, and of the Chalcolithic (Copper Age) period, around 3000 BC. So an archaeoacoustic aspect is evident at three sites. We have found none at any other of the hundreds of Valcamonica art sites. Is this a chance effect meaning nothing? Or a breakthrough discovery? Analysing the three locations topographically, and studying the statue-stele, portable boulders of the same period and carrying similar art, we show decisively that the discovery was and is real, significant and a breakthrough.



The SONART project (2014-2016): an overview of archaeoacoustic investigations on a sample of Schematic rock art sites in Spain, France and Italy

Margarita DÍAZ-ANDREU,
University of Barcelona, Spain
Tommaso MATTIOLI, *University
of Barcelona*

Contact email:
mattiolitomm@gmail.com

Keywords: acoustics,
schematic rock art,
soundscapes, Mediterranean,
auditory perception

In the last few years the authors of this paper have worked on the project “SONART – The Sound of rock art: Archaeoacoustics and post-Palaeolithic Schematic rock art in the Western Mediterranean”. The aim of this project is to analyse the relevance of acoustics as a factor for the production, location and active use of post-Palaeolithic rock art sites and landscapes. A comparative study of acoustics and the location of rock art in different regions of the Western Mediterranean is being undertaken in order to explore the auditory perception and sensorial experiences sought by prehistoric communities. The potential use of landscape acoustics to produce music in the past is one of the other aspects covered in this project. In this paper we will present an overview of the results obtained so far in a sample of rock art areas in Spain, France, and Italy. We will also discussed on the new and portable equipment for performing acoustic measurements in rock art landscapes



Music and musical instruments in the rock art of Valcamonica

Within the rock art of Valcamonica, among other themes, several representations of musical instruments are evident that only occur from the Middle Bronze Age (16th cent. BC) and throughout the Iron Age (1st millennium BC). In previous periods only figures that can be interpreted as dance scenes have been located, these are dated to the end of the 3rd A style period (2500-2000 BC). These consist of depictions of parallel rows of anthropomorphs that seem to dance in a circle with open arms, juxtaposed or connected together. Dance scenes also appear late in the 2nd and in the 1st millennium B.C., occasionally accompanied by human figures playing rhythmic or melodic musical instruments. In fact, several female figures play wooden sticks, but also horns, and aulos. During the art of warriors, the so-called 4th style of Valcamonica rock art (1st millennium BC), there are numerous images of musical instruments, including carynxes, cornua and harps depicted isolated or associated with warrior figures. The possible chronology and interpretation of these instruments and themes are discussed here.

Angelo E. FOSSATI, *Università Cattolica del Sacro Cuore di Milano, Italy*

Contact email:
angelo.fossati@unicatt.it

Keywords: musical instruments, Valcamonica, Bronze Age, Iron Age, dance



Fig. 1 - Paspardo, In Valle, Rock 4. Figure of warrior playing a buccina. (photo by A.E. Fossati - Le Orme dell'Uomo)



Fig. 2 - Paspardo, In Valle, Rock 4. Figure of woman playing wooden sticks. (photo by A.E. Fossati - Le Orme dell'Uomo)

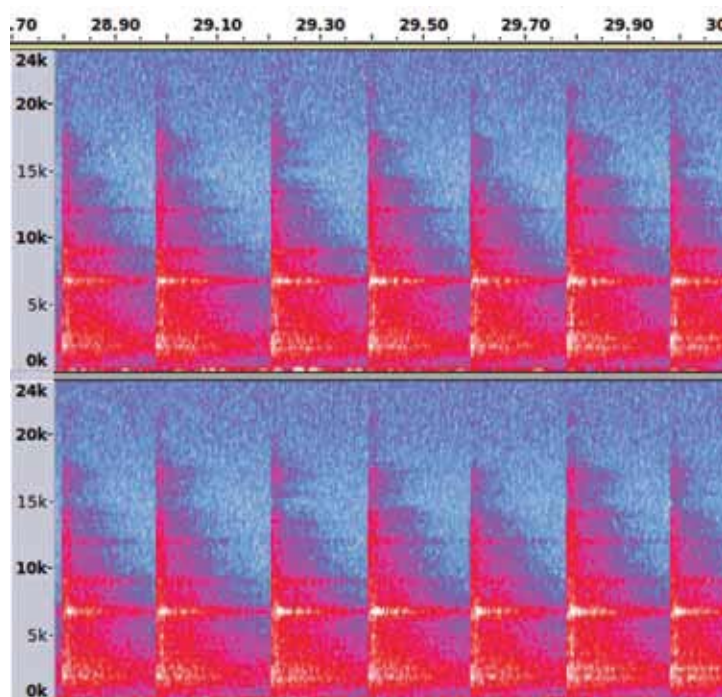
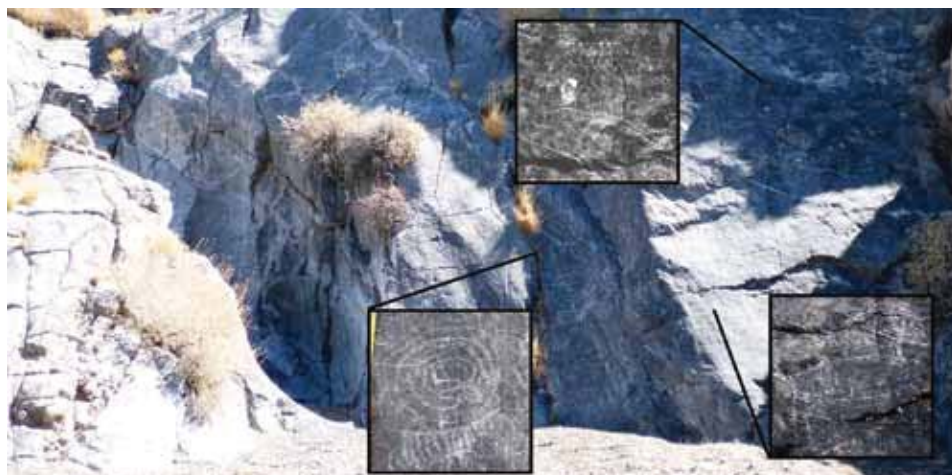
The Rock Opera Experience: a multisensory phenomenology of petroglyph engagements in the Mojave Desert, California, United States

Chester R. LIWOSZ, *University of California, Santa Cruz*

Contact email:
cliwosz@ucsc.edu

Keywords: archaeoacoustics, ethnoarchaeology, experimental archaeology, cognitive archaeology, interdisciplinarity, phenomenology

Many competing models for explaining the placement and symbolism of Western North American petroglyphs have been proposed, but these have often been difficult to unequivocally substantiate. One of the more promising models melds emic and etic perspectives, examining related oral traditions (song and narrative) through neuropsychology theory. The resultant cognitive approach considers a phenomenology of petroglyph production and interaction as an inherently multi-sensory embodied experience. This study employs the aforementioned cognitive approach to two slot canyon petroglyph sites at the convergence of the Mojave Desert and Great Basin. Employing emergent zero-impact experimental methods, this project explores socially weighted psychological implications of spatially-contextualized petroglyph production methods. This paper argues that far from accidental choices, production methods at the study locations enhanced sensory manifestation of culturally significant components of connected oral tradition. Specifically, the percussive marking technique is intrinsically an audible experience enacted judiciously at choice soundscapes. Quantitative datasets characterizing novel acoustical attributes belonging to key loci within each site are curated and contextualized in a 3D digital environment. These data are reported alongside relevant oral traditions, and connections are reinforced through iconography. While not exhaustive, this study demonstrates means of producing socially significant interpretations through systematic practices of non-destructive data collection.



Questions of Methodology in the Archaeoacoustics of Resonant Spaces

Igor REZNIKOFF, *Université de
Paris Ouest, France*

Contact email:
dominiqueteconte@yahoo.fr

Keywords: archaeoacoustics,
painted caves, rock art,
resonance, echoes, human
voice

It has been a few years since Archaeoacoustics has emerged as a field of research, although the subject existed long ago, e.g. since Vitruvius (see The evidence of the use of sound resonance from Palaeolithic to Medieval times, Acoustics, Space and Intentionality, Lawson, G. and Scarre, C. eds., Cambridge (McDonald Institute for Archaeological Research, Monographs), 2006, p.77-84). Archaeoacoustic research is now very prolific, and it is time to make an appraisal in order to improve studies in this field. There are many different facets to this research including the study of: ancient instruments (flutes, lithophones, etc.), closed spaces (caves, temples), and open spaces and sites. We will limit the discussion to the methodology needed to study resonant spaces, such as painted caves, temples or open echoing spaces.



Fig.1 - Solsemhula cave, West coast of
Norway. (photo Adjun Selfjord 2011)