

WORSHIP SOUND SPACES

Sound perception of places of worship (of different religions) via a multidisciplinary anthropological and acoustic approach

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Co-organized by the Research Center for Ethnomusicology (CREM-LESC) of the CNRS/University of Paris Ouest Nanterre, the Laboratory MRTE of the University of Cergy Pontoise and the Department of Research and Teaching of the Musée du quai Branly.

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ABSTRACTS

Marc ASSELINEAU (Peutz & Associés, Paris)

Characterization of worship spaces acoustics: to believe or not in acoustic indicators

Worship spaces are usually meant to impress, which often is achieved through large – if not monumental – proportions. But they are also meant to prompt cohesion between members of the community by, e.g., amplifying the music and songs as well as the voice of the officiant. Acoustics can serve both purposes.

The larger the volume or the less dense the fittings, the longer the reverberation time is. While this is nice for music and singing purposes, the intelligibility will suffer. According to the period and the cult, and even to the geographic location, the intelligibility requirements may vary, with direct consequences on the preferred RT value and on the volume, fittings and finishes. Such options are also reflected in the sacred music to be played in those worship spaces or in the specialization to speech.

But is a mere RT sufficient to describe the acoustics of a worship space? As such physical parameters as the reverberation time and background noise level do not account for everything, some psycho-acoustic attributes and some historical culture may be needed too.

This paper aims at outlying to the public, especially non acousticians, the acoustic challenges faced by the acoustical consultant. In order to understand them a brief reminder of a few physical acoustics parameters will be submitted. It will be followed by an equally brief reminder of some psycho-acoustical attributes of interest. Next, a few points of interest will be examined (e.g. a few typical standards and requirements applicable to worship spaces), and those will be illustrated by examples. One will then examine a few trends of worship spaces construction or rehabilitation with regards to their acoustics, and conclude about their impact on acoustic engineering.

Gérard COLAS (CNRS, Centre d'Études de l'Inde et de l'Asie du Sud, CEIAS UMR 8564, EHESS, Paris)

Temple soundscape as recorded in ancient Sanskrit treatises

This paper will first outline the process of emission and perception of sound as explained by ancient Indian physics. It will then examine the interpretation by 10th c. ritual and architectural treatises, of ominous noises heard within the temple precincts and the purpose of producing exclamations, vocal and musical sounds in ritual space. It will also study how the temple soundscape reproduces the social, spatial and ritual hierarchy.

Alpana R. DONGRE and Amit J. WAHURWAGH (Visvesvaraya National Institute of Technology, Department of Architecture and Planning Nagpur, India)

The Original Acoustics of Sixteenth-Century Mughal Heritage of Burhanpur, India

The acoustics of Asian cultural heritage and worship spaces in particular, have emerged on the basis of rites and rituals adopted in various cultures. The cultures have evolved owing to the dynamism of philosophies, traditional knowledge systems, beliefs and religious concepts. Unlike their Western counterparts, acoustics of these worship spaces are not extensively

researched upon and need multidisciplinary approach for comprehensive understanding. The enduring worship spaces of Asian cultural heritage are nourished by changes in context and tradition. The architectural elements of the worship spaces also have a significant role in the acoustics apart from symbolism perceived and decoded by community. This research, with Burhanpur; India as a case, explores the potential of acoustics of these worship spaces.

The Tomb of Shah Nawaz Khan of historic Burhanpur; amongst various sixteenth-century Mughal architectural heritage that served acoustical purposes; is unique, since it was used in the verse recitations from the Holy Quran and Qawwalies (Sufi song) during the holy. Its spatial configuration and sonic dimension associates the community emotionally, intellectually and spiritually. Due to neglect, inappropriate interventions and vandalism its acoustical features are defaced, weakening communities' association with the Tomb.

In this research, the digital simulation model of the Tomb of Shah Nawaz Khan was developed in EASE 4.3, calibrated, and validated on the basis of in-situ acoustical measurements. The model was used to predict the acoustical characteristics for the 'compatible repair condition' and the 'revival of original condition'. The experiments along with complementary studies facilitated identification of acoustical characteristics; unique to the Tomb. It was observed that the well-designed original acoustical features have not been considered during its conservation and interventions.

This research provides insight into the acoustics of worship spaces with references to decision making in architectural conservation concerning specific aspects like its use, materials of restoration and the revival of original conditions. It potentially contributes to theory building related to acoustics of the worship spaces and their conservation.

Andrew J. EISENBERG (Visiting Assistant Professor of Music and Anthropology, NYU Abu Dhabi, UAE)

Soundly Placed Subjects: Resonant Voices and Spatial Politics in Mombasa, Kenya

Unlike the other famous "Swahili towns" of the East African coast, the Old Town section of Mombasa, Kenya sits like a small Muslim casbah within a sprawling, heterogeneous port city. Here spatial boundaries outlined by aging edifices and traditional residential patterns appear to define a space of relative privacy vis-à-vis the rest of the city (and by extension the nation-state). But such boundaries are physically porous. The discreteness of Old Town is only made real in social practice, that is, in the course of structured (and structuring) activities that continually reproduce and reinforce the local meanings of public spaces. As I demonstrate in this paper, there is perhaps no better entry into this ongoing process of spatial definition than through audible practices, because the sonic environment of a place is by definition made up of quotidian soundings. Beginning with the Islamic soundscape, especially the Muslim calls to prayer that literally interpellate Old Town residents as Muslim subjects, I describe a field of sonic practices - or, following Steven Feld, an "acousteme" - within which vocalizations serve to gender, sacralize, and ultimately demarcate public spaces. I describe how the architectonics of Old Town's Islamic soundscape invests each vocalization - from the most sacred act of recitation to the most mundane speech act - with certain kinds of (acoustemic) authority within the space of its reverberation, putting listening subjects in their places and framing illocutionary acts as inherently political and productive of social space.

Nina ERGIN (Koç University, Archaeology and History of Art, Istanbul)

Linking the Universal Community of Muslims (umma) Across Time and Space: The Sound- and Smellscapes of Ottoman Mosques and Tombs

This paper challenges traditional approaches to the history of Ottoman architecture of the sixteenth century in that it considers the theatrical and non-visual sensory aspects of the spaces encapsulated in mosques and tombs. While their soundscapes included preaching, the recitation of Qur'anic text, and the clicking of prayer beads, their smellscapes were purposefully manipulated through substances such as rose water and incense (*buhur*). For instance, many of the endowments supporting and maintaining these monuments provided not only for a large number of reciters and eulogists, but also for a perfumer (*buhurcu*) to create a pleasant olfactory experience especially on Fridays and other holy days, as we can understand from the extant archival record. Drawing on the field of Sensory Anthropology, I will argue here that through these carefully staged sound- and smellscapes - which were circumscribed and regulated by traditions and customs going back to the times of the Prophet - the Ottoman elite created various links both diachronic and synchronic in nature. The diachronic link extends to the lifetime of the Prophet, when the first community of Muslims acquired preferences for specific fragrances and sonic practices which were then also deployed in sixteenth-century Ottoman mosques, while the synchronic link stretches across the Ottoman elite, as well as the empire's territory, wherever the Ottomans built mosques and tombs, and the universal community of Muslims who preferred the same fragrances based on the ahadith. Thus, the Ottomans created sensory experiences of worship that would be shared by millions of worshippers across space as well as time.

Christine GUILLEBAUD (CNRS, Laboratoire d'Ethnologie et de Sociologie Comparative, LESC-CREM UMR 7186, Université Paris Ouest Nanterre)

The Dēva/Asura sound categories and their spatial distribution in the Maṅṅarśāla Nāgas temple (Kerala, South India)

Studies of Hindu temple space have shown it to be arranged according to the principle of exteriorizing and distancing impurity. Based on fieldwork in Kerala, in southern India, I will demonstrate the range of observable relations between architectural and sound space by combining methods from ethnomusicology, the anthropology of sound, and urban ambiance studies.

The ethnomusicological approach reveals a categorization of musical instruments and their tones into the "divine" (*deva*) and the "asuric" (*asura*), which structures musical life differently in various spaces of the temple and according to the type of ritual actions performed. An approach focused on the other sound technologies available in the temple (bells, mechanical instruments, mantra box) reveals other concomitant logics such as attracting peoples' attention with sound or stimulating the divine presence. Lastly, accompanying the devout on commented soundwalks in these spaces provided illustrations of a more multi-sensorial perception of the space that is fundamentally connected to individual habits of movement in such sites.

The conclusion will identify some characteristic traits of these temple sound spaces and outline a comparison with other places of worship in the region.

Pascal JOANNE (UMR MCC/CNRS, Centre de recherche méthodologique d'architecture, Nantes)

Sound heterotopia in cistercian monastery

Place of living of monks communities, the Cistercian monastery resulting of the Benedictine monastic expansion in the twelfth century, is a space designed out of the world. Isolated, with a fence and operating according to a rule of life preaching work and prayer, austere and silent place, monastery is an emblematic figure of what Michel Foucault called Heterotopias – these utopias anchored in reality.

Place of silence, the monastery is still inhabited by multiple noises: noises of activities and movements, sounds of nature, equipment noises, liturgical ritual noise. Indeed, this one in particular is sequenced with various tones that enable to organize the time of prayer and offices in the daily life of the monks. More ever, the sound environment of an abbey and the multiple effects appear in close correspondence with, and even reveal, various temporal duration sensations: occurrence, rupture, stretching or acceleration... How then the sound or sounds perceived and lived, “build” the heterochrony of the monastery? Can we meet sound configurations, specific to the space of the monastery and sufficient to remove it from the secular time, and so to rise it to the rank of a sound heterotopia?

From sound simulation and reproduction work on three French Cistercian abbeys and by relying on criteriology of heterotopias, we will see at first how the monastery is a heterotopia, and the place that holds the sound dimension in this qualification. Then we will try to update the potential temporal modulation of detectable sound effects in the cloister and in the church of abbey.

Josée LAPLACE (Université du Québec à Montréal, Chaire de recherche du Canada en patrimoine urbain)

Experience(s) and functions of monumental soundscapes in Roman Catholic churches of Montréal

In the Montréal of the turn of the XXth Century, the fast growing landscape of the metropolis saw the emergence of many worship places, mainly Christian, among those a large number of Roman-Catholic churches and chapels inscribed in a dense and systematic grid of parishes. In each of these places, a highly codified ritual, and specific sonic devices and practices, were carefully put in place; each bell tower competed to be the most eloquent. The regular attendance to the rite has fostered accordingly a shared auditory memory among several generations of worshippers. Now that their decline as a place of worship threatens the maintenance of church buildings, new vocations given to those architectural works certainly take into account their acoustic qualities, a phenomenon exemplified by the many conversions into concert halls and places dedicated to music. Nevertheless, how could we take into account the whole spectrum of connotative functions held by ecclesiastic soundscapes?

Our empirical survey into «post-secular» Montréal, demonstrates the profound anchorage of the religious auditory culture, and also reveals the complex interactions between the symbolic and experiential aspects of churches' sonic realms. Aural environment is of course emblematic (and definitional) of these spaces and highly significant at different levels (cognitive, memorial, affective, spiritual, sacred, etc.). It also acts «corporeally» and on kinaesthetic functions of the body. The specific spatiotemporal setting it creates, could appeal, as such, to the «spiritual» (not exclusively and in a very broad sense), independently of the worship activity. Thereby, could these special features be taken into account in re-thinking the new

uses and material interventions on the buildings in the light of such secular (re) interpretations of these spaces? More specifically, how could we bridge the acoustical and anthropological dimensions of the church sonic environment?

Marehalli G. PRASAD (Stevens Institute of technology, Department of Mechanical Engineering, Hoboken New Jersey, USA)

The role of coupled spaces in propagation of Vedic chants, bells, conch-shells and gongs in Hindu temples

Sound plays a major role in Hindu worship practices. In a Hindu temple, Garbha-Griha is an important space where the deity is consecrated for worship. In front of the Garbha-Griha, there is a space called Ardha-Mantapa. In front of the Ardha-Mantapa, a large hall called Maha-Mantapa is located where large number of devotees assemble to offer worship through priests. The priests can only enter and conduct the worship in Garbha-Griha and Ardha-Mantapa. In a Hindu temple, priests through Vedic chants and instruments such as conch-shells, bells and gongs conduct worship on behalf of devotees. Throughout the worship rituals, the chief priest recites the Vedic chants in the Garbha-Griha and the assisting priests would be in Ardha-Mantapa joining in the chorus of Vedic chanting along with playing the instruments during certain stages of the rituals. Acoustically the coupled space of the Garbha-Griha and Ardha-Mantapa is highly reverberant. The reverberant sound of the Vedic chants and instruments emanating from the priests enhance the spiritual perception and experience of devotees who would be visually focusing on the deity. The intonations of the collective Vedic chants and the tonality of the instruments bring out the acoustical quality of the sacred space to the devotees. It is noted that the tonal sound from conch-shell and the ringing sound of bells resemble the sacred sound of OM. The gong is played as a percussion instrument with a nice rhythm in harmony with other instruments. The completion of the worship ritual is marked by offering a lamp along with Vedic chants and all instruments played simultaneously. It is interesting to note that the sound from the Vedic chants would get embedded into the sounds from the instruments. Thus worship in a Hindu temple is a celebration in which reverberant sound in coupled space plays an important role.

Paola RICCIARDI (University of Pavia, Department of Civil Engineering and Architecture, Italy)

Churches as auditoria: analysis of acoustical parameters for a better understanding of sound quality

In the present time, in ancient worship buildings often music performances take place. In this case they may present significant problems related to their acoustic quality. Acoustical parameters experimental results in several historically relevant churches, located in the city of Genova, are presented. 10 Churches were selected, all characterized by rectangular plans and two aisles with and without lateral chapels and/or cupolas, with volume variable from 2183 to 43540 m³. In addition 14 Genovese Churches with central plan, with volume variable from 1409 to 43756 m³, were analyzed. Measurement results were compared with acoustic data available in literature regarding theatres and auditoriums. The examined Churches are classified in agreement with the optimal values of the acoustical parameters for the listening of music. Moreover the spatial distribution of the acoustical parameters, as a function of the source – receiver distance, is evaluated. It is then correlated to the presence of architectural elements, such as lateral chapels, dome, vaults and columns. A case study on the evaluation of

the effects of non permanent and permanent acoustical restorations, without a significant variation in the architectural characteristics, has been considered in one of the measured churches. The results of the measurements in the various phases of the correction and of some software simulations are presented.

Gaspard SALATKO (Centre Norbert Elias, UMR 8562 CNRS/EHESS, Université d'Avignon)

Church bells and their ontological status in Christian rituals (France)

From an anthropological point of view, the church bells are ritually treated as people and inseparable from the practice of Christianity, which they ring the feasts punctuating the life of religious communities. The history of Catholicism showed the relation between the church, its steeple and village society. Nevertheless, the ritual grammars that constrain the use of these instruments are relatively poorly known. An ethnographic description of the contemporary uses of catholic bells reveals the ability of their sounds to support perceptions and emotions that are constitutive of christian worship and, from there, lead to consider these sounds as a part of the atmosphere where the religious experience takes form.

Menino Allan S.M. Peter TAVARES and Buland SHUKLA (Founder-Heritage Acoustics, Goa)

Rehabilitation of churches in goa: restoring an experience

A worship space aims to restore one from a facile din of compromise into an aura of awe, reverence, stillness, intimacy and wisdom. The Goan churches merge the best of the European and the Indian architectural and liturgical traditions. Acoustical characterization of worship ambience (*measuring ITDG, RASTI, RT, D50, C80, TS and L_{Aeq}*) (*calculating SaF, InF and SiF*) during rehabilitation indicates differences between the observed objective values and preferences of the congregation for sacred music rendered from different source locations and also for different genres of music. While the diminished sanctuary of the church becomes an apt instrument for a magnified delivery of speech and chanting, the strategic location of the pulpit makes it a preferable spot for easy communication with the congregation. The choir loft and the nave floor provide options for singing and the rendition of sacred music. In our research of ancient spaces with an acoustical function, we observed various structurally restorative interventions which were more often than not counterproductive and led to gradual loss of information. Its impact was particularly observed in the acoustical behaviour of the space. Thus the question arose. Considering interventions and restorations to be inevitable, can we restore a heritage structure so that it "sounds" the same as it did before? And thus by extension, can it "feel" the way it did before? Thus the focus went from being a merely aesthetic restoration to the restoration of an *experience*. Thus various systems, functions, subjective and objective parameters constituting an experience were first identified, and then worked upon during the course of the restoration.

Jean-Christophe VALIÈRE (Equipe Archéologie du son - Institut Polytechnique Poitevin de recherche en Ingénierie, Mécanique et Énergétique CNRS - UPR 3346)

Towards a history of architectural acoustics using archeological evidence: how recent works on acoustic pot implementations enlighten the quest of sound quality in churches from 11th to the 17th century

The history of acoustics has not yet been written, especially the history of acoustical techniques. Current knowledge is based upon the great philosophical texts of antiquity, their transmission to medieval (5th-15th) and modern times (16th-17th) and the works of the scientists from 18th and 19th centuries. However, few archeological objects can be considered as having a unique acoustic function at medieval times. The so-called "acoustic pots" are one of the few, probably the only example currently identified. For this reason, understanding the intentions that governed the selection of pots, their inclusion in the walls and in the vaults, would help us to build the foundation for acoustic practice in buildings, added to the study of scholars' texts.

For the middle Ages, the first archeological samples of acoustic pots are dated from the IXth century in Europe, followed during the XIVth and XVIth centuries by a great intensification of this technique. Thanks to the studies we have conducted for ten years now (400 buildings identified in Europe in 1000 pots measured in France), we manage to establish a "grammar" of technical knowledge which led formerly prime contractors, builders or architects to insert pots in buildings. However, like the methodologies applied in archeology, the understanding of the builder intentions may be found out thanks to hypotheses raised from various studies as the acoustics, archeology, philology, linguistics, liturgy, or musicology.

More recently, attention has been paid to some selected buildings. These monographic studies have mostly confirmed the first statistical studies (large scale) concerning the deliberate choice of the pots. In some cases, it clearly shows that builders attempted to improve the quality of the sound space.

Astrid ZOTTER (Cultural and Religious History of South Asia, Ruprecht-Karls Universität Heidelberg)

Reflections on Sound and Music in Nepalese Life-Cycle Rituals

In Nepal, as probably elsewhere in South Asia, many rituals performed in public or private space are marked by sound and music. The rich repertoire of musical traditions, which has attracted the attention of anthropologists and musicologists, provides rituals of different ethnic and social groups with distinguished sonic characters. Priestly recitations, ritual songs etc. further enrich and diversify the acoustic dimension.

This paper will deal with Hindu life-cycle rituals of Nepalese speaking high-caste families in urban Kathmandu. Based on fieldwork and textual studies, the diverse sounds occurring during marriages and initiations, will be looked at more closely. It will be argued that the different types of sound produced by different agents (priests, women, musicians), on the one hand, contribute to the creation and structuring of ritual time and space, while on the other, they transcend and radiate the same.